

GLOBALIZATION AND INCOME INEQUALITY
A STUDY OF INDIAN STATES

**DISSERTATION SUBMITTED TO JADAVPUR UNIVERSITY, KOLKATA,
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MASTER OF PHILOSOPHY (ARTS) IN ECONOMICS**

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2019

TO WHOM IT MAY CONCERN

Certified that the thesis, entitled *Globalization and Income Inequality: A study of Indian states* submitted by me towards the partial fulfilment of the Degree of Master of Philosophy (Arts) in Economics of Jadavpur University, is based upon my own original work and there is no plagiarism. This is also to certify that the work has not been submitted by me for the award of any other degree/diploma of the same Institution where the work is carried out, or to any other Institution. A paper out of this dissertation has also been presented by me at a seminar/conference at the Department of Economics, Jadavpur University, Kolkata - 700032, thereby fulfilling the criteria for submission, as per the M.Phil. Regulation (2017) of Jadavpur University.

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CHAPTER 1

OVERVIEW

1.1 Introduction

This dissertation investigates into the question whether globalization has impacted on variations in income inequality across Indian states. A study of this nature is necessary to understand whether income growth and structural transformation during post reforms have led to changes in income inequality levels across states in India. Reforms since 1991 have relaxed the constraints hitherto operating in the Indian economy, thereby increasing the income growth possibilities in the economy. It is expected that reforms, with increased job and income opportunities as well as structural transformation, will reduce inequality and improve welfare at the state level. Overall gross domestic product (GDP) and per capita income grew at higher rates during post reforms (Balakrishnan and Parameswaran, 2007; Banerjee and Sinha Roy, 2014). In specific, Figure 1 shows that GDP growth increased on the average during the period since 2000-01 despite a relative slow down after 2008.¹ Nonetheless, such high post-reforms growth has been mainly on account of rapidly increasing services growth. As a result, as Figure 2 shows, there has been significant structural transformation in the economy towards the services sector.

Despite a high income growth rate and consequent structural transformation for the economy as a whole level does not necessarily imply national economic well-being, in specific in terms of rising employment, reduced poverty and lower inequality. Significant inequality in consumption expenditure is evident (Sen and Himanshu, 2004a;

¹ It needs to be mentioned here that GDP growth declined further in the recent period since 2011-12, and the average growth rate for the entire post-2000 period sharply fell as a result.

2004b; Jayadev et al. 2007; Subramanian and Jayaraj, 2015). As Figure 3 shows, during 1973-78, inequality consistently increased in both rural and urban areas. Post 1978, rural inequality has taken a sharp dip without much changes in the urban inequality levels, leading to a divergence in inequality between rural -urban areas. Post-1993, inequality, rural and urban, rose indicating rising inequality levels during globalization.

Figure 1.1: GDP growth in India since 2000

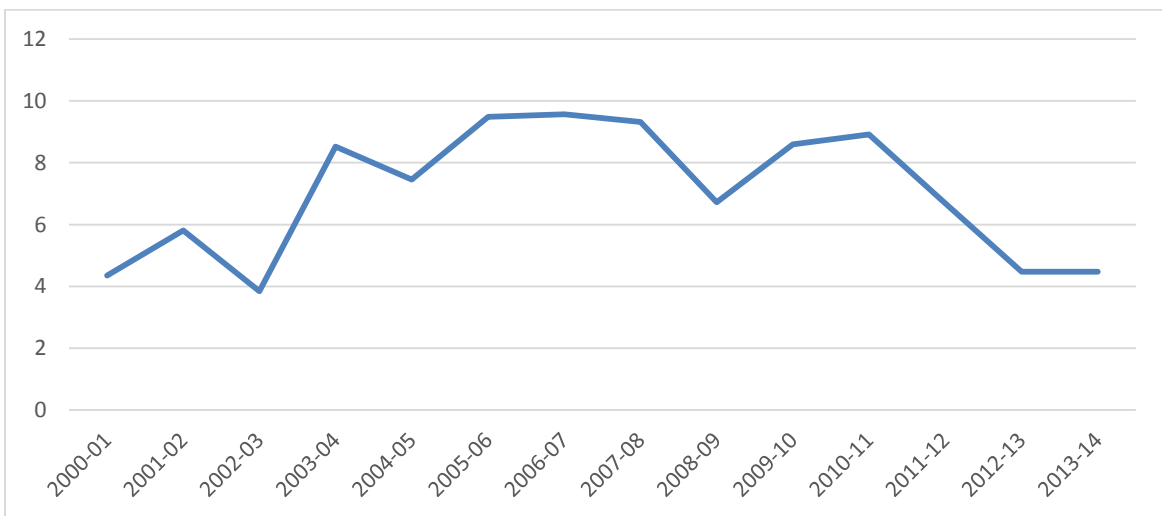


Figure 1.2: Structural changes in the Indian economy since 1991

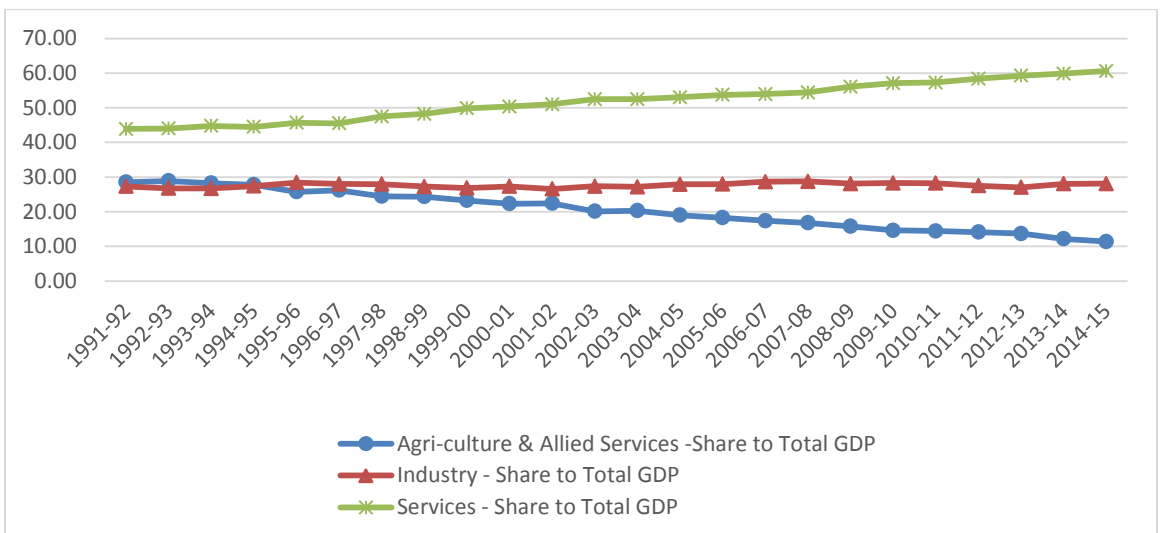
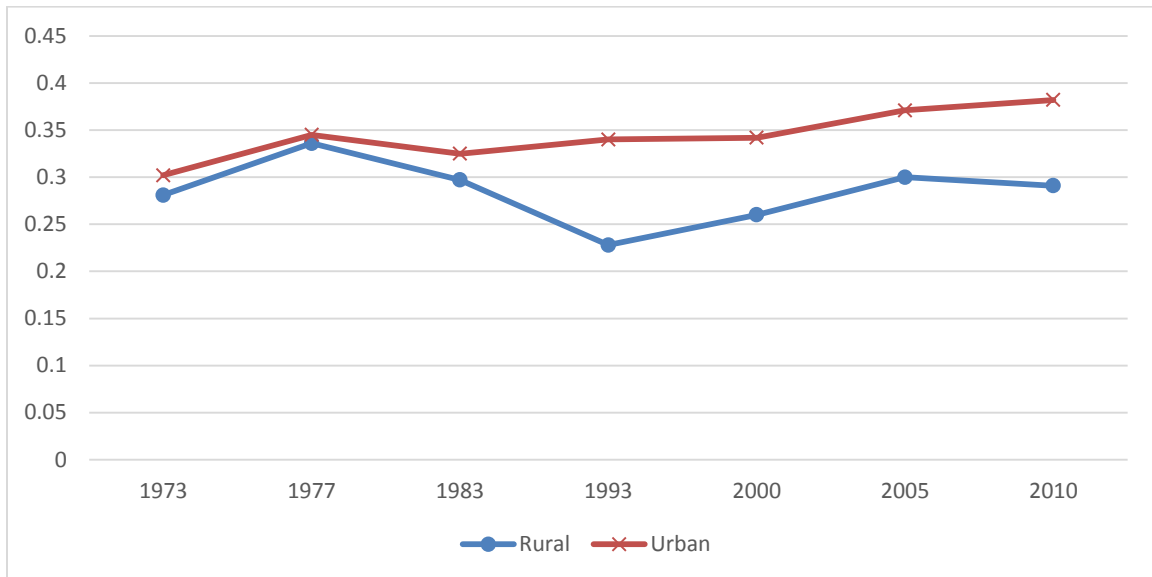


Figure 1.3: Inequality in India



Further, there has been widening variations in per capital income across states (Ahluwalia, 2000). It is also likely that with rising economy-wide inequality, inequality at the state level has been rising, with wide differences in levels of income inequality patterns across states as well as between rural and urban areas within the same state. A pertinent question that emerges is whether there has been rising incidence of income inequality across states in India during post-reforms. It is important understand the nuances of evidence on spatial diversity in income inequality especially at the sub-national level and the factors underlying such differences, as evident in the literature.

