Chapter Seven

INTERSTATE VARIATION IN ECONOMIC GROWTH IN INDIA

I. Introduction :

We have seen in Chapter 3 above that State income inequalities are increasing in India during the decade 1960-61 to 1970-71. This phenomenon by itself gives rise to some other interesting questions which are important not only from the analytical viewpoint but also have some practical implications for policy-making. These questions are : (i) What is the pattern of economic growth in each State during the last decade? In other words, what is the growth experience of different States in India? Which of the factors have positively contributed towards growth and which of the factors have exercised a retarding influence on the growth of per capita income in each State? (ii) What factors are responsible in explaining the observed interstate variations in the growth of per capita income in India? (iii) What contribution has the growth of each factor to make to the observed increase in the State income inequalities between 1960-61 and 1970-71? In other words, whether the growth of

a particular factor has a favourable influence or an unfavourable influence on the State income inequalities? (iv) What is the effect of interstate variations in the growth of different factors on the changing income inequalities in India?

In the present Chapter, an attempt is made to examine these questions in detail. It should be pointed out at this stage that these questions are relatively new*1 and unfortunately few systematic efforts seem to have been made so far to probe into such questions especially in the case of a typically underdeveloped country like India.*2 It is but natural, therefore, that the treatment given to these questions in the following pages may be regarded as quite

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*1 It may be felt that Perloff et al are addressing themselves to almost similar set of questions. However, these questions are substantially different in details from the ones considered by Perloff et al. Cf. H.S. Perloff, E.S. Dunn Jr., E.E. Lampard and R.F. Muth: Regions, Resources and Economic Growth, (Baltimore: Resources for the Future, Inc., 1961).

*2 There are a couple of exceptions. See, K.R.G.Nair: "A Note on Interstate Income Differentials in India, 1950-51 to 1960-61", in The Journal of Development Studies, Vol.7, No.4, July 1971; Ravindra H. Dholakia: "Estimates of District Income and Changing Industrial Structure in Gujarat", in Journal of Gujarat Research Society, Vol.38, July 1976. However, these are not comprehensive efforts in the sense that they consider only one or two of the above-mentioned questions.

rudimentary and largely experimental in nature. Though the method followed in the following sections of the present Chapter lacks the theoretical elegance unlike the famous neo-classical growth model which was adopted by E.F. Denison in the case of the United States*3 and by B.H. Dholakia in the case of India*4 to enquire into the sources of economic growth of a nation, it certainly has the merit of recommending some meaningful policy measures to promote growth in a given State. Had India been an economically advanced country where the assumptions of constant returns to scale and perfect competition might command some plausibility for each State,*5 it would have been the most interesting exercise to estimate the neo-classical growth equation for each State separately and then examine the implications of interstate

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*3 Cf. E.F.Denison: Sources of Economic Growth in United States Alternatives Before Us, (New York: Committee for Economic Development, 1962).

*4 Cf. Bakul H. Dholakia: The Sources of Economic Growth in India, (Baroda: Good Companions, 1974).

*5 Some authors express grave doubts about the validity of these assumptions even in the case of a developed economy. See, for instance, H.W.Richardson: Regional Growth Theory (MacMillan: 1973). On the other hand, if we follow the aggregate production function approach, the impact of industrial structure is largely ignored because of the implicit assumption of the homogeneity of labour and other factors of production. For further discussion, see J. Berent: "Impact of Changes in the Employment Structure on the Rate of Economic Growth, Illustrated by the Post-War Trends in Europe", in World Population Conference, 1965 (New York: United Nations, Dept. of Economic and Social Affairs, 1967), pp.49-54.

variations in the growth of labour, capital and technology on the interstate variations in the economic growth and on the observed State income inequalities. But unfortunately, the basic assumptions of the constant returns to scale and perfect competition are far from reality in the case of a country like India in the first place and all the more so in different state economies in such a country. Once the basic assumptions of the constant returns to scale and perfect competition are dropped, the relative factor shares cannot be taken to reflect the elasticities of output with respect to corresponding factors of production. Thus, estimation of factor elasticities of output poses an insurmountable problem and any attempt to approximate the same by the relative factor shares would involve genuine errors in the estimates of the contributions of labour, capital and the 'residual'. Moreover, the non-availability of the required type of data*6 in the case of most of the States in India remains a problem to be tackled in practice. Thus, both, on theoretical and practical, grounds the neo-classical growth equation appears

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*6 The minimum data required for the purpose would include a fairly long time series of output, employment, capital, and share of labour or property. See R.M. Solow: "Technical Change and the Aggregate Production Function", in Review of Economics and Statistics, August, 1957.

to be rather too sophisticated tool of analysis to be applied to the problem at hand. We have, therefore, relied on the simple identity analysis for the purpose of investigating the above-mentioned questions. It should be admitted that the method followed in the present chapter is, in a sense, only an extention of the method used in the previous chapter, viz., the deviation approach.*7

It is obvious that the deviation approach is only a method of regional analysis and cannot be given the status of an independent theory of interregional growth differential. However, it has a potential to be converted into some kind of a theory of the interregional growth differentials, if we make some behavioural assumptions about each one of the variables involved, viz., worker rate, industrial structure, labour productivity, capital intensity and capital productivity. What is important to note is that in this kind of an approach, we are dealing directly with the relevant variables, while in the other approach we are dealing with the growth of the factors of production which amounts to rather an indirect approach and necessitates the assumption of an overall production function and so on. Since our basic

*7 As pointed out earlier, it is also known as Standardization methods or shift-share approach.

objective here is not to build a theory of interregional growth differential, but to examine the observed interstate growth differential in India, we can pass over to the next section where the contribution of different factors to the observed growth of per capita income in each state is derived on the basis of the deviation approach. Then, in the third section, an attempt is made to explain the interstate variations in the observed growth of per capita income with the help of the interstate variations in the growth of different factors. Interrelationships among the growth of different factors in India are also examined with the help of the correlation technique. In the fourth section of the present Chapter, contributions of various factors in the State growth inequalities in India are derived following the deviation approach. In the last two sections, implications of the growth of different factors and the interstate variations therein on the changing State income inequalities in India are examined.

II. Growth Experience of State Economies in India, 1960-61 to 1970-71 :

We have already seen in Chapter 3, Table 3.6 above that growth of real per capita income during 1960-61 to

1970-71 differed significantly among different states in India. Before we ask the question as to Why the growth rates differ from one State to another, we must first of all see what leads to the growth of per capita income in each State. As we have seen in the previous chapter, the per capita income of a given State can be expressed in terms of the overall worker rate, industrial structure, capital intensity and capital productivity in the given State.*8 It is possible to argue, therefore, that the per capita income can grow only when one or more of these factors undergo a change. It is important to note here that the changes in these variables need not always be favourable to the growth of per capita income. It is quite probable that some of the factors may change over a period of time in such a way that the per capita income may actually decline if precisely those factors turn out to be dominating in that particular State economy

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*8 It is interesting to note that H.S. Perloff et al : Regions, Resources, and Economic Growth, op.cit., consider the following factors in their analysis of personal income in States of U.S.A.: worker rate, average earning per person, industrial structure, capital-labour ratio, place of residence and marginal productivity of labour. Thus, except capital productivity, they consider almost all the factors that we consider.

over the given period of time. It is, therefore, an interesting exercise to find out which of the factors contribute positively and which of the factors contribute negatively to the growth of real per capita income in different State economies in India. In more precise terms, we should make an attempt to find out the exact contribution of each of these factors to the observed growth of the real per capita income of each State in India. For this purpose, we must take the help of the identity developed in the previous chapter.

If we denote the per capita income of the j^{th} State in the initial year 1960-61 and in the terminal year 1970-71 at 1960-61 prices by y_j^0 and y_j^1 respectively, then, we are interested in attributing the difference $(y_j^1 - y_j^0)$ to the above-mentioned factors. Now, if w_j represents overall worker rate, x_{ij} represents capital intensity in i^{th} sector of the j^{th} State, z_{ij} represents the capital productivity in the i^{th} sector of the j^{th} State and l_{ij} represents the proportion of working force engaged in the i^{th} sector of the j^{th} State, and if o and 1 at the R.H.S. top of the letters stand for the initial year and the terminal year respectively, then,

$$y_j^0 = w_i^0 \sum_{i=1}^{n} x_{ij}^0 \cdot z_{ij}^0 \cdot l_{ij}^0$$

and

$$y_j^1 = w_j^1 \sum_{i=1}^{n} x_{ij}^1 \cdot z_{ij}^1 \cdot l_{ij}^1$$

Now, we are in a position to obtain the expected income of the j^{th} State by following the partial approach for each factor where we assume that only that factor changes between 1960-61 and 1970-71, the other factors being held constant between 1960-61 and 1970-71. We shall get the following expected incomes for j^{th} State.

$$(1)\ A_w y_j = W_j^1 \sum x_{ij}^0 \cdot z_{ij}^0 \cdot l_{ij}^0$$

$$(2)\ A_l y_j = W_j^0 \sum x_{ij}^0 \cdot z_{ij}^0 \cdot l_{oj}^1$$

$$(3)\ A_x y_j = W_j^0 \sum x_{ij}^1 \cdot z_{ij}^0 \cdot l_{ij}^0$$

$$(4)\ A_z y_j = W_j^0 \sum x_{ij}^0 \cdot z_{ij}^1 \cdot l_{ij}^0$$

$$(5)\ A_p y_j = W_j^0 \sum p_{ij}^1 \cdot l_{ij}^0$$

where p_{ij} stands for labour productivity in i^{th} sector of j^{th} State. The expected incomes so calculated for each State are presented below in the Appendix Table 7A.1. From these expected incomes of the j^{th} State, when we subtract the per capita income in the initial year, i.e., y_j^0, we get the partial contribution of the respective factors. Since these are only partial contributions of different factors, they generally do not add up to the exact difference $(y_j^1 - y_j^0)$, hence there exists a residual standing for the interactions of

Table 7.1

Growth Experience of State Economies in India - 1960-61 to 1970-71

Partial Contribution of Factors (in Rs.)

States	Partial Contribution of Changes in					Residual	Observed change in PCI $(y_j^1 - y_j^0)$
	W	l	x	z	p		
1	2	3	4	5	6	7	8
1. Andhra	- 6	0	+33	+14	+37	-11	+30
2. Assam	-44	- 7	+143	+ 5	+115	-86	+ 9
3. Bihar	-25	-21	+134	-32	+63	-61	- 5
4. Gujarat	-19	+11	+87	- 5	+80	- 9	+65
5. Haryana	-22	+ 4	+109	+73	+163	-27	+137
6. Karnataka	- 5	+ 3	+101	+27	+140	+13	+139
7. Kerala	-20	+ 5	+114	-49	+58	-31	+19
8. M.P.	-21	- 5	+81	-34	+33	-20	+ 1
9. Maharashtra	-31	+11	+132	-85	+21	-23	+ 4
10. Orissa	-15	- 8	+95	+22	+86	-50	+44
11. Punjab	- 3	- 6	+157	+26	+145	-49	+125
12. Rajasthan	-36	+10	+32	+54	+92	- 7	+53
13. Tamil Nadu	-21	-10	+104	- 5	+79	-35	+33
14. U.P.	-10	- 3	+ 78	-27	+35	-18	+20
15. W.Bengal	-63	-17	+186	-46	+112	-49	+11
Total	-21	- 6	+100	-18	+68	-22	+33

Note: For symbols used, see the text.

