Indian Journal of Human Development, Vol. 7, No. 1, 2013

Does Higher Economic Growth Reduce Poverty and Increase Inequality? Evidence from Urban India

Sabyasachi Tripathi*

This paper calculates select urban inequality and poverty indices and finds their policy linkages. In order to empirically estimate the links between poverty and inequality, it uses the new theoretical framework which was proposed by Araar and Timothy (2006). In addition, it estimates the determinants of urban poverty and inequality by using data pertaining to 52 large cities in India. The main results show that higher levels of city economic growth and large city population agglomerations are associated with a reduction in the poverty level of cities and an increase in the extent of inequality between cities.

Keywords: *Urban economic growth, Inequality, Poverty, Urban India*

INTRODUCTION

Urban India has been experiencing increasing economic growth, geographical expansion and demographic growth. For instance, the share of the urban Net Domestic Product (NDP) in the total NDP increased from 41.09 per cent in 1980-81 to 52.02 per cent in 2004-05. Similarly, the urban geographical area increased by about 103 per cent, that is, from 38,509.28 square kilometers (1.32 per cent of the total area) in 1971 to 78,199.66 square kilometers (2.38 per cent of the total area) in 2001. The urban population as a percentage of the total population increased from 19.9 per cent in 1971 to 27.8 per cent in 2001.

At the same time, there exists a wide rural–urban disparity in per capita consumption in India. For instance, Vaidyanathan (2001) finds that the per capita total consumption (or food consumption) in urban areas is 63 (or 41) per cent higher than in rural areas. Most importantly, the *India-Urban Poverty Report 2009* by Government of India (2009) finds that about 80 million people were estimated as poor in the cities and towns of India in 2007-08, and urban poverty in some of the larger states is higher than that of rural poverty, a phenomenon generally known as 'Urbanization of Poverty'.

Urban India is also characterized by intra-urban inequalities; as per the 61st Round of the National Sample Survey (NSS) of 2004-05 on consumer expenditure, the urban consumption inequality measured by the Gini coefficient is about 0.38. A reduction in

* Fellow, Indian Council for Research on International Economic Relations, New Delhi; Email: sabya.tripathi@gmail.com

consumption inequality and poverty between rural and urban India as well as within urban India is an important component of the inclusive growth strategy of the ongoing Eleventh Five Year Plan (2007-12); it is also the growth strategy enunciated in the Approach to the Twelfth Five Year Plan (2012-17).

There is a vast body of literature that measures poverty and inequality by rural and urban sectors and at national and state levels, especially since 1990. In general, these studies highlight the increasing inequality between urban and rural sectors (Deaton and Kozel, 2005; Sen and Himanshu, 2004; Sundaram and Tendulkar, 2003; Kundu, 2006). Using per capita consumption expenditure as a measure of welfare, Deaton and Dreze (2002) find that inter-state inequality increased between 1993-1994 and 1999-2000 and that urban–rural inequality increased not only throughout India but also within states. Jha (2002) finds higher inequality in both urban and rural sectors during the post-reform period as compared to the early 1990s.

In the context of city level inequality, Kundu (2006) finds that there is gross inequality with regards to economic base between the million plus cities (with one million or more population), medium towns (with 50,000 to one million population) and small towns (with less than 50,000 population) in terms of employment, consumption, and poverty. In particular, consumption expenditure differences across the size classes of urban centres are indicative of severe intra urban inequality. The study finds that as of 1999-2000, the per capita monthly consumption expenditure of million plus cities was Rs. 1070, about 53 per cent higher than that of small towns. In contrast, the *India: Urban Poverty Report 2009* by the Government of India (2009) finds that across the Indian states, poverty is negatively correlated with the level of urbanization, and large and medium cities have a lower incidence of poverty than small cities in India. A World Bank study (World Bank, 2010) finds that poverty is more widespread in very small towns than in large cities. Most importantly, a study by Gangopadhyay, *et al.* (2010) applies the small area estimation methodology in three states of India in 2004-05, and confirms that in the states of West Bengal, Orissa and Andhra Pradesh, the poverty level in large cities is much lower than that in small towns.

Several studies have been undertaken on the decomposition of poverty changes in terms of the growth effect and inequality effect. For instance, following Kakwani (2000), and Mazumdar and Son (2002), Bhanumurthy and Mitra (2004) decomposed changes in poverty into a growth effect, an inequality effect, and a migration effect for two periods: 1983-1993/94 and 1993/94-1999/2000 for India. They found that rural-to-urban migration contributed to poverty reduction in rural areas by 2.6 per cent between 1983 and 1993-94. Poverty in the urban sector increased during the same period, but by a smaller rate than the reduction of poverty in rural areas. Therefore, the net poverty incidence for the country as a whole decreased over the period studied. Datt and Ravallion (1992) show how changes in poverty measures can be decomposed into growth and redistribution components, and they use their methodology to study the poverty in Brazil and India during the 1980s. They find that redistribution alleviated poverty in India and due to India's lower mean consumption, India's poverty level is higher than that of Brazil. However, earlier studies, such as Kakwani (2000), and Jain and Tendulkar (1990) attempted to assess the impact of growth and inequality separately on poverty.

In this context, this paper focuses on the following two key objectives: first, to measure the extent of urban inequality and poverty across cities and demonstrate the link between them by emphasizing the share of inequality components (that is, between and within group inequalities) in the total poverty, in six geographical urban zones of India; and second, to identify and estimate the economic determinants of city inequality and poverty by using unit (or individual) level data of the NSS 61st Round of the consumer expenditure survey and city level data for other important variables. To our knowledge, this paper is a beginning for measuring inequality and poverty at large city levels and for establishing an empirical link between inequality and poverty, with a view to suggesting a policy prescription for reducing poverty and inequality in urban India. Moreover, the paper also sheds light on the impact of urban agglomeration and urban economic growth on urban inequality and poverty.

The paper is organized as follows. After the Introduction, Section 2 measures the selected poverty and inequality indices at the city level. The inter-urban variation in inequality and poverty is discussed Section 3. Section 4 presents the relevant determinants of urban inequality and poverty by using the OLS regression estimation. Finally, major conclusions and implications are presented in Section 5.

MEASUREMENT OF SELECT POVERTY AND INEQUALITY INDICES AT THE DISTRICT LEVEL

Inequality is measured by the familiar Gini coefficient. In order to check the confidence interval of the Gini coefficient values, Jackknife standard errors have been calculated.[1] Poverty is measured by the Poverty Headcount Ratio (PHR), the Poverty Gap Ratio (PGR), and the Squared Poverty Gap Ratio (SPGR). The PHR is a percentage of the population living in households with the income per person being below the poverty line. The PGR gives the mean distance below the poverty line as a proportion of that line (the mean is taken over the whole population, counting the non-poor as having a zero gap). For the SPGR, the individual poverty gaps are weighted by the gaps themselves, so as to reflect inequality amongst the poor (Foster, *et al.*, 1984) as given in Ravallion (2004).

Data Used

Due to the non-availability of income data at the individual level, the urban monthly per capita consumer expenditure (MPCE) data from the 61st Round of the National Sample Survey (NSS) 2004-05, is employed for the estimation of city level income inequality and poverty by considering the total number of sample urban persons of the respective city district.[2] The 61st Round on consumption expenditure survey follows both the Uniform Recall Period (URP) and Mixed Recall Period (MRP).[3] In order to measure urban poverty, the new poverty lines have been considered, as worked out by the Expert Group, which was set up by the Planning Commission of India in 2009 under the Chairmanship of Professor Suresh Tendulkar to suggest a new poverty line.[4] However, as India's official estimates do not provide the city level poverty line, state-specific urban poverty lines have been used for measuring city level poverty for the cities located in the corresponding states.[5] Following the Expert Group's suggestion, the MRP-based poverty estimation is considered, as MRP-based estimates capture the household consumption expenditure of the poor households on low frequency items of purchase more satisfactorily than the URP.[6] On the other hand, in order to measure urban inequality, the commonly used URP-based estimation has been considered, as the data collected for a 30-day recall period are more authentic due to the higher response from the respondents.[7]

Status of Poverty and Inequality at the District Level

The Gini Coefficients for 52 large city districts (see Appendix Table 1 for details) are presented in Appendix Table 2. Lower values in the Gini coefficient are observed for the districts of Amritsar, Kamrup, Aligarh, Meerut and Jalandhar than the other districts considered. In contrast, the districts which have registered a higher value of Gini coefficient are Ludhiana, Agra, Durg, Jaipur and Visakhapatnam. In addition, the standard errors for these estimates are small; thus inequality in the urban areas, as measured by the Gini coefficient, is statistically the highest for Ludhiana district and the lowest for Amritsar district among other districts.

The calculated values of PHR (see Appendix Table 2) show that the five city districts of Aurangabad, Nasik, Khordha, Solapur, and Allahabad occupy the top ranks in descending order in terms of higher urban poverty levels. On the other hand, the five city districts of Bangalore, Thiruvananthapuram, Mumbai, Kota, and Chennai are at the lower bottom in descending order with regard to a higher poverty level. The calculated values of PGR show that among the 52 city districts under study, the districts of Aurangabad, Nasik, Solapur, Khordha and Barddhaman show high levels of abject poverty. In contrast, the districts of Bangalore, Thiruvananthapuram, Mumbai, Chennai, and Kolkata have lower levels of poverty. The calculated values of SPGR show that the poverty level is lower in Bangalore, Mumbai, Chennai, Jodhpur, and Thiruvananthapuram. In contrast, Aurangabad, Nashik, Khordha, Solapur, and Kozhikode show higher levels of poverty. The poverty level of Bangalore is the lowest among 52 large city districts as per the PHR, PGR, and SPGR. On the other hand, Aurangabad and Nashik have the highest and second highest levels of poverty, respectively, among the 52 large city districts as per the PHR, PGR, and SPGR. However, the other 49 city districts (except Bangalore, Aurangabad, and Nashik) occupy different ranks (or different levels of poverty) according to the values

Table 1
Spearman's Rank Correlation Coefficients between the Poverty Indices

	PHR	*PGR*	*SPGR*
PHR	1		
PGR	0.95*	1	
SPGR	0.90*	0.98*	1

Note: *Indicates the statistical significance at a 1% level.
Source: Author's calculation.

of the PHR, PGR, and SPGR. For that reason, the Spearman's rank correlation coefficients (or Spearman's rho) have been calculated to examine the changing relative ranks of cities by the PHR, PGR, and SPGR. Table 1 presents the calculated values of the Spearman's rho. The results do not indicate any remarkable change in relative ranking by PHR, PGR, and SPGR. Therefore, if a city shows a higher urban poverty level than others by the calculated values of the PHR, the calculated values of PGR and SPGR would also be identical.