1.2 Review of Literature

There is a large literature on difference facets of inequality, income or otherwise. While a large body of the literature discusses on the methodological issues relating to measurement of inequality, one strand of the literature relates inequality to growth and

structural transformation in the economy.² Several empirical studies, following the seminal papers by Kuznets (1955, 1963), find the nexus between structural change and inequality. With globalization, structural change across developed and developing economies led to increases in inequality in general and, in specific, the wage gap between skilled and unskilled labor (Lundberg and Squire 2003, Zhu and Trefler 2005, Blum 2008, OECD 2008, OECD 2011, Aizenman, Lee and Park 2012, ECLAC 2012, Henze 2014, ILO 2014).

International trade, or more precisely trade liberalization, plays an important role in explaining intra-country wage gap (Attanasio, Goldberg and Pavcnik 2004; Wood 1997).³ The transmission channel of international trade leading to wage inequality is necessarily through a rise in the relative price of goods produced in the sectors using relatively more high-skilled labor intensively, or through a rise in skill premium following skill-biased technological progress during trade liberalization. Skill-enhancing trade can also induce productivity differences to explain wage inequality. On the other hand, as some studies show, trade also reduces inequality (Dollar and Kraay 2002; Edwards 1997). Along with trade, FDI is often found to increase income inequality. FDI worsens income distribution in host countries by benefiting high-skilled workers more than low-skilled workers (Feenstra and Hansen 1997; Lipsey and Sjöholm 2004; Choi 2006), by raising demand for skilled workers (Taylor and Driffield 2005) or by raising wages in the modern sectors more than in others. Some studies however show that FDI reduces inequality (see, for example, Blonigen and Slaughter 2001).

² There is an extensive literature on the impact of inequality on growth, as reviewed by Ostry, Berg and Tsangarides 2014; and Roy and Sinha Roy (2017a, b).

³ See Acharyya (2010, 2016) for a detailed discussion on different theoretical studies.

In the literature, there are hardly any studies examining the impact of structural change on income inequality as a whole. Moreover, studies on linking international trade and FDI to income inequality are far from conclusive. In this context, Roy and Sinha Roy (2017b), in a cross-country study, show that structural change is the main cause of increasing inequality. The study also shows the strong negative impact of trade liberalization on income inequality and weak negative impact of FDI inflow on the same in the long run. On the other hand, Mamoon (2018) finds that trade liberalization is associated with significantly increased wage inequality in developing countries on account of education bias of international trade which favours educated more than uneducated.

On India, there is a large body literature on inequality has emerged. Some of the recent studies are reviewed here. Cain et al (2010) examine the evolution of inequality during 1983–2004 and conclude that Inequality levels were relatively stable during 1983–93, but increased during 1993–2004. Motiram and Vakulabharanam (2012) examine both interpersonal inequality and inequality among subgroups of the population and find that the interpersonal inequality increased at the rural, urban and all-India levels since the 1990s, although changes in the latest period (2004-05 to 2009-10) are less pronounced. Vakulabharanam and Motiram(2018) mainly examine urban wealth inequality in 2002-13 . They analyze urban wealth inequality along different urban scales, and caste, religious and regional dimensions. During 1991, urban inequality has emerged as the main driver of wealth inequality in India. When within-urban inequality has increased during the same period urban-rural gap has also increased significantly.

At the sub-national level, there are a limited number of studies. Most of these studies are very recent. Singh et al. (2003), using HDI, show that though regional inequality increased, the rate of increase in inequality vary over time for different states. The results suggest that trends in inequality are quite significant such that they have been stronger in western states compared to the southern ones. Ross and Carlos (2012) examine the growth experience and evolution of inequality of India over the last three decades. Chauhan et al (2015) estimate the extent of money-metric poverty and inequality in regions of India and they find the inequality is more in developed regions and low in under-developed regions.

In the literature on India as well as at the state level, a wide range of factors are found to underlie the evidence of rising inequality during post-reforms. These include growth, sectoral growth and structural change, labour market characteristics, apart from infrastructure, trade and FDI. For instance, Pieteres (2010) shows how sectoral growth in India affects inequality and he finds that only agricultural growth reduces inequality, while growth in heavy manufacturing and services sectors raises inequality. Chakravorty et al. (2016) find that (a) high income inequality in India's agricultural sector, (b) about half of the income inequality is explained by the household-level variance in income from cultivation, which in turn is primarily dependent on variance in landownership, and (c) there are significant state-level differences in the structures/patterns of income generation from agriculture. Nath (2017) finds that increasing fragmentation and marginalization of agriculture land tends to create constraints to feasible activity and thereby accentuate inequality in India. On the other hand, Chamarbagwala (2009) examines how the distributions of labor market characteristics and the returns to these

characteristics contributed to urban–rural inequality during this period(which period) . He also finds that urban–rural equality may require policies that seek to equalize returns to labor market characteristics between the two sectors at the lower half of the distribution and improve rural labor market characteristics at the top half of the distribution.

Ghosh and De (2004) analyse how do the different categories of infrastructure affected the state level economic development in India and find that differences in infrastructure can be held responsible for growing income inequalities. A recent study by Chadha and Nandwani (2019) find that though faster-growing states show high spending on the development sector, development spending benefited mostly the rich in these more effectively than the poor—contrary to the intent behind it—thereby raising inequality in the state.

There are fewer studies linking inequality to trade, and still fewer at the sub-national level. Acharyya (2008) shows that increased inequality in India was largely on account of trade liberalisation through changes in the skill composition of export basket, and also the persistent differences in the capacity of individuals to exploit market opportunities or to achieve access to productive employment and property rights. At the regional level, Marjit et al. (2007), linking up inequality to openness, find that openness is strongly correlated with rising income disparity across regions. Exporting states are found to be getting richer over the years and the import competing states are falling behind. Jha (2000) finds the coefficient of variation of the rural head count ratio to be rising over time, indicating greater dispersion in rural poverty across states during reforms. Barua and Chakraborty (2010) investigate the trends of regional income inequality during the pre and post WTO reforms period in India with the observation that

income inequality is steadily increasing. Their regression result shows that there is a systematic relationship between manufacturing inequality and income inequality. If income increases the share of manufacture in GDP also increases. A recent study by Roy and Sinha Roy (2019) further show, though using non-econometric evidence, that structural transformation and trade liberalisation led to increases in inequality across Indian states.

There is even a larger literature on inequality in India at the national level, though lesser at the sub-national level. Most of these studies highlight on the measurement of inequality and the debate that has centred around this⁴. On the whole, the studies reviewed above, however, do not adequately provide any conclusive evidence linking income inequality to openness and structural change at the state level. We attempt to do that here in this dissertation.

1.3 Objectives of the study

The main purpose of this paper is to study the nature of and variations in rural and urban inequalities across sixteen major states in India during the 1990s and 2000s and to investigate into the underlying factors to which such variations can be attributed.

During this period since 1990, there have been significant changes in structure of the economy towards manufacturing and more so, towards services. The endeavour here will be thus to understand whether such structural changes during globalization explains inequality as evident across states.

⁴ This large literature is however not reviewed here in order to keep the discussions more focused to linking up inequality to structural transformation.

1.4 Definition and Data Source

Economic inequality is the difference of economic well-being among individuals in a group, among groups in a population or among countries. Economic inequality can be in terms of inequality of outcomes and inequality of opportunities. Economic inequality in terms of outcomes includes income inequality and inequality in wealth, assets etc.. This study intends to take into account see income inequality at the sub-national level, not taking to account wealth or assets. Gini coefficient is used for the purpose. This is the most commonly used summary measure of income inequality for which both time series and across the-state data are available. Essentially the Gini coefficient measures the area between the Lorenz curve and the egalitarian line (the diagonal or 45 degree line). The value of the Gini coefficient lies between 0 and 1. An increasing value of the Gini coefficient for two distributions (say, over time) will indicate growing inequality only if the corresponding Lorenz curves do not cross over each other.

For observing state-wise income distribution pattern, data on monthly per capita expenditure (MPCE) is used to calculate inequality. The inequality so arrived at is consumption inequality instead of income inequality. This is primarily on account of non-availability of household level income data for the entire post-reforms period. The data on MPCE collected from National Sample Survey Organisation (NSSO) quinquennial reports on 'Level and Pattern of Consumer Expenditure' (50th, 55th, 61st, 66th, and 68th rounds) covering the years 1993-94, 1999-2000, 2004-05, 2009-10, 2011-12. The data on MPCE is conducted every five years with large sample households using three reference periods namely Uniform Reference Period (URP) (30 days), Mixed Reference Period (MRP) (30 days and 365 days) and Modified Mixed Reference Period

(MMRP) (7 days, 30 days and 365 days). Before 55th round only URP was used to conduct the survey.

However, in this dissertation, Gini coefficient measuring inequality is not calculated by this researcher. Instead, this study used Gini coefficient calculated by the erstwhile Planning Commission, which is available in the NITI Aayog website. The calculation of Gini coefficient thus available is based on the MPCE data collected from National Sample Survey Organisation (NSSO) quinquennial reports, as mentioned above. For purposes of comparison, the sixteen states considered in this study are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Maharashtra, Karnataka, Kerala, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal. For the study, on account of unavailability of time comparable data for post reforms, the union territories and new states not considered are Chhattisgarh, Jharkhand, Uttaranchal, Telengana, among others.

In executing the objectives to understand the patterns of inequality across states, this study intends to look into the pattern of inequality, rural and urban, across states. The tool used for the purpose is non-econometric, mainly in terms of line and bar graphs. A further step is to look into non-econometric evidence of possible relationships between certain underlying factors and inequality. For the purpose, following Acharyya (2008), we have used only urban inequality. The reason behind is that the activities such as manufacturing and services, which are largely related to the urban sector, are more integrated with the global economy than the rural areas. Urban population has better access to markets following trade liberalisation and globalisation. Further, there is evidence of rising urban inequality through the entire post-reforms period. This pattern

can be largely on account of more opportunities in the urban areas than in rural areas following trade and other reforms leading to rural-urban migration and with rare evidence on reverse migration in India.

