CHAPTER –V

FUNCTIONAL SPECIALISATION OF CITIES AND ITS RELATIONSHIP WITH CITY SIZE AND CITY GROWTH

In the previous chapter we analysed the relationship between city size and city growth in India on the basis of 1991-2001 data. In this chapter the relationship between functional specialisation of cities and city growth is examined on the basis of same data for the period 1991-2001. As a related aspect the relationship between city size and functional specialisation of cities is also analysed. This chapter is divided into four sections. In section-I, some related studies are briefly reviewed. The functional specialisation of Indian cities along with data and methodology used for this purpose are discussed in section-II. In section-III, relationship between city size and functional specialisation of city labour force has been analysed and section-IV analyses the impact of functional specialisation on growth of cities.

I. Brief Review of Some Earlier Studies

On the relationship between functional specialisation of cities and city growth and city size only a few studies are available in the literature. These studies are briefly reviewed in this section to provide the necessary background to the present analysis of relationship of functional specialisation of city with city growth and city size in India.

The earliest study on this issue seems to be by Colin Clark \(^1\) entitled “The Economic Functions of a City in Relation to its Size.” In this study he tries to find the relationship between city size and the size of various economic activities performed by city labour force in USA, Great Britain, Canada and Australia. The main objective of this study was to determine the optimum size of the city on the basis of various economic services performed by the labour domiciled in the city. For this purpose he used the “number of workers engaged in an activity per million dollars of income” as an indicator of the relative size of an economic
activity being performed by workers in a city. He considered various economic activities such as “commerce and finance”, “retailing”, “government and education”, “private domestic services”, etc. On the basis of his analysis of data he came to the following main conclusions: (i) that the principal function of a city now (i.e. in the Post First World War Period), is the provision of services rather than manufacturing; (ii) that a region gives its inhabitants an adequate range of services when the population of its main city is between one lakh to two lakh: (iii) that manufacturing tends to be concentrated in the older cities and that in new cities a population size between two to five lakhs is necessary for the development of manufacturing; (iv) that for the optimum performance of municipal services the right size of the city is between one lakh to two lakhs.

Albert J. Reiss Jr. in his study entitled, “Functional specialization of cities” has tried to determine the functional specialization of American cities on the basis of data pertaining to 1950. He divided the cities into two categories: diversified cities and specialized cities. According to him if the labour force of a city is performing various economic activities mainly to cater to the local demand of the population of the city then the city will have a diversified economic structure. On the other hand, if the services and goods produced by the labour domiciled in a city are also sold or exported to residents of other cities and even to residents of foreign countries then it will be a specialized city. He considered the following activities of functional specialisation: manufacturing, wholesale and retail trade, public administration, higher education, transportation, military, entertainment, finance, insurance and real estate, and health services. He used the following criteria to determine the functional specialisation of cities.

(i) If the proportion of labour of a city employed in a particular economic activity is higher than the national proportion of labour in that activity, then the city is said to be specialized in that economic activity;

(ii) If a city falls in the upper quartile on the basis of ranking of all cities by percentage of labour employed in a particular economic activity, then also it is deemed to be specialised in that economic activity.
He also emphasises that many cities may have dual or even triple specialisation when ranked on the basis of the above two criteria. On the basis of his analysis of 1950 U.S. data he found that 50.6 percent of American cities had a single specialisation, and 34.3 percent of the cities had a dual specialisation. His analysis also shows that almost every aspect of city structure is related to its functional specialisation. According to him functional specialisation of a city is a significant determinant of structural differences among city communities.

R. Bradley and J.S. Gans\(^3\) in their study entitled ‘Growth in Australian Cities’ analyse various determinants of city growth in Australia during the 1981-1991 period. Along with many other explanatory variables they also analysed the role of functional specialisation in city growth. For this purpose they used three functional specialization variables, namely “manufacturing employment share in city labour force in 1981”, “government employment share in city labour” and “specialisation in 1981”. The specialization variable was defined in terms of concentration of city workers in a small number of economic activities. Their results revealed that in Australia, during this period, cities whose employment tended to be concentrated in a relatively small number of economic activities experienced relatively lower growth rate of population. They also found that the share of manufacturing employment in city labour did not significantly impact city growth. Similarly, they found that there is a significant negative correlation between share of employment in government sector and growth rate of city population.

The above review of some related studies does provide some clues, but not very clear indications regarding the relationship between functional specialisation of cities and city growth and city size. However, these do indicate that city size is positively related with functional specialisation, and city specialisation in a small number of economic activities adversely impacts its further growth.
II. FUNCTIONAL SPECIALISATION OF INDIAN CITIES

(i) Data and Methodology

To determine the functional specialisation of Indian cities data on functional classification of India’s cities published by Census of India are used. The 1991 census data on labour engaged in various economic activities in each city given in the Census of India publication Functional Classification of India’s Towns are used. The 1991 census gives information on labour engaged in each of the nine industrial categories in each city. These nine industrial categories are grouped into 5 broad economic sectors as shown in chart 5.1. It may be seen that all the service activities are classified into three sub-sectors mentioned at III, IV and V in chart 5.1.

Chart-5.1

Five Fold Classification of Economic Activities

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>Industrial category</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Primary</td>
<td>1. Cultivators</td>
</tr>
<tr>
<td></td>
<td>2. Agricultural Labourers</td>
</tr>
<tr>
<td></td>
<td>3. Livestock, forestry, fishing, hunting, plantation, orchards and allied activities.</td>
</tr>
<tr>
<td></td>
<td>4. Mining and Quarrying</td>
</tr>
<tr>
<td>II. Industry</td>
<td>5. Manufacturing, processing, servicing and repairs.</td>
</tr>
<tr>
<td></td>
<td>(a) Household industry.</td>
</tr>
<tr>
<td></td>
<td>(b) Other than household industry.</td>
</tr>
<tr>
<td></td>
<td>6. Construction</td>
</tr>
<tr>
<td>III. Trade and Commerce</td>
<td>7. Trade and Commerce</td>
</tr>
<tr>
<td>IV. Transport and</td>
<td>8. Transport, Storage and Communications.</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>V. Other services</td>
<td>9. All other services.</td>
</tr>
</tbody>
</table>

For each city the percentage of total main workers in each of these five economic sectors is used for determining the functional specialisation of cities.5

(ii) Criteria of Functional Specialisation

The functional specialisation of cities can be determined by using many different criteria. For example Colin Clark in his study6 used number of workers per million dollars of regional income engaged in various economic activities in a city for determining the functional specialisation of cities. If the number of workers engaged in an economic activity, per million dollars of regional income, is found to be above the national average, then this was taken as an indication of specialisation of the city in that economic activity. Albert J. Reiss, on the other hand used percent of workers engaged in an economic activity as the indicator for identifying the specialisation of cities. When a city has a much larger proportion of labour employed in an economic activity than the national average of the cities of the same size, then it was called specialised in that particular economic activity.7 It may be seen that most of these criteria have a similar logic at their base. The working population (labour) residing in a city is producing various goods and services mainly to satisfy the demands of the residents of that city. But in cities that are specialized in some economic activity the labour engaged in the production of that particular type of goods and services not only satisfies the local demand of the residents of that very city, but also demand of residents of many other cities and surrounding rural communities and even residents of foreign countries. In a way the specialised city exports the goods and services of a particular type, in which it specializes, to other cities and surrounding rural communities. The economic activities carried out to satisfy the local demand constitute the maintenance activity of residents of that community. For example these will include activities such as construction, public utilities, sanitary services, transportation and retail trade, etc necessary to maintain the level of living of the people of the city. The export activity of a city, by contrast, depends on extra local demand for goods and services produced and exported by the city, and consumed
by people living in other cities and communities. The city-wise data on quantity/volume of goods and services produced in each city and exported from it are not available in India. So this method could not be used. As an alternative an unusually high percentage of city labour employed in a particular economic activity is used to measure the specialisation of the city. When a city has a much larger proportion (percent) of its labour force engaged in a particular economic activity than the average of all the cities, then it may be presumed to export part of the goods and services produced by that economic activity and therefore one can say that it specialises in that economic activity. More specifically, to determine the functional specialisation of Indian cities we have used a slightly modified version of the criteria used in the above mentioned 1991 census of India publication on functional classification of cities. These criteria are the following:⁸

(i) If the proportion (percent) of workers engaged in an economic activity (out of the five mentioned above) is 40 percent or more (of the total workers of the city), then it is presumed to be specialised in that particular economic activity.