Source: see the text.

these factors. The partial contribution of these factors along with the residual for each State in India are presented in Table 7.1. A worth-noting thing from the table is that only in the case of Karnataka, the residual turns out to be positive. This implies that the interaction of the four above-mentioned factors was favourable only in Karnataka. For other State economies in India, the interaction of changes in these factors turned out to be quite unfavourable from the viewpoint of the growth of per capita income. In fact, in Bihar, it was only because of this interaction of different factors that the overall growth of per capita real income turned out to be negative. It is, however, possible to get the exact contributions of different factors such that the residual does not exist. For this purpose, we need to derive the expected incomes of different factors by following the total contribution approach where we assume that all other factor except the one under consideration changes during 1960-61 and 1970-71 and the factor under the consideration remains at the level of the initial year. Thus, by total contribution approach we get the following expected incomes for j^{th} State :

Table 7.2

Growth Experience of State Economies in India - 1960-61 to 1970-71

Total Contribution of Factors

(in Rs.)

States	Total Contribution of Change in					Residual	Observed change in PCI $(y_j^1 - y_j^0)$
	W	l	x	z	p		
1	2	3	4	5	6	7	8
1. Andhra	- 6	- 1	+22	+ 6	+36	+ 9	+30
2. Assam	-52	-47	+51	-10	+60	+67	+ 9
3. Bihar	-27	-37	+60	-46	+38	+45	- 5
4. Gujarat	-24	+ 9	+82	-11	+74	+ 9	+65
5. Haryana	-32	+ 6	+92	+40	+155	+31	+137
6. Karnataka	- 7	+ 6	+114	+40	+141	-14	+139
7. Kerala	-23	-15	+85	-55	+34	+27	+19
8. M.P.	-23	- 8	+57	-42	+27	+17	+ 1
9. Maharashtra	-34	+15	+104	-104	+25	+23	+ 4
10. Orissa	-20	-21	+45	- 4	+67	+44	+44
11. Punjab	- 4	-16	+99	+ 9	+134	+37	+125
12. Rajasthan	-50	+ 9	+34	+51	+81	+ 9	+ 53
13. Tamil Nadu	-24	-21	+67	-24	+63	+35	+33
14. U.P.	-11	- 4	+57	-39	+33	+17	+20
15. W.Bengal	-76	-22	+125	-58	+89	+42	+11
Total	-25	- 9	+76	-28	+59	+19	+33

Note: For symbols used, see the text.

Source: see the text.

$$(1)\quad A'_w y_j = W_j^0 \sum x_{ij}^1 . z_{ij}^1 . l_{ij}^1$$

$$(2)\quad A'_l y_j = W_j^1 \sum x_{ij}^1 . z_{ij}^1 . l_{ij}^0$$

$$(3)\quad A'_x y_j = W_j^1 \sum x_{ij}^0 . z_{ij}^1 . l_{ij}^1$$

$$(4)\quad A'_z y_j = W_j^1 \sum x_{ij}^1 . z_{ij}^0 . l_{ij}^1$$

$$(5)\quad A'_p y_j = W_j^1 \sum p_{ij}^0 . l_{ij}^1$$

The expected incomes so calculated for each State are presented below in Appendix Table 7A.2. When we subtract these expected incomes from the observed income of the j^{th} State in the terminal year, we get the total contribution of each of the factors in j^{th} State. The total contributions of all these factors along with the residual (which has an opposite sign as compared to the residual in the partial contribution approach) for each of the fifteen States are presented in Table 7.2. From the Table 7.1 and Table 7.2, it is possible for us to calculate the average contribution of each of the above-mentioned factors (such that the residual does not exist) by taking the weighted average of the partial and total contributions of the same factors, weights being derived on the basis of the residuals in the two approaches.*9 The average contributions of these factors in

*9 See Chapter 6 above.

Table 7.3

Growth Experience of State Economies in India - 1960-61 to 1970-71

Average Contributions of Factors

States	Average Contribution (in Rs.) of changes in					Observed change in PCI in Rs. $(y_j^1 - y_j^0)$	Average Contributions as Proportion of y_j^0 (in %) of					Observed Growth of PCI in %
	W	l	x	z	p		W	l	x	z	p	
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Andhra	- 6	- 1	+27	+10	+37	+30	- 2.05	- 0.34	+ 9.25	+ 3.42	+12.67	+10.27
2. Assam	-49	-30	+91	- 3	+88	+ 9	-14.04	- 8.60	+26.07	- 0.86	+25.21	+ 2.58
3. Bihar	-26	-30	+91	-40	+51	- 5	-11.40	-13.16	+39.91	-17.54	+22.37	- 2.19
4. Gujarat	-22	+10	+85	- 8	+77	+65	- 5.91	+ 2.69	+22.85	- 2.15	+20.70	+17.47
5. Haryana	-27	+ 5	+101	+58	+159	+137	- 7.50	+ 1.39	+28.06	+16.11	+44.17	+38.06
6. Karnataka	- 6	+ 4	+107	+34	+141	+139	- 1.88	+ 1.25	+33.54	+10.66	+44.20	+43.57
7. Kerala	-22	- 6	+99	-52	+47	+19	- 7.86	- 2.14	+35.36	-18.57	+16.79	+ 6.79
8. M.P.	-22	- 7	+68	-38	+30	+ 1	- 8.43	- 2.68	+26.05	-14.56	+11.49	+ 0.38
9. Maharashtra	-32	+13	+118	-95	+23	+ 4	- 7.94	+ 3.23	+29.28	-23.57	+ 5.71	+ 0.99
10. Orissa	-17	-15	+68	+ 8	+76	+44	- 7.56	- 6.67	+30.22	+ 3.56	+33.78	+19.56
11. Punjab	- 3	-12	+124	+16	+140	+125	- 0.80	- 3.21	+33.16	+ 4.28	+37.43	+33.42
12. Rajasthan	-42	+10	+33	+52	+85	+53	-15.05	+ 3.58	+11.83	+18.64	+30.47	+19.00
13. Tamil Nadu	-22	-16	+86	-15	+71	+33	- 6.20	- 4.51	+24.23	- 4.23	+20.00	+ 9.30
14. U.P.	-11	- 3	+67	-33	+34	+20	- 4.62	- 1.26	+28.15	-13.87	+14.29	+ 8.40
15. W.Bengal	-70	-20	+153	-52	+101	+11	-15.84	- 4.52	+34.62	-11.76	+22.85	+ 2.49
Total	-23	- 8	+87	-23	+64	+33	- 7.49	- 2.61	+28.34	- 7.49	+20.85	+10.75

Note: For Symbols used, see the text.
Source: See the text.

each State and in the total of the fifteen States are presented in Table 7.3.

From the Table 7.3, we can make a number of interesting observations. In the first, place, we can see that the contribution of a change in overall worker rate is negative for each State without exception, though the extent of contribution varies significantly from as low as -0.80 percentage points in Punjab to as highas -15.84 percentage points in West Bengal. On an average, the change in worker rate has proved to be a major retarding factor in the growth of the per capita real income. In as many as six States, viz., Assam, Bihar, Kerala, Madhya Pradesh, Maharashtra and West Bengal, the reduction in the worker rate over the last decade caused the per capita income to grow at less than half the rate it would have otherwise grown had there not been the observed decline in the overall worker rate. Only in Punjab, Karnataka and Andhra Pradesh, the influence of worker rate was rather insignificant.

Another important thing to note from Table 7.3 is that the contribution of changes in capital intensity in all the States has turned out to be significantly positive. In fact,

in almost all the States except Rajasthan, the per capita real income increased only because of the changes that took place in the capital intensity over the last decade. In Rajasthan, the changes in capital intensity were not so overwhelmingly important as compared to the other factors. But in five States, viz., Assam, Kerala, Tamil Nadu, Uttar Pradesh and West Bengal, the growth of per capita real income was positive only because of the changes in capital intensity over the decade. Moreover, the contribution of changes in labour productivity turned out to be positive in all the States largely because of the changes in capital intensity. In only six States, viz., Andhra Pradesh, Haryana, Karnataka, Orissa, Punjab and Rajasthan, the contribution of changes in capital productivity turns out to be positive. Here also only in three States, viz., Haryana, Karnataka and Rajasthan, the contribution of changes in capital productivity was positive and significant. In these states, the growth of per capita real income also turned out to be quite high. On the other hand, in the three States, viz., Bihar, Madhya Pradesh and Maharashtra, where the growth of per capita real income was less than one percentage point, the contribution of the changes in capital productivity was significantly negative.

Only in Assam and Gujarat, the changes in the capital productivity had insignificant negative effects on the observed growth of per capita real income over the last decade.

Another important thing to note from the table is that the contribution of changes in the industrial structure in different State economies varies from -13.16 percentage points in Bihar to +3.58 percentage points in Rajasthan. Only in five States, viz., Gujarat, Haryana, Karnataka, Maharashtra and Rajasthan, the contribution of changes in the industrial structure has turned out to be positive. However, in all these five States, the contribution of changing industrial structure is quite insignificant as compared to the contributions of other factors. Actually, except Assam and Bihar in all the States, the changes in industrial structure during 1960-61 to 1970-71 had only marginal contribution towards the observed growth of per capita real income.

On the basis of the above observations, it is now possible to divide States into four broad categories of the growth pattern. The simplicity of the classification of States into only four broad categories is made possible

because worker rate has exercised a retarding influence in all the State economies without exception and the capital intensity and hence the labour productivity have had a favourable influence in all the State economies without exception. Therefore, the growth pattern of different State economies differed only to the extent to which the industrial structure and capital productivity had different influences on the observed growth of per capita income. Thus, we get the following four broad patterns of growth:
(a) Unfavourable change in worker rate, favourable change in capital intensity, favourable change in labour productivity, favourable change in industrial structure and favourable change in capital productivity. Three States, viz., Haryana, Karnataka and Rajasthan, fall under this category. The growth experience of these three States can legitimately be compared. We find that on the structural and technological grounds, Rajasthan scores over the other two states, however, in terms of the capital intensity effort, Rajasthan far lags behind the other two States. Rajasthan, therefore, presents a genuine case for being taken up for rapid development if the capital intensity is carefully increased in the State without disturbing the other variables in the system signi-

ficantly. A very high growth of per capita income in Karnataka, on the other hand, is explained in terms of a remarkably favourable change in the capital intensity and almost insignificantly unfavourable change in the overall worker rate.