It has also been observed that by and large, the districts with a lower mean MPCE have higher poverty levels. For instance, the districts of Aurangabad, Khordha, Solapur, and Allahabad show a higher level of poverty with a lower level of mean MPCE. Moreover, Table 2 presents the poverty and inequality situations for different sizes of cities at the aggregate level in three categories: the marginalized group, 'Others', and total (the marginalized plus the 'Others' group). Across the three categories, the lowest levels of inequality are observed among the marginalized group. However, the highest level of poverty among all size groups is also found in the marginalized group. On the other hand, the 'Others' category exhibits the lowest level of poverty and the highest level of inequality among all size of cities. In particular, the lowest levels of poverty are observed for the mega cities among the three categories.

Most importantly, among the six mega city districts (with a population of over five million), the estimates of poverty are the lowest in Bangalore and the highest in Hyderabad. Stochastic dominance tests have been performed to explore the robustness of comparison between the poverty situations of each mega city districts with the rest of the urban areas of the respective states in which the city is located. Appendix Figure 1 presents the result of the first order stochastic dominance, according to which the districts of Bangalore, Chennai, Kolkata, Hyderabad and Mumbai dominate the rest of the urban regions in the states of Karnataka, Tamil Nadu, West Bengal, Andhra Pradesh, and Maharashtra, respectively. This conclusion is drawn as the poverty incidence curve (the cumulative distribution function) of these five mega city districts is consistently below that of the other urban regions of the respective states over a wide range of interval. However, in the case of Delhi city, represented

Table 2
Measurement of Poverty and Inequality across Different Size Classes of Cities

		All India Urban	*Large Cities (52 Cities)*	*Metro-politan Cities (30 Cities)*	*Mega Cities (6 Cities)*	*Total All India Urban (except 52 cities)*
Gini Index	Marginalized Group	0.33	0.35	0.34	0.32	0.32
	Others	0.38	0.40	0.41	0.39	0.36
	Total	0.38	0.40	0.40	0.38	0.35
Headcount Index (in %)	Marginalized Group	34	25	24	8	39
	Others	16	11	10	6	19
	Total	26	18	17	7	30
Sample size (Persons)	Marginalized Group	121411	26871	18917	5167	94540
	Others	85118	23186	17425	8172	61932
	Total	206529	50057	36342	13339	156472

Notes:

1. The 'Marginalized Group' includes Scheduled Tribes (STs), Scheduled Castes (SCs), and Other Backward Classes (OBCs).
2. Metropolitan cities are cities with a population of more than one million and mega cities are cities with with a five million-plus population, as per the 2001 Census.
3. The all-India urban poverty line for 2004-05, which has been worked out by the Tendulkar methodology, has been used to calculate the headcount poverty index.

Source: Author's calculation using he NSS 61st Round of National Sample Survey in 2004-05 on consumer expenditure.

by the North-west Delhi district and the other regions of Delhi, ascertaining the first-order poverty dominance is inconclusive as there are more than one interaction points.[8] Given that first-order dominance could not be ascertained, higher-order dominance (that is, second-order dominance) is tested; it is found that there is no clear dominance of the North West Delhi District over the other regions of Delhi. Thus, mega cities show lower levels of poverty than the other cities (or urban regions) located in the corresponding states.

INTER-URBAN VARIATIONS IN INEQUALITY AND POVERTY

In order to find the linkages between urban inequality and poverty, urban India has been divided into the following six regions: the *Northern* region (comprising the states of Haryana, Uttarakhand, Himachal Pradesh, Jammu and Kashmir, Uttar Pradesh, Delhi and Punjab), the *North-East* region (comprising the states of Assam, Tripura, Manipur, Meghalaya, Nagaland, Arunachal Pradesh, and Mizoram), the *Western* region (comprising the states of Gujarat, Maharashtra, Goa, and Rajasthan), the *Southern* region (comprising the states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Pondicherry), the *Eastern* region (comprising the states of West Bengal, Orissa, Bihar, Jharkhand, and Sikkim), and the *Central* region (comprising the states of Madhya Pradesh and Chhattisgarh). The zones have been divided by considering the geographical location of the states in India. In this section, we mainly empirically test the theoretical framework that links poverty and inequality proposed by Araar and Timothy (2006).

Appendix Table 3 gives the result of decomposition of the FGT index (for alpha =0) by the six zones. Over 29 per cent of the total poverty is attributed to the population group that lives in the *Northern* zone, though this zone comprises about 27 per cent of the total population. On the other hand, in the *Western* zone, with an identical size of the population share, only 22 per cent of the total poverty is attributed to the population group that lives in the *Western* zone. Appendix Figure 2 shows that the 'within the poor' group makes a lower contribution to the total inequality (measured by the Gini index) than the 'non-poor' group, while a major part of the inequality is explained by the inequality between the 'poor' and the 'non-poor' groups.

In Appendix Table 4, the Gini index has been decomposed by the six Indian geopolitical urban zones. It can be seen that the within group inequality contributes (23 per cent) higher than the between group inequality (12 per cent) to total inequality. Most importantly, the overlap group expenditure explains the residue component, and this component can be attributed to between groups component (Araar, 2006). The highest level of the overlap component indicates that the level of identification of groups, based on these six geopolitical zones, is low. Here, it is important to note that the group identification by a given indicator, like the household consumption expenditure, is high when population groups are identified only by using this indicator.[9]

The distribution of the consumption expenditure depends on the average consumption expenditure, the between groups inequality and the within groups inequality. In Appendix Figures 3 and 4, the magnitude of the contribution of each component has been shown according to the poverty line when the parameter alpha = 0 and alpha = 1. For a given level of poverty, the contribution of each of the three components to the total poverty is estimated. However, when the poverty line varies, the contribution of each of the three components also varies. For instance, for alpha = 0, and where the poverty line exceeds the average expenditure, the between group inequality helps to reduce poverty because the between group inequality makes that some individuals have consumption expenditure higher than the poverty line and others have consumption expenditure lower than the poverty line. In the case of urban India, when the poverty line (of Rs. 578.8 in 2004-05) is below the average monthly per capita expenditure (of Rs. 1052 based on the URP), the contribution of this average is nil. For the headcount index, the contribution of the inequality component is greater than zero when the poverty line is below the average per capita consumption expenditure.

The decomposition of the FGT index by the average monthly per capita expenditure and inequality components across zones is presented in Appendix Tables 5 and 6 for alpha = 0 and alpha = 1, respectively. The results show that while the within group inequality contributes more to the total inequality as measured by the Gini index, its contribution to the total poverty is also very high.

DETERMINANTS OF URBAN INEQUALITY AND POVERTY

In Sections 2 and 3, we measured the level of poverty and the extent of inequality in each district (proxied for the city) level and by geographical zones, and we tried to establish the link between them. In this section, we estimate the economic determinants of poverty and inequality.

Framework for the Estimation of Determinants of Urban Inequality

Following Glaeser, *et al.* (2009), the estimable model for determinants of urban inequality is as follows:

$$G_i = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + u_1 \quad (1)$$

G_i is Gini coefficient value of a city, X_1 refers to the city population agglomeration, X_2 stands for the per capita city output or city output growth, X_3 refers to the level of human capital accumulation of a city, and X_4 refers to the city poverty rate. Equation (1) has been estimated by the technique of OLS. In Equation (1), the expected sign of α_2 is positive (or negative), depending on the different stages of development (or the urbanization process) at the national level.[10]

As Glaeser, *et al.* (2009) find an increasingly positive relationship between the area population and the Gini coefficient across American metropolitan areas, the expected effect of the city population agglomeration on city inequality is positive (i.e., $\alpha_1 > 0$). The effect of the human capital accumulation on inequality depends on the level of education that is represented by X_3. For instance, Glaeser, *et al.* (2009) find that the share of college graduates (or the share of high school graduates) has a positive (or negative) effect on city inequality due to differences in the returns to skill. Due to the paucity of city level data, large city district level Primary Gross Enrolment Ratio (PGER), the Upper Primary Gross Enrollment Ratio (UPGER) and literacy rate are considered as the basic measures of accumulation of human capital in the city. The expected sign of α_3 can be positive or negative. A positive impact of poverty on inequality (that is, $\alpha_4 > 0$) is expected, as Le (2010) finds a similar relationship in the case of Vietnam from 1996 to 2004 by using the provincial data and data from the household living standard surveys.

On the basis of the current Indian scenario, it is clear that the large city population agglomeration, the per capita city output growth rate, the human capital accumulation and the higher poverty rate have a positive effect on city inequality.

Framework for Estimation of Determinants of Urban Poverty

Following Le (2010), the following specification is used to examine the determinants of urban poverty:

$$P_i = \alpha_{00} + \alpha_{11}X_{11} + \alpha_{22}X_{22} + \alpha_{33}X_{33} + \alpha_{44}X_{44} + u_{11} \quad (2)$$

P_i is the poverty headcount ratio of a city, X_{11} refers to the city population agglomeration, X_{22} stands for the per capita city output or city output growth, X_{33} refers to the level of human capital accumulation of a city, and X_{44} refers to the city inequality. Equation (2) has been estimated by the technique of OLS.