(ii) If the proportion (percent) of workers in each of any two or more than two economic activities, out of the five mentioned above (Chart 5.1), is between 30 percent to 39 percent of the total workers of the city then it is presumed to be specialized in those two or three economic activities.

It may be mentioned that the mean, (for all the cities) of percent of labour engaged in each of the five economic activities is less than 30 percent (Table 5.1).

The set of 2673 Indian cities which was used in the previous chapters and on which population data both for 1991 and 2001 and functional classification data for 1991 were available was used for demarcating the functional specialization of Indian cities for this purpose. All the cities were arranged in ascending order of proportion of labour force engaged in each of the above mentioned five economic activities/sectors. Then by using the above mentioned two criteria the number of cities specializing in a single economic activity, and in
two or more than two economic activities was determined. All the remaining cities are presumed to have diversified economic/functional structure.

(iii) **Functional Classification of Indian Cities**

The functional classification of Indian cities in terms of the five broad economic sectors mentioned above and on the basis of 1991 census data is summarized in table 5.1. The distribution of cities on the basis of percent of labour force in each of the five economic sectors is presented in this table. It may be seen that ‘Transport & Communication’ activities are almost evenly distributed in all the cities; as 86.79 percent of all cities were having 9 percent or less of their labour force employed in this sector.

**Table-5.1**

**Functional Classification of Indian Cities**
*(Based on 1991 census data)*

<table>
<thead>
<tr>
<th>S.No</th>
<th>Percent of Labour Force</th>
<th>Number and Percent of Cities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary</td>
<td>Industry</td>
</tr>
<tr>
<td>1.</td>
<td>Upto 9%</td>
<td>409 (15.30)</td>
</tr>
<tr>
<td>2.</td>
<td>10% to 19%</td>
<td>627 (23.46)</td>
</tr>
<tr>
<td>3.</td>
<td>20% to 29%</td>
<td>492 (18.41)</td>
</tr>
<tr>
<td>4.</td>
<td>30% to 39%</td>
<td>393 (14.70)</td>
</tr>
<tr>
<td>5.</td>
<td>40% and above</td>
<td>752 (28.13)</td>
</tr>
<tr>
<td>6.</td>
<td>All</td>
<td>2673 (100.00)</td>
</tr>
</tbody>
</table>

*Note: Figures in brackets are percentages.*
In the case of ‘Other Services’ sector the biggest number of cities is having 10 to 29 percent of the labour force in this activity; 74.33 percent of all cities were having their total labour employed in other services in this range. Similar is the case of ‘Trade and Commerce’ economic sector, 78.6 percent of all cities were having 10 to 29 percent of their total labour deployed in this economic sector. The ‘Industry Sector’ also displays a similar pattern, as 70.44 percent of cities were having 10 percent to 29 percent of their labour force working in industry. The Primary Sector, however, displayed a more dispersed pattern; as only 41.87 percent of the cities were having 10 percent to 29 percent of their labour force in the primary sector. On the basis of information presented in table 5.1 it may be concluded that, except for the ‘Primary Sector’ and the ‘Transport and Communication’ sector, in all the other three economic sectors about three-fourth of the cities were having 10 to 29 percent of their labour force working in each of these three sectors. In the ‘Transport and Communication’ sector almost all the cities (98.31 percent) were having 19 percent or less of labour force engaged in this activity. The proportion of labour force engaged in primary sector does not show any marked concentration; the number of cities in each of the five ranges of labour force proportion is between 14 to 29 percent.

The functional specialization of Indian cities was demarcated on the basis of the two criteria mentioned earlier. On the basis of those criteria the number and proportion of mono-specialized cities (with 40 percent or more of labour force in one economic sector), and dual specialisation cities (with 30 percent to 39 percent of labour force in each of two of more economic sectors), was worked out. This information is presented in table 5.2. It may be seen that 44.93 percent of all cities were mono-specialised cities, with 40 percent or more of their labour force in one of the above mentioned five economic sectors. However, only 6.51 percent of all cities were found to have dual-specialisation in the sense that these have 30 percent to 39 percent of their labour force in each of the two economic sectors. This indicates that in these dual-specialization cities 60 percent or more of the
Table 5.2

Functional classification of Indian Cities: Specialised and Diversified Cities

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Functional specialisation Type</th>
<th>Number of cities</th>
<th>Proportion of cities (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mono specialisation cities (with 40 percent or more labour force in one functional category)</td>
<td>1201</td>
<td>44.93</td>
</tr>
<tr>
<td>2.</td>
<td>Dual specialisation cities (with 30 to 39 percent of labour force in each of two functional categories)</td>
<td>174</td>
<td>6.51</td>
</tr>
<tr>
<td>3.</td>
<td>Diversified cities</td>
<td>1298</td>
<td>48.56</td>
</tr>
<tr>
<td>4.</td>
<td>All cities</td>
<td>2673</td>
<td>100.00</td>
</tr>
</tbody>
</table>

labour force was working only in two economic sectors. The remaining 48.56 percent of all cities can be called diversified cities because in these cities no single economic sector was employing 40 percent or more labour force; nor any two economic sectors were employing 60 percent or more of the labour force. So in these 48.56 percent cities labour force was more or less evenly distributed in all the five economic sectors and consequently these were having a diversified economic structure. The great difference in the proportion of mono-specialisation cities (44.93 percent of all) and dual – specialization cities (6.51 percent of all) suggests that among the specialised cities mono specialisation predominates. A specialized city is usually a city specialised in one particular type of economic activity.
Mono-Specialisation Cities

The sector-wise (in terms of five economic sectors) employment of labour in the 44.93 percent mono specialised cities was further probed, and the results of that exercise are displayed in table 5.3. It may be seen that 5.99 percent of all cities (160 in number) have 40 percent or more labour force employed in the ‘Other Services’ economic sector. So these can be labelled as having ‘specialised’ in other services economic sector. Similarly 8.72 percent of all cities were having 40 percent or more of their labour force employed in ‘Industry’ and these can be deemed to have specialised in industrial production. The ‘Trade and Commerce’ sector employs 40 percent or more labour force in only 1.87 percent of all cities (50 in number) and therefore these cities can be called having specialised in Trade and Commerce. Only 0.22 percent (6 in number) of all cities are having 40 percent or more labour force employed in ‘Transport and Communication’ economic sector.

Table 5.3

Mono Specialisation Cities: Distribution by Specialisation Activity
(With 40 percent or more Labour Force in One Functional Activity)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Functional specialisation</th>
<th>Number of cities</th>
<th>Proportion of all cities (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Other services</td>
<td>160</td>
<td>5.99</td>
</tr>
<tr>
<td>2.</td>
<td>Trade &amp; Commerce</td>
<td>50</td>
<td>1.87</td>
</tr>
<tr>
<td>3.</td>
<td>Transport &amp; communication</td>
<td>6</td>
<td>0.22</td>
</tr>
<tr>
<td>4.</td>
<td>Industry</td>
<td>233</td>
<td>8.72</td>
</tr>
<tr>
<td>5.</td>
<td>Primary</td>
<td>752</td>
<td>28.10</td>
</tr>
<tr>
<td>6.</td>
<td>All</td>
<td>1201</td>
<td>44.93</td>
</tr>
</tbody>
</table>

These cities can be called having specialised in Transport and communication economic sector. The biggest proportion of cities (28.10 percent of all cities) is found to have 40 percent or more of the labour force employed in the ‘Primary Sector’. It means in these 28.10 percent cities the primary sector
economic activities dominate the scene, as 40 percent or more of the labour force of each of these cities is working in the primary sector.\(^9\)

\[(b) \textbf{Dual-Specialisation Cities}\]

On the above lines the economic structure of dual specialisation cities, mentioned above, was also probed further and the results of that exercise are presented in table 5.4. It may be seen from this table that in 1.83 percent of all cities 60 percent or more labour is employed in ‘Primary and Industry’ economic sectors; which means these two economic activities dominate the economy of these cities. Similarly, in 1.83 percent of all cities ‘Primary Sector’ and ‘Other Services’ sector dominate the economic scene with 60 percent or more of the labour force of the cities employed in these two economic activities. On the same lines ‘Primary’ sector and ‘Trade and Commerce’ sector dominate in 24 (0.89 percent) cities; ‘Industry’ and ‘Other Services’ dominate in 22 (0.82 percent) cities; ‘Trade and Commerce’ and Other Services’ dominate in 18 (0.67 percent) cities; ‘Industry and Trade and Commerce’ dominate in 6 (0.22 percent) cities; and ‘Industry’ and ‘Transport and Communication’ sector dominate in 6 (0.22 percent) of all cities. So this is the detailed distribution of 174 (6.51 percent) cities which have dual-specialisation in the sense that 60 percent or more of the city labour force is employed in only two economic activities.