(b) Unfavourable change in worker rate, favourable change in capital intensity, favourable change in labour productivity, favourable change in industrial structure and unfavourable change in capital productivity. Only two States, viz., Gujarat and Maharashtra, fall under this category. A comparison of the growth experience of these two states reveals that although Gujarat experienced much less favourable effect of changing capital intensity as compared to Maharashtra, the unfavourable changes in capital productivity were quite insignificant in Gujarat while they were of the largest order in the case of Maharashtra. It is because of this reason that the growth of per capita income in Maharashtra was substantially less than the one in Gujarat. All that we can say is that there is a great need to concentrate on technological aspects in Maharashtra if the large investments should yield the desired results.*10 More and more capital

*10 Some authors feel that the choice of more capital intensive techniques is advantageous only if it is accompanied by more than proportionate increase in labour productivity. In other words, a rise in capital intensity should accompany an (contd)

saving devices should be encouraged in Maharashtra if the growth of per capita income is to be stepped up.

(c) Unfavourable change in worker rate, favourable change in capital intensity, favourable change in labour productivity, unfavourable change in industrial structure and favourable change in capital productivity. Only three States, viz., Andhra Pradesh, Orissa and Punjab, fall under this category. It becomes clear when we compare the growth experience of these three States that Andhra Pradesh has experienced quite a low growth of per capita income largely on account of a substantially low contribution of changes in capital intensity as compared to the other States in India. On the other hand, both Orissa and Punjab have experienced an above average contribution of changes in capital intensity and hence their growth of per capita income turns out to be fairly high. In all these three States, the contribution of changes in capital productivity is almost negligible in absolute terms, while the negative contribution of the changes

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increase rather than a decrease in the capital productivity, if the choice of more capital intensive technique is to be advantageous. See, Samir Amin: "Levels of Remuneration, Factor Proportions, and Income Differentials with special reference to Developing Countries", in A.D.Smith (ed.): Wage Policy Issues in Economic Development, (MacMillan: St. Martin's Press: 1969).

in industrial structure in Orissa cannot be regarded as insignificant. Moreover, the difference between the growth of per capita income in Punjab and Orissa can be explained by the fact that the negative contribution of changes in worker rate is almost insignificant in Punjab as compared to Orissa.

(d) Unfavourable change in worker rate, favourable change in capital intensity, favourable change in labour productivity, unfavourable change in industrial structure and unfavourable change in capital productivity. As many as seven States, viz., Assam, Bihar, Kerala, Madhya Pradesh, Tamil Nadu, Uttar Pradesh and West Bengal fall under this category. If we consider the growth experience of all the fifteen States taken together, it also reveals the same type of growth pattern. It is interesting to note that all the States included under this category, consistently show relatively low growth of per capita income in spite of highly favourable changes in the capital intensity over the period in some of the States. In fact, Bihar, Kerala and West Bengal experienced significantly high contribution of changes in capital intensity, but extremely unfavourable changes in capital productivity on the one hand, and fairly high

retarding effects of changes in overall worker rate on the other hand, depressed the growth of per capita real income to almost an insignificant level in these states. These are the states where systematic efforts on technological front are badly required. Instead of going in for a highly capital intensive technology, if labour intensive technology is encoureged, these States can improve their performance in terms of the growth of the per capita real income. Madhya Pradesh and Uttar Pradesh also fall more or less in line with Bihar, Kerala and West Bengal with the only difference that changes in capital intensity in the former group of States are not so favourable as compared to the latter group of States. The remedy for Madhya Pradesh and Uttar Pradesh would, therefore, be more investment in the labour-intensive techniques of production. Even among these two States, Madhya Pradesh requires greater attention not only because its growth of per capita income is almost negligible but also because the problems are acute for Madhya Pradesh on all the fronts as compared to Uttar Pradesh. The remaining two States, viz., Assam and Tamil Nadu, form a special group where capital intensity had not changed very favourably and that is how the growth of per capita income has not attained a higher level than what it has already attained. Even here,

Assam seems to have been affected very adversely by unfavourable changes in worker rate and industrial structure as compared to Tamil Nadu. In both these States, however, if more investment in capital intensive techniques of production is made with a view to diversifying the economic activities in the State economies, the per capita income is most likely to grow at a faster rate than what is observed.

From the above analysis, it becomes fairly obvious that the first category of growth pattern is the best type of growth experience which was found in the case of the fastest growing States like Karnataka and Haryana. On the other hand, the fourth category of the growth pattern is the worst type of growth experience, and it is not very surprising that as many as seven States in India fall under this category. In fact, it provides us the explanation why we have not been able to achieve a rapid growth of our per capita income in spite of best of our efforts. Unfortunately, we were concentrating heavily on capital intensity neglecting almost all other factors and it is precisely the other factors which have faltered our efforts to raise the growth of per capita income. Better planning in future, with more realistic approach to the regional situations, can still make up for the loss.

III. Interrelationships Among Growth of Various Factors :

In the previous section, we have examined the growth experience of different State economies and we found there that it varies significantly from State to State. Let us now turn to examine the question what explains variations in growth of per capita income among States in India. For this purpose, it is helpful for us to derive the growth identity on the basis of the income identity developed in the previous chapter. Following the notations, we have been using, we can say

$$y_j = W_j \sum x_{ij} \cdot z_{ij} \cdot l_{ij} \text{ in the base year.}$$

We can remove j for the sake of simplicity from the above identity so that

$$y = W \sum x_i \cdot z_i \cdot l_i$$

Differentiating both the sides with respect to t (time), we get,

$$\frac{dy}{dt} = \frac{dW}{dt} \sum x_i z_i l_i + W \sum \left(z_i l_i \frac{dx_i}{dt} + x_i l_i \frac{dz_i}{dt} + x_i z_i \frac{dl_i}{dt} \right)$$

$$\therefore \frac{dy}{dt}/y = \frac{dW}{dt}/W + \frac{W}{y} \sum \frac{Y_i}{L} \left(\frac{dx_i}{dt}/x_i + \frac{dz_i}{dt}/z_i + \frac{dl_i}{dt}/l_i \right)$$

where L is the total working force.

$$\therefore G_y = G_W + \sum \frac{Y_i}{Y} \left(G_{x_i} + G_{z_i} + G_{l_i} \right)$$

where G_y is the total relative growth of per capita income, G_W is the relative growth of worker rate, Y_i/Y is the proportion of income originating in i^{th} sector in the base year, G_{x_i} is the relative growth of capital intensity in i^{th} sector, G_{z_i} is the relative growth of capital productivity in i^{th} sector and G_{l_i} is the relative growth of proportion of working force in i^{th} sector over the given period of time.

Similarly, we can say that

$$G_y = G_W + \sum \frac{Y_i}{Y} (G_{p_i} + G_{l_i})$$

Where G_p is the relative growth of labour productivity in i^{th} sector over the given period of time, and that

$$G_y = G_W + G_x + G_z = G_W + G_p$$

where G_x, G_z and G_p are the relative growth of overall capital intensity, overall capital productivity and overall labour productivity. Thus we can express the growth of per capita income in a given State in terms of the growth of all the factors involved and the proportion of income originating in different sectors of the economy in the base year.*[11] Moreover, the expression is additive and hence it is

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11 R.L.Pfister: "External Trade and Regional Growth: A Case Study of the Pacific Northwest", in Economic Development and Cultural Change, Vol.11, No.2, Part I, Jan.1963; tests the hypothesis that "specialization in primary products means that growth will necessarily be slow relative to more industrialized areas", and finds that it is not valid in all cases. The Indian data, as can be seen from Table 7.4, also do not support this hypothesis.

all the more expected that variations in the growth of the State per capita income should be explained by variations in one or more of the component growth factors satisfactorily. In other words, it should be possible to ascribe the variations in the growth of State per capita income to variations in growth of some of the specific variables. The relevant data on these variables are presented below in Appendix Table 7A.3.

Table 7.4 presents coefficients of correlation and coefficients of determination between the growth of State per capita income and the growth of the component factors & the sectoral distribution of the State Domestic Product in the base year, 1960-61. From the table, it becomes clear that the variations in the growth of capital productivity plays the most important part in explaining the interstate variations in the growth of per capita income in India during 1960-61 to 1970-71. The interstate variations in the growth of capital productivity in the primary sector, tertiary sector and in the economy as a whole are three out of six factors which explain a significant part of the interstate variations in the growth of per capita income. The other three factors are the growth of labour productivity in the primary sector, growth of labour productivity for the economy

Table 7.4

Correlation Between the Growth of State Per Capita Income and Various Component Factors.

Component Factors	Correlation with Growth of State PCI	
	Coefficient of Correlation (r)	Coefficient of Determination (r^2)(in%)
1	2	3
I. Growth of		
A. Primary Sector :		
1. Proportion of Working Force	-0.2212	4.89
2. Capital Intensity	0.4161	17.31
3. Capital Productivity	0.5744	32.99*
4. Labour Productivity	0.6697	44.85**
B. Secondary Sector :		
1. Proportion of Working Force	0.3808	14.50
2. Capital Intensity	-0.1054	1.11
3. Capital Productivity	0.1902	3.62
4. Labour Productivity	-0.3417	11.68
C. Tertiary Sector :		
1. Proportion of Working Force	0.1920	3.69
2. Capital Intensity	-0.4200	17.64
3. Capital Productivity	0.8434	71.13**
4. Labour Productivity	0.3071	9.43
All Sectors		
1. Overall Worker Rate	0.5643	31.84*
2. Capital Intensity	-0.3334	11.12
3. Capital Productivity	0.8123	65.98**
4. Labour Productivity	0.9330	87.05**
II. Proportion in the Total SDP in the year 1960-61 of		
A. Primary Sector	0.2077	4.31
B. Secondary Sector	-0.1105	1.22
C. Tertiary Sector	-0.2718	7.39

* Significant at 5% level of significance.
** Significant at 1% level of significance.
Source: Appendix Table 7A.3 below.

as a whole and growth of the overall worker rate in the State economies. All the six significant correlations are positive implying thereby that higher growth (without ignoring the sign) of these factors are on an average associated with higher growth of the per capita income and vice-versa. An interesting thing to observe from the table is that the interstate variations in the growth of capital productivity in the tertiary sector explains a larger proportion of the variations in the growth of per capita income than the interstate variations in the capital productivity in the economy as a whole. This probably implies that the interstate variations in the growth of capital productivity in different sectors do not follow the same pattern.

Another important thing to observe from Table 7.4 is that the coefficient of correlation, though not significant even at 5% level of significance, turns out to be negative between the growth of per capita income and the growth of capital intensity except in the primary sector. This implies that higher growth of capital intensity on an average tends to be associated with lower growth of per capita income. This is an important finding because it proves that too much emphasis on the capital intensity may

not always achieve the desired result of raising the growth of the State per capita income in the short run, in fact, it may have exactly the opposite effect. If at all capital intensity is increased to raise the growth of per capita income, the primary sector should be given priority because the correlation between the growth of per capita income and the growth of capital intensity in the primary sector turns out to be positive in the case of India.