In Equation (2), a negative impact of the large city agglomeration on the city poverty rate (i.e., $\alpha_{11} < 0$) is expected as large cities have higher productivity, wages and capital per worker (World Bank, 2004). As absolute poverty tends to fall with a higher economic growth, combined with a low level of inequality, a negative sign of α_{22} is expected. Following Ali and Tahir (1999) and Le (2010), a positive effect of inequality on the poverty rate (that is, $\alpha_{44} < 0$) is expected. Finally, a negative effect of the human capital accumulation on the city poverty rate is expected as a higher share of school (or college) education has been found to have created better work opportunities for the people and could, therefore, lead to reduction of poverty level (i.e., $\alpha_{33} < 0$).

Urban India is experiencing an increase in the trend of a large city population agglomeration, per capita city output and its growth, human capital accumulation, inequality and a reduction of poverty rate. Therefore, a negative effect of the large city population agglomeration, per capita city output and its growth, and human capital accumulation on the city poverty rate and a positive effect of the higher inequality on the city poverty rate can be predicted.

Measurement of Variables and Data Sources

Table 3 summarizes the descriptions, measurements, and data sources of all the variables used in the OLS estimation of Equations (1) and (2).

Description of data

Appendix Table 7 presents the means, standard deviations, minimum, and maximum values for the sample used in regression analysis. Appendix Table 8 reports the sample correlation coefficients of the variables used in the regression analysis. The values of the correlation coefficients show a higher level of positive correlation between the primary and upper primary gross enrolment ratios (0.76), city population and city output (0.52), city output and its growth rate (0.37), and the city population and city literacy rate (0.36). On the other hand, higher levels of negative correlations are observed between the city poverty rate and city output (-0.37), the city poverty rate and city population (-0.31), and the city inequality and the PGER (-0.17). However, the values of the

Table 3
Measurement and Data Sources of the Variables

Variable	*Measurement*	*Data Source(s)*
Dependent variables:		
City inequality	Gini coefficient of the large city districts by considering urban sample persons of that districts.	Unit level data of NSS 2004-05 on consumer expenditure.
City poverty rate	Poverty head count ratio of the large city districts by considering urban sample persons of that districts.	Unit level data of NSS 2004-05 on consumer expenditure.
Independent variables:		
Large city population and its growth rate	52 urban agglomerations with 750,000 or more inhabitants in 2005 and growth rate of city population over the period 2000 to 2005.	UN, World Urbanization Prospects, 2009 Revision.
Growth rate of city population density	Growth rate of city population density over the period 2000 to 2005.	UN, World Urbanization Prospects, 2009 Revision and Town Directory, Census of India 2001, GoI.
City output and its growth	Per capita non-primary District Domestic Product (DDP) is used to measure the city output in 2004-05 and growth rate of the non-primary DDP over the period 2000-01 to 2004-05 at 1999-2000 constant prices, is taken as a measure of urban economic growth.	Directorate of Economics and Statistics (DES), various State Governments, GoI.
Human capital accumulation	The effect of education which is proxied by primary gross enrollment ratio (Grades I-IV) and upper primary gross enrolment ratio (Grades V-VIII) as of 2005-06 of the city district and the city district literacy rate in 2001.	District Information System of Education: District Report Cards published by National University of Educational Planning and Administration (NUEPA), New Delhi, and Census of India, 2001.

Source: Author's compilation.

correlations between the independent variables do not show the presence of multi-collinearity. Most importantly, Appendix Figure 5 shows a 19 per cent positive correlation between the logarithm of city population and of city inequality. Appendix Figure 6 shows a 32 per cent negative correlation between the city PHR and logarithm of the city population.

The key proxy variables in the estimation include the following: (i) the city district literacy as a proxy to the human capital accumulation, as literate people generally have a higher socio-economic status and employment prospects; (b) the PGER and UPGER as a second proxy variable of human capital accumulation, because the high rate of enrolment in school leads to faster growth in the per capita income through a rapid improvement in productivity (Bils and Klenow, 2000); (c) the growth rate of the density of the city population is used as a proxy for the internal urban agglomeration as it is associated with higher productivity; (d) the non-primary District Domestic Product (DDP) as a proxy of the city output as the urban agglomeration mainly indicates the agglomeration of the manufacturing and service sectors (Krugman, 1991).

Results of the Estimation

Table 4 summarizes the key results from the OLS regression estimation of the determinants of urban inequality and poverty based on Equations (1) and (2) with robust standard errors (to correct for heteroskedasticity) in parentheses. The urban inequality measured by the city-specific Gini coefficient values is the dependent variable for Regressions (1) and (2). On the other hand, urban poverty measured by the city-specific poverty headcount ratio is the dependent variable for Regressions (3), (4), and (5) for identifying the determinants of urban poverty. The estimated models are different from each other due to the specifications of the variables used. Regressions (1) and (3) show the estimates of the full model, which include all the independent variables, while Regressions (2), (4) and (5) report the results for a parsimonious model, excluding controls that are not found to be statistically significant in the estimated models (1) and (3).

In Regression (1), the result shows that the log of the city population has a positive and significant effect (at a 5 per cent level) on the log of city inequality. As the two variables are in log form, the coefficient can be interpreted as elasticity. The finding supports the expected hypothesis and shows that a 10 per cent increase in the size of the city population increases the city inequality by 0.7 per cent. This finding implies that a large city population agglomeration and an increase in urban inequality go together. On the other hand, a 10 per cent increase in the city population growth rate (or the growth rate of the city population density) reduces urban inequality by 0.1 (or 0.4) per cent. This result runs counter to the expected hypothesis. However, both the coefficients turn out to be insignificant. The coefficient of DDP (or growth rate of the DDP per capita) has a negative (or positive) significant effect on the city inequality. The results suggest that with a 10 per cent increase in the per capita DDP (or the growth rate of the DDP per capita), the city inequality decreases (or increases) by 1.1 (or 22.7) per cent. The results imply that a higher per capita income, which captures the average distribution of income, reduces urban inequality, but higher economic growth increases urban inequality. This result locates urban India in the initial phase of the Kuznets curve and suggests that higher economic growth is associated with higher inequality. The coefficient of poverty is 0.07, which implies that a 10 per cent increase in urban poverty increases urban inequality by 0.7 per cent. As the two variables are in log form, the coefficient can be interpreted as elasticity. The coefficient is significant (at a 10 per cent level) and consistent with the expected sign. The coefficient of the PGER is negative and significant, which implies that with a 100 per cent increase in the PGER, urban inequality decreases by almost 0.4 per cent. Nevertheless, the UPGER and the district literacy rate show a positive effect on city inequality even though the coefficients are not significant. Regression (1) explains 25 per cent of the total variation in the dependent variable.

The Regression (2) reports estimate a parsimonious set of controls. The regression results show that the effect of the UPGER on urban inequality is positive as in Regression (1), and is significant at a 5 per cent level. This result implies that a higher level of UPGER is associated with a higher level of urban inequality. Moreover, the result also shows that the significance level of the PGER variable increases from 10 per cent in Regression (1) to 5 per cent in Regression (2). In addition, the estimates of Regression (2) provide consistent results for other variables that include the DDP per capita, the growth rate of the DDP per capita, and city population, as the coefficients of these variables show an equal level of significance and the expected signs of Regression (1). In addition, the coefficient of the growth rate of city density does not show any improvement from the earlier regression results in terms of the level of significance. Overall, the explaining power of the model (R^2) remains almost the same (about, 0.24).

Regression (3) shows that the elasticity (as the two variables are in log form) between the city population and urban poverty is -0.24, implying that a 10 per cent increase in the large city population causes a reduction in poverty by 2.4 per cent. The coefficient is significant (at a 10 per cent level) and has the expected sign. In contrast, the growth of the city population has a significant negative effect (at a 5 per cent level) on urban poverty. The result runs counter to the expected hypothesis. These results imply that though a large population agglomeration reduces urban poverty, over-concentration (or the higher population growth rate of a large city) increases urban poverty. The estimated coefficient of the urban inequality is positively and significantly related to urban poverty, which supports the predicted hypothesis. An increase of 10 per cent in the urban inequality leads to 7 per cent increase in the urban poverty. The coefficient of the DDP per capita (or growth rate of the DDP per capita) is negative and insignificant. The coefficients of the PGER, UPGER, the district literacy rate, and growth rate of population density do not show a significant effect on urban poverty. The regression explains 39 per cent of the total variation in the dependent variable.

Regression (4) shows that the DDP per capita has a significant negative effect on urban poverty, which implies that a higher per capita income leads to reduction (as expected) in urban poverty. The results also show that while the significance level of the coefficient of the city population growth rate remains constant, the effect of urban inequality on urban poverty becomes insignificant. Most noticeably, the regression explains just 21 per cent of the total variation in urban poverty across cities.

The coefficient of the growth rate of the DDP per capita in Regression (5) is negative and has a significant effect (at the 10 per cent level) on urban poverty. The result supports the hypothesis of a negative impact of per capita income (or growth rate of

Table 4
Determinants of Urban Inequality and Poverty

	Dependent Variables				
	Log of Gini		Log of Poverty Headcount Ratio		
Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant	-0.942 (0.568)	-0.788 (0.518)	4.96** (1.96)	5.68** (2.16)	5.058*** (1.36)
Log of DDP per capita	-0.111** (0.044)	-0.101** (0.047)	-0.004 (0.228)	-0.343* (0.199)	
Growth rate of DDP per capita	2.27* (1.2)	2.26* (1.14)	-6.14 (3.68)		-5.65* (3.353)
Log of city population	0.068** (0.032)	0.069** (0.032)	-0.239* (0.122)		-0.215* (0.121)
PGER	-0.004* (0.002)	-0.005** (0.002)	0.008 (0.009)		0.011 (0.008)
UPGER	0.003 (0.002)	0.004** (0.002)	-0.004 (0.007)		-0.009* (.005)
District literacy rate	0.003 (0.003)		-0.005 (0.012)		
Log of city population growth rate	-0.011 (0.063)		23.81** (10.64)	22.65** (9.47)	
Log of growth rate of city population density	-0.044 (0.035)	-0.04 (0.035)	0.163 (0.215)		
Log of Poverty	0.071* (0.039)	0.066* (0.039)			
Log of Gini			0.701** (0.335)	0.051 (0.342)	0.688* (0.345)
No. of Obs.	52	52	52	52	52
R^2	0.25	0.24	0.39	0.21	0.29

Note: Figures in parentheses represent robust standard errors. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively

Source: Regressions (1) and (2) are estimated by using Equation (1). Regressions (3), (4), and (5) are estimated by using Equation (2).