1.5 Study Scheme

This dissertation comprises of four chapters. Apart from this introductory chapter with review of literature on the subject and its gap, Chapter 2 analyses consumption inequality across different states of India. Chapter 3 estimates the factors underlying (urban) inequality across for Indian states. The final chapter, Chapter 4, concludes by summarising the major findings with implications for policies and the scope for further research.

CHAPTER 2

BROAD PATTERNS IN STATE-LEVEL INEQUALITY: 1993-94 TO 2009-10

2.1 Introduction

In Chapter 1, it is observed that a high overall growth rate during post-reforms does not necessarily ensure declining income inequality in the economy. The states in India have registered varying growth during this period. The level of well-being in terms of income/consumption inequality might vary across states during post reforms, which is evident in the recent literature as observed in Chapter 1. This chapter presents basic facts on consumption inequality, measured in terms of Gini coefficient for rural and urban sectors across major states in India. This chapter also attempts to relate such varying levels of inequality across states to various factors determining inequality. The factors explaining inequality, as evident from the literature, can be globalization and structural change, among others.

The chapter provides non-econometric evidence on variations in inequality levels across states in India. Section 2.2 provides with evidence on varying patterns of income growth across states as well as per capital income disparity across states. Section 2.3 compares consumption inequality for rural and urban areas of different states. In section 2.4, an attempt is made to link inequality levels across Indian states to various determining factors using x-y scatter plots. Section 2.5 summarises the major observations in the chapter.

2.2 Income growth and disparity across Indian states

The evidence on average income growth is provided in terms of average annual growth rate in gross state domestic product (GSDP) during 1990s and 2000s, as in Figures 2.1 a and b. It can be observed from the figures that all the states witnessed positive average growth during both the decades with wide variations across them. India's average growth in GDP increased from 5.27 per cent in 1990s to 6.51 per cent in 2000s. Five states including Bihar, Assam, Andhra Pradesh, Uttar Pradesh and Madhya Pradesh registered lowered average growth than the national average during the 1990s, while that in Haryana, Punjab and Odisha were higher, but closer, to the national average. On the other hand, average growth in Andhra Pradesh, Assam, Punjab, Uttar Pradesh, West Bengal and Odisha were below the national average during the 2000s. During the later decade, Himachal Pradesh and Gujarat registered growth at around 9 per cent.

Figure 2.1a: Growth in GSDP across Indian States during 1990s

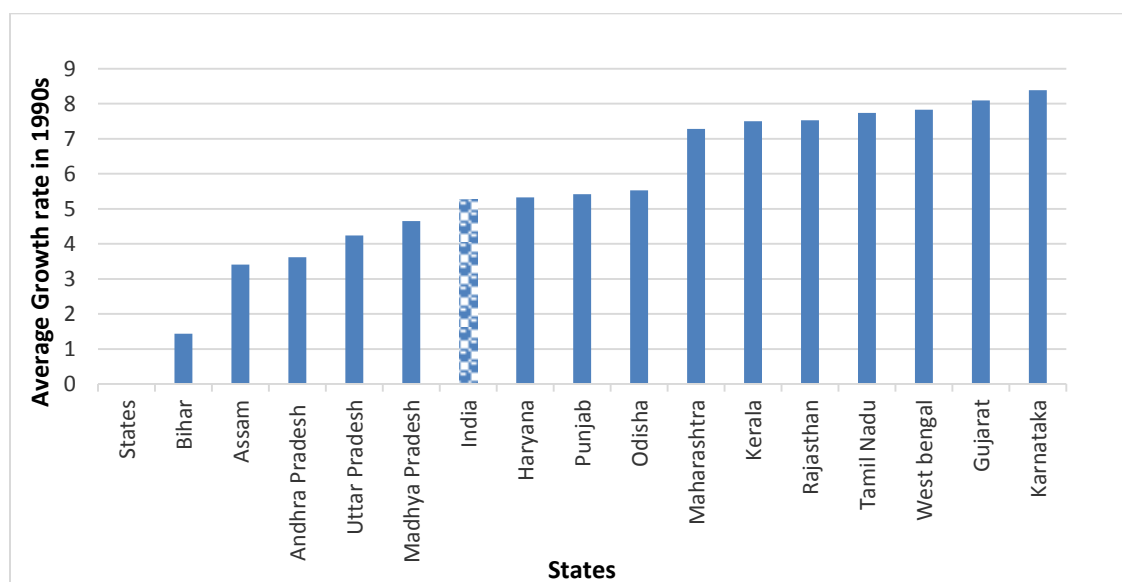
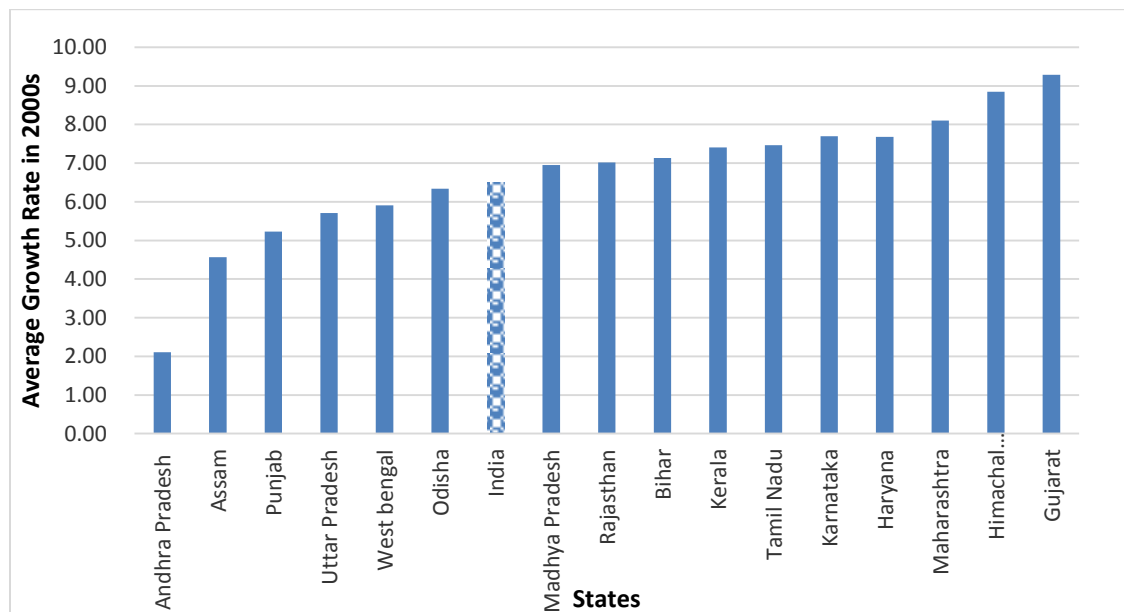
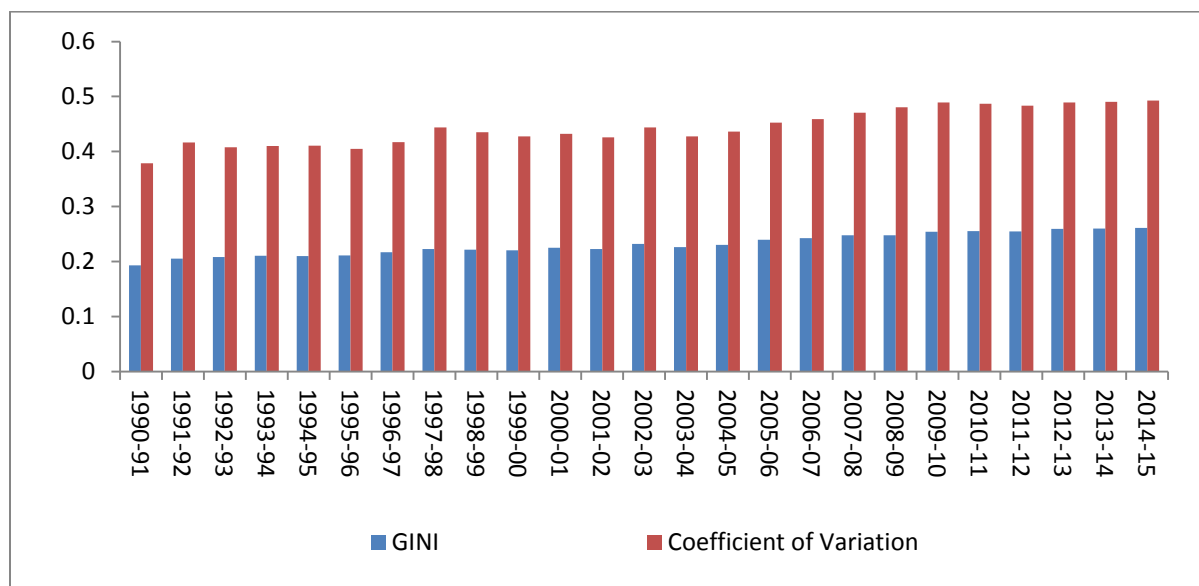


Figure 2.1b: Growth in GSDP across Indian States during 2000s



Such high and rising growth rates across states have not necessarily led to lowering of income disparity across states. As observed from Chakraborty (2017), income disparity across major Indian states, measured in terms of coefficient of variation and Gini coefficient of per capita net state domestic product (PCNSDP), increased in the post-reforms period. This increasing disparity, as in Figure 2.2, is especially after 2003-04. This is despite high overall growth as observed in case of most states. Chakraborty (2017) further points to the fact that there is marked and rising disparity in per capita income across states. It is further observed in Chakraborty (2017) that some states like the eastern Indian states, Uttar Pradesh and Rajasthan continue to lag behind even after wide-spread reforms in the country. This has significant implications for consumption inequality across states.