Moreover, we can see from the table that the growth of worker rate is significantly and positively related with the growth of per capita income. This is an illuminating finding because, it throws more light on the dynamics of the worker rate. It is believed that, in the initial stages of development, the worker rate tends to decline. All that our finding says is that the extent of relative decline in the worker rate tends to be inversely related to the growth of per capita income, because in the initial stages of development, the per capita income is likely to grow at a slow rate, on account of a high growth of population and a relatively low growth of labour productivity; while as development proceeds, the economy is likely to experience a higher growth of per capita income on account of a relatively low growth of

population and a relatively high growth of productivity.*12 It is in the early stages of development that the economy faces significant and fundamental changes in the institutional frame-work and social traditions which, in turn, affect the worker rate in the downward direction. However, once this stage of development is crossed, the changes in the institutional frame-work and social traditions become a process and are accepted in the strides of development. On the other hand, in the initial stages of development, these changes are entirely new and hence their impact is also likely to be greater as compared to the changes in the later stages of development.

Another important thing to note from the Table 7.4 is that it is the growth of overall labour productivity which singly explains the largest part of the interstate variations in the growth of per capita income. It implies that higher growth of labour productivity is associated on an average with the higher growth of per capita income. Thus, overall labour productivity is important not only in

*12 It is for such reasons, that during stage of 'take-off', the inequalities tend to increase. For further discussion, see W.W.Rostow: "The Take-Off into Self-Sustained Growth", in Economic Journal, Vol.66, March,1956.

explaining a major part of the interstate variations in the levels of per capita income at a point of time, but it also plays an important role over a period of time, i.e. the growth of labour productivity explains a large part of variations in the growth of per capita income.*13 At this stage, it is interesting to compare the results of Table 7.4 with the results of Table 6.4 above.

First of all, only six factors, viz., capital productivity in the secondary sector, labour productivity in the secondary sector, share of the secondary sector in the total employment, labour productivity in the tertiary sector, capital intensity in the economy as a whole and labour productivity in the economy as a whole, are significantly correlated with the level of per capita income in 1960-61 in India. Similarly, six factors, viz., growth of capital productivity in the primary sector, growth of labour productivity in the primary sector, growth of capital productivity in the tertiary sector, growth of capital productivity in the economy as a whole, growth of labour productivity in the economy as a whole and growth of overall worker rate,

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*13 It is because of such close association between the per capita income and labour productivity, that the inter-changeable use of these two measures to reflect the level and rate of development is frequent in the literature.

are significantly correlated with growth of per capita real income between 1960-61 and 1970-71 in India. It can be seen that barring labour productivity, the two lists of factors do not coincide, which means that the set of factors important in explaining the interstate variations in the levels of per capita income in the base year is totally different from the set of factors important in explaining the interstate variations in the growth of per capita income. It was capital intensity which was important in explaining the interstate variations in the levels of per capita income, whereas it is the growth of capital productivity which is more important in explaining the interstate growth variations. Three out of six factors explaining a significant part of the interstate variations in the level of income belonged to the secondary sector, whereas none out of the six major explanatory variables for the growth of per capita income belongs to the secondary sector of the economy. The worker rate does not explain a significant proportion of the total variations in the levels of per capita income, but relative decline in the worker rate does explain a significant proportion of the total variation in the growth of per capita income. To remove the interstate growth inequality, we need to concentrate on the second set of factors rather than

Table 7.5

Coefficients of Correlation Between Growth of Various Factors

Growth over 1960-61 to 1970-71 of	Growth over 1960-61 to 1970-71 of			Proportion of Total SDP in 1960-61
	Capital Productivity	Labour Productivity	Proportion of working force	
1	2	3	4	5
	The Primary Sector			
1. Capital Intensity	0.1153	0.5600*	-0.4517	-0.2261
2. Capital Productivity		0.8865**	-0.3222	0.2511
3. Labour Productivity			-0.4656	0.0931
4. Proportion of Working force				0.0513
	The Secondary Sector			
1. Capital Intensity	-0.3952	0.8773**	-0.7670**	-0.4674
2. Capital Productivity		-0.1593	0.1550	0.0779
3. Labour Productivity			-0.8100**	-0.3588
4. Proportion of Working force				0.2259
	The Tertiary Sector			
1. Capital Intensity	-0.6358	0.5999*	-0.7642**	0.1888
2. Capital Productivity		0.2067	0.1959	-0.3570
3. Labour Productivity			-0.7396**	-0.0985
4. Proportion of Working Force				-0.0045
	All Sectors			
1. Capital Intensity	-0.7567**	-0.2970	-0.2868	
2. Capital Productivity		0.8457**	0.2969	
3. Labour Productivity			0.2316	

Note: For 'All Sectors', the column (4) represents Growth of overall Worker rate instead of the growth of proportion of working force.

* Significant at 5% level of significance.

** Significant at 1% level of significance.

Source: Appendix Table 7A.3 below.

those factors which are important for the levels of the per capita income.

Let us now turn to examine the interrelationships among the growth of different factors in India. Table 7.5 gives the coefficients of correlation and coefficients of determination between growth of different factors in Indian States. The table reveals that the variations in growth of labour productivity in the primary sector are significantly explained by the variations in the growth of capital intensity as well as capital productivity in the primary sector. Both the correlations turn out to be positive. The correlations between the growth of the proportion of working force engaged in the primary sector and the growth of the labour productivity, capital intensity and capital productivity in the primary sector, turn out to be negative implying that high growth of the proportion of workers in the primary sector is associated with low growth of labour productivity, capital productivity and capital intensity in the primary sector. It should be noted, however, that all these three correlations are statistically insignificant. The correlation between the growth of capital intensity and growth of capital

productivity in the primary sector turns out to be quite insignificant.

As far as the secondary sector is concerned, the variations in the growth of labour productivity are significantly explained by the variations in the growth of capital intensity and the variations in the growth of the proportion of workers in the secondary sector. The first correlation is positive, while the other one is negative. Similarly, the correlation between the growth of capital intensity in the secondary sector and the growth of the proportion of workers in the secondary sector also turns out to be negative and significant. It only implies that higher growth of the proportion of workers in the secondary sector tends to be associated with lower growth of the labour productivity and capital intensity in the secondary sector and vice-versa.*14 It is also worth-mentioning that the correlations between the growth of capital productivity and the growth of capital intensity and labour productivity in the secondary sector turn out to be negative though statistically insignificant. The case of the tertiary sector is much the same as that of the secondary sector with the difference that the correlation

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*14 In a very loose sense, one can say that these findings imply that the technological factors in the secondary sector are not strong enough to significantly alter the operation of the law of variable proportions.

between the growth of capital productivity and growth of labour productivity is positive though insignificant, and that the correlation between the growth of capital productivity and capital intensity is negative and significant at 5% level of significance which implies that lower growth of capital productivity is associated with higher growth of capital intensity in the tertiary sector and vice-versa.

For the economy as a whole, the growth of labour productivity is negatively related with the growth of capital intensity, however, the correlation is statistically significant.*15 On the other hand, growth of capital productivity is positively and highly significantly correlated with the growth of labour productivity. Thus, growth of capital productivity is not only important in explaining the variations in the growth of per capita income, but it is also important in explaining the variations in the growth of labour productivity between 1960-61 and 1970-71 in India. Again for the economy as a whole, the growth of capital productivity and the growth of capital intensity are negatively and highly

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*15 If we assume a uniform production function for all the States in India, and if we assume constant returns to scale, this finding implies that marginal productivity of capital in India is not significantly different from zero. However, these "ifs" are too weak to sustain the burden of reality, and hence such implications are better avoided.

significantly correlated. The growth of worker rate is not significantly correlated with any of the three factors, viz., the growth of capital intensity, growth of capital productivity and the growth of labour productivity.

These results are worth-comparing with those obtained in Chapter 6 above where we found that (i) capital intensity and labour productivity are significantly related, (ii) capital intensity and capital productivity are not significantly related, (iii) capital productivity and labour productivity are also not significantly related, (iv) overall worker rate is significantly related with capital intensity and labour productivity. It becomes clear that there is a vast difference between the analysis of the levels and the growth of different variables. It was capital intensity and not capital productivity which explained a significant part of the interstate variations in the labour productivity, whereas it is the growth in the capital productivity and not in capital intensity which explains a significant part of the interstate variations in the growth of labour productivity. While there was no relation between the capital intensity and capital productivity in the base year, there exists a significant negative relationship between the growth of

capital intensity and growth of capital productivity. Moreover, the worker rate was significantly correlated with the capital intensity and labour productivity, whereas the growth of worker rate is not significantly related with the growth of any of these factors.

Before we pass on to the next section, it will be an interesting exercise to examine the interstate variations in the growth of total State Domestic Product between 1960-61 and 1970-71. As Siebert points out, "the greater the accumulation of capital and increase in labour supply in a region, the greater its growth rate."*16 In Chapters 2, 4 and 5 above, we have constructed the required estimates to test this hypothesis. In fact, E.E.Hagen and O.Hawrylyshyn have suggested a cross-section regression such that $G_Y=f(G_K,G_L)$, where G_Y, G_K and G_L stand for relative growth in output, capital-stock and labour supply respectively.*17 As it can be seen readily, if the function is linear, the least squares estimate of the constant term in the equation represents the rate of Hicks neutral technical progress on the assumption of

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*16 H.Siebert: Regional Economic Growth: Theory and Policy, (Scranton, Pa: International Textbook Company, 1969). See also, G.H.Borts and J.L.Stein: "Regional Growth and Maturity in United States: A Study of Regional Structural Change", in L. Needleman(ed.): Regional Analysis (Penguin Books, 1968).

*17 Cf. E.E. Hagen and O.Hawrylyshyn: "Analysis of World Income and Growth, 1955-65", in Economic Development and Cultural Change, Vol.18, No.1, Part II, Oct.1969.

a uniform Cobb-Douglas production function with constant returns to scale for all States. On the other hand, if we do not assume Cobb-Douglas production function, $(1-r^2)$*18 gives in "some sense a measure of the relative importance of technical change broadly defined in explaining growth rates."*19 This is because the total growth of output is by definition explained by growth of capital, growth of labour and the residual factors generally referred to as technical change. Therefore, whatever variations in the growth of total output are left unexplained by growth of labour & capital, are necessarily explained by the variations in the residual factor.

Since, we do not feel that the assumptions necessary to derive the estimate of the rate of Hicks neutral technical progress are justified in the case of India, we rather run simple correlation and the multiple correlation between G_Y, G_K and G_L. The coefficient of determination between G_Y and G_L turns out to be 46.64% which is significant at 1% level of significance, and the coefficient of determination between G_Y and G_K turns out to be 0.05% which is totally insignificant

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*18 The r^2 represents the coefficient of determination or the total explanatory power of the independent variables.

*19 E.E.Hagen and O.Hawrylyshyn: "Analysis of World Income and Growth, 1955-65", op.cit.

statistically. The implication of these findings is that growth of capital does not explain any part of the observed variation in the growth of total output among different States in India during the sixties, whereas growth of labour explains nearly 47% of the observed interstate variations in the growth of total SDP.

If we consider the coefficient of multiple determination between G_Y and G_L & G_K, we find that it turns out to be 48.62% in the case of linear equation, and the same turns out to be 52.68% in the case of semi-logarithmic form. Thus, the maximum explanation provided by the growth of labour and capital does not significantly exceed 50% of the observed variations in the growth of total SDP in India during the sixties. It, therefore, implies that the residual factor or the technological factors play a statistically significant role in explaining the observed variations in the growth of total SDP in India during 1960-61 to 1970-71. This conclusion falls fairly in line with our conclusion arrived at independently on the basis of the analysis of per capita income growth.