DDP per capita) on urban poverty. Among the proxy variables considered to capture the human capital accumulation, the UPGER shows a significant effect (at the 10 per cent level) and a negative effect (as expected) on urban poverty. However, the PGER again remains statistically insignificant. The significance level of the coefficient of urban inequality has improved to a 10 per cent level from Regression (4). The R^2 shows a marginal increase to 0.29.

MAJOR CONCLUSIONS AND IMPLICATIONS

This paper explores the following two important issues: first, quantifying the level of the city inequality and poverty by establishing an empirical link between them; and second, to estimate the determinants of urban inequality and poverty by using the OLS regression estimation. For this analysis, individual level data of NSS 2004-05 on consumer expenditure and city (or district) level data from various sources are used by considering 52 large city districts in India.

The study finds that by and large, cities with lower mean levels of per capita expenditure have higher headcount poverty rates and that mega cities unambiguously show lower poverty rates. An analysis of the different sizes of cities at the aggregate level shows that the marginalized group (or other group) has a lower level of inequality (or a higher level of inequality) and higher level of poverty (or lower level of poverty). The decomposition of the Gini index by the six Indian geographical urban zones shows that within group inequality contributes higher than between group inequality to total inequality. The decomposition of the FGT index (for alpha =0) by the six zones shows that more than 29 per cent of the total poverty is attributable to the population group that lives in *Northern zone*.

The OLS regression results suggest that a large city population agglomeration, the growth rate of the city output, the UPGER and the city poverty rate have a strong positive effect on city inequality. On the other hand, the per capita city output and the PGER have a strong (or robust) negative effect on city inequality. Moreover, the level and growth rate of the city output, the large city population agglomeration, and the UPGER have a significant negative effect on the city poverty rate. On the other hand, a large city population growth rate (capture over concentration) has a positive effect on the city poverty rate.

The empirical analysis involving the linking of urban inequality with poverty shows that redistributive policies would be more effective in achieving quick poverty alleviation rather than boosting the economy by increasing per capita GDP. This is because the average per capita monthly consumption expenditure is found to be relatively higher than the all-India urban poverty line in 2004-05. Most importantly, policy-makers can use the decomposition results to formulate a workable poverty reduction policy. For instance, as suggested by Araar and Timothy (2006), the introduction of subsidy programmes for some goods that are largely consumed by poor households and a progressive income tax structure may result in a significant reduction in the total poverty in urban India.

Finally, this paper argues that the Indian Government needs to produce substantial city level data on consumption and income for facilitating better analysis and policy prescription at the sub-national or regional level for achieving a reduction in poverty and inequality. However, the estimation of poverty at the city level by using a small area methodology and effects of urban economic growth on urban inequality and poverty in respect of different time periods is left for future research.

ANNEXURE I

Indicators of Economic Inequality and Poverty and the Link between Them

1. Indicators of Economic Inequality

1.1 The Gini Coefficient:

Let $x_{i,}$ the cumulated proportion of the population variable, be a point on the X-axis, for k = 0,...,n, with $x_0 = 0$, $x_n = 1$,
whereas, $y_{i,}$ the cumulated proportion of the income variable, is a point on the Y-axis, for k = 0,...,n, with $y_0 = 0$, $y_n = 1$.
Then,

$$Gini = 1 - \sum_{i=1}^{N} (x_i - x_{i-1})(y_i + y_{i+1}) \quad (1)$$

Jackknife Standard Errors (As Discussed in Haughton and Khandker, 2009):

Suppose that we have a statistic, θ, and we consider the static as the Gini coefficient. For calculating its standard error, we estimate the statistic, which is θ, provided the statistic is not highly non-linear. We could also estimate the statistic leaving out the i^{th} observation, representing it as $\hat{\theta}_{(i)}$.If there are N observations in the sample, then the jackknife standard error of the statistic is given by:

$$\widehat{se} = \left[(N - 1/N)\sum_{i=1}^{N}\left(\theta_{(i)} - \theta\right)^2\right]^{1/2} \quad (2)$$

2. Indicators of Urban Poverty

2.1 Foster-Greer-Thorbecke (FGT) Index (Foster-Greer-Thorbecke, 1984):

A generalized version of poverty indices was considered by Foster, *et al.* (1984) as follows:

$$FGT = P_\alpha\left(x, x^*\right) = \sum_{i=1}^{P}\left(\frac{1 - x_i}{x^*}\right)^\alpha \quad (3)$$

= PR when $\alpha = 0$

= PGR when $\alpha = 1$

= SPGR when $\alpha = 2$

x^* = poverty line
x_i = monthly per capital consumption expenditure of *i*th individual
P = number of persons with consumption expenditure less than x^*.

3. Measurement of Poverty Dominance

Distribution 1 dominates Distribution 2 at order s over the range [z⁻, z⁺] if only if:

$$P_1(\zeta;\alpha) < P_2(\zeta;\alpha) \quad \forall \quad \zeta \in \left[Z^-, Z^+\right] \text{ for } \alpha = \text{s-1} \tag{4}$$

This involves comparing the stochastic dominance curves at order *s* or FGT curves with $\alpha = s - 1$. This application estimates the points at which there is a reversal of the ranking of the curves.

4. The Link between Poverty and Inequality (As given in Araar and Timothy, 2006)

4.1 Poverty Indices and Inequality

Poverty indices can be decomposed as follows:

$$P(y,z) = E_\mu + E_\pi \tag{5}$$

where y represents the vector of incomes, z is the poverty line, Eμ is the contribution of average income (μ) with perfect equality, and E_Π is the contribution of total inequality (Π) with the observed average income. Formally, as in Araar and Timothy (2006), the contribution of average income can be written as:

$$E_{\mu/\Pi=0} = 0, \text{ when } \mu > z \tag{6}$$

$$= P(\mu,z), \text{ when } \mu < z \tag{7}$$

4.2 Gini Index Lorenz Curve and Poverty

The Lorenz curve is a useful tool for representing the overall inequality. As shown by Datt and Ravallion (1992), the link between the headcount, noted by H, and the Lorenz curve is:

$$L^{'}(H) = \frac{Z}{\mu} \tag{8}$$

where Z and μ stand for poverty line and average income, respectively.

The link between the average poverty gap, denoted by P_1, and inequality represented by the Lorenz curve, is:

$$P_1 = [Z - \mu_P]H \tag{9}$$

where μ_p is the average income of the poor group. The link between the severity index, represented by the square of the poverty gap, and the Lorenz curve can be written as:

$$P_2 = \int_0^H \left[Z - \mu L^{'}(p)\right]^2 dp \tag{10}$$

As shown by Araar and Timothy (2006), the decomposition of the Gini index can be written in the following form:

$$I = \varphi_p \psi_p I_p + \varphi_{np} \psi_{np} + \tilde{I} \tag{11}$$

where I is the Gini index, Φg and Ψg are the population and income shares for the group g respectively and $\tilde{I}$ is the Gini index where within group inequality is eliminated, that is, each household has the average income of its group. Based on this, the link between the headcount index and the between group inequality is as follows:

$$H = \mu \tilde{I} \left(\frac{1}{\mu - \mu p} \right) \tag{12}$$

Then they find that the component between the group inequality can be expressed as follows:

$$\tilde{I} = H - L(H) \tag{13}$$

where L(H) is the level of the Lorenz curve when the percentile p = H.

For the poverty gap index, the link can be expressed as follows:

$$P_1 = \mu \tilde{I} \left(\frac{Z - \mu_p}{\mu - \mu p} \right) \tag{14}$$

4.3 Population Groups, Inequality and Poverty

In order to make out the contribution of regional disparities to the total poverty and to estimate the contribution of the within group inequality of a given group to the total poverty, an excellent decomposition method has been proposed by Araar and Timothy (2006), which takes the following form.

$$P(y,z) = E_\mu + E_B + \sum_{g=1}^{G} E_W^g \tag{15}$$

where

$$E_W^g = 0.5\phi_g \left[P_g(y) - P_g\left(y\left(\mu/\mu_g\right)\right) + P_g\left(\mu_g\right) - P_g(\mu) \right] \tag{16}$$

where E_B is the contribution of the between group inequality and E_w^g is the contribution of inequality within the group g.

ACKNOWLEDGEMENT:

This paper is a part of the author's Doctoral Dissertation at the Institute for Social and Economic Change (ISEC), Bangalore. The author would like to thank his Ph.D. thesis supervisor, Professor M.R. Narayana for his constant guidance, inspiration, valuable comments and suggestions. He would also like to thank Meenakshi Rajeeb, Veerarasekharappa, Krishna Raj, Elumalai Kanan, B.P. Vani and Amrita Ghatak for their helpful comments and discussions. In addition, he wishes to thank Abdelkrim Araar for his comments and suggestions in elucidating the link between inequality and poverty, as also his permission to use the Distributive Analysis Stata Package (DASP) for the empirical estimation. He is also grateful to anonymous referees for their detailed and constructive comments. Finally, he wants to thank Anupma Mehta for her copyediting. However, the usual disclaimer applies.