The detailed analysis of functional classification and functional specialisation of Indian cities presented in this section has revealed that 44.93 percent of Indian cities are mono-specialised having 40 percent or more of their labour force employed in one of the five economic sectors; 6.15 percent cities have dual-specialisation with 30 percent or more of labour force working in each of the two economic activities dominating the economy of these cities. The remaining 48.56 percent cities are having a more diversified occupational structure where none of the five economic activities mentioned above dominates.
Table-5.4

Dual Specialisation Cities: Distribution by Specialisation Activities
(Cities with 30% to 39% Labour Force in Each of Two Functional Activities)

<table>
<thead>
<tr>
<th>Specialisation Activities</th>
<th>Number of cities</th>
<th>Percentage of cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary and Industry</td>
<td>49</td>
<td>1.83</td>
</tr>
<tr>
<td>Primary and Trade</td>
<td>24</td>
<td>0.89</td>
</tr>
<tr>
<td>Primary and Services</td>
<td>49</td>
<td>1.83</td>
</tr>
<tr>
<td>Industry and Services</td>
<td>22</td>
<td>0.82</td>
</tr>
<tr>
<td>Trade and Services</td>
<td>18</td>
<td>0.67</td>
</tr>
<tr>
<td>Industry and Trade</td>
<td>6</td>
<td>0.22</td>
</tr>
<tr>
<td>Industry and Transport</td>
<td>6</td>
<td>0.22</td>
</tr>
<tr>
<td>Primary and Transport</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trade and Transport</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trade and Services</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>All</td>
<td>174</td>
<td>6.51</td>
</tr>
</tbody>
</table>

III. RELATIONSHIP BETWEEN CITY SIZE AND FUNCTIONAL SPECIALISATION

Before analysing the impact of functional specialization of cities on city growth it will be useful to analyse the relationship between city size and functional/occupational structure of the cities. This exercise will help us in finding
out whether there is any positive or negative relationship between labour force employed in particular economic sector e.g. Trade and Commerce and the size of the city. For analysing the relationship between city size and functional/occupational structure of the city, the data on the percent of labour force employed in each of the five broad economic sectors mentioned earlier is classified according to city size. The seven size classes of cities, used in the previous chapters, have been used for this purpose. The results of this exercise are presented in table 5.5. The mean percent of labour force employed in each of the five economic sectors in the complete set of 2673 cities is as follows: Primary sector (29.19 percent), Industry sector (21.56 percent), Trade and Commerce (21.0 percent), Transport and Communication (6.03 percent) and Other Services sector (22.45 percent). On the basis of these mean figures the ‘Primary sector’ emerges as the biggest employer of labour force in Indian cities. The ‘Other Services’ sector comes second, and Industry, and Trade and Commerce sectors are almost bracketed in the third position, and the Transport and Communication sector is the last and the smallest with only 6.03 percent of labour force employed in this sector. The information given in table 5.5 seems to indicate no clear relationship between city size and functional/occupational structure of city except in case of industry. The percent of labour force employed in industry rises consistently as we move from the smallest size class cities (less than 5000 population) to metropolitan cities with 10 lakh and above population. In the case of percent of labour force employed in the primary sector an inverse relationship with city size is visible, but it is not fully clear from the data displayed in the table. Similarly, in the case of transport & communication sector there is some indication of a mild positive relationship between city size and percent of labour force employed in this sector, but it is not very clear. Both in the case of trade and commerce sector, and the other services sector no clear relationship of specialization in these two sectors with city size is visible in the data presented in table 5.5.
### Table 5.5

**Functional Classification of Cities by City Size**

<table>
<thead>
<tr>
<th>Size class of city</th>
<th>City size in 1991 Mean Population (000)</th>
<th>Percent of Labour Force in (Mean)</th>
<th>Primary</th>
<th>Industry</th>
<th>Trade &amp; Com.</th>
<th>Transport &amp; Com.</th>
<th>Other Services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>(Less than 5000)</td>
<td>3.57 (1.14)</td>
<td>27.31 (21.87)</td>
<td>14.70 (6.60)</td>
<td>21.27 (10.77)</td>
<td>4.41 (3.09)</td>
<td>32.06 (16.97)</td>
</tr>
<tr>
<td>5</td>
<td>(5000 to 9999)</td>
<td>7.78 (1.38)</td>
<td>38.45 (21.50)</td>
<td>18.09 (14.31)</td>
<td>18.58 (10.32)</td>
<td>3.99 (5.29)</td>
<td>20.63 (11.83)</td>
</tr>
<tr>
<td>4</td>
<td>(10,000 to 19,999)</td>
<td>14.77 (2.86)</td>
<td>35.40 (18.61)</td>
<td>19.77 (13.07)</td>
<td>19.63 (8.88)</td>
<td>4.79 (3.92)</td>
<td>20.44 (10.13)</td>
</tr>
<tr>
<td>3</td>
<td>(20,000 to 49,999)</td>
<td>30.79 (8.24)</td>
<td>28.78 (16.41)</td>
<td>21.22 (11.07)</td>
<td>21.23 (6.99)</td>
<td>6.61 (4.57)</td>
<td>22.16 (9.36)</td>
</tr>
<tr>
<td>2</td>
<td>(50,000 to 99,999)</td>
<td>68.3 (13.80)</td>
<td>18.55 (13.30)</td>
<td>25.58 (12.70)</td>
<td>23.32 (6.66)</td>
<td>7.88 (4.24)</td>
<td>24.68 (9.49)</td>
</tr>
<tr>
<td>1</td>
<td>(1 lakh to 9,99,999)</td>
<td>252.21 (191.80)</td>
<td>12.86 (10.09)</td>
<td>28.87 (11.96)</td>
<td>22.39 (5.22)</td>
<td>9.04 (3.798)</td>
<td>26.85 (9.00)</td>
</tr>
<tr>
<td>0</td>
<td>(10 lakh and above)</td>
<td>3086.8 (3306.2)</td>
<td>4.74 (3.06)</td>
<td>36.13 (9.88)</td>
<td>22.61 (3.33)</td>
<td>8.96 (2.58)</td>
<td>27.26 (8.07)</td>
</tr>
<tr>
<td>All Cities</td>
<td></td>
<td>70.9</td>
<td>29.19</td>
<td>21.56</td>
<td>21.0</td>
<td>6.03</td>
<td>22.45</td>
</tr>
</tbody>
</table>

**Note:**

1. *Figures in brackets are Standard Deviations.*
2. The row wise proportion of labour force employed in each sector may not total to exact 100 percent due to rounding errors.
To explore further the relationship between city size and percent of labour force employed in each of the five economic sectors, regression analysis was used. More specifically the following simple regression models were estimated.\textsuperscript{10}

\begin{align*}
Y &= a + b \times + e \\
Y &= A + B \log X + E
\end{align*}

Where \(Y\) is percent of labour force in each of the five economic sectors and \(X\) is city size in 1991.