Figure 2.2: Coefficient of Variation and Gini Coefficient of PCNSDP across Major States



Source: Chakraborty (2017) based on RBI database

2.3 Consumption Inequality across Indian States

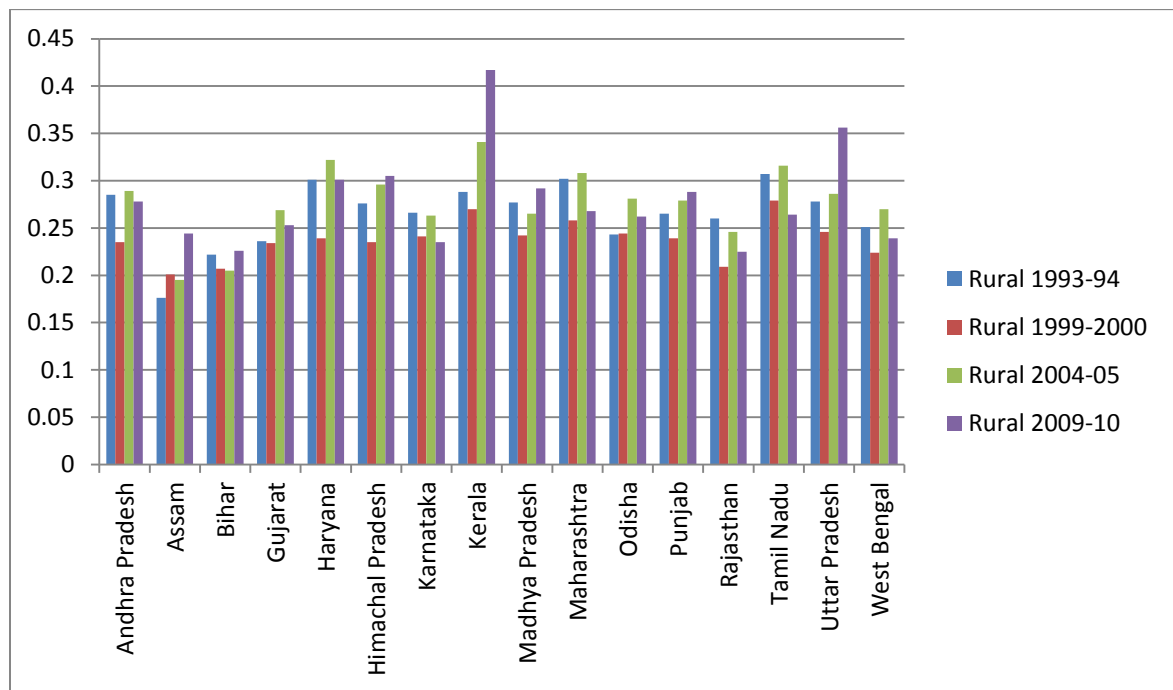
In this section, a comparison of consumption inequality for rural and urban areas of different states is carried out. A comparison of state-wise rural inequality is followed by a presentation of stylized facts on urban inequality. As observed in Chapter 1, such rural and urban inequality is measured in terms of Gini coefficient.

State-wise rural inequality

The Gini Coefficients indicating distribution of consumption for the rural and urban sectors of the 16 major states reveal interesting patterns. In the rural sector, it is found that inequality is the highest in Kerala (0.417). Rural inequality has declined in 9

states including Andhra Pradesh, Haryana, Gujarat, Karnataka, Maharashtra, Odisha, Rajasthan, Tamil Nadu, West Bengal during 1993 – 2010, whereas it has increased in the remaining states such as Bihar, Assam, Himachal Pradesh, Kerala, Madhya Pradesh, Punjab, Uttar Pradesh. It is observed that maximum decline in the Gini coefficient is for the states of Bihar and Rajasthan, the reduction in Gini being the highest in Rajasthan.

Figure 2.3: Rural inequality across Indian states



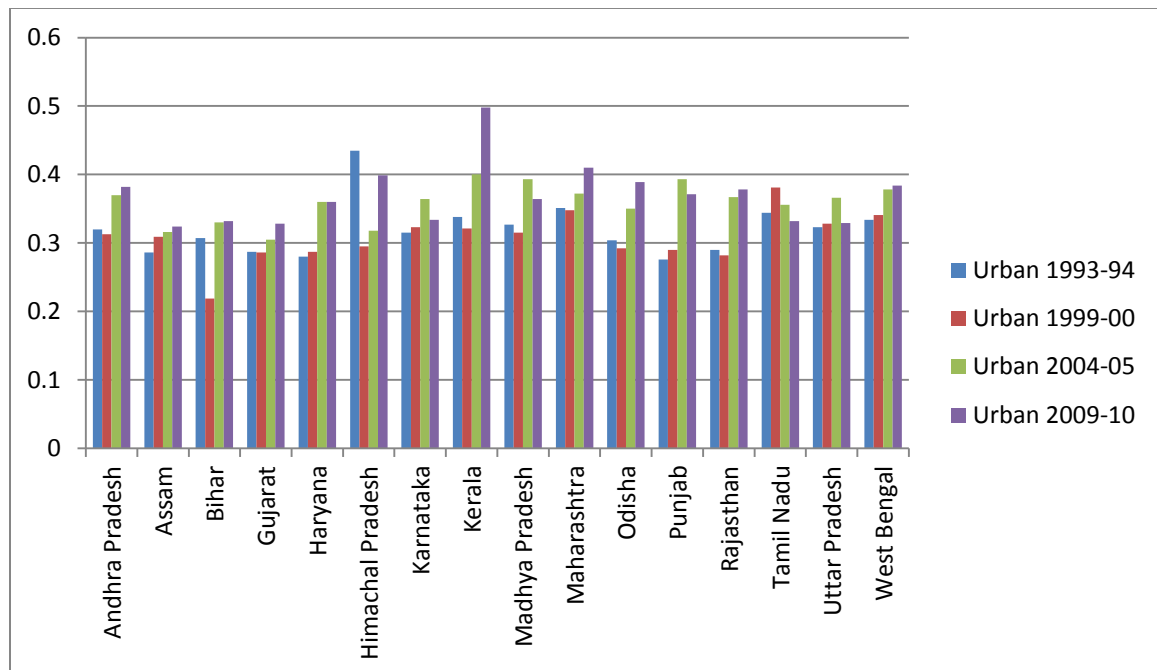
Source: Data available on Planning Commission website

State-wise urban inequality

In the urban areas, the inequality (as measured in terms of Gini Coefficient) has not declined in Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Kerala, Maharashtra, Odisha, Rajasthan and West Bengal during the period till 2010, especially during post

reforms. The Gini Coefficient has increased the most in Kerala. In the urban sector, it is found that inequality is the highest in Kerala (0.498) and the lowest in Assam(0.324). This is evident from Figure 2.4. This indicates that the gap between rich and poor in terms of income (consumption) is widening in urban areas in most of the states.

Figure 2.4: Urban inequality across Indian states



Source: Data available on Planning Commission website

On the whole, inequality in rural area is found to be less than the urban area across the sixteen major states all over India. While urban inequality has increased in most Indian states, rural inequality is observed to have lowered during post reforms in a few states. In specific, it is found that both in rural and urban sectors, inequality is the highest in Kerala. Till 1999-10, inequality is rising in both the sectors in Kerala. Given this pattern of inequality across states during globalization, it is important to understand

the nature of relationship between plausible factors explaining variations in inequality across Indian states. It is to this non-econometric analysis that we turn in the following section.

2.4 Factors underlying variations in inequality across Indian states

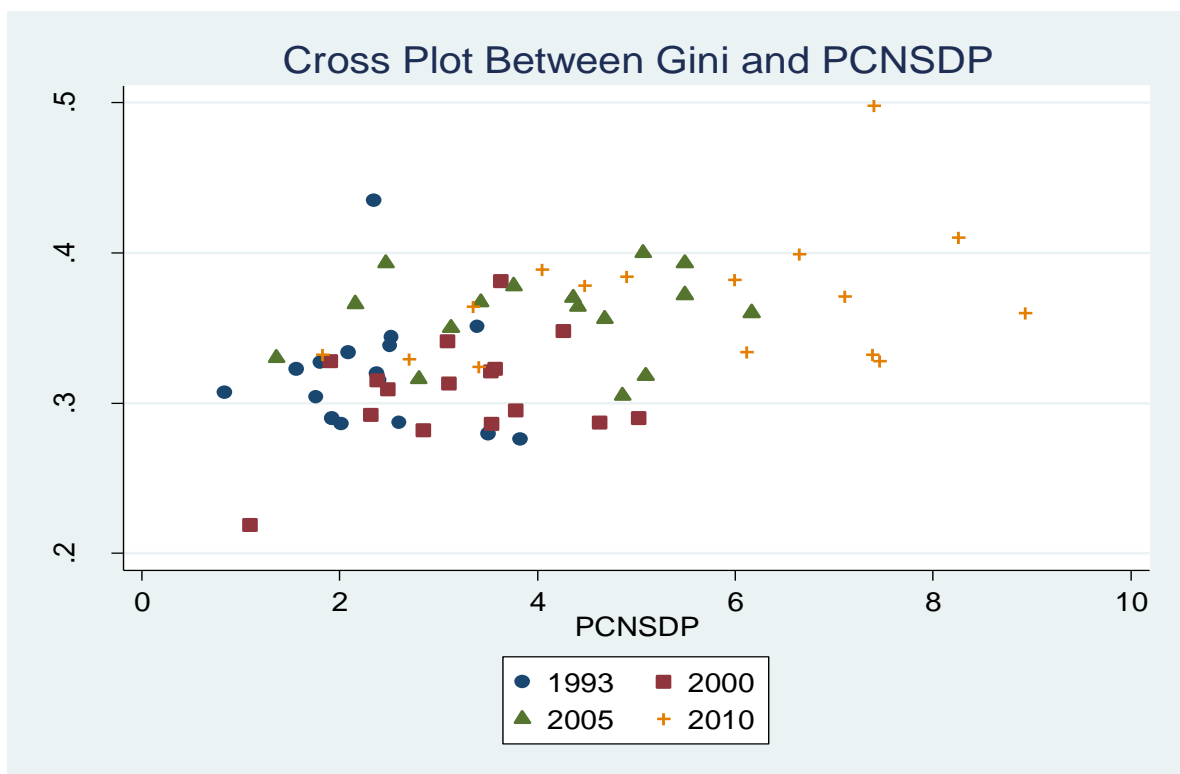
In this section, an attempt is made to provide an understanding of how various factors explain varying levels of inequality, urban in specific, across Indian states. This is carried out using x-y scatter plots. The factors that are looked into, as available from the literature reviewed in Chapter 1, are per capita net state domestic products, indicators of structural transformation of the economy, infrastructure, and indicators of globalisation including trade and FDI. This analysis will help us to design an econometric framework for further analysis.