Appendix Table 1
Names of the Districts Used in the Regression Analysis

Agra (Agra)[1], Aligarh (Aligarh), Allahabad (Allahabad)[1], Amritsar (Amritsar)[1], Barddhaman (Asansol)[1], Aurangabad (Aurangabad), Bangalore Urban (Bangalore)[1], Bareilly (Bareilly), Thane (Bhiwandi), Bhopal (Bhopal)[1], Khordha (Bhubaneswar), Chandigarh*, Chennai (Chennai)[1], Coimbatore (Coimbatore)[1], Delhi*[1], Dhanbad (Dhanbad)[1], Durg (Durg-Bhilainagar), Kamrup (Guwahati), Gwalior (Gwalior), Dharward (Hubli-Dharwad), Hyderabad (Hyderabad)[1], Indore (Indore)[1], Jabalpur (Jabalpur), Jaipur (Jaipur)[1], Jalandhar (Jalandhar)[1], Purbi Singhbhum (Jamshedpur)[1], Jodhpur (Jodhpur), Kanpur Nagar (Kanpur)[1], Eranakulam (Kochi)[1], Kolkata (Kolkata)[1] Kota (Kota), Kozhikode (Kozhikode), Lucknow (Lucknow)[1], Ludhiana (Ludhiana)[1], Madurai (Madurai)[1], Meerut (Meerut)[1], Moradabad (Moradabad), Mumbai (Mumbai)[1], Mysore (Mysore), Nagpur (Nagpur)[1], Nashik (Nashik)[1], Patna (Patna)[1], Pune (Pune)[1], Raipur (Raipur), Ranchi (Ranchi), Salem (Salem), Solapur (Solapur), Thiruvananthapuram (Thiruvananthapuram), Tiruchirappalli (Tiruchirappalli), Varanasi (Varanasi)[1], Krishna (Vijayawada)[1], Visakhapatnam (Visakhapatnam)[1]

Notes: Name in the first bracket indicates the names of the cities located in the corresponding district.

* Delhi and Chandigarh were considered as a whole proxy of a city district.

[1] Indicates metropolitan cities.

Source: Author's compilation

Appendix Table 2
Calculated Values of Inequality and Poverty Indices at the District Level –Urban

		Urban Inequality					*Urban Poverty*			
				95% Confidence Interval						
S. No.	*Name of the Districts*	*Gini*	*Standard Error*	*Lower Bound*	*Upper Bound*	*State Urban Poverty Lines (2004-05)*	*FGT (0)*	*FGT (1)*	*FGT (2)*	*Mean MPCE*
1	Agra	0.514	0.028	0.46	0.568	532.12	27.6	7.4	2.3	1393
2	Aligarh	0.276	0.015	0.246	0.305	532.12	29.7	6	2.1	784
3	Allahabad	0.316	0.021	0.274	0.358	532.12	41.8	9.2	2.8	731
4	Amritsar	0.226	0.005	0.216	0.237	642.51	17.5	2.4	0.5	917

contd...

Appendix Table 2 *Contd...*

		Urban Inequality					*Urban Poverty*			
				95% Confidence Interval		*State Urban Poverty*				
S. No.	*Name of the Districts*	*Gini*	*Standard Error*	*Lower Bound*	*Upper Bound*	*Lines (2004-05)*	*FGT (0)*	*FGT (1)*	*FGT (2)*	*Mean MPCE*
5	Auranga-bad	0.388	0.022	0.345	0.431	631.85	63.8	20.7	8.1	688
6	Bangalore	0.329	0.008	0.313	0.346	588.06	2.6	0.4	0.1	1395
7	Barddha-man	0.334	0.008	0.319	0.348	572.51	38.1	9.2	2.9	824
8	Bareilly	0.389	0.02	0.35	0.428	532.12	21.6	4.5	1.5	1121
9	Bhopal	0.3	0.009	0.282	0.318	532.26	23.4	4.7	1.3	856
10	Chandigarh	0.36	0.009	0.344	0.377	634.46	10.1	2.1	0.6	1770
11	Chennai	0.37	0.009	0.353	0.387	559.77	7.5	1.1	0.2	1596
12	Coimbatore	0.354	0.014	0.327	0.381	559.77	17.1	2.9	0.8	1085
13	Delhi	0.336	0.005	0.326	0.347	642.47	12.9	2	0.5	1319
14	Dhanbad	0.388	0.02	0.348	0.428	531.35	24.8	4.6	1.1	1065
15	Dharward	0.393	0.031	0.331	0.454	588.06	32.1	6.3	2.3	1083
16	Durg	0.498	0.065	0.371	0.626	513.7	16.5	2.2	0.4	1310
17	Ernakulam	0.401	0.018	0.366	0.436	584.7	14	1.9	0.4	1419
18	Greater Mumbai	0.371	0.007	0.357	0.386	631.85	6.3	1	0.2	1570
19	Gwalior	0.414	0.023	0.369	0.46	532.26	36.3	7.7	2.4	941
20	Hyderabad	0.433	0.027	0.381	0.485	563.16	15.3	2.9	0.7	1296
21	Indore	0.454	0.036	0.382	0.525	532.26	18.2	3.5	1	1648
22	Jabalpur	0.293	0.012	0.27	0.316	532.26	18.7	4.3	1.6	871
23	Jaipur	0.481	0.044	0.395	0.567	568.15	35.7	6.5	1.8	1147
24	Jalandhar	0.286	0.01	0.267	0.305	642.51	16.4	2	0.4	1170
25	Jodhpur	0.302	0.017	0.269	0.335	568.15	12.6	1.3	0.2	1073
26	Kamrup	0.273	0.016	0.243	0.304	600.03	11.3	2.5	0.9	1272
27	Kanpur Nagar	0.399	0.021	0.358	0.44	532.12	15.8	3.2	0.9	1224
28	Khordha	0.401	0.017	0.367	0.434	497.31	45.3	11.6	4.8	809
29	Kolkata	0.403	0.012	0.379	0.427	572.51	8.3	1.2	0.3	1520
30	Kota	0.355	0.021	0.315	0.395	568.15	6.4	1.4	0.3	1477
31	Kozhikode	0.368	0.016	0.337	0.399	584.7	31.3	8.8	3.3	918
32	Krishna	0.329	0.016	0.298	0.36	563.16	13.9	2.7	0.7	793
33	Lucknow	0.437	0.014	0.41	0.463	532.12	11.4	2.3	0.9	1329
34	Ludhiana	0.523	0.086	0.353	0.692	642.51	16.7	2.6	0.6	1835
35	Madurai	0.286	0.011	0.264	0.307	559.77	14.2	2.5	0.7	1025
36	Meerut	0.281	0.012	0.256	0.305	532.12	15.4	3.2	0.9	897
37	Moradabad	0.308	0.01	0.289	0.326	532.12	25.9	3.4	0.9	952

contd...