<table>
<thead>
<tr>
<th>Functional specialisation</th>
<th>Dependent Variable</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>t-Value</th>
<th>R-Sqr</th>
<th>Number of observations</th>
<th>Equation Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Percent of labour force in primary</td>
<td>29.680</td>
<td>-0.007</td>
<td>-7.768*</td>
<td>0.022</td>
<td>2673</td>
<td>1</td>
</tr>
<tr>
<td>Industry</td>
<td>Percent of labour force in Industry</td>
<td>21.282</td>
<td>0.004</td>
<td>6.303*</td>
<td>0.015</td>
<td>2673</td>
<td>2</td>
</tr>
<tr>
<td>Trade and commerce</td>
<td>Percent of labour force in Trade &amp; commerce</td>
<td>20.756</td>
<td>0.001</td>
<td>1.808*</td>
<td>0.001</td>
<td>2673</td>
<td>3</td>
</tr>
<tr>
<td>Transport and communication</td>
<td>Percent of labour force in transport &amp; communication</td>
<td>5.954</td>
<td>0.001</td>
<td>4.798*</td>
<td>0.009</td>
<td>2673</td>
<td>4</td>
</tr>
<tr>
<td>Other Services</td>
<td>Percent of labour force in other services</td>
<td>22.365</td>
<td>0.001</td>
<td>2.641*</td>
<td>0.003</td>
<td>2673</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: \(a\) and \(c\) indicate respectively significant at 1% and 10% levels for a two tailed test.
Table 5.7  
Relationship of City Size with Functional Specialisation:  
Regression Results – II  

Independent Variable: Log City Size

<table>
<thead>
<tr>
<th>Functional specialisation</th>
<th>Dependent variable</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>t-value</th>
<th>R-sqr</th>
<th>Number of observations</th>
<th>Equation Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Percent of labour force in primary</td>
<td>51.791</td>
<td>-6.969</td>
<td>-22.531</td>
<td>0.16</td>
<td>2673</td>
<td>1</td>
</tr>
<tr>
<td>Industry</td>
<td>Percent of labour force in industry</td>
<td>10.830</td>
<td>3.306</td>
<td>15.115</td>
<td>0.079</td>
<td>2673</td>
<td>2</td>
</tr>
<tr>
<td>Trade and commerce</td>
<td>Percent of labour force in trade &amp; commerce</td>
<td>17.598</td>
<td>0.989</td>
<td>6.899*</td>
<td>0.018</td>
<td>2673</td>
<td>3</td>
</tr>
<tr>
<td>Transport and communication</td>
<td>Percent of labour force in transport and communication</td>
<td>1.403</td>
<td>1.426</td>
<td>18.588*</td>
<td>0.115</td>
<td>2673</td>
<td>4</td>
</tr>
<tr>
<td>Other services</td>
<td>Percent of labour force in other services</td>
<td>18.150</td>
<td>1.218</td>
<td>6.589*</td>
<td>0.016</td>
<td>2673</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: * indicates significant at 1% level; for a two tailed test.

The results of the regression exercise are presented in tables 5.6 and 5.7. Out of the two models estimated the semi-log form seems to be a better fit on account a substantial bigger R-square in each of the five economic sectors. It may be seen from equation one in tables 5.6 and 5.7 that the regression coefficient of city size is negative and significant at 1 percent level whether we take city size in normal form or in log form. This result suggests clearly a significant negative relationship between city size and percent of labour force employed in the primary sector. It means as a city grows in size the relative weight of the primary sector, (i.e. percent of labour force employed in the primary sector), in the economic structure of the city declines. The impact of city size on the relative importance of
industry in the economic structure of city is also clearly revealed by equation 2 in tables 5.6 and 5.7. It may be seen that regression coefficient of city size, when percent of labour employed in industry is the dependent variable, is positive and significant at 1 percent level. As cities become bigger the relative weight of industrial activity in their economic structure increases. In the case of Trade and Commerce also a positive relationship between city size and percent of labour force in this economic sector is indicated by the results given in tables 5.6 and 5.7. However, these results are not as robust as in the case of Primary and Industry economic sectors discussed earlier. In the case of Trade and Commerce economic sector the positive regression coefficient of city size is significant only at 10 percent level in table 5.6, in which city size independent variable is inserted in normal form. However, when city size independent variable is entered in log form (table 5.7), the t-value of the regression coefficient of this variable rises markedly and it becomes significant at 1 percent level. In the case of Transport and Communication sector results given in tables 5.6 and 5.7 clearly suggest a positive significant relationship between city size and percent of labour force employed in Transport and Communication sector. So is the case in the other services economic sector, because the regression coefficient of city size variable is positive and significant at 1 percent level whether we take city size independent variable in normal form or log form.

On the basis of regression results presented in tables 5.6 and 5.7, the following broad conclusion can be derived.

1. Percent of labour force employed in primary sector declines as city becomes bigger.
2. Percent of labour force employed in Industry, Trade and Commerce, Transport and Communication, and Other Services sector rises as city becomes bigger.
3. As cities become bigger, the percent of labour force employed in industry increases the fastest and that in Trade and Commerce the slowest.

IV. IMPACT OF FUNCTIONAL SPECIALISATION ON GROWTH OF CITIES

In this section the impact of functional specialisation on growth of cities is analysed with the help of regression analysis. For this purpose the following simple regression models are used.\textsuperscript{11}

1. \( Y = a + bx + e \)
2. \( Y = A + B \log x + E \)

Where \( Y \) = growth rate of cities during 1991-2001 period
\( X \) = percent of labour force in cities, one by one, employed in the following five economic sectors.

1. Labour force in Primary sector.
2. Labour force in Industry sector.
5. Labour force in Other Services Sector.

The all-India results are discussed in sub-section (A) and the results for the 16 major Indian states are discussed in sub-section (B).

(A) All-India Results

The regression results on the impact of functional specialisation of cities on growth of cities in India as a whole are presented in table 5.8. It may be recalled from the previous chapter that the number of cities for which we have complete 1991-2001 data is 2673, and these all-India results are based on this set of 2673
observations. It may be seen from results presented in table 5.8 that the regression coefficient of percent of labour force in Primary Sector variable is negative and significant at 1 percent level, both when the independent variable is taken in normal form as well as when it is taken in log form. This result clearly suggests that in the cross-section of Indian cities, the city growth rate during 1991-2001 period declined as the percent of labour force employed in Primary sector in a city increased. This means that cities dominated by primary sector economic activities grew at a slower rate, on an average, than cities in which this economic activity was smaller.

### Table – 5.8

**Impact of Functional Specialisation on Growth of City: Univariate Results**  
**Dependent Variable: Growth Rate of City**  
**Number of Observations: 2673**

<table>
<thead>
<tr>
<th>Functional specialisation</th>
<th>Independent variable</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>t-value</th>
<th>R-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>Percent of labour force in primary</td>
<td>2.642</td>
<td>-0.012</td>
<td>-5.998a</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>Log percent of labour force in primary</td>
<td>2.912</td>
<td>-0.261</td>
<td>-5.357a</td>
<td>0.011</td>
</tr>
<tr>
<td>Industry</td>
<td>Percent of labour force in industry</td>
<td>2.178</td>
<td>-0.004</td>
<td>-1.192</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Log percent of labour force in industry</td>
<td>1.867</td>
<td>0.080</td>
<td>1.139</td>
<td>0.000</td>
</tr>
<tr>
<td>Trade and commerce</td>
<td>Percent of labour force in trade and Commerce</td>
<td>1.220</td>
<td>0.042</td>
<td>8.776a</td>
<td>0.028</td>
</tr>
<tr>
<td></td>
<td>Log percent of labour force in trade and commerce</td>
<td>-0.166</td>
<td>0.770</td>
<td>9.344a</td>
<td>0.032</td>
</tr>
<tr>
<td>Transport and communication</td>
<td>Percent of labour force in transport and communication</td>
<td>2.058</td>
<td>0.007</td>
<td>0.776</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>Log percent of labour force in transport and communication</td>
<td>1.836</td>
<td>0.168</td>
<td>2.911a</td>
<td>0.003</td>
</tr>
<tr>
<td>Other services</td>
<td>Percent of labour force in other services</td>
<td>1.661</td>
<td>0.019</td>
<td>5.172a</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>Log of percent of labour force in other services</td>
<td>0.354</td>
<td>0.580</td>
<td>6.934a</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Note: a indicates significant at 1% level for a two tailed test.
The impact of percent of labour force employed in Industry on growth of Indian cities fails to find reflection in the regression results presented in table 5.8. The regression coefficient of Percent of Labour Force in Industry Variable is not only not significant even at 10 percent level, irrespective of the form of the independent variable, but also takes opposite signs in the two estimated regression equations. From this result one may suggest that functional specialisation in Industrial activity did not have any significant impact on the growth rate of cities in India during 1991-2001 period.

The regression results presented in table 5.8 show a highly significant positive impact of specialisation in Trade and commerce on the growth of cities in India during 1991-2001 period. It may be observed from this table that the regression coefficient of percent of labour force in Trade and Commerce variable has consistent positive sign in both the equations and quite high ‘t-value’ indicating significance at 1 percent level. This suggests that cities that were specialized in Trade and Commerce activity grew at a faster rate than others not so specialized during 1991-2001 period.