IV. Contribution of Various Factors in the State Growth Inequalities in India :

In the previous section, we have examined the relationship of different factors and the State per capita income growth in India. It was an aggregate analysis which was intended to throw some light on those factors which largely explain the observed variations in the growth of the State per capita income in India. In this section, let us make an attempt to measure the precise contribution of different component factors to the observed growth inequalities of State income. Before we proceed to examine the growth inequalities of per capita income among different states in India, let us first of all see what we really mean by the term "growth inequalities". It is observed that the per capita income of different State economies in India are growing at significantly different rates over the decade 1960-61 to 1970-71. The per capita income of all the fifteen States taken together has grown by 10.75%. Inasmuch as different State economies have grown at the rate other than 10.75% over the last decade, we say that there exists inequalities of the growth of per capita income among different States in India. Thus, the ideal thing from the viewpoint

of the growth inequalities is that the per capita income in each State grows by 10.75% over the decade 1960-61 to 1970-71.

Now, it is wel-known that the per capita income grows at different rates in different States because the worker rate, industrial structure,*20 capital intensity and capital productivity grow at different rates in different States. In other words, the observed growth of per capita income in a given State is due to the observed growth of these factors in that State.*21 Similarly, for the fifteen States taken

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*20 Growth of industrial structure is a very vague concept. To concretize this concept, we can take the absolute difference in the proportion of working force in a given sector over the period as a proxy. S. Kuznets has also employed more or less the same technique. See S.Kuznets: "Quantitative Aspects of Economic Growth of Nations-II", op.cit.

*21 It is important to point out that most of the studies made so far emphasise the role of the industrial structure and sectoral growth only in explaining the interstate variations in the growth of labour which is taken as a proxy. See, for instance, J.R. Boudeville: "A Survey of Recent Techniques for Regional Economic Analysis," in W.Isard & J.H.Cumberland(ed.): Regional Economic Planning - Techniques of Analysis for Less Developed Areas, (Paris: European Productivity Agency,1961); A.P.Thirlwall: "A Measure of the 'Proper Distribution of Industry", in Oxford Economic Papers, Vol.19, No.1, March 1967; J.N.Randall: "Shift-Share Analysis as a Guide to the Employment Performance of West Central Scotland", in Scottish Journal of Political Economy, Feb.1973; R.Weed[27] "Regional Rates of Growth of Employment: An Analysis of Variance Treatment", in NIESR: Regional Papers,III,(Cambridge:1974); etc. On the other hand, those who analyse the interstate variations in the growth of income per capita generally distinguish between effects of industrial structure and sectoral productivities only. See, for example, S.Kuznets: "Quantitative Aspects of Economic Growth of Nations-II & III", in Economic Development and Cultural Change, Supplement to Vol.V, July 1957 and Vol.6,

together, the observed growth of per capita income is also due to the observed growth of these factors (for the sake of simplicity, let us call the growth of a given factor for the fifteen States taken together as the 'average' growth of that factor). It is then expected that if all these factors grow at the respective 'average' rates in all the States, then, the growth of per capita income would also be the same as the 'average', unless some cross effects of the large magnitude of the growth of different factors with the differing levels of the factors take/ place. If these cross effects exist, (and they generally do) they represent a genuine residual which seems to be almost inevitable in the sense that we have to accept our inability to distribute it among different factors in a convincing way.

Once we accept the existence of this residual, we can find out the precise contribution of different factors in the observed growth inequalities among different States in

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July 1958; G.M.Farooq: "Economic Growth and Changes in the Industrial Structure of Income and Labour Force in Pakistan", in Economic Development and Cultural Change, Vol.21, No.2, Jan.1973; N.D.Chaudhry: Regional Income According in an Underdeveloped Economy - A Case Study of India,(Calcutta: 1966); A.G.Green: "Regional Inequality, Structural Change, and Economic Growth in Canada", in Economic Development and Cultural Change, Vol.17, No.4, July 1969; etc.

India by following the familiar method of the partial contribution and total contribution. We should make it clear that since the initial level of income in a given State remains the same as the observed income in that State in the base year, the differences of absolute growth is reflected in the differences in the levels of income that we obtain for that State in the terminal year. Therefore, we can generate different expected incomes, for a given State for the year 1970-71 only. Our objective is to explain or distribute the difference between the observed per capita income of the given State in the year 1970-71 (y_j) and the per capita income of that State which would have been observed in the year 1970-71 had the per capita income in that State grown at the 'average' rate over the decade (Ay_j), i.e., ($y_j - Ay_j$). When each of the component factor grows at the respective 'average' rate in the given State, the expected per capita income that we get in the year 1970-71 for that State (By_j) would be different from Ay_j, the difference being the pure residual R_j, i.e. $By_j - Ay_j = R_j$. Therefore, ($y_j - Ay_j$) can be represented as ($y_j - By_j + R_j$). This is necessary because conceptually, we can distribute the difference ($y_j - By_j$) among different factors while it is not possible to distribute the difference ($y_j - Ay_j$) directly

among different factors since an inevitable residual exists. Ay_j and By_j for every j are presented below in Appendix Table 7A.4.

If we accept the By_j as the basic income in the year 1970-71, for the partial contribution approach, we require to generate the expected income for the year 1970-71 in the j^{th} State such that only one factor grows at the observed rate in the j^{th} State with all other factors growing at their respective 'average' rate during the decade. In symbolic terms, if we use the letters (we have been using for different factors) with a prime to denote the levels of the respective factors in 1970-71 which the factors would have attained, had they grown at the 'average' rate; and if we use the same letters without a prime to indicate the levels of the factors actually observed in the year 1970-71, then we have to generate the following expected incomes of the j^{th} State in the year 1970-71 :

(1) $E_0y_j = V_j \sum x'_{ij} \cdot z'_{ij} \cdot l'_{ij}$

(2) $E_1y_j = V'_j \sum x'_{ij} \cdot z'_{ij} \cdot l_{ij}$

(3) $E_xy_j = V'_j \sum x_{ij} \cdot z'_{ij} \cdot l'_{ij}$

(4) $E_zy_j = V'_j \sum x'_{ij} \cdot z_{ij} \cdot l'_{ij}$

(5) $E_py_j = V'_j \sum p_{ij} \cdot l'_{ij}$

Table 7.6

State Growth Inequalities in India - 1960-61 to 1970-71

Partial Contribution of Factors

(in Rs.)

States	Partial Contribution of the Observed Growth of					Residual	$y_j - Ey_j$
	W	l	x	z	p		
1	2	3	4	5	6	7	8
1. Andhra	+17	+ 8	-43	+30	-18	- 8	+ 4
2. Assam	-23	- 6	+24	+20	+45	-30	-15
3. Bihar	-10	-22	+45	-23	+12	-15	-25
4. Gujarat	+ 8	+30	-40	+26	-12	-10	+14
5. Haryana	+ 3	+15	+ 2	+95	+88	- 9	+106
6. Karnataka	+20	+13	+ 8	+61	+67	+ 8	+110
7. Kerala	- 1	- 1	+27	-30	- 2	-10	-15
8. M.P.	- 4	+ 3	+ 5	-20	-16	- 1	-17
9. Maharashtra	- 4	+31	-17	-58	-74	0	-48
10. Orissa	0	- 9	+21	+29	+41	-14	+27
11. Punjab	+27	-11	+20	+50	+60	- 7	+79
12. Rajasthan	-20	+27	-34	+74	+38	-15	+32
13. Tamil Nadu	+ 5	- 9	-14	+16	- 1	- 7	- 9
14. U.P.	+ 8	+ 1	+14	-19	- 7	- 2	+ 2
15. W.Bengal	-41	-13	- 1	- 7	-14	- 3	-65

Note: For symbols used, see the text.

Source: see the text.

All these expected incomes are presented below in the Appendix Table 7A.5. The partial contribution of different factors, then, can be calculated by subtracting from these expected incomes the 'equal growth of component' income, i.e. Dy_j. These partial contribution of different factors need not exactly add up to the difference $(y_j - Ey_j)$ and hence a residual exists. These partial contributions of different factors along with the residual are presented in the Table 7.6.

This residual can be removed and the exact (average) contribution of different factors can be obtained by deriving the expected incomes of the j^{th} State on the basis of the total contribution approach. These incomes for the year 1970-71 are derived by assuming that only one factor grows in the j^{th} State at the 'average' rate with all other factors growing at the actual observed rate. In symbolic terms, we have to generate the following expected incomes of the j^{th} State in the year 1970-71 :

(1) $F'_W y_j = r'_j \sum x_{ij} \cdot z_{ij} l_{ij}$

(2) $F'_l y_j = r_j \sum x_{ij} \cdot z_{ij} \cdot l'_{ij}$

(3) $F'_x y_j = r_j \sum x'_{ij} \cdot z_{ij} \cdot l_{ij}$

(4) $F'_z y_j = r_j \sum x_{ij} \cdot z'_{ij} \cdot l_{ij}$

(5) $F'_p y_j = r_j \sum p'_{ij} \cdot l_{ij}$.

Table 7.7

State Growth Inequalities in India - 1960-61 to 1970-71

Total Contribution of Factors

(in Rs.)

States	Total Contribution of the Observed Growth of					Residual	$y_j - Ey_j$
	W	I	x	z	p		
1	2	3	4	5	6	7	8
1. Andhra	+16	+ 6	-53	+27	-21	+ 8	+ 4
2. Assam	-24	-34	-5	+17	+14	+31	-15
3. Bihar	-10	-26	+24	-25	+ 6	+12	-25
4. Gujarat	+ 8	+18	-50	+28	-24	+10	+14
5. Haryana	+ 4	+14	- 3	+81	+88	+10	+106
6. Karnataka	+25	+18	+ 7	+68	+76	- 8	+110
7. Kerala	0	-12	+21	-34	-13	+10	-15
8. M.P.	- 4	+ 5	+ 4	-20	-16	0	-17
9. Maharashtra	- 3	+30	-19	-55	-75	- 1	-48
10. Orissa	0	-14	+ 8	+18	+36	+15	+27
11. Punjab	+31	-13	+ 3	+51	+63	+ 7	+79
12. Rajasthan	-24	+17	-44	+68	+27	+15	+32
13. Tamil Nadu	+ 5	-13	-19	+12	- 4	+ 6	- 9
14. U.P.	+ 8	+ 1	+13	-21	- 7	+ 1	+ 2
15. W.Bengal	-39	-11	- 5	-11	-12	+ 1	-65

Note: For symbols used, see the text.

Source: see the text.

These expected incomes calculated for all the fifteen States under consideration are given below in the Appendix Table 7A.6. The total contributions of different factors are then worked out by subtracting these expected incomes from the observed per capita income of the j^{th} State in the year 1970-71. Here again a residual exists, but with the opposite sign as compared to the correesponding residual which exists in the partial contribution approach. The total contributions of different factors along with the residual for each of the fifteen States are presented in Table 7.7.