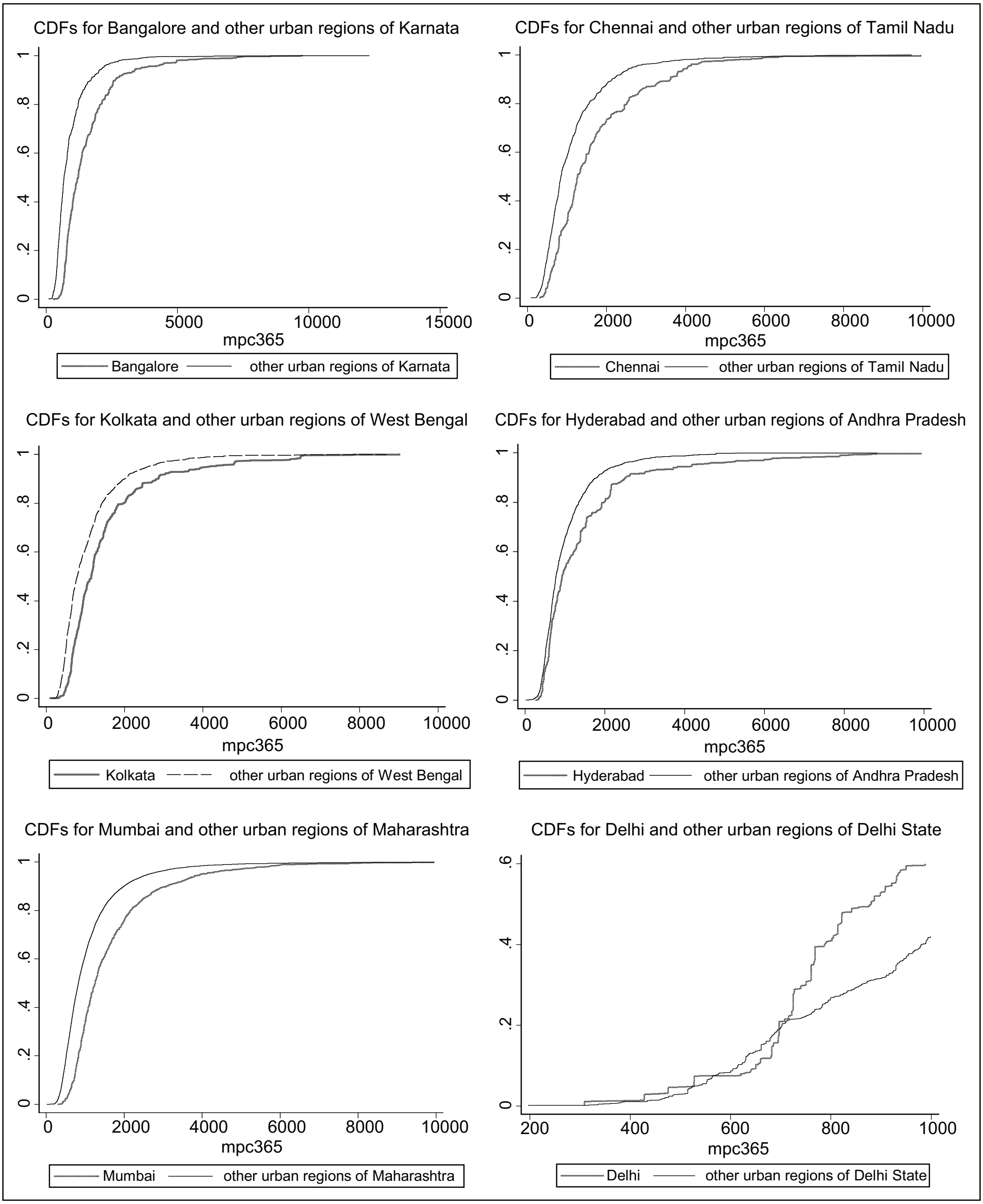
Appendix Table 2 *Contd...*

S. No.	*Name of the Districts*	*Urban Inequality*				*State Urban Poverty Lines (2004-05)*	*Urban Poverty*			*Mean MPCE*
		Gini	*Standard Error*	*95% Confidence Interval*			*FGT (0)*	*FGT (1)*	*FGT (2)*	
				Lower Bound	*Upper Bound*					
38	Mysore	0.297	0.014	0.27	0.324	588.06	18.6	3.9	1.4	1046
39	Nagpur	0.395	0.023	0.35	0.44	631.85	30.3	8.1	3	1078
40	Nashik	0.367	0.008	0.352	0.382	631.85	54.3	16.1	7	875
41	Patna	0.352	0.023	0.307	0.398	526.18	27	7	2.1	908
42	Pune	0.325	0.007	0.311	0.339	631.85	19.5	3	0.7	1177
43	Purbi -Singhbhum	0.309	0.014	0.281	0.337	531.35	13.4	3.2	1	1212
44	Raipur	0.377	0.024	0.33	0.424	513.7	24.6	7.3	2.9	835
45	Ranchi	0.299	0.013	0.273	0.325	531.35	21	5.7	1.9	799
46	Salem	0.379	0.015	0.349	0.408	559.77	27.6	7.2	2.7	965
47	Solapur	0.288	0.009	0.271	0.304	631.85	44.8	11.8	4.2	735
48	Thane	0.327	0.008	0.311	0.343	631.85	10	1.9	0.5	1281
49	Thiruvan-anthapuram	0.391	0.021	0.351	0.431	584.7	4.7	0.9	0.3	1867
50	Tiruchir-appalli	0.321	0.011	0.298	0.343	559.77	16.3	2.3	0.6	1111
51	Varanasi	0.322	0.021	0.282	0.363	532.12	20.6	4.5	1.5	837
52	Visakha-patnam	0.467	0.019	0.43	0.504	563.16	9.6	1.8	0.6	1734

Notes: 1. The average of the poverty line of Punjab and Haryana is considered as Chandigarh's poverty line.
2. The mean MPCE is based on a 30-day recall or reference period.

Source: Author's calculation using the NSS 61st Round unit level data of the National Sample Survey of 2004-05 in consumer expenditure.

Appendix Figure 1
Poverty Dominance Curve for Six Mega Cities Districts



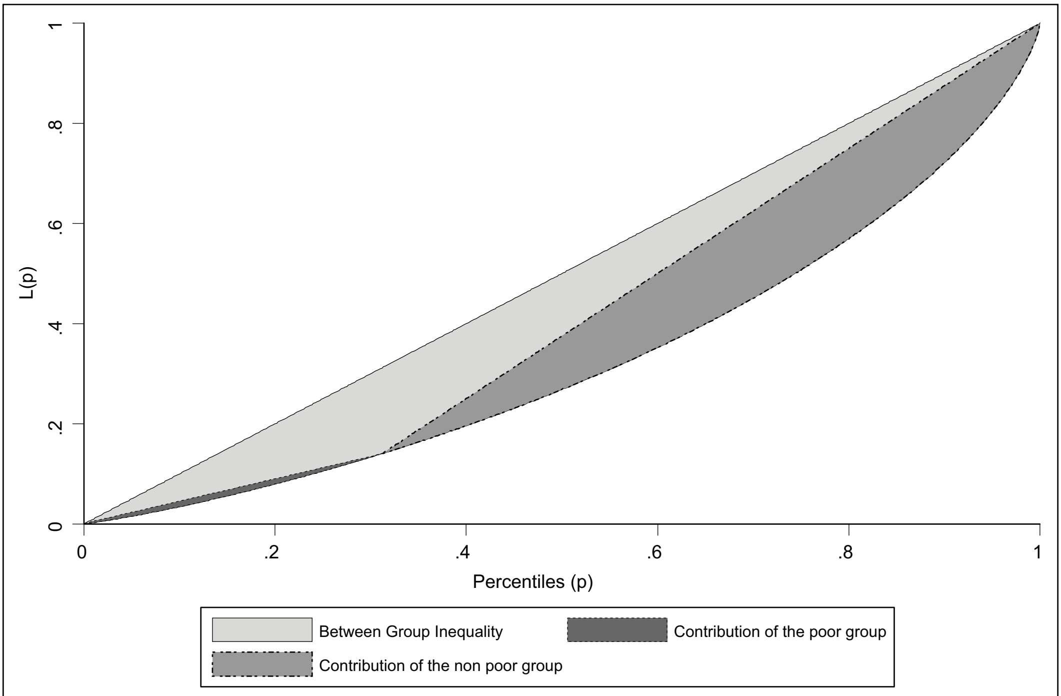
Source: Author's calculation using STATA 11 and individual level data from the NSS 61st Round on the consumption expenditure survey.

Appendix Table 3
Decomposition of the FGT Index according to the Geopolitical Zones (α = 0; z = Rs. 578.8)

Group	*FGT Index*	*Population Share*	*Absolute Contribution*	*Relative Contribution*
North	0.332954	0.2722	0.090642	0.288562
North-east	0.202630	0.015123	0.003064	0.009756
West	0.246889	0.272224	0.067209	0.213962
South	0.274732	0.222792	0.061208	0.194857
East	0.406335	0.141072	0.057322	0.182487
Central	0.452903	0.076552	0.034671	0.110375
Total	**0.314117**	**1.000000**	**0.314117**	**1.000000**

Source: Author's calculation using DASP software and NSS 61st Round unit level data of the National Sample Survey in 2004-05 on consumer expenditure.

Appendix Figure 2
Lorenz curve, Gini index and Poverty, Urban India (2004-05)



Source Drawn by the author using DASP software and the NSS 61st Round unit level data of the National Sample Survey in 2004-05 on consumer expenditure.

Appendix Table 4

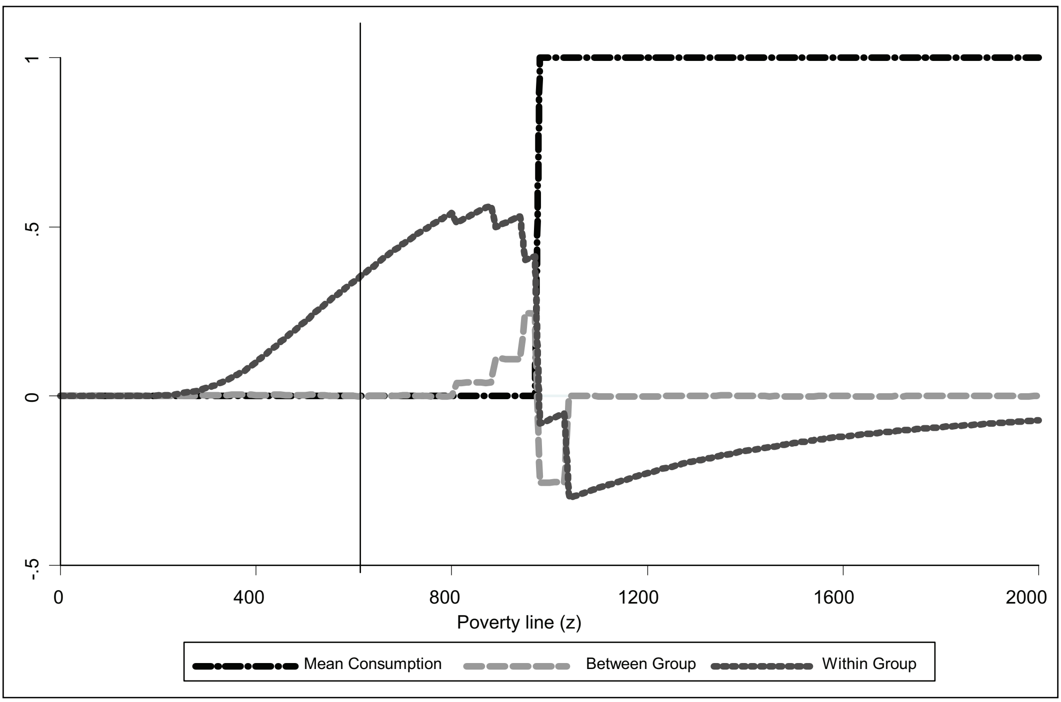
Decomposition of the Gini Index according to the Geopolitical Zones

Group	*Gini Index*	*Population Share*	*Income Share*	*Absolute Contribution*	*Relative Contribution*
North	0.3486	0.2722	0.2642	0.0251	0.0722
North-east	0.2852	0.0151	0.0161	0.0001	0.0002
West	0.3329	0.2722	0.2901	0.0263	0.0757
South	0.3507	0.2228	0.2380	0.0186	0.0535
East	0.3551	0.1411	0.1282	0.0064	0.0185
Central	0.3464	0.0766	0.0634	0.0017	0.0048
Within group	—	—	—	0.0781	0.2250
Between group	—	—	—	0.0404	0.1163
Overlap (residue)	—	—	—	0.2288	0.6587
Total	**0.3473**	**1.0000**	**1.0000**	**0.3473**	**1.0000**

Source: Author's calculation using DASP software and NSS 61st Round unit level data of the National Sample Survey in 2004-05 on consumer expenditure.