The impact of specialisation in Transport and Communication economic activity on the growth of cities is suggested by the regression results, but not fully confirmed. It may be observed from the regression results that the coefficient of Percent of labour force in Transport and Communication variable has positive sign in both the equations, but is significant (at 1 percent level) only when the independent variable is taken in log form. When the independent variable is taken in ‘normal form’ the t-value attached to the coefficient is not significant even at 10 percent level. So the positive impact of percent of labour force in Transport and communication variable on city growth in indicated, but not fully established by the regression results.

The impact of functional specialisation in the Other Services sector is very clearly established by the regression results presented in table 5.8. The regression coefficient of Percent of labour force in Other Services Sector variable has a consistent positive sign and is significant at 1 percent level in both the equations.
On the basis of this result we may suggest that Indian cities that were specialized in the provision of Other Services grew at a significantly higher rate during the 1991-2001 period, than others that were not specialised in this type of economic activity.

To sum up the all India results we can say that specialisation in Trade and Commerce and Other Services economic activities had a positive significant impact on city growth during 1991-2001 period, but specialisation in the Primary Sector economic activities adversely impacted city growth. The growth of cities was not significantly influenced during this period by specialisation in Industrial activity and the impact of specialisation in Transport and Communication sector on city growth is indicated, but not clearly established by the regression results.

(B) State-wise Results

The impact of functional specialisation of cities on city growth was also analysed separately for each of the 16 major Indian states. These results are reported in tables 5.9 to 5.13 for each of the five functional specialisation categories separately. The same two regression equations given earlier are estimated for each of the 16 major states. These results are discussed below for each of the functional specialisation category separately.

(i) Impact of functional specialisation in Primary sector on city growth

The regression results on the impact of percentage of labour force in primary sector on city growth rate for each of the sixteen major states are presented in table 5.9. It may be seen from this table, that in thirteen out of the sixteen states the regression coefficient of percent of labour force in primary sector variable has a negative sign, in both the equations, and in the case of 9 of these states it is also significant at 10 percent or higher level. In the remaining three states the regression coefficient of this variable has a positive sign, but is significant only in one case (Himachal Pradesh), that too only in one of the two equations. Taking an overall view of these state-wise results, in the light of the all-India results, on the impact of percent of labour force in primary sector on city growth...
growth, we may conclude that the negative relationship between functional specialisation in primary sector and city growth is observed in most of the of Indian states.

Table 5.9
Impact of Specialisation in Primary Sector on City Growth: State-Wise Regression Results

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>State</th>
<th>Independent variable form</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>$R^2$</th>
<th>Number of observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>Natural form</td>
<td>2.419</td>
<td>-0.023(-2.086)$^b$</td>
<td>0.033</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.976</td>
<td>-0.376(-1.656)$^c$</td>
<td>0.018</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Assam</td>
<td>Natural form</td>
<td>2.395</td>
<td>0.023(0.619)</td>
<td>0.007</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.159</td>
<td>0.229(0.542)</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Bihar</td>
<td>Natural form</td>
<td>2.681</td>
<td>-0.021(-1.813)$^c$</td>
<td>0.022</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>3.755</td>
<td>-0.544(-1.656)$^c$</td>
<td>0.018</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Gujarat</td>
<td>Natural form</td>
<td>2.366</td>
<td>-0.026(-1.207)</td>
<td>0.010</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>3.257</td>
<td>-0.509(-1.376)</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Haryana</td>
<td>Natural form</td>
<td>3.728</td>
<td>-0.026(-1.653)$^c$</td>
<td>0.029</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>4.424</td>
<td>-0.453(-1.690)$^c$</td>
<td>0.030</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Himachal Pradesh</td>
<td>Natural form</td>
<td>2.428</td>
<td>0.022(0.846)</td>
<td>0.019</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.615</td>
<td>0.489(1.747)$^c$</td>
<td>0.055</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Karnataka</td>
<td>Natural form</td>
<td>2.450</td>
<td>-0.010(-2.092)$^b$</td>
<td>0.023</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.768</td>
<td>-0.195(-1.780)$^c$</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Kerala</td>
<td>Natural form</td>
<td>2.312</td>
<td>-0.039(-1.176)</td>
<td>0.026</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>4.537</td>
<td>-1.018(-1.165)</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Maharashtra</td>
<td>Natural form</td>
<td>3.023</td>
<td>-0.026(-4.541)$^a$</td>
<td>0.083</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>4.245</td>
<td>-0.645(-5.043)$^a$</td>
<td>0.100</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Madhya Pradesh &amp;</td>
<td>Natural form</td>
<td>2.790</td>
<td>-0.018(-4.131)$^a$</td>
<td>0.057</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td>Chhattisgarh</td>
<td>Log Form</td>
<td>3.597</td>
<td>-0.425(-3.528)$^a$</td>
<td>0.042</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Orissa</td>
<td>Natural form</td>
<td>2.184</td>
<td>-0.010(-0.702)</td>
<td>0.006</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.587</td>
<td>-0.081(-0.224)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Punjab</td>
<td>Natural Form</td>
<td>2.852</td>
<td>-0.015(-1.688)$^c$</td>
<td>0.021</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>3.336</td>
<td>-0.293(-1.662)$^c$</td>
<td>0.018</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Rajasthan</td>
<td>Natural form</td>
<td>2.531</td>
<td>-0.010(-0.834)</td>
<td>0.004</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.346</td>
<td>-0.024(-0.992)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Tamil Nadu</td>
<td>Natural form</td>
<td>1.370</td>
<td>-0.017(-2.588)$^a$</td>
<td>0.032</td>
<td>206</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.696</td>
<td>-0.264(-1.963)$^b$</td>
<td>0.015</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Uttar Pradesh &amp;</td>
<td>Natural form</td>
<td>2.769</td>
<td>-0.009(-3.673)$^a$</td>
<td>0.021</td>
<td>629</td>
</tr>
<tr>
<td></td>
<td>Uttarakhand</td>
<td>Log Form</td>
<td>3.048</td>
<td>-0.173(-2.922)$^a$</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>West Bengal</td>
<td>Natural form</td>
<td>1.027</td>
<td>0.006(0.256)</td>
<td>0.001</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.122</td>
<td>0.007(0.017)</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

Note: (1) Figures in brackets are t-values
(2) a,b,c indicate significant at 1%, 5%, 10% levels for a two tailed test.
The state-wise regression results on the impact of percent of labour force in industry on city growth are presented in table 5.10. These results do not show any consistent pattern of relationship between percent of labour force in Industry and city growth rate. Out of the 32 estimated regression equations presented in this table, in 9 equations the sign of the regression coefficient is negative, and in the remaining 23 it is positive. Similarly in the case of some states the coefficient in one equation is positive and in the other negative, e.g., Andhra Pradesh. In the case of Assam and West Bengal a negative significant relationship between percent of labour force in industry and city growth is shown by these regression results. On the other hand, in the case of following states a significant positive (at different levels of confidence) relationship between percent of labour force in industry and city growth is suggested by the results: Haryana, Maharashtra, and Tamil Nadu. In the case of the following states a significant positive relationship between the two variables is suggested by the log form of the regression equation estimated: Karnataka, Punjab, Uttar Pradesh, and Madhya Pradesh. The above description of results clearly shows that the impact of percent of labour force in industry on city growth is not consistent across the 16 major Indian states, rather considerable variation in this relationship is observed among the states. These heterogeneous state wise results, seen in relation to the all-India results on the impact of this variable on city growth presented in Table 5.8, suggest that though a positive impact is indicated, but nothing definitive can be said about how city specialisation in industry influences city growth.
### Table 5.10