Inequality across Indian states and per capita net state domestic product

Per capita income is taken as the most readily available indicator of economic development and it can be used to understand the impact of economic growth and development on the level of living of the people. However, this measure conceals many significant qualitative and institutional aspects influencing the distribution of income. It is important to remember, as observed in Chapter 1, that GDP performance in post-reforms India. However, this is not the pattern with regards to income across Indian states. Per capita state domestic product across states is found to have varied widely. This pattern could have necessarily impacted on the inequality levels across Indian states.

There seems to be a positive relationship between inequality and per capita income across Indian states. This is evident from Figure 2.5. Even though there has been mixed patterns of changes in the Gini coefficient over time across Indian states, PCNSDP has shown a tendency to increase consistently during the period of economic reforms. The scatter plot shows increases in inequality with rising income. However, as evident from the figure, there can be, at best, a weak relationship between the two.

Figure 2.5: Scatter plot: Per capita NSDP and Inequality



Gini coefficient and structural changes across Indian states

Structural change is necessarily measured in the literature in terms of share of manufacturing and services in income. Here, the endeavour is to observe whether

structural change in the economy, especially at the state level, has impacted on inequality, in specific urban inequality. The literature, as observed in Chapter 1, often views that changes in structure towards more of manufacturing and services necessarily leads to lowering of inequality levels.

The changing share of manufacture in GSDP across Indian states may be taken as a very approximate measure of changing pattern of industrialization. Our data reveals that in general there is no necessary interconnection between urban inequality and share of manufacture in GDP. We do not observe a Kuznet type relationship. Even though, there seems to be an inconclusive pattern of association between the Gini coefficients and share of manufacture over the period of reforms with evidence of a mixed relationship across certain states, a closer look at Figure 2.6 shows an inverse relation between income inequality and share of manufacture. At best, a weak relationship in terms of a lower inequality level with rising share of manufacturing can be observed.

On the contrary, there is evidence of increasing urban inequality with rising share of services across Indian states (Figure 7). It has to be brought into recognition that, since the early 1990's, the services sector recorded high growth particularly in the Indian economy along with that in the Indian states. In addition, urban inequality across most states, as observed in the earlier section, has been found to be rising during this period. Thus, there appears to be a clear strong positive relationship between urban inequality and rising share of services across Indian states.

Figure 2.6: Scatter plot: Share of manufacturing in GSDP and Inequality

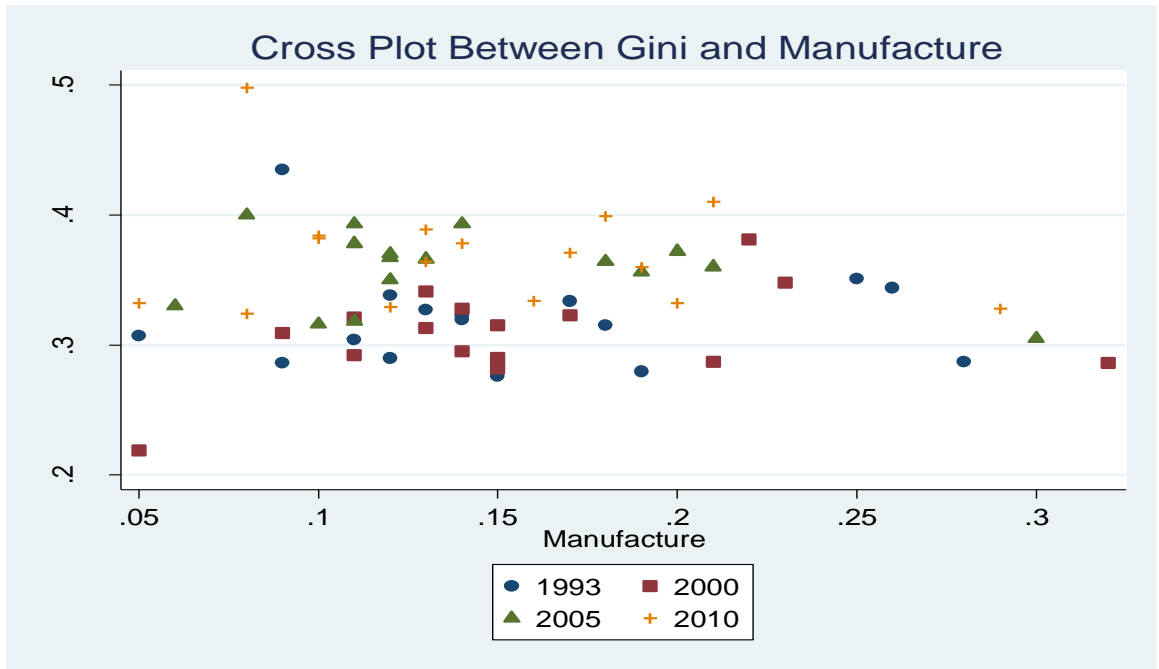
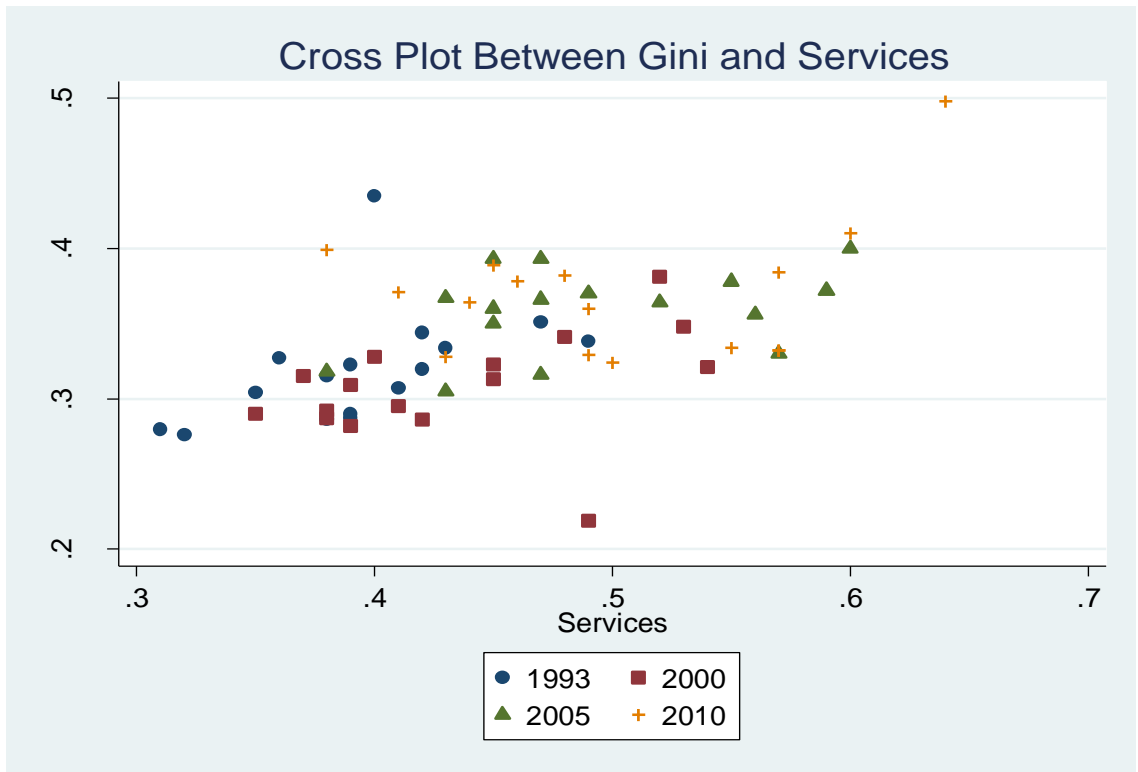