Appendix Figure 3

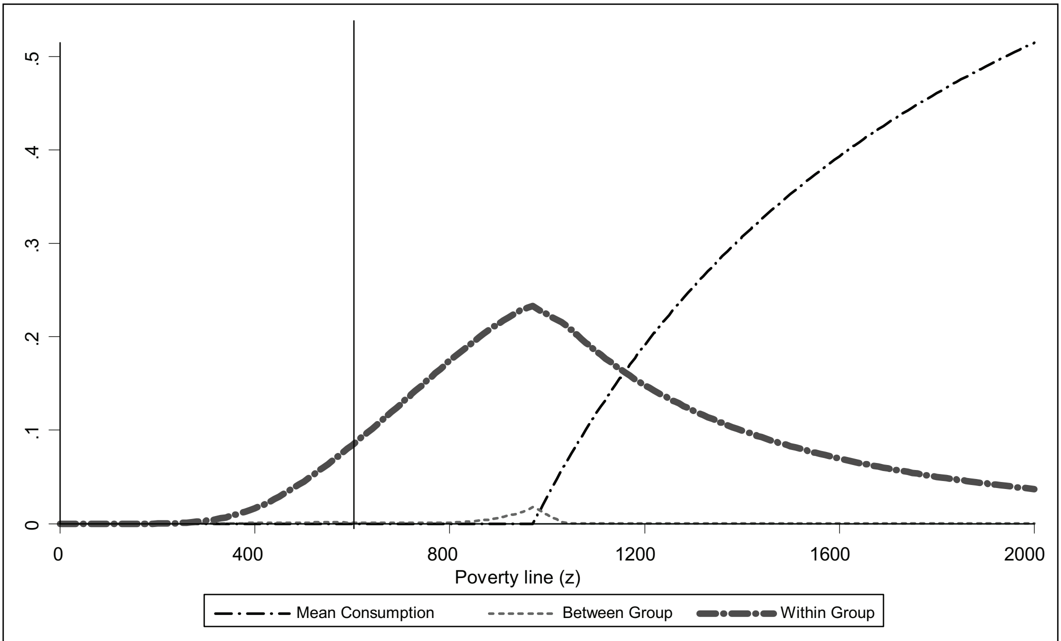
Contribution of the Average Expenditure and Inequality and Components to the Total Poverty (FGT (α = 0))



Source: Drawn by author using DASP software and NSS 61st Round unit level data of the National Sample Survey in 2004-05 of consumer expenditure.

Appendix Figure 4

Contribution of the Average Expenditure and Inequality and Components to the Total Poverty (FGT (α = 1)).



Source: Drawn by author using DASP software and NSS 61st Round unit level data of the National Sample Survey in 2004-05 on consumer expenditure.

Appendix Table 5

Decomposing the FGT Index (α = 0) by Average Expenditure and Inequality Components

	Poverty Line = Rs. 578.8		
Components	*Absolute Contribution*	*Relative Contribution*	*Population Share*
North	0.088143	0.280644	0.272237
North-east	0.003283	0.010454	0.015123
West	0.073797	0.234968	0.272224
South	0.066040	0.210269	0.222792
East	0.053325	0.169785	0.141072
Central	0.029485	0.093880	0.076552
Within Group	0.314073	0.999859	1.00000
Between Group	0.000044	0.000141	—
Average income	0.000000	0.000000	—
Total	**0.314117**	**1.000000**	**1.000000**

Source: Author's calculation using DASP software and NSS 61st Round unit level data of the National Sample Survey in 2004-05 on consumer expenditure.

Appendix Table 6
Decomposing the FGT Index (α = 1) by Average Expenditure and Inequality Components

Components	*Poverty Line = Rs. 578.8*		
	Absolute Contribution	*Relative Contribution*	*Population Share*
North	0.021709	0.287231	0.272237
North-east	0.000605	0.008006	0.015123
West	0.016568	0.219213	0.272224
South	0.015381	0.203508	0.222792
East	0.013660	0.180738	0.141072
Central	0.007657	0.101304	0.076552
Within Group	0.075580	0.982362	1.000000
Between Group	0.001357	0.017638	—
Average income	0.000000	0.000000	—
Total	**0.076937**	**1.000000**	**1.000000**

Source: Author's calculation using DASP software and NSS 61st Round unit level data of the National Sample Survey in 2004-05 on consumer expenditure.

Appendix Table 7
Descriptive Statistics

	Mean	*Standard Deviation*	*Minimum*	*Maximum*
Gini coefficient (GC)	0.36	0.07	0.23	0.52
Poverty head count ratio (PHCR)	21.52	12.78	2.6	63.8
City population in thousands (CP)	2553.48	3980.36	744	19493
City population growth (CPG)	0.028	0.009	0.009	0.044
Growth rate of city density (CPDG)	0.21	0.27	0.04	1.44
Per capita city output in thousand Rs. (CY)	21.34	11.73	0.79	66.82
Growth of per capita city output (GCY)	0.051	0.028	0.001	0.13
Primary gross enrollment ratio (PGER)	71.34	23.92	0	114.5
Upper primary gross enrollment ratio (UPGER)	45.03	23.58	0	98.1
District literacy rate in % (DLR)	72.67	9.93	44.75	93.2

Source: Author's computation.

Appendix Table 8

Correlations between Dependent and Independent Variables

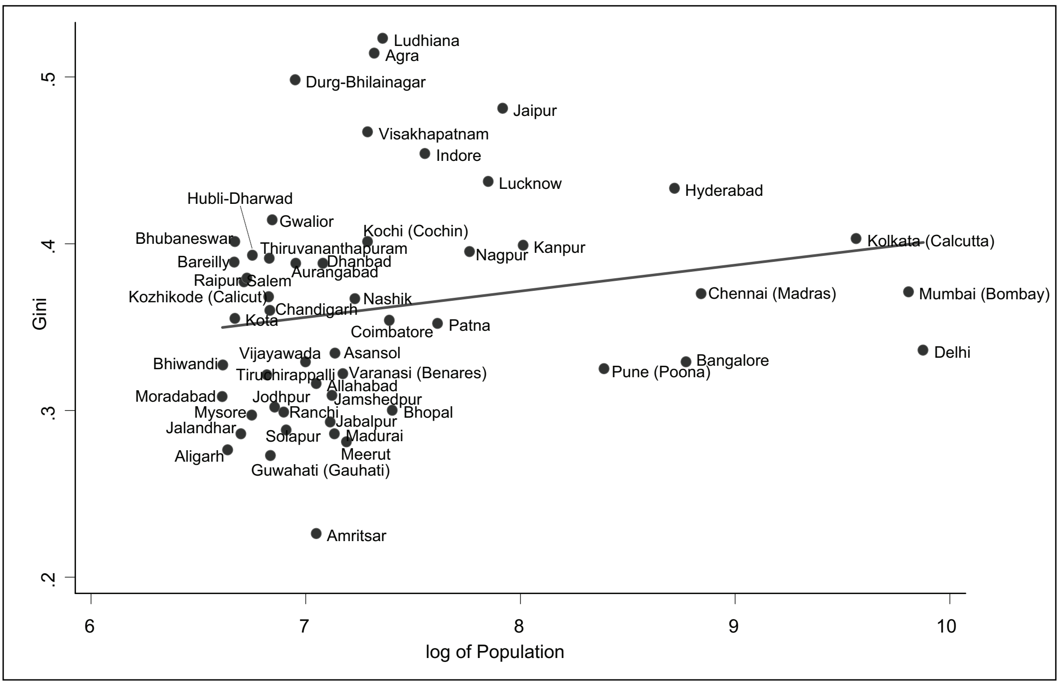
GC	*PHCR*	*CY*	*GCY*	*CP*	*PGER*	*UPGER*	*DLR*	*CPG*	*CPDG*	
GC	1									
PHCR	0.06	1								
CY	0.00	-0.37	1							
GCY	0.08	-0.13	0.37	1						
CP	0.08	-0.31	0.52	0.09	1					
PGER	-0.17	0.16	-0.23	-0.05	-0.28	1				
UPGER	-0.01	-0.06	0.1	-0.06	-0.01	0.76	1			
DLR	0.13	-0.22	0.6	0.19	0.36	-0.15	0.23	1		
CPG	0.05	0.33	0.14	0.1	0.06	-0.15	-0.28	-0.14	1	
CPDG	-0.04	-0.14	0.23	0.24	0.23	-0.16	-0.07	0.17	-0.01	1

Note: See Appendix Table 11 for variable definitions.

Source: Author's calculations.

Appendix Figure 5

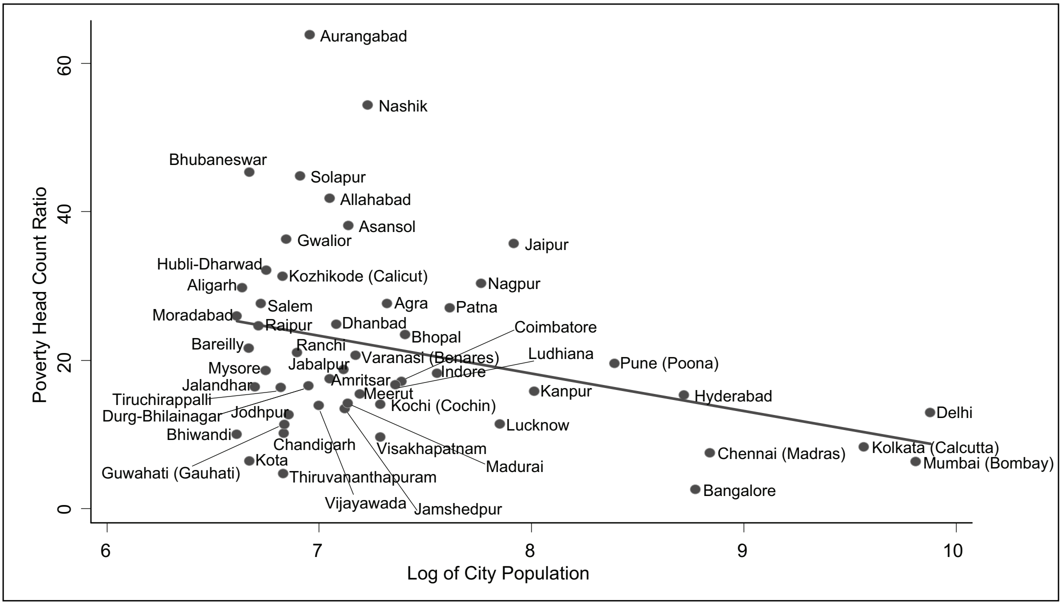
Relationship between the Gini Coefficient and Log of City Population, 2005



Source: Author's analysis.