**Impact of Specialisation in Industry on City Growth:**

**State-Wise Regression Results**

**Independent Variable:** Percent of Labour Force in Industry  
**Dependent Variable:** Growth Rate of City

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>State</th>
<th>Independent variable form</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>$R^2$</th>
<th>Number of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>Natural form</td>
<td>1.900</td>
<td>-0.004(-0.331)</td>
<td>0.001</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.210</td>
<td>0.193(0.587)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Assam</td>
<td>Natural form</td>
<td>4.209</td>
<td>-0.074(-2.637)$^a$</td>
<td>0.107</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>8.147</td>
<td>-1.853(-2.881)$^a$</td>
<td>0.089</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Bihar</td>
<td>Natural form</td>
<td>1.477</td>
<td>0.033(1.031)</td>
<td>0.007</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.629</td>
<td>0.525(1.179)</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Gujarat</td>
<td>Natural form</td>
<td>1.670</td>
<td>0.005(0.234)</td>
<td>0.000</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.363</td>
<td>0.135(0.230)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Haryana</td>
<td>Natural form</td>
<td>1.969</td>
<td>0.062(1.959)$^a$</td>
<td>0.045</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.054</td>
<td>1.112(1.688)$^a$</td>
<td>0.034</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Himachal Pradesh</td>
<td>Natural form</td>
<td>2.512</td>
<td>0.012(0.427)</td>
<td>0.005</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.044</td>
<td>0.242(0.337)</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Karnataka</td>
<td>Natural form</td>
<td>1.972</td>
<td>0.007(1.981)</td>
<td>0.005</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.096</td>
<td>0.354(2.270)$^b$</td>
<td>0.026</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Kerala</td>
<td>Natural form</td>
<td>0.381</td>
<td>0.037(1.116)</td>
<td>0.024</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-2.210</td>
<td>1.114(1.314)</td>
<td>0.033</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Maharashtra</td>
<td>Natural form</td>
<td>1.273</td>
<td>0.044(4.249)$^*b$</td>
<td>0.073</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.981</td>
<td>1.083(4.465)$^*b$</td>
<td>0.080</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Madhya Pradesh &amp; Chhattisgarh</td>
<td>Natural form</td>
<td>2.042</td>
<td>0.008(1.060)</td>
<td>0.004</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.443</td>
<td>0.263(1.698)$^*b$</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Orissa</td>
<td>Natural form</td>
<td>2.574</td>
<td>-0.042(-2.235)$^b$</td>
<td>0.054</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>3.179</td>
<td>-0.497(-1.185)</td>
<td>0.016</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Punjab</td>
<td>Natural Form</td>
<td>2.277</td>
<td>0.011(0.763)</td>
<td>0.005</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.718</td>
<td>0.612(1.750)$^b$</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Rajasthan</td>
<td>Natural form</td>
<td>2.826</td>
<td>-0.023(-1.063)</td>
<td>0.007</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.848</td>
<td>-0.184(-0.352)</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Tamil Nadu</td>
<td>Natural form</td>
<td>0.276</td>
<td>0.022(3.004)$^*b$</td>
<td>0.042</td>
<td>206</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.643</td>
<td>0.489(2.722)$^b$</td>
<td>0.035</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Uttar Pradesh and Uttarakhand</td>
<td>Natural form</td>
<td>2.406</td>
<td>0.004(1.030)</td>
<td>0.002</td>
<td>629</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.892</td>
<td>0.213(2.654)$^b$</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>West Bengal</td>
<td>Natural form</td>
<td>3.337</td>
<td>-0.085(-4.291)$^b$</td>
<td>0.161</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>8.444</td>
<td>-2.337(-3.855)$^b$</td>
<td>0.134</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** (1) Figures in brackets are t-values.  
(2) $a,b,c$ indicate significant at 1%, 5%, 10% levels for a two tailed test.
(iii) Impact of proportion of labour in Trade and Commerce on city growth

The State-wise results on the impact of percent of labour in Trade and Commerce sector on growth of cities are presented in table 5.11. In all 32 regression equations were estimated for the 16 major states of India; 2 for each state, one in which independent variable is in the normal form and the other in which it is in log form. It may be seen from this table that in case of 14 states, the regression coefficient is positive, and in the case of 11 of these states it is significant as well, at different levels of confidence. Only in the case of two states, namely Gujarat and Haryana, the regression coefficient has a negative sign, but it is not significant even at 10 percent level in both these cases. On the basis of these results one can conclude with reasonable confidence that in most of the Indian states a positive significant impact of percent of labour force in Trade and Commerce on city growth is observed. These state wise results are quite in line with the impact of this variable on city growth observed at the all-India level. It may be recalled from table 5.8 that at the all-India level the impact of percent of labour force in Trade and Commerce sector on city growth is positive and significant at 1 percent level.
### Table 5.11

Impact of Specialisation in Trade and Commerce on City Growth: State-Wise Regression Results

**Independent Variable:** Percent of Labour Force in Trade and Commerce  
**Dependent Variable:** Growth Rate of City

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>State</th>
<th>Independent variable form</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>$R^2$</th>
<th>Number of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Andhra Pradesh</td>
<td>Natural form</td>
<td>0.411</td>
<td>0.070 (2.753)</td>
<td>0.056</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-1.751</td>
<td>1.210 (2.973)</td>
<td>0.064</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Assam</td>
<td>Natural form</td>
<td>0.637</td>
<td>0.067 (2.306)</td>
<td>0.084</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-1.753</td>
<td>1.324 (1.970)</td>
<td>0.057</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bihar</td>
<td>Natural form</td>
<td>0.492</td>
<td>0.073 (2.815)</td>
<td>0.051</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-1.393</td>
<td>1.164 (2.774)</td>
<td>0.050</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Gujarat</td>
<td>Natural form</td>
<td>1.803</td>
<td>-0.005 (-0.001)</td>
<td>0.000</td>
<td>151</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.636</td>
<td>(0.392) (0.601)</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Haryana</td>
<td>Natural form</td>
<td>4.148</td>
<td>-0.036 (-1.150)</td>
<td>0.018</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>5.406</td>
<td>-0.690 (-0.865)</td>
<td>0.010</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Himachal Pradesh</td>
<td>Natural form</td>
<td>1.296</td>
<td>0.066 (1.817)</td>
<td>0.084</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.315</td>
<td>1.011 (1.802)</td>
<td>0.045</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Karnataka</td>
<td>Natural form</td>
<td>1.232</td>
<td>0.046 (3.442)</td>
<td>0.059</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.563</td>
<td>0.927 (4.447)</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Kerala</td>
<td>Natural form</td>
<td>0.598</td>
<td>0.037 (0.512)</td>
<td>0.005</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-1.170</td>
<td>0.847 (0.589)</td>
<td>0.007</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Maharashtra</td>
<td>Natural form</td>
<td>0.822</td>
<td>0.073 (3.403)</td>
<td>0.075</td>
<td>230</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.634</td>
<td>0.988 (3.727)</td>
<td>0.057</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Madhya Pradesh &amp; Chhattisgarh</td>
<td>Natural form</td>
<td>1.306</td>
<td>0.049 (3.613)</td>
<td>0.044</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.003</td>
<td>0.777 (3.986)</td>
<td>0.053</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Orissa</td>
<td>Natural form</td>
<td>-0.513</td>
<td>0.129 (3.186)</td>
<td>0.104</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-3.641</td>
<td>1.931 (3.112)</td>
<td>0.100</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Punjab</td>
<td>Natural form</td>
<td>1.963</td>
<td>0.021 (1.131)</td>
<td>0.011</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.227</td>
<td>0.406 (1.220)</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Rajasthan</td>
<td>Natural form</td>
<td>1.092</td>
<td>0.056 (1.945)</td>
<td>0.023</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.972</td>
<td>1.082 (1.902)</td>
<td>0.022</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Tamil Nadu</td>
<td>Natural form</td>
<td>0.775</td>
<td>0.005 (0.338)</td>
<td>0.001</td>
<td>206</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.115</td>
<td>0.265 (1.055)</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Uttar Pradesh and Uttarakhand</td>
<td>Natural form</td>
<td>2.067</td>
<td>0.020 (3.740)</td>
<td>0.022</td>
<td>629</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.226</td>
<td>0.429 (4.929)</td>
<td>0.037</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>West Bengal</td>
<td>Natural form</td>
<td>-2.467</td>
<td>0.156 (3.785)</td>
<td>0.130</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-8.425</td>
<td>3.106 (4.060)</td>
<td>0.147</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**  
(1) Figures in brackets are t-values.  
(2) a,b,c indicate significant at 1%, 5%, 10% levels for a two tailed test.
(iv) Impact of proportion of labour force in Transport and communication on city growth