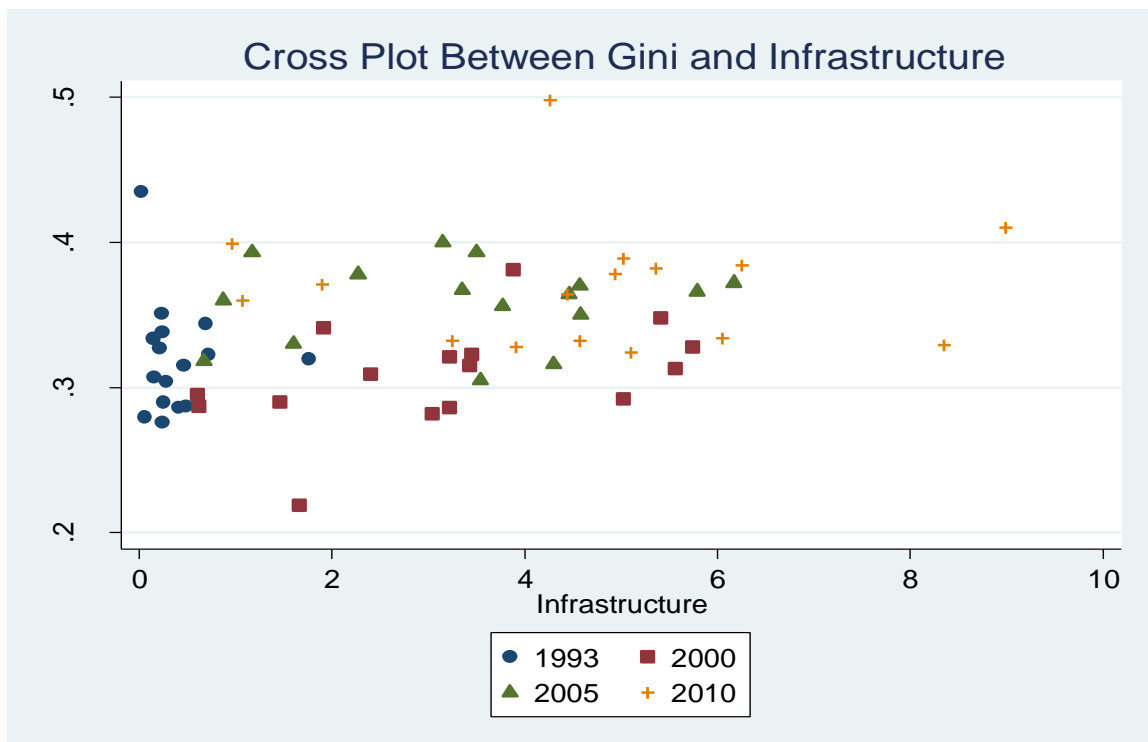
Figure 2.7: Scatter plot: Share of services GSDP and Inequality



Gini coefficient and Infrastructure

The relationship between income inequality and infrastructure is expected to be a positive one as improvements in infrastructure contribute to the process of economic growth and thereby reduce skewness in income distribution. During economic reforms, there are changes in both quantity and quality of infrastructural services across states. However there are significant interstate variations in the provision of infrastructure over time. The index of infrastructure has improved at a high rate during 1994-2000 and further over 2005-10. Against this, if we compare inequality of states between 1994-2000, it is found that in spite of improvement in the infrastructure index, inequality has increased (see Figure 2.8). We may conclude that a mere quantitative jump in the infrastructure is not significant to ensure decline in inequality.

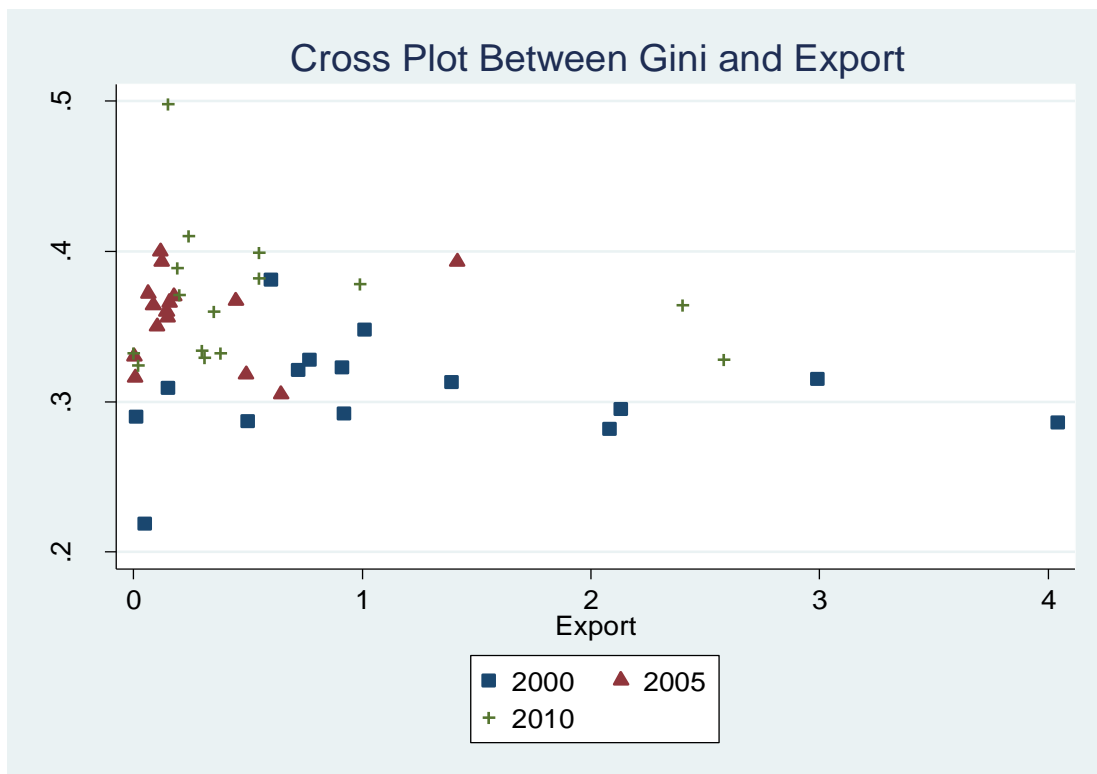
Figure 2.8: Scatter plot: Infrastructure and Inequality



Trade and FDI and Gini Coefficient

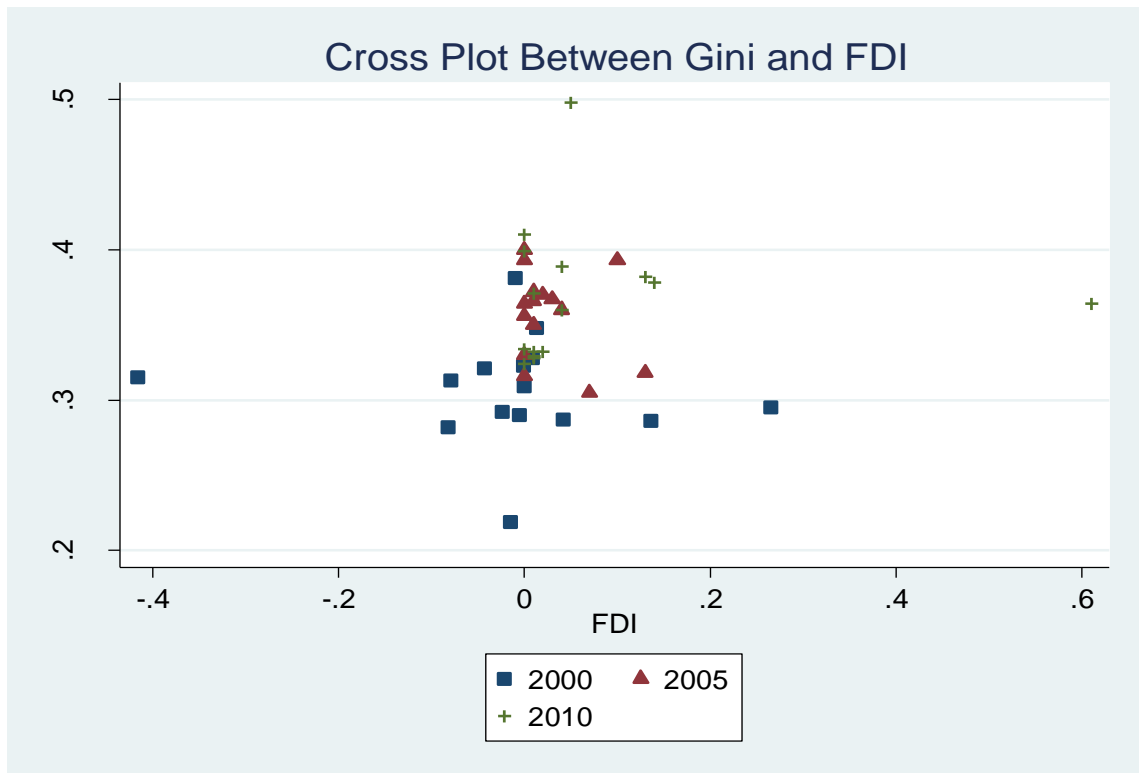
As regards the impact of trade on income inequality in an open economy, it can be said that trade being the engine of growth contributes directly to raise per capita income with a favorable impact on quality of life. In this analysis, trade openness is captured in terms of the percentage share of exports in GDP. We have examined the association between state-wise inequality levels and export levels (See Figure 2.9). It is observed that there is a positive, though weak, association between the estimated values of Gini and the level of exports, particularly over the period 2005-10. Despite such association, there is no clear evidence of the relationship between exports and inequality across states for the entire post-reforms period.

Figure 2.9: Scatter plot: Exports and Inequality



There have been significant increases in FDI inflows to the economy during globalization. During economic reforms, the FDI policy has been made more flexible and liberal to attract foreign capital for promoting technology and economic growth. There has been a state and sector wise concentration problem such that the inflow of FDI has not been uniformly distributed across states and sectors within states. Nonetheless, one may expect that in a liberalized economic environment FDI is capable of making a positive dent on income inequality. However, there is no systematic evidence to show that FDI inflow at the state level led to decline in inequality or vice versa (Figure 2.10).