From the Table 7.6 and Table 7.7, it is possible to derive the exact (average) contribution of different factors by allocating the residual as described in the previous Chapter. It should be noted, however, that the residual which can be distributed among different factors is the residual which belongs to the difference $(y_j - By_j)$ and not to the difference $(y_j - Ay_j)$ in which ultimately we are interested. As pointed out earlier, the residual which results as a difference between By_j and Ay_j is inevitable. Table 7.8, therefore, presents the exact (average) contribution of different factors to the observed State growth inequalities along with the pure residual.

Before we discuss the results of the Table 7.8, it is necessary and important to make a clear distinction between the results of the Table 7.3 and Table 7.8. What we have examined in the second section above is the growth experience of different State economies. In other words, our attempt was to explain the observed growth of per capita income in a particular State over the decade in terms of the changes in different factors. We were investigating the question whether the observed change in a given factor in the given State is favourable or unfavourable for the growth of per capita real income in that State economy. In the present section, on the other hand, we are accepting the phenomenon of growth of different factors in different States and investigate the question whether the observed growth of a particular factor in the given State is favourable or unfavourable as compared to the observed 'average' growth of that factor during the last decade. Though the point of reference, viz., State incomes in the base year, remains the same in both the questions, the context of both these questions are absolutely different. In the second section, we were interested in finding out the contributions of different factors in the observed growth in a given State economy, whereas in the present section, our intention is to find out the contri-

Table 7.8(a)

State Growth Inequalities in India - 1960-61 to 1970-71

Absolute Average Contribution of Factors

(in Rs.)

States	Average Contribution of the Observed Growth of					Pure residual	$(y_j - Ay_j)$ in 1970-71
	W	l	x	z	p		
1	2	3	4	5	6	7	8
1. Andhra	+17	+ 7	-48	+28	-20	- 5	- 1
2. Assam	-23	-20	+10	+18	+28	-14	-29
3. Bihar	-10	-24	+33	-24	+ 9	- 5	-30
4. Gujarat	+ 8	+24	-45	+27	-18	+11	+25
5. Haryana	+ 3	+15	0	+88	+88	- 8	+98
6. Karnataka	+22	+16	+ 7	+65	+72	- 5	+105
7. Kerala	- 1	- 6	+24	-32	- 8	+ 4	-11
8. M.P.	- 4	+ 3	+ 4	-20	-16	-10	-27
9. Maharashtra	- 4	+31	-17	-58	-75	+ 9	-39
10. Orissa	0	-11	+15	+23	+38	- 7	+20
11. Punjab	+29	-12	+12	+50	+62	+ 6	+85
12. Rajasthan	-22	+22	-39	+71	+32	- 9	+23
13. Tamil Nadu	+ 5	-11	-17	+14	- 3	+ 4	- 5
14. U.P.	+ 8	+ 1	+13	-20	- 7	- 8	- 6
15. W.Bengal	-40	-11	- 4	-10	-14	+28	-37

Note: For symbols used, see the text.

Source: see the text.

Table 7.3(b)

State Growth Inecualities in India- 1960-61 to 1970-71

Relative* Average Contribution of Factors

(in per cent)

States	Average Contribution of the Observed Growth of					Pure Residual	$\frac{y_j - Ay_j}{y_j^o}$
	H	l	x	z	p		
1. Andhra	+5.82	+2.40	-16.44	+9.59	-6.85	-1.71	-0.34
2. Assam	-6.59	-5.73	+2.87	+5.16	+8.02	-4.01	-8.31
3. Bihar	-4.39	-10.53	+14.47	-10.53	+3.95	-2.19	-13.16
4. Gujarat	+2.15	+6.45	-12.10	+7.26	-4.84	+2.96	+6.72
5. Haryana	+0.83	+4.17	0	+24.44	+24.44	-2.22	+27.22
6. Karnataka	+6.90	+5.02	+2.19	+20.38	+22.57	-1.57	+32.92
7. Kerala	-0.36	-2.14	+8.57	-11.43	-2.86	+1.43	-3.93
8. M.P.	-1.53	+1.15	+1.53	-7.66	-6.13	-3.83	-10.34
9. Maharashtra	-0.99	+7.69	-4.22	-14.39	-18.61	+2.23	-9.68
10. Orissa	0	-4.89	+6.67	+10.22	+16.89	-3.11	+8.89
11. Punjab	+7.75	-3.21	+3.21	+13.37	+16.58	+1.60	+22.73
12. Rajasthan	-7.89	+7.89	-13.98	+25.45	+11.47	-3.23	+8.24
13. Tamil Nadu	+1.41	-3.10	-4.79	+3.94	-0.85	+1.13	-1.41
14. U.P.	+3.36	+0.42	+5.46	-8.40	-2.94	-3.36	-2.52
15. W.Bengal	-9.05	-2.49	-0.90	-2.26	-3.17	+6.33	-8.37

* The word 'Relative' is used to indicate that the figures are the percentages of the respective State per capita incomes in the base year 1960-61, i.e. y_j^o.

Note: For symbols used, see the text.

Source: see the text.

butions of the observed growth of different factors in the observed divergence of the growth of a given State economy from the 'average' growth.The former has the context of the observed growth experience of different State economies, while the latter has the context of State growth inequalities.

Now let us turn to examine the results of the Table 7.8. In the first place, we can observe that the magnitude of the pure residual is relatively small except in the case of West Bengal. Moreover, no definite systematic relationship can be observed between the direction as well as the magnitude of the pure residual and any of the characteristics of different State economies. In this sense the pure residual can be regarded as random, though it is the result of the cross-effect of growth of different factors and their levels.

Another thing to observe from the Table 7.8 is that the growth of worker rate and the industrial structure play relatively less important part in most of the States in explaining the observed deviation of the actual growth of the State economy and the 'average' growth. In seven of the fifteen States, viz., Andhra Pradesh, Assam, Karnataka, Madhya Pradesh, Punjab, Uttar Pradesh and West Bengal, the growth of worker rate plays a more important part than the growth

of industrial structure in explaining the deviation; in Rajasthan, the two are equally important, while in the rest of the seven States the growth of the industrial structure is more important as compared to the growth of the worker rate. It is also illuminating to compare the contributions of the growth of capital intensity and capital productivity. In only four States, viz., Andhra Pradesh, Bihar, Gujarat and Tamil Nadu, the contribution of the growth of capital intensity is greater than that of capital productivity; in the remaining eleven States, it is the growth of capital productivity which is more dominant as compared to the growth of capital intensity in explaining the deviation. Moreover, it can be seen from the table that barring the case of West-Bengal, the contribution of the growth of capital productivity is not relatively unimportant in any State. It is also worth-noting that the sign of the contribution of the growth of labour productivity and the sign of the deviation to be explained are the same for all the States except Assam, Bihar and Gujarat. In Assam and Bihar, the contribution of the growth of labour productivity is positive and the deviation is negative, while in Gujarat it is the other way round. This only implies that a favourable growth of labour productivity implies a favourable growth of per capita income

also in most of the States except Assam and Bihar; and that an unfavourable growth of labour productivity implies an unfavourable growth of per capita income in the States except Gujarat.

Another interesting exercise to perform on the basis of the Table 7.8 is to classify the fifteen States into various categories of favourable and unfavourable growth of factors. The classification of the fifteen States is given below in a tabular form .

From the classification, it becomes clear that Karnataka and Haryana have experienced a favourable growth of every factor under consideration as compared to the 'average' and hence, it is not surprising to find that these two States have also experienced the highest growth of per capita real income over the last decade. On the other hand, West Bengal is a State where the growth of each factor under consideration is unfavourable as compared to the 'average', however, West Bengal has not experienced the lowest growth of per capita real income since the extent of unfavourableness of the growth of different factors was very much less in West Bengal. Bihar which is the only State to experience a reduction in

	Favourable Growth of Capital Intensity		Unfavourable Growth of Capital Intensity	
	Favourable growth of capital Productivity	Unfavourable growth of capital productivity	Favourable growth of capital Productivity	Unfavourable growth of capital productivity
Favourable Growth of Worker Rate				
Favourable growth of Industrial Structure	Haryana,* Karnataka,	U.P.,	Andhra, Gujarat,	--
Unfavourable Growth of Industrial Structure	Orissa,* Punjab	---	Tamil-Nadu,	
Unfavourable Growth of Worker Rate				
Favourable growth of Industrial Structure	--	M.P.,	Rajas-than,	Mahara-shtra,
Unfavourable Growth of Industrial Structure	Assam,	Bihar, Kerala,	--	West-Bengal.

*In Haryana and Orissa, the contribution of the growth of capital intensity and the contribution of the growth of worker rate respectively is zero, still we have treated them as the favourable growth of the respective factors since the contribution is non-negative.

its per capita real income over the decade had only the growth of capital intensity and hence the growth of labour productivity to be favourable; the growth of every other

factor in Bihar was unfavourable as compared to the 'average', especially, the growth of industrial structure in Bihar turned out to be significantly unfavourable.

It should be noted that only in six States, viz., U.P., M.P., Bihar, Kerala, Maharashtra and West Bengal, the growth of capital productivity turned out to be unfavourable.The first four of these six States are the poor States in India which have simultaneously experienced a favourable growth of capital intensity while the last two States are the rich States in India which have experienced an unfavourable growth of capital intensity also. In fact, barring the cases of Andhra Pradesh and Rajasthan, all other poor States in India have experienced a favourable growth of capital intensity, while Gujarat, Tamil Nadu, Maharashtra and West Bengal - the four better off States in India - have experienced an unfavourable growth of capital intensity over the decade. This does not seem to be merely a coincidence, it rather seems to be due to a deliberate action on the part of the Government. If that is so, Andhra Pradesh and Rajasthan should be regarded as neglected States which demand our immediate attention because both of them have experienced a favourable growth of the capital productivity.

Before we pass on to the next section, it is a worthwhile exercise to compare the above classification with the one presented in the previous Chapter for the levels of the factors in the base year, 1960-61. The comparison can be most systematically summarised by the factor-wise tabular classifications given below :

1. Factor : Overall Worker Rate

	Favourable Level	Unfavourable Level
Favourable Growth	Andhra, Karnataka, Orissa, Tamil Nadu,	Gujarat, Haryana, Punjab, U.P.,
Unfavourable Growth	Assam, M.P., Maharashtra, Rajasthan	Bihar, Kerala, West Bengal.

2. Factor : Industrial Structure

	Favourable Level	Unfavourable Level
Favourable Growth	Gujarat, Maharashtra	Andhra, Haryana, Karnataka, M.P., Rajasthan, U.P.
Unfavourable Growth	Kerala, Punjab, Tamil Nadu, West-Bengal.	Assam, Bihar, Orissa

3. Factor : Capital Intensity

	Favourable Level	Unfavourable Level
Favourable Growth	Haryana, Punjab, U.P.	Assam, Bihar, Karnataka, Kerala, M.P., Orissa.
Unfavourable Growth	Gujarat, Rajasthan, West Bengal	Andhra, Maharashtra, Tamil Nadu

cont...