The state-wise regression results on the impact of proportion of labour in Transport and Communication Sector on city growth are detailed in table 5.12. The regression coefficient of this variable has a positive sign in 13 states, out of which in 5 states it is also clearly significant at different levels of confidence; in Uttar Pradesh (at 1 percent level), Orissa (at 1 percent level), Andhra Pradesh (at 5 percent level), Madhya Pradesh (at 1 percent and 5 percent level), Karnataka (at 1 percent and 5 percent level). In the case of Gujarat the regression coefficient has a positive sign in both the equations, but is significant (at 5 percent level) only when the independent variable is taken in log form. Similarly in Tamil Nadu the regression coefficient is positive in both equations, but significant (at 10 percent level) only when independent variable is taken in log form. So in the case of nine states (out of 16), the impact of this variable on city growth is not significantly different from zero and in the case of two states the results are mixed in the sense that coefficient is significant only in one of the two equations. Taking an overall view of the results presented in table 5.12 one may say that though in most of the states a positive influence of percent of labour force in Transport and Communication sector on city growth is indicated, but it confirmed with statistical significance only in the case of about one-third of the 16 states. It may be recalled from table 5.8 that the impact of this variable on city growth at all the India level was also not very clear, the regression coefficient being significant only in the normal form of the independent variable. So by considering both the State – wise results and the all-India results one can only say that the positive impact of proportion of labour force in Transport and Communication sector on city growth is indicated, but not conclusively confirmed.
### Table 5.12

**Impact of Specialisation in Transport and Communication on City Growth: State-Wise Regression Results**

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>State</th>
<th>Independent variable form</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>$R^2$</th>
<th>Number of observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>Natural form</td>
<td>1.196</td>
<td>0.070(2.013)$^b$</td>
<td>0.030</td>
<td>131</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.526</td>
<td>0.632(2.225)$^b$</td>
<td>0.037</td>
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</tr>
<tr>
<td>2.</td>
<td>Assam</td>
<td>Natural form</td>
<td>2.776</td>
<td>-0.011(-0.250)</td>
<td>0.001</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.146</td>
<td>0.256(0.471)</td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Bihar</td>
<td>Natural form</td>
<td>2.264</td>
<td>-0.064(-1.751)</td>
<td>0.020</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.446</td>
<td>-0.399(-1.396)</td>
<td>0.013</td>
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</tr>
<tr>
<td>4.</td>
<td>Gujarat</td>
<td>Natural form</td>
<td>1.631</td>
<td>0.019(0.442)</td>
<td>0.001</td>
<td>151</td>
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<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.575</td>
<td>1.147(2.109)$^b$</td>
<td>0.029</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Haryana</td>
<td>Natural form</td>
<td>3.110</td>
<td>0.011(0.114)</td>
<td>0.000</td>
<td>73</td>
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<td></td>
<td>Log Form</td>
<td>2.901</td>
<td>0.174(0.310)</td>
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<td>6.</td>
<td>Himachal Pradesh</td>
<td>Natural form</td>
<td>2.598</td>
<td>0.029(0.182)</td>
<td>0.001</td>
<td>38</td>
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<td></td>
<td>Log Form</td>
<td>2.450</td>
<td>0.191(0.256)</td>
<td>0.002</td>
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<tr>
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<td>Karnataka</td>
<td>Natural form</td>
<td>1.820</td>
<td>0.054(1.991)$^b$</td>
<td>0.018</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.444</td>
<td>0.438(2.894)$^a$</td>
<td>0.042</td>
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</tr>
<tr>
<td>8.</td>
<td>Kerala</td>
<td>Natural form</td>
<td>1.496</td>
<td>-0.016(-0.119)</td>
<td>0.000</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.139</td>
<td>0.095(0.074)</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Maharashtra</td>
<td>Natural form</td>
<td>2.031</td>
<td>0.025(0.903)</td>
<td>0.004</td>
<td>230</td>
</tr>
<tr>
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<td></td>
<td>Log Form</td>
<td>1.429</td>
<td>0.436(2.216)$^b$</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Madhya Pradesh &amp; Chhattisgarh</td>
<td>Natural form</td>
<td>1.904</td>
<td>0.053(2.205)$^b$</td>
<td>0.017</td>
<td>286</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.594</td>
<td>0.400(3.234)$^a$</td>
<td>0.036</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Orissa</td>
<td>Natural form</td>
<td>1.139</td>
<td>0.128(2.326)$^a$</td>
<td>0.100</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.397</td>
<td>0.993(3.043)$^a$</td>
<td>0.059</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Punjab</td>
<td>Natural form</td>
<td>2.240</td>
<td>0.047(0.740)</td>
<td>0.005</td>
<td>121</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.902</td>
<td>0.371(1.131)</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Rajasthan</td>
<td>Natural form</td>
<td>2.159</td>
<td>0.018(0.329)</td>
<td>0.001</td>
<td>166</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>1.830</td>
<td>0.258(0.666)</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Tamil Nadu</td>
<td>Natural form</td>
<td>0.689</td>
<td>0.034(0.950)</td>
<td>0.004</td>
<td>206</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>0.421</td>
<td>0.303(1.693)$^a$</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Uttar Pradesh and Uttaranchal</td>
<td>Natural form</td>
<td>2.297</td>
<td>0.044(3.949)$^b$</td>
<td>0.024</td>
<td>629</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>2.165</td>
<td>0.278(3.947)$^b$</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>West Bengal</td>
<td>Natural form</td>
<td>1.050</td>
<td>0.011(0.150)</td>
<td>0.000</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Log Form</td>
<td>-0.173</td>
<td>0.658(1.212)</td>
<td>0.015</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
(1) Figures in brackets are t-values.
(2) a,b,c indicate significant at 1%, 5%, 10% levels for a two-tailed test.
(v) Impact of proportion of Labour in Other Services sector on city growth

The regression results on the impact of this variable are presented in table 5.13. It may be observed that the regression coefficient of this variable has a positive sign in 12 states, negative sign in 3 states and a mixed negative/positive sign in the two equations of one state (Karnataka). Out of the 12 states with a positive sign of the coefficient of this variable, the coefficient is significant (in both the equations) at different levels of confidence only in 3 states. In another 6 states the coefficient is significant at different levels of confidence only in one of the two equations. Similarly, in the case of 3 states in which the coefficient has a negative sign, it is significant statistically only in one state. In view of these mixed results it is difficult to say anything definite about the impact of this variable on city growth at the state level. On the basis of positive sign of this coefficient in 12 out of 16 states, one may suggest that a positive impact of percent of labour force in Other Services sector on city growth is indicated, but not fully confirmed, because only in 3 states the coefficient is statistically significant in both the equations. It may be recalled from table 5.8 that at the all-India level the regression coefficient of this variable is highly significant and has a positive sign suggesting a significant impact of percent of labour force in Other Services sector on city growth. But, somehow, the state-wise results do not clearly confirm the all India result. The failure of the all India results on impact of functional specialisation on city growth being confirmed at the state level in most cases, may be due to many reasons. One possibility is that urban population of different states being more integrated than the rural population, the relationship between functional specialisation and city growth holds at the all India level and not at the individual state level.
Table – 5.13

Impact of Specialisation in other Services on City Growth: State-Wise Regression Results

Independent Variable: Percent of Labour Force in Other Services
Dependent Variable: Growth Rate of City