Appendix Figure 6

Relatioship Between Poverty and Log of City Population, 2005



Source: Author's analysis.

NOTES

1. The jackknife estimate provides a satisfactory approximation for the estimation of the Gini coefficient (where analytical standard errors may not exist).
2. City district means the district in which the city is located.
3. The Uniform Recall Period refers to the consumption expenditure data collected by using the 30-day recall or reference period. The Mixed Recall Period refers to consumption expenditure data collected by using the one-year recall period for five non-food items (that is, clothing, footwear, durable goods, education, and institutional medical expenses) and a 30-day recall period for the rest of the items.
4. Tendulkar's committee recommended a methodology for poverty estimation, which is now a controversial issue in India, and the Government of India has set up a Technical Group (Planning Commission Press Release on 24 May 2012) to revisit the methodology for estimation of poverty and identification of the poor under the chairmanship of Dr. C. Rangarajan, which is now ongoing.
5. The survey data of several agencies have clearly brought out that the prices of commodities and services vary significantly across different size class of cities/towns (for a detailed explanation, see Kundu and Sarangi, 2005).
6. Sampling weights are used to derive the population level for all the estimates.
7. The URP distribution of MPCE has more extreme MPCE values than the MRP, which results in higher values of inequality measures. As per the NSS report on "Level and Pattern of Consumer Expenditure, 2004-05", the Lorenz ratio for urban India is 0.37 (or 0.36) for the MPCE based on URP (or MRP).

8. In order to compute different poverty indices, the whole of Delhi has been considered as a proxy of Delhi city, but for comparing the poverty dominance, the North-west Delhi district is considered as a proxy of Delhi city and compared with the rest of Delhi.
9. The overlap is implied when the income of the richer person in group *i* is higher than that of the poorer person in group *j* (for a detailed explanation, see Araar, 2006).
10. The relationship between economic growth, inequality and poverty is complex and non-linear, and follows a dynamic process. Kuznets (1955) examined the link between poverty, inequality and growth, and found an inverted U-shaped relationship between growth and inequality. Ravallion (1997) suggests that higher growth with a high level of inequality may not help reduce the poverty level of a country.

REFERENCES

Ali, S.S. and S. Tahir (1999). "Dynamics of Growth, Poverty, and Inequality in Pakistan", *Pakistan Development Review*, Vol. 38, No. 4, pp. 837-58.

Araar, A. (2006). "On the Decomposition of the Gini Coefficient: An Exact Approach, with an Illustration Using Cameroonian Data", *Working Paper 06-02*, Centre interuniversitaire sur le risque, les politiques économiques et l'emploi (CIRPÉE), Université du Québec à Montréal. Available at http://www.cirpee.org/fileadmin/documents/Cahiers_2006/CIRPEE06-02.pdf, Accessed on 15 June 2011.

Araar, A. and A.T. Timothy (2006). "Poverty and Inequality Nexus: Illustration with Nigerian Data", *Working Paper, 06-38*, Centre interuniversitaire sur le risque, les politiques économiques et l'emploi (CIRPEE), Université du Québec à Montréal, Available at http://www.cirpee.org/fileadmin/documents/Cahiers_2006/CIRPEE06-38.pdf, Accessed on 10 October 2011.

Bhanumurthy, N.R. and A. Mitra (2004). "Declining Poverty in India: A Decomposition Analysis", *Indian Journal of Labour Economics*, Vol. 47, No. 2, pp. 311-21.

Bils, M. and P.J. Klenow (2000). "Does Schooling Cause Growth?", *American Economic Review*, Vol. 90, No. 5, pp. 1160-83.

Datt, G. and M. Ravallion (1992). "Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s", *Journal of Development Economics,* Vol. 38, No. 2, pp. 275-95.

Deaton, A. and V. Kozel (2005). "Data and Dogma: The Great Indian Poverty Debate", *World Bank Research Observer,* Vol. 20, No. 2, pp. 177-200.

Deaton, A. and J. Dreze (2002). "Poverty and Inequality in India: A Re-Examination", *Economic and Political Weekly*, Vol. 37, No. 36 pp. 3729-48.

Foster, J., J. Greer and T. Thorbecke (1984). "A Class of Decomposable Poverty Measures", *Econometrica*, Vol. 52, No. 3, pp. 761-66.

Gangopadhyay, S., P. Lanjouw, T. Vishwanath and N. Yoshida (2010). "Identifying Pockets of Poverty: Insights from Poverty Mapping Experiments in Andhra Pradesh, Orissa and West Bengal", *Indian Journal of Human Development*, Vol. 4, No. 1, pp. 5-28.

Glaeser, E.L., M. Resseger and K. Tobio (2009). "Inequality in Cities", *Journal of Regional Science*, Vol. 49, No. 4, pp. 617-46.

Government of India (2009). "India: Urban Poverty Report 2009", Ministry of Housing and Urban Poverty Alleviation and Oxford University Press, New Delhi

Haughton, J. and S.R. Khandker (2009). *Hand Book on Poverty and Inequality*The World Bank, Washington DC, Available at: http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/

EXTPOVERTY/EXTPA/0,,contentMDK:22405907~pagePK:148956~piPK:216618~theSitePK:430367,00.html, Accessed on 15 June 2011.

Jain L.R., and S.D. Tendulkar, (1990) "Role of Growth and Distribution in the Observed Change in Headcount Ratio Measure of Poverty: A Decomposition Exercise for India", *Indian Economic Review,* Vol. 25, No 2, pp. 165-205.

Jha, R. (2002). "Reducing Poverty and Inequality in India: Has Liberalization Helped?", *Working Papers 2002-04*, Arndt-Corden Department of Economics, Australian National University. Canberra, Australia. Available at: https://crawford.anu.edu.au/acde/publications/publish/papers/wp2002/wp-econ-2002-04.pdf, Accessed on 19 July 2011.

Kakwani, N. (2000). "On Measuring Growth and Inequality Components of Poverty with Application to Thailand", *Journal of Quantitative Economics,* Vol. 16, No. 1, pp. 67-79.

Krugman, P. (1991). "Increasing Returns and Economic Geography", *Journal of Political Economy*, Vol. 99, No. 3, pp. 483-99.

Kundu, A. (2006). "Trends and Patterns of Urbanization and their Economic Implications", *India Infrastructure Report 2006*, Oxford University Press, New Delhi, Chapter 2, pp. 27-41.

Kundu, A. and N. Sarangi (2005). "Issue of Urban Exclusion", *Economic and Political Weekly*, Vol. 40, No. 33, pp. 3642-46.

Kuznets, S. (1955). "Economic Growth and Income Inequality", *American Economic Review,* Vol. 45, Issue No. 1, pp. 1-28.

Le, H.Q. (2010). "The Linkages between Growth, Poverty and Inequality in Vietnam: An Empirical Analysis", *Working Paper Series No. 2010/06*, DEPOCEN Hanoi, Viet Nam, Available at: http://depocenwp.org/modules/download/index.php?id=80, Accessed on 10 December 2011.

Mazumdar, D. and H.H. Son (2002). "Vulnerable Groups and the Labour Market in Thailand: Impact of the Asian Financial Crisis in the Light of Thailand's Growth Process", Paper presented at the Conference on 'Social and Economic Impacts of Liberalization and Globalization: Effects on Labour Markets and Income Distribution', at University of Toronto, 19-20 April, Also available at: http://www.utoronto.ca/plac/pdf/Conf_6_Berry/Mazumdar.pdf, Accessed on 10 April 2012.

Ravallion, M. (1997). "Can High-Inequality Developing Countries Escape Absolute Poverty?", *Economic Letters*, Vol. 56, No. 1, pp. 51-57.

——— (2004). "Looking beyond Averages in the Trade and Poverty Debate", *World Bank Policy Research Working Paper 3461*, World Bank, Washington DC, November. Web Address: http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-3461, Accessed on 15 December 2011.

Sen, A. and Himanshu (2004). "Poverty and Inequality in India—I", *Economic and Political Weekly*, Vol. 39, No. 38, pp. 4247-63.

Sundaram, K. and S.D. Tendulkar (2003). "Poverty in India in the 1990s: An Analysis of Changes in 15 Major States", *Economic and Political Weekly,* Vol. 38, No. 14, pp. 1385-93.

United Nationa (2009). World Urbanization Prospects: The 2009 Revisions. New York, United Nations, Population Database, Population Division, Department of Economic and Social Affairs [Cited 10 June 2010]. Available from http://esa.un.org/unpd/wup/doc_highlights.htm.

Vaidyanathan, K.E. (2001). "Measurement of Income Inequalities in Urban and Rural Areas in India", Paper presented at the 53rd Session of the International Statistical Institute, Seoul. Available at: http://isi.cbs.nl/iamamember/CD2/pdf/241.PDF, Accessed on 10 December 2011.

World Bank (2004). "*India: Investment Climate and Manufacturing Industry*", The World Bank, Washington DC.

——— (2010). "*Perspectives on Poverty in India: Stylized Facts from Survey Data*", India Poverty Assessment, Poverty Reduction and Economic Management Network, The World Bank, Washington DC.