4. Factor : Capital Productivity

	Favourable Level	Unfavourable Level
Favourable Growth	Assam, Gujarat, Karnataka, Tamil-Nadu	Andhra, Haryana, Orissa, Punjab, Rajasthan.
Unfavourable Growth	Kerala, Maharashtra, West Bengal.	Bihar, M.P., U.P.

5. Factor : Labour Productivity

	Favourable Level	Unfavourable Level
Favourable Growth	Assam, Haryana, Karnataka, Orissa, Punjab.	Bihar, Rajasthan.
Unfavourable Growth	Gujarat, Kerala, Maharashtra, Tamil-Nadu, West Bengal.	Andhra, M.P., U.P.,

In the first place, it can be observed from the above classification that in the case of all the five factors, no block remains unfilled. The implication of this observation is that no systematic hypothesis about the level and the nature of growth of any of these five factors seems to hold except the null hypothesis. It may be the result of deliberate policy of the Government. This contention derives further support from the fact that not a single State shows favourable level and favourable growth in the case of even four out of the five factors considered above. However, Bihar has experienced unfavourable level as well as

unfavourable growth in the case of four out of five factors. Probably for this reason only, the relative position of Bihar has gone from bad to worse over the last decade.

V. Growth of Various Factors and Changing State Income Inequalities in India :

In the previous three sections of the present Chapter, we have made an attempt to examine the growth experience and the growth inequalities of the State per capita income in India. Let us, now, make an attempt to examine the implications of the growth of the various factors on the State income inequalities in India. In the very first place, we can point out that in examining the implications of the growth of various factors on the State income inequalities, two broad questions are involved.The first question is: What is the effect of the actual observed growth of different factors on the State income inequalities over the last decade? In other words, had these factors not grown over the decade what would have been the change in the State income inequalities; and because these factors have actually grown, what is the change in the State income inequalities? The second question is: What is the effect

of the differing growth of each factor on the State income inequalities? In other words, what would have been the State income inequalities in 1970-71, had the factors under consideration grown at the 'average' rate in all the States; and what would have been the State income inequalities, when the factors under consideration grew at the observed rate?

A superfluous look at these questions may lead us to believe that afterall these are not two substantially different questions.However, a detailed look at these questions certainly reveals that the two questions are quite different. In the first of the two questions, we are interested in finding out the contribution of the observed growth of a given factor in the changing State income inequalities; while in the second question, our intention is to find out the contribution of the interstate variations in a given factor in the State income inequalities in the terminal year. Both these questions are important in their own way. In the present section, we make an attempt to examine the first question, while the second question is examined in the next and the last section of the present Chapter.

To investigate about the effects of growth of various factors on the changing State income inequalities in India

over the last decade, we can again fall back on the total and partial approach. We are not interested in the exact contribution of the growth of different factors since our objective is to examine the overall State income inequalities, and not to explain a given deviation. For this purpose, therefore, we have to generate the expected incomes of different states by assuming that only one particular factor grows over the decade in different States (the partial approach); and that only one particular factor does not grow over the decade in different States (the total approach). Precisely these expected incomes have already been derived in the third section above and are presented below in the Appendix Table 7A.1 and the the Appendix Table 7A.2 respectively.

If we calculate the Gini Coefficient of inequality for each one of these series, we get some idea about the broad contribution of the growth of each factor to the changing State income inequalities in India. The Gini Coefficient for expected incomes calculated on the basis of the partial approach should be compared with the Gini coefficient for the observed State per capita incomes in the base year. If the former turns out to be greater, then the growth of that particular factor is said to be unfavourable from the

viewpoint of equity in State income; and if it turns out to be less, then the growth of that particular factor is said to be favourable from the viewpoint of equity in State income. On the other hand, the Gini Coefficient for expected incomes calculated on the basis of the total approach should be compared with the Gini coefficient for the observed State per capita incomes in the terminal year. If the former turns out to be higher, the growth of that particular factor is said to be favourable from the viewpoint of equity in State incomes because had that particular factor not changed, the State income inequalities would have been much greater in 1970-71 than what it actually turned out to be. If the former turns out to be lower, then the growth of that particular factor is said to be unfavourable from the viewpoint of equity in the State incomes. The Gini Coefficients of the expected incomes based on the partial as well as the total contribution approaches are presented in Table 7.9.

The table clearly reveals that except the overall worker rate, the growth in each of the factors under consideration over the last decade is unfavourable from the viewpoint of the equity in State per capita income. Growth in worker rate has turned out to be favourable from the view-

Table 7.9

Gini Coefficients for Expected Incomes due to the Growth of Various Factors

(in per cent)

Expected State Incomes Due only to Growth of	Gini Coefficient of Inequalities	
	Partial Approach	Total Approach
1	2	3
1. Worker Rate	12.4443	14.5410
2. Industrial Structure	13.7069	13.1325
3. Capital Intensity	13.1851	14.2281
4. Capital Productivity	13.9354	13.3875
5. Labour Productivity	13.6090	13.3012
Observed PCI in 1960-61	12.9260	
Observed PCI in 1970-71	14.3306	

Source : Appendix Tables 7A.1 and 7A.2.

point of equity in State income. Another interesting thing to note from the Table 7.9 is that the least unfavourable factor from the viewpoint of the equity in State income is the growth of capital intensity over the decade. This is consistently brought out in both the approaches. However, it remains a fact that, in spite of the Government policy, capital intensity in different States has grown in a way which would increase rather than decrease the State income

inequalities over the decade. It should also be pointed out from the table that the case of the most unfavourable factor is not so unambiguous as the case of the least unfavourable factor from the viewpoint of equity in State income. The Gini Coefficient of inequalities with partial approach is maximum for the expected State incomes due to the growth of capital productivity; while the same with total approach is minimum for the expected State incomes due to the growth of industrial structure. On the basis of this observation, it can be said that, if only one factor is allowed to grow over the decade, the State income inequalities in India would have increased most, had only capital productivity been allowed to grow; while, if only one factor is not allowed to grow over the decade, the State income inequality would have been lowest had the industrial structure remained the same over the period. At the margin, therefore, changes in the industrial structure of the State economies proved to be most unfavourable, whereas individually, the growth of capital productivity proved to be the most unfavourable factor from the viewpoint of equity in State income.

VI. Interstate Variations in Growth of Various Factors and State Income Inequalities in India:

As mentioned in the previous section, our objective in this section is to examine the effect of interstate variations in the growth of different factors on the State income inequalities in India. The fact that different factors are growing in different States in India is accepted. The question is whether the observed growth of a given factor in different States is favourable or unfavourable as compared to the equal growth of that factor in all the States, from the viewpoint of equity in State income. For this purpose, again we can follow a sort of partial approach and total approach. We can generate the expected income in each State for the year 1970-71 such that only one factor grows at the observed rate over the decade, the other factors growing at the respective 'average' rates (partial approach); and that only one factor grows at the 'average' rate over the decade, other factors growing at the respective observed rates (total approach). Precisely these expected incomes are used in the fourth section above and are presented below in the Appendix Tables 7A.4 and 7A.5. Moreover, when we want to compare these expected incomes, especially the expected

especially the expected incomes based on the partial approach, we need the expected income for each State in the year 1970-71 such that all the component factors of the per capita income are growing at their respective 'average' rates. For the sake of curiosity, we can also get the expected income for each State in the year 1970-71 such that the overall per capita income grows at the 'average' rate in each State. These expected incomes are presented below in the Appendix Table 7A.3.

To get an idea of the effects of interstate variations in the growth of different factors on the State income inequalities, we are required to calculate the Gini Coefficient of inequality for all these expected incomes and compare them with the Gini Coefficient of inequality for the observed State per capita incomes in the year 1970-71. If the Gini Coefficient for the expected State income calculated on the basis of the partial approach turns out to be greater than the one for the expected income calculated by taking the 'average' growth for each of the component factor, then we can say that the interstate variation in the growth of that particular factor is unfavourable from the viewpoint of equity in State income. Similarly, if the Gini Coefficient

for the expected State incomes calculated on the basis of the total approach turns out to be less than the one for the observed State per capita incomes in 1970-71, then we can say that the interstate variation in the growth of that factor is unfavourable from the viewpoint of equity in State income. In both cases just described, the opposite sign of inequality between the Gini Coefficients, would imply that the interstate variation in that particular factor is favourable from the viewpoint of equity in State income. Table 7.10 presents the Gini Coefficient of inequality for all the above-mentioned expected State incomes along with the one for the observed State per capita real income in 1970-71.

It can be immediately seen from the table that the interstate variations in the growth of two factors, viz., the industrial structure and the capital productivity, are unfavourable from the viewpoint of equity in State income. On the other hand, interstate variations in the growth of three factors, viz., the overall worker rate, capital intensity and labour productivity, are favourable from the viewpoint of equity in State income. Interstate variations in the growth of capital intensity is most favourable and

Table 7.10

Gini Coefficients for Expected Incomes Due to the Interstate Variations in the Growth of Various Factors

(in Per cent)

Expected State Income Due only to Interstate Variations in Growth of	Gini Coefficient of Inequality	
	Partial approach	Total approach
1	2	3
1. Worker Rate	13.7454	14.5287
2. Industrial Structure	15.3198	13.3359
3. Capital Intensity	12.5492	16.1464
4. Capital Productivity	15.5725	12.8323
5. Labour Productivity	13.6966	14.8481
Expected Income with 'average' Growth of all Components	14.2807	
Expected Income with 'average' Growth of PCI	12.8871	
Observed PCI in 1970-71	14.3306	

Source: Appendix Tables 7A.3, 7A.4 and 7A.5 below.

interstate variations in the growth of capital productivity is most unfavourable for the equity in State income. This implies that had there been equal growth of capital intensity in all the States, the State income inequality would have increased by more than what it actually has over the past decade; while had there been equal growth of capital productivity

in all the States, the State income inequality would have declined instead of increasing over the past decade.

On the other hand, had every other factor grown at the 'average' rate and only capital intensity been growing at the observed rate in different states, the State income inequality would have significantly declined. This only implies that though the growth of capital intensity as such might have been unfavourable, the interstate variation therein has proved to be quite favourable from the point of view of equity in State income. Therefore, the Government policy with respect to the capital intensity was not totally faulty; in fact, it has succeeded significantly in arresting the increasing State income inequalities to its existing level in the year 1970-71. To put it differently, we can say that the Government policy with respect to the capital intensity would have yielded significant positive results in terms of achieving equity in State incomes, had all other factors grown at their respective 'average' rates in all the States. The results of Table 7.10 also imply that the policy could not succeed visibly in reducing the State income disparities largely on account of the interstate growth variations in the capital productivity. Had the Government also taken suffi-

cient care of the technological factors, it might have succeeded in actually reducing the State income inequalities over the decade 1960-61 to 1970-71.