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>State</th>
<th>Independent variable form</th>
<th>Intercept</th>
<th>Regression coefficient</th>
<th>( R^2 )</th>
<th>Number of observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Andhra Pradesh</td>
<td>Natural form</td>
<td>1.524</td>
<td>0.013 (0.715)</td>
<td>0.004</td>
<td>131</td>
</tr>
</tbody>
</table>
|        | Log Form               |                           | 0.211      | 0.529 (1.893)
| 2.     | Assam                  | Natural form              | 2.554      | 0.004 (0.144)           | 0.000    | 60                   |
|        | Log Form               |                           | 0.608      | 0.636 (0.807)           | 0.011    |                      |
| 3.     | Bihar                  | Natural form              | 1.338      | 0.022 (1.234)           | 0.010    | 149                  |
|        | Log Form               |                           | -0.204     | 0.676 (1.555)           | 0.016    |                      |
| 4.     | Gujarat                | Natural form              | 1.631      | 0.019 (0.442)           | 0.001    | 151                  |
|        | Log Form               |                           | -0.575     | 1.147 (2.109)
| 5.     | Haryana                | Natural form              | 1.770      | 0.052 (1.982)
|        | Log Form               |                           | -1.011     | 1.294 (1.975)
| 6.     | Himachal Pradesh       | Natural form              | 4.561      | -0.046 (-2.288)
|        | Log Form               |                           | -1.416     | -1.930 (-1.980)
| 7.     | Karnataka              | Natural form              | 2.150      | -0.001 (-0.105)         | 0.000    | 192                  |
|        | Log Form               |                           | 1.185      | 0.326 (1.647)
| 8.     | Kerala                 | Natural form              | 1.660      | -0.016 (-0.249)         | 0.001    | 53                   |
|        | Log Form               |                           | 2.125      | -0.265 (-0.209)         | 0.001    |                      |
| 9.     | Maharashtra            | Natural form              | 1.884      | 0.015 (1.027)           | 0.005    | 230                  |
|        | Log Form               |                           | 0.639      | 0.523 (1.975)
| 10.    | Madhya Pradesh & Chhattisgarh | Natural form | 1.468 | 0.032 (3.685)
|        | Log Form               |                           | -0.621     | 0.926 (4.659)
| 11.    | Orissa                 | Natural form              | 1.148      | 0.027 (1.138)           | 0.015    | 89                   |
|        | Log Form               |                           | -1.648     | 1.098 (1.984)
| 12.    | Punjab                 | Natural form              | 2.289      | 0.009 (0.599)           | 0.003    | 121                  |
|        | Log Form               |                           | 1.548      | 0.307 (0.935)           | 0.007    |                      |
| 13.    | Rajasthan              | Natural form              | 1.844      | 0.019 (0.879)           | 0.005    | 166                  |
|        | Log Form               |                           | 1.114      | 0.378 (0.724)           | 0.003    |                      |
| 14.    | Tamil Nadu             | Natural form              | 1.069      | -0.011 (-0.634)         | 0.002    | 206                  |
|        | Log Form               |                           | 1.100      | -0.080 (-0.290)         | 0.000    |                      |
| 15.    | Uttar Pradesh and Uttarakhand | Natural form | 2.398 | 0.004 (0.916)          | 0.001    | 629                  |
|        | Log Form               |                           | 1.729      | 0.256 (2.766)
| 16.    | West Bengal            | Natural form              | -1.396     | 0.106 (3.180)
|        | Log Form               |                           | -6.635     | 2.519 (3.852)

Note: (1) Figures in brackets are t-values.
(2) a,b,c indicate significant at 1%, 5%, 10% levels for a two tailed test.
Conclusions

The results of the impact of functional specialisation on city growth are now consolidated by considering both the all-India regression results presented in table-5.8 and the State-wise regression results presented in tables 5.9 to 5.13. The overall inferences which can be deduced from this consolidation are summarized in table 5.14.

1. Negative impact of percent of labour force in Primary sector on city growth rate emerges quite clearly, because the coefficient of this variable in the all-India results has a negative sign and is significant at 1 percent level; and in 11 out of 16 states a similar negative significant impact is observed.

2. The positive impact of percent of labour force in Trade and Commerce sector on city growth also emerges quite clearly because the regression coefficient of this variable in all-India results has a positive sign and is statistically significant at 1 percent level; and in 11 states a similar positive significant impact is observed.

Table 5.14
Impact of Functional specialisation on city Growth:
(Summary of Results)
Based on results reported in tables 5.8 to 5.13

<table>
<thead>
<tr>
<th>Functional Specialization Variable</th>
<th>All India Results</th>
<th>State wise results (16 major states)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Labour in Primary sector</td>
<td>Negative Significant impact at 1 percent level</td>
<td>Negative significant impact in 9 states in both models</td>
</tr>
<tr>
<td>Percent of Labour in Industry sector</td>
<td>Impact not significant even at 10 percent level</td>
<td>Positive significant impact in 3 states in both models. Positive significant impact in 4 states in one model. Negative significant impact in 2 states in both models.</td>
</tr>
<tr>
<td>Percent of labour in Trade and commerce sector</td>
<td>Positive significant impact at 1 percent level</td>
<td>Positive significant impact in 11 states in both models</td>
</tr>
<tr>
<td>Percent of labour in Transport and communication sector</td>
<td>Positive significant impact at percent level in one model Not significant even at 10 percent in the other model</td>
<td>Positive significant impact in 5 states in both models and in 3 states in one model.</td>
</tr>
<tr>
<td>Percent of labour in other services sector</td>
<td>Positive significant impact at 1 percent level.</td>
<td>Positive significant impact in 3 states in both models and in 6 states in one model. Negative significant impact in 1 state in both models.</td>
</tr>
</tbody>
</table>
3. The positive impact of percent of labour force in Other Services sector on city growth is also suggested by the results, though the confidence one can place on this result is somewhat lower than the earlier two cases. The coefficient of this variable has a positive sign and is statistically significant at 1 percent level in the all India regression results, and also in 3 out of 16 states; and in 6 more states the coefficient has a positive sign, but is significant only in one of the two equations. These results suggest a positive impact of this variable on city growth rate, although it is not conclusively confirmed at the state level.

4. The impact of percent of labour force in Industry sector does not emerge very clearly. The regression coefficient of percent of labour force in Industry Sector is not significant even at 10 percent level in the all-India results; but in 6 states the coefficient of this variable has a positive sign and is statistically significant. At the same time we observe that in the case of 2 states the coefficient of this variable has a negative sign and is statistically significant. From this mixed set of results it is difficult to draw any definitive conclusion about the impact of this variable on city growth.

5. Similarly, in the case of percent of labour in Transport and Communication sector the impact is not clearly brought out by the results. In the all India regression results the coefficient of this variable has a positive sign and is significant at 1 percent level when independent variable is taken in log form; but not significant even at 10 percent level when taken in the normal form. In the state-wise results, in 8 states a positive significant impact of this variable on city growth is observed. On the basis of this mixed set of results one can only say that positive impact of this variable on city growth is suggested, but not fully confirmed.

The main conclusions of the analysis of this chapter are now summarized. About 45 percent of Indian cities are specialized in a single economic activity; 5.99 percent in Other services sector, 8.72 percent in Industry sector; 1.87 percent in Trade and commerce, 0.22 percent in Transport and communication, and 28.10
percent in primary activities. The size of city is positively related with percent of labour force in Industry, Trade and commerce, Transport and Communication, and Other Services, but negatively related with labour employed in Primary sector. The city growth rate is negatively impacted by percent of labour in Primary sector, but positively impacted by percent of labour employed in Trade and Commerce and in Other Services sector. The impact of percent of labour employed in Industry and in Transport and communication sectors on city growth does not emerge clearly from the analysis presented in this chapter.
Notes and References

1) Colin Clark divided economic activities into four major sectors viz. (1) Agriculture, Forestry and Fishing; (2) Mining; (3) Manufacturing; and (4) Service Industries. See Colin Clark, “The Economic Functions of a City in Relation to its Size”, *Econometrica*, April, 1945, pp. 97-113.


3) R. Bradley and J.S. Gans, “Growth in Australian Cities”, *Economic Record*, September, 1998, pp.266-78. For estimating specialization in Manufacturing and Government employment they used simple proportion or share of each of these two sectors in city labour force. For measuring overall degree of specialization of a city they used a modified version of Herfindahl Index.


5) The services sector is not only the largest sector of the Indian economy accounting for more than 50 percent of National Product, but also very heterogeneous in terms of economic activities included in it. We have tried to account for this diversity by dividing the services sector into three sub-sectors shown in chart 5.1 and analysed the impact of each of these sub-sectors of service sector on city growth separately.


8) The cut-off proportions, (40 percent in one sector, or 30 percent in each of two or more sectors), used to determine the functional specialisation of cities are justified on the ground that when such a high proportion of labour
force of a city is engaged in one or two economic activities, then that activity/activities dominate the economic life of the city and the total production in these activities must be much more than the local needs of city population. So a major part of the production of these activities must be being exported out of the city.

9) Since primary sector includes agricultural activities and mining etc. so many of these cities may have a sizeable proportion of labour engaged in agricultural activities. However, as per census of India definition of ‘urban area’ 75 percent or more of labour force of a population cluster must be engaged in non-agricultural activities for it being included in cities/towns. So, it is more likely that a high proportion of labour of these primary sector specialized cities may be cities dependent on mining and quarrying activities.

10) The semi-log form (equation 2) was used because it proved to be a better fit to data in terms of R-square in each of the five economic sectors for which results are reported in tables 5.6 and 5.7. It may be mentioned that R-squares in equations 1 and 2 are comparable because the dependent variable is in the same form in both and only the form of independent variable is changed. See Damodar Gujarati: Basic Econometrics, 1978, pp.110-11.

11) The reason for using the semi-log model (equation 2) are explained in note (10) above. However in the case of impact of functional specialisation on city growth the semi-log model did not prove a better fit in terms of higher R-square (table 5.8). Both models gave almost similar results.