Figure 2.10: Scatter plot: FDI and Inequality



2.5 Summary of major findings

Overall, the impact of liberalized economic environment, growth and structural change on income inequality do not always tend to provide any conclusive and uniform evidence. The non-econometric evidence can be summarised as follows. Urban inequality seems to have risen during the period since 1991 along with rising GSDP growth during the period. Economic growth itself falls short of achieving the target of reducing inter-state inequality. The so called trickle down impact of growth on bringing down economic inequality is hard to establish. Instead, there is evidence that a disproportionate, unequal and non-inclusive process of income generation might contribute negatively to aggravate urban inequality. Furthermore, structural change towards more of services might have led to rising inequality across states. These aforementioned stylized facts call for a detailed econometric analysis, which is carried out in Chapter 3.

Chapter 3

FACTORS DETERMINING VARIATIONS IN INCOME INEQUALITY ACROSS INDIAN STATES

3.1 Introduction

The earlier chapters establish the incidence of rising income (consumption) inequality across states in India after globalization since 1991. This chapter investigates into the factors that determine such wide variations in consumption inequality across states. A study of this nature has assumed extreme importance with incidence of rising urban inequality during globalization. For the purpose, a panel data estimation of sixteen major states in India has been carried out based on an econometric model in which inequality measured in terms of Gini coefficient is made to depend on various factors including per capita income, structural changes, infrastructure and different indicators of globalization. Most of the earlier studies, as seen in the literature reviewed earlier, have focused on these factors, but at cross-country level or for individual countries at the aggregate level. Only a counted few studies have investigated into all these factors that determine variations in inequality at the sub-national level, but with a limited scope. In section 3.2, the econometric model is discussed in brief. In section 3.3, the methodology is discussed and the panel data estimation model is also specified. The next section provides with an analysis and interpretation of the results. Section 3.5 summarises the major findings of this chapter.

3.2 The Estimation Model

Based on the literature reviewed in Chapter 1 and accordingly the stylized facts presented in Chapter 2, the estimable model establishing the structural change-inequality relationship is given by:

$$\text{INQ} = \beta_{0it} + \beta_{1it}\text{PCNSDP} + \beta_{2it}\text{MANUSH} + \beta_{3it}\text{SERVSH} + \beta_{4it}\text{ISI} + \beta_{5it}\text{EXPORTSH} + \beta_{6it}\text{FDISH} + \mu \dots \dots \dots (1)$$

where,

- INQ = Consumption Inequality
- PCNSDP = per capita NSDP per capita
- MANUSH = Share of manufacturing in GSDP
- SERVSH = Share of services in GSDP
- FDISH = Share of State-level Foreign Direct Investment in GSDP
- EXPORTSH = Share of State-level Exports in GSDP
- ISI=Infrastructure Stock Index

Gini coefficient of distribution of consumption (for urban sector) across states will be used as the dependent variable in the panel data regression analysis. This regression analysis will establish whether factors relating to globalization such as trade and FDI as well as structural change (measured in terms of share of manufacturing and/or services in GSDP) determine inequality across states. Panel data estimation methods are applied in this study to arrive at estimates of the various effects.

3.3 The Methodology

We estimate the model through fixed effect (FE) or random effect (RE) techniques by taking the Hausman test. We estimate the following FEM:

$$Y_{it} = \beta X_{it} + \alpha_1 + \varepsilon_{it}$$

where ϵ_{it} = Within-entity and where, ϵ_{it} is residual effect for time point t for the ith unit.

We also estimate the following REM:

$$Y_{it} = \beta X_{it} + \alpha_i + u_{it} + \epsilon_{it}$$

where ϵ_{it} = Within-entity error and U_{it} = Between- entity error. u_i represents the effect of unit i and e_{it} is residual effect for time point t for that unit. But in a random effects model, unit residuals u_i do not have specific values – u_i is a normally distributed random variable.

Hausman tests for the Exogeneity of the Unobserved Error Component. If the unobserved effects are exogenous, the FE and RE are asymptotically equivalent. The null hypothesis for the Hausman test is: $H_0: \beta_{RE} = \beta_{FE}$, where β_{RE} and β_{FE} are coefficient vectors for the time-varying explanatory variables, excluding the time variables. If the null hypothesis is rejected, we conclude that RE is inconsistent, and the FE model is preferred. If the null hypothesis cannot be rejected, random effects are preferred because it is a more efficient estimator. The Hausman test confirms the desirable testing procedure either in favour of the random effect or the fixed effect.

Next we have also incorporated the between effects (BE). The BE estimator is found to be important on account of the fact that the RE estimator is given by a weighted average of FE and BE coefficient. This alternatively implies that the Hausman test judges whether FE and BE lead to the same coefficient.

The between estimator in panels uses just the cross-sectional variation. In an individual-specific effect model, Mean of all observations 'state i', $\bar{y}_i = \alpha + \bar{x}_i\beta + u_i + \bar{\varepsilon}_i$. This can be rewritten as the between model $\bar{y}_i = \alpha + \bar{x}_i\beta + (\alpha_i - \alpha + \bar{\varepsilon}_i)$. $i=1, 2, 3, \dots, N$

The between estimator is the OLS estimator from regression of \bar{y}_i on the intercept and \bar{x}_i . It uses variation between different individuals and is the analogue of cross-section regression. The between estimator is consistent if the regressors \bar{x}_i are independent of the composite error $(\alpha_i - \alpha + \bar{\varepsilon}_i)$ in (1). For the fixed effects model the between estimator is inconsistent as α_i is then assumed to be correlated with x_{it} and hence \bar{x}_i .

Thus in order to explain the extent to which different aspects of the economy and their behavior over time influences urban inequality in the post liberalization period, a panel data regression framework with state and time specific effect has been designed. As a first step, the technique of instrument variable (IV) identification is used. An IV regression model is preferable under certain conditions when the explanatory variables tend to behave as endogenous variables being correlated with the error term. In this case reliance on OLS or ANOVA leads to biased estimates and a distorted performance of the regression model. The IV regression method might also come to be extremely helpful in cases where controlled experiments are not feasible. An IV can be identified through a correlation matrix showing the degree of association between different pairs of postulated explanatory variables out of which the remaining are treated as endogenous under alternative assumptions. The IV, even though does not directly influence the dependent variable; it indirectly produces an impact through its high correlation with the

explanatory variables. This technique in the present context appears to be appropriate to follow in view of the fact that there can be a ‘reverse causation’ and omission of a number of relevant explanatory variables.

Panel data regression have been done taking 16 major states of India for the years 1993-1994, 1999-2000, 2004-2005 and 2009-2010. We have used two regression models. Three approaches have been followed, namely, the Fixed Effects Model (FEM) and Random Effects Model (REM) and Between effect model(BE) and tried to show which one is appropriate. The entire study is taken up for the period 1993-94- 2009-10.

To look into the impact of infrastructure stock index (ISI) on urban inequality across states, state-wise infrastructure indices have been constructed by using Principal Component Analysis (PCA). There are various dimensions of infrastructure out of which the present study utilizes a number of selected dimensions. In specific, the infrastructural indicators used in the PCA for construction of ISI are:

- a) Transport and communication infrastructure (Road length , length of railway lines, tele-density)
- b) Power infrastructure (per capita consumption of electricity)
- c) Education infrastructure (Literacy rate)
- d) Health infrastructure (Number of doctors per population member, IMR)
- c) Financial infrastructure (Number of bank branches, credit- deposit ratio)

While constructing the infrastructure index the Eigen vector method of assigning weights to the components has been followed. Only the vectors exceeding unity are considered as weights.

Data adjustments and bridging the information gaps

A number of adjustments in data had to be made to resolve the problems of information gap and inconsistency.

- i) For output data on manufacturing and services, data have been brought to 1999-2000 base year.
- ii) NSDP figures at factor cost have been adjusted for current prices.
- iii) In case of PCNSDP data were available at current and constant prices such that the base-conversion exercise was done by considering the ratio of price changes between base and current periods.
- iv) Certain time series gaps in data; particularly in case of state wise literacy rates are mitigated through the method of interpolation while preparing the infrastructure indices.
- v) In case of IMR and state wise length of railway line the method of extrapolation is followed when and where required to overcome information gaps.
- vi) Further, gaps in state level export data have been bridged-up by considering the average share of exports in GSDP of a state over the available time series and adjusting for the missing data accordingly. State-level exports data are available from DGCIS Kolkata.

The estimated zero order correlation matrix showing Pearson's correlation coefficient (r) between different pairs of variables along with the corresponding levels of significance are reported below in Table 3.1. The Table shows that some variables are significantly correlated. In order to avoid the problem of multicollinearity, certain

variables are dropped and hence, various specifications of the regression equations are used. On the basis of the estimated values of (r) and the associated probability levels the instrument variables (IV) identified are – PCNSDP, Export, FDI and Infrastructure index. We can say therefore that these instruments are capable of producing and impact on the level of inequality (Gini) through their influences on the remaining variables which are treated as endogenous in alternative panel data regression models estimated by us.

Table 3.1: Correlation Matrix

	MANUSH	SERVSH	ISI	PCNSDP	EXPORTSH	FDISH
MANUSH	1					
SERVSH	-0.1296 (0.3042)	1				
ISI	-0.0032 (0.9798)	0.5602*** (0.0000)	1			
PCNSDP	0.3776*** (0.0021)	0.3623*** (0.0033)	0.2915** (0.0194)	1		
EXPORTSH	0.8317*** (0.0000)	0.0997 (0.4485)	0.1451 (0.2687)	0.4600*** (0.0002)	1	
FDISH	0.5475*** (0.0000)	0.1501 (0.2522)	0.1553 (0.2360)	0.3753*** (0.0031)	0.6043*** (0.0000)	1

Note- *** implies significance at 1% level & ** implies significance at 5% level.