The interstate variation in the growth of overall worker rate and in the labour productivity are also favourable, but their influence does not seem to be so strong, because even if interstate variations in these two factors were granted individually with the 'average' growth of all other factors, it would not have reduced the State income inequality over the decade. On the other hand, the interstate variations in growth of industrial structure is unfavourable, but here again, its influence does not seem to be very powerful, because even when no interstate variation in the growth of industrial structure is allowed, the State income inequality does rise over the decade. These are, therefore, the marginal factors; while capital intensity and capital productivity are really the vital factors, the interstate variations in the growth of which significantly affect the State income inequalities in the terminal year. Another worth-noting thing from the table is that the State income inequalities would have marginally declined over the decade, had the per capita income in each State grown at the 'average'

rate. However, if all the components had grown at their respective 'average' rates, there would not have been significant difference in the extent of the observed State income inequality. Thus, the pure residual seems to be playing an important part in the direction of raising State income inequalities.

Finally, it is important to compare the results of Table 7.10 with the results of the previous Chapter. Two factors, viz., Interstate variations in industrial structure and capital productivity, were found to be unfavourable from the viewpoint of equity in the State income in the base year. The interstate variations in the growth of the same two factors were again found to be unfavourable from the viewpoint of equity in State income. The Government should pay due attention, therefore, to the structural and technological factors while taking important decision about the regional investment policy if movement towards equity in the state income in India is to be achieved in the near future.

Appendix Table 7A.1

Expected State Incomes Due to Growth of Various Factors - Partial Approach

(in Rs.)

States	Expected State per Capita Incomes				
	$A_w y_j$	$A_l y_j$	$A_x y_j$	$A_z y_j$	$A_p y_j$
1	2	3	4	5	6
1. Andhra	286	292	325	306	329
2. Assam	305	342	492	354	464
3. Bihar	203	207	362	196	291
4. Gujarat	353	383	459	367	452
5. Haryana	338	364	469	433	523
6. Karnataka	314	322	420	346	459
7. Kerala	260	285	394	231	338
8. M.P.	240	256	342	227	294
9. Maharashtra	372	414	535	318	424
10. Orissa	210	217	320	247	311
11. Punjab	371	368	531	400	519
12. Rajasthan	243	289	311	333	371
13. Tamil Nadu	334	345	459	350	434
14. U.P.	228	235	316	211	273
15. W.Bengal	379	425	628	396	554

Source: see the text.

Table 7A.2

Expected State Income Due to Growth of Various Factors - Total Approach

(in Rs.)

States	Expected State Per Capita Incomes				
	$A'_w y_j$	$A'_l y_j$	$A'_x y_j$	$A'_z y_j$	$A'_p y_j$
1	2	3	4	5	6
1. Andhra	328	323	300	316	286
2. Assam	410	405	307	368	298
3. Bihar	250	260	163	269	185
4. Gujarat	461	428	355	448	363
5. Haryana	529	491	405	457	342
6. Karnataka	465	452	344	418	317
7. Kerala	322	314	214	354	265
8. M.P.	285	270	205	304	235
9. Maharashtra	441	392	303	511	382
10. Orissa	289	290	224	273	202
11. Punjab	503	515	400	490	365
12. Rajasthan	382	323	298	281	251
13. Tamil Nadu	412	409	321	412	325
14. U.P.	269	262	201	297	225
15. W.Bengal	529	475	328	511	364

Source: See the text.

Appendix Table 7A.3

Relative Growth of Different Factors in the State Economies in India - 1960-61 to 1970-71

States	Primary Sector					Secondary Sector				
	$\frac{dx}{x}$	$\frac{dz}{z}$	$\frac{dl}{l}$	$\frac{dp}{p}$	$\frac{Y_p}{Y}$	$\frac{dx}{x}$	$\frac{dz}{z}$	$\frac{dl}{l}$	$\frac{dp}{p}$	$\frac{Y_s}{Y}$
1	2	3	4	5	6	7	8	9	10	11
1. Andhra	-7.13	9.68	0.56	1.90	54.71	86.64	-24.27	-5.65	41.23	14.41
2. Assam	-9.14	8.65	3.05	-1.06	64.02	296.19	-20.62	-43.95	214.40	14.07
3. Bihar	-4.36	-2.28	7.21	-6.49	53.51	163.10	-28.26	-29.20	88.65	19.73
4. Gujarat	22.99	13.07	-2.00	39.17	39.93	26.41	-22.06	12.46	-1.48	28.73
5. Haryana	8.91	29.73	-0.16	41.22	58.72	131.25	-33.78	17.41	53.13	17.10
6. Karnataka	10.15	4.18	-0.97	14.64	55.36	80.24	15.66	1.53	8.47	16.78
7. Kerala	-0.55	-27.01	16.91	-27.43	53.09	87.58	-5.36	-6.22	77.46	15.65
8. M.P.	6.69	-11.53	1.53	-5.63	58.34	99.34	-25.14	-9.09	49.19	18.40
9. Maharashtra	5.44	-29.14	-2.55	-25.36	41.66	75.93	-25.18	6.24	31.62	25.95
10. Orissa	-5.31	21.40	6.97	15.00	62.05	216.57	-49.42	-12.36	60.15	14.46
11. Punjab	11.33	15.43	7.80	28.49	52.54	147.70	-33.49	-25.74	64.74	22.98
12. Rajasthan	10.36	35.84	-2.41	50.00	54.28	14.42	-16.05	10.47	-3.99	17.96
13. Tamil Nadu	-12.43	4.34	6.60	-8.61	49.20	119.02	-28.40	-4.11	58.84	18.34
14. U.P.	14.80	-6.54	1.68	7.20	59.73	113.26	-35.69	-8.12	37.20	13.95
15. W.Bengal	1.82	0.90	6.11	2.72	31.84	66.29	-14.94	-10.68	41.40	29.45
Total	5.05	-0.78	2.33	4.26	50.36	91.38	-23.25	-6.51	46.84	20.06

(contd)

Appendix Table 7A.3 (contd.)

States	Tertiary Sector					All Sectors				
	$\frac{dx}{x}$	$\frac{dz}{z}$	$\frac{dl}{l}$	$\frac{dp}{p}$	$\frac{Y_T}{Y}$	$\frac{dx}{x}$	$\frac{dz}{z}$	$\frac{dW}{W}$	$\frac{dp}{p}$	$\frac{dy}{y}$
	12	13	14	15	16	17	18	19	20	21
1. Andhra	8.77	9.44	1.75	19.04	30.88	12.30	0.34	- 1.97	12.61	10.27
2. Assam	21.95	- 5.99	9.60	15.07	21.91	34.56	-12.69	-12.73	17.45	2.58
3. Bihar	108.60	-27.23	-27.42	51.83	26.76	43.05	-23.47	-10.80	9.64	- 2.19
4. Gujarat	20.81	- 1.17	0.18	19.48	31.34	25.66	- 1.54	- 5.16	23.70	17.47
5. Haryana	10.16	35.20	- 7.33	48.94	24.18	20.26	22.17	- 6.09	46.95	38.06
6. Karnataka	44.32	12.41	4.00	62.28	27.86	43.04	1.65	- 1.43	45.44	43.57
7. Kerala	87.73	- 6.96	-19.78	74.68	31.26	47.56	-22.14	- 7.02	14.90	6.79
8. M.P.	38.40	- 6.59	- 5.10	29.27	23.26	33.20	-17.85	- 8.15	9.44	0.38
9. Maharashtra	33.36	- 7.29	6.94	23.60	32.39	45.55	-24.84	- 7.58	9.39	0.99
10. Orissa	59.55	16.09	-27.14	85.22	23.49	36.90	- 6.32	- 6.85	28.29	19.56
11. Punjab	8.27	25.75	0.25	36.17	24.48	20.86	11.11	- 0.80	34.25	33.42
12. Rajasthan	12.63	10.99	11.13	25.07	27.76	17.87	16.30	-13.06	37.03	19.00
13. Tamil Nadu	41.95	5.29	-16.36	49.52	32.46	25.42	- 7.47	- 5.79	16.03	9.30
14. U.P.	32.02	- 8.56	- 4.08	20.71	26.32	30.88	-13.46	- 4.04	13.16	8.40
15. W.Bengal	57.08	-16.15	- 6.67	31.72	38.71	41.00	-15.24	-14.29	19.52	2.49
Total	39.65	- 3.20	- 6.18	35.18	29.58	32.02	-10.03	- 6.89	18.74	10.75

Note: i) 'd' stands for absolute change.
ii) For other Symbols, see the text.

Source: Chapters 2 to 5 above.

Appendix Table 7A.4

Expected State Incomes in 1970-71 with the 'Average' Growth. (in Rs.)

States	Expected State PCI in 1970-71	
	With 'Average' Growth of overall PCI (Ay_j)	With 'Average' Growth of Each Component Factor (By_j)
1	2	3
1. Andhra	323	318
2. Assam	387	373
3. Bihar	253	248
4. Gujarat	412	423
5. Haryana	399	391
6. Karnataka	353	348
7. Kerala	310	314
8. M.P.	289	279
9. Maharashtra	446	455
10. Orissa	249	242
11. Punjab	414	420
12. Rajasthan	309	300
13. Tamil Nadu	393	397
14. U.P.	264	256
15. W.Bengal	490	518

Source: See the text.

Appendix Table 7A.5

Expected State Incomes Due to Interstate Variations in Growth of Various Factors - Partial Approach

(in Rs.)

States	Expected State Per Capita Incomes in 1970-71				
	$F_w y_j$	$F_l y_j$	$F_x y_j$	$F_z y_j$	$F_p y_j$
1	2	3	4	5	6
1. Andhra	335	326	275	348	300
2. Assam	350	367	397	393	418
3. Bihar	238	226	293	225	260
4. Gujarat	431	453	383	449	411
5. Haryana	394	406	393	486	479
6. Karnataka	368	361	356	409	415
7. Kerala	313	313	341	284	312
8. M.P.	275	282	284	259	263
9. Maharashtra	451	486	438	397	381
10. Orissa	242	233	263	271	283
11. Punjab	447	409	440	470	480
12. Rajasthan	280	327	266	374	338
13. Tamil Nadu	402	388	383	413	396
14. U.P.	264	257	270	237	249
15. W.Bengal	477	505	517	511	504

Source: See the text.

Appendix Table 7A.6

Expected State Incomes Due to Interstate Variations in Growth of Various Factors - Total Approach

(in Rs.)

States	Expected State Per Capita Incomes in 1970-71				
	$F'_w y_j$	$F'_l y_j$	$F'_x y_j$	$F'_z y_j$	$F'_p y_j$
1	2	3	4	5	6
1. Andhra	306	316	375	295	343
2. Assam	382	392	363	341	344
3. Bihar	233	249	199	248	217
4. Gujarat	429	419	487	409	461
5. Haryana	493	483	500	416	409
6. Karnataka	433	440	451	390	382
7. Kerala	299	311	276	333	312
8. M.P.	266	259	258	282	278
9. Maharashtra	410	377	426	462	482
10. Orissa	269	283	261	251	233
11. Punjab	468	512	496	448	436
12. Rajasthan	356	315	376	264	305
13. Tamil Nadu	383	401	407	376	392
14. U.P.	250	257	245	279	265
15. W.Bengal	492	464	458	464	465

Source: See the text.