3.4 The Findings and Analysis

With the four IVs, panel data regression models have been estimated by alternating the sets of endogenous and instrumental variables. Table 3.2 presents the estimates obtained both for fixed effect (FE) and random effect (RE). The former gives an idea of the ‘within variation’ while the latter simultaneously provides an explanation of change over time and the cross- sectional variations among units. To be more specific

FE enables us to know about the behavior of an explanatory variable under very specific conditions or a particular state where as the RE coefficients imply the temporal changes as well as cross sectional divergences. We have conducted the Hausman test to choose between the results of the FE and RE models. On the basis of chi-square statistic, Hausman test favors the RE to be taken. Out of the four models, Model 3 is not found to be suitable. Model 1 shows that fixed effects model is suitable only at 10 per cent level. Alternately, models 2 and 4 are taken into consideration, which show that the random effects model are more appropriate.

Table 3.2: Determinants of Inequality across Indian States: FE & RE Models

Explanatory variable	Model 1		Model 2		Model 3		Model 4	
	Coefficient		Coefficient		Coefficient		Coefficient	
	FE	RE	FE	RE	FE	RE	FE	RE
Manufacturing in GSDP	0.075 (0.26)	-0.053 (-0.33)	0.158 (0.56)	-0.079 (-0.85)	0.157 (0.57)	-0.090 (-0.63)	0.151 (0.52)	-0.077 (-0.51)
Services in GSDP	0.596*** (4.94)	0.397*** (4.54)	0.459*** (3.36)	0.251*** (3.36)	0.471*** (3.60)	0.266*** (3.28)	0.376*** (2.97)	0.273*** (3.48)
PCNSDP			0.010** (2.19)	0.009*** (3.13)	0.008* (1.76)	0.008*** (2.95)	0.005 (1.18)	0.008*** (2.75)
Infrastructure	-0.004 (-1.31)	-0.001 (-0.04)	-0.005* (-1.85)	0.006 (0.28)	-0.005* (-1.75)	-0.002 (-0.11)		
Export	0.021* (1.84)	0.005 (0.72)			0.013 (1.14)	-0.003 (-0.05)	0.016 (1.31)	0.001 (0.16)
FDI	0.338 (0.64)	-0.102 (-0.29)	0.039 (0.07)	-0.140 (-0.50)			0.124 (0.23)	-0.148 (-0.45)
Constant	0.030 (0.39)	0.156*** (3.46)	0.081 (1.07)	0.199*** (5.77)	0.063 (0.84)	0.195*** (4.91)	0.095 (1.24)	0.191*** (4.66)
Hausman Test value	chi2= 9.62 (.0868) n=60		chi2= 1.75 (0.8824) n=60		chi2= -11.91 ⁺⁺ n=60		chi2= 2.80 (0.7310) n=60	

FE=fixed effect, RE= Random effect, all cases RE is applicable

*=1% level of significant, **=5% level of significant, ***=10% level of significant

++ Model fitted on this data fails to meet the asymptotic assumptions of the Hausman test. So this model is not suitable for panel data analysis.

The results of model(1), taking PCNSDP as the IV, suggest that income inequality is inversely associated with infrastructure, but has a positive association with the rest of the variables. However, the coefficient of infrastructure is not found to be significant except that of share of services. When export share in GSDP is taken as the IV under fixed effect as in model(2), we find a significant positive relationship between Gini coefficients and the share of services and that between Gini and per capita NSDP. In model(4), taking infrastructure as the IV, the significant positive association with the share of services exists. PCNSDP is also found to have significant positive impact on rising inequality. However, the share of manufacturing does not have any significant impact on inequality across states in any of the models. It is noteworthy that variables capturing globalization, such as exports and FDI, have insignificant impact on inequality. There is an exception to this pattern model 1, where merchandise exports are found to impact positively on inequality at the state level.

It is often observed that explanatory variables are capable of changing over time, and it is postulated that income, industrial growth and trade openness leads to higher income inequalities under conditions of rising shares of manufacturing and services output. This evidence in Table 3.2 enable us to infer that the growth patterns during post-reforms has been largely non-inclusive and also that the services sector growth has been inducing inequality across states to rise. Such rising inequality might be on account of specific skill requirement required for services growth.

Since RE constitutes a weighted average of FE and BE, therefore there is a relationship between BE and RE estimates and we can say the between estimator is inconsistent in the FE model but consistent in the RE model. It is proper to consider the

BE model. This is also justified in view of the fact that BE provides a better understanding of Hausman test. The estimates of the BE effect regressions are presented below-

Table 3.3: Determinants of Inequality across Indian States: BE estimates

Explanatory variable	Model 1	Model 2	Model 3	Model 4
	Coefficient	Coefficient	Coefficient	Coefficient
Manufacture in GSDP	0.175 (0.65)	-0.173* (-1.69)	-0.042 (-0.20)	-0.051 (-0.19)
Services in GDSP	0.255* (1.91)	0.193** (2.31)	0.182* (1.83)	0.244* (1.94)
PCNSDP		0.021*** (3.71)	0.014*** (2.70)	0.009 (1.44)
Infrastructure Index	0.005 (0.88)	0.014*** (3.18)	0.010** (2.31)	
Export	-0.011 (-0.74)		-0.010 (-0.98)	-0.003 (-0.27)
FDI	0.109 (0.20)	-0.856** (-2.05)		-0.056 (-0.10)
Constant	0.191** (2.50)	0.163*** (3.59)	0.187*** (3.48)	0.201*** (2.88)

Notes: *=1% level of significant, **=5% level of significant, ***=10% level of significant
Figures in first brackets are t values.

The BE model strongly points to the fact that the determinants of inequality tend to produce varying degrees of impact on the Gini coefficient when differences between states are incorporated. In that differences between states regarding infrastructure appear to be particularly important. The openness of the economy also seems to be important in producing a positive impact on inequality as far as the degree of openness is functionally linked with a process of income generation and employment growth through its impact on industrial growth.

Considering the results of the BE model with the same alternative instrumental variables used, the coefficients of the share of manufacturing in GSDP in model (1) is positive and in the remaining models are negative, but in no case it is significant except model 2. This implies that share of manufacture in GSDP might be instrumental in effectively reducing state-level inequality. However, the share of services has a significant positive association with Gini coefficient, though the level of significance varies between states when PCNSDP, infrastructure, export and FDI are taken as the IV alternatively.

There are significant positive relationship between inequality and per capita income in model (2) and model (3) taking export and FDI alternatively as the instruments, but in model (1), the positive relation is observed only between inequality and per capita income taking infrastructure as the instrument. It is found that when PCNSDP, infrastructure and FDI is taken as the IV alternatively, the coefficients of the export in all the models become negative but insignificant. In case of FDI, its positive coefficient in model(1) changes to a significant negative coefficient in model(2) when PCNSDP is taken as the IV. This once again suggests that differences across units may lead to variable impact on reducing inequalities.

Lastly, but not of least importance, we get a counterintuitive result with regards to infrastructure. In models 2 and 3, infrastructure is found to have significant and positive on rising inequality across states. It might so that provisioning of infrastructure across states may not be inclusive, with a few having access to such infrastructure.

3.5 Summary of major findings

Our results in this chapter, based on panel data analysis, enable us to broadly observe that structural changes towards services have contributed to rising inequality. Such growth of services is largely jobless or requires only services with specific skills to grow, which might have led to a widening of income gaps at the sub-national level. However, manufacturing growth is ineffective in significantly reducing inequality during globalization. Moreover, trade openness in itself and inflows of FDI will not contribute to reduce inequality unless the income and employment potentials of the real output sector are enhanced. The reduction in the inter-state variations in the distribution of incomes, assets and economic opportunities is highly dependent on a fair distribution and equitable provisioning of infrastructure through public investment. However, provisioning of infrastructure is found to have induced inequality to rise under certain conditions.

CHAPTER 4

CONCLUSIONS

This dissertation had set out to investigate into identifying variations in income inequality and factors that determine such variations across Indian states during globalization. The analyses show rising income (consumption) inequality across states in India, in specific urban inequality. This is despite rising growth at the sub-national level, with some states performing better than the national average, while some others lagging behind. Furthermore, structural change towards more of services might have led to rising inequality across states.

The panel data estimates of the determinants of variations in rising inequality structural changes towards services have contributed to rising inequality. Such growth of services is largely jobless or requires only services with specific skills to grow, which might have led to a widening of income gaps at the sub-national level. However, manufacturing growth is ineffective in significantly reducing inequality during globalization. Moreover, trade openness in itself and inflows of FDI will not contribute to reduce inequality unless the income and employment potentials of the real output sector are enhanced. The reduction in the inter-state variations in the distribution of incomes, assets and economic opportunities is highly dependent on a fair distribution and equitable provisioning of infrastructure through public investment. However, provisioning of infrastructure is found to have induced inequality to rise under certain conditions.

It is important to note here that with globalisation, certain section of the population across states have benefitted more than other leading to rising inequality. States which had higher per capital income, better human capital with high skilled labour,

and infrastructure might have a tendency towards widening inequality. With a policy of liberalization such states became better investment destinations than their poorer counterparts. The government has to step in these situations and increase public investment, and provide safety net to that part of the population which have not benefitted from the process of globalisation. Priorities need to be in building up infrastructure and human capital, and skill acquisition and providing equal opportunity to a large section of the population to accessing such infrastructure, who have been otherwise deprived of it. These steps at the sub-national level in India will benefit states in reducing inequality and achieving the targets as enshrined in SDG 10.

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