Does higher economic growth reduce poverty and increase inequality? Evidence from Urban India

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Abstract: This paper calculates select urban inequality and poverty indices and finds their policy linkages. In addition, the determinants of urban poverty and inequality are estimated by using data of 52 large cities in India. The main results show that higher city economic growth and large city population agglomeration are associated with reduction in city poverty and increase in inequality between cities.

JEL Classification: R11, D 63

Key Words: Urban Economic Growth, Inequality, Poverty, Urban India.

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1. INTRODUCTION

Urban India has been experiencing increasing economic growth, geographical expansion and demographic growth. For instance, the share of urban net domestic product (NDP) in total NDP increased from 41.09 per cent in 1980-81 to 52.02 per cent in 2004-05. Similarly, the urban geographical area has increased by about 180 per cent, i.e., from 38509.28 square kilometer (1.32 per cent of total area) in 1971 to 78199.66 square kilometer (2.38 per cent of total area) in 2001. Urban population as a percentage of 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) percent higher than in rural areas. Most importantly, 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 61st Round of National Sample Survey (NSS) of 2004-05 on consumer expenditure, the urban consumption inequality measured by Gini coefficient is about 0.38. A reduction in 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 XI 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 compared to the early 1990s.

In the context of city level inequality, Kundu (2006) finds that there is gross inequality in the matter of economic base between the million plus cities (one million or more population), medium towns (50,000 to one million population) and small towns (less than 50,000 population) in terms of employment, consumption, and poverty. In particular, consumption expenditure differences across size classes of urban centers 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, India: Urban poverty report 2009 by 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 lower incidence of poverty than small cities in India. World Bank study (World Bank 2010) finds that poverty is more widespread in very small towns than in large cities. Most importantly, Gangopadhyay et al. (2010) study applies the small area estimation methodology in three states of India in 2004-05 and confirms that in West Bengal, Orissa and Andhra Pradesh the poverty level in large cities is much lower than small towns.

The above review of select studies shows that urban India is characterized by higher poverty and inequality. 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 on the share of inequality components (i.e., between and within group inequalities) in total poverty, in six geographical urban zones of India. Secondly, to identify and estimate the economic determinants of city inequality and poverty, using unit (or individual) level data of NSS 61st Round of consumer expenditure survey and city level data for other important variables. It is assumed that this is a pioneering effort for measuring inequality and poverty at large city levels and establishing an empirical link between inequality and poverty, with a view of suggest policy prescription to reduce 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.

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

2. MEASUREMENT OF SELECT POVERTY AND INEQUALITY INDICES AT DISTRICT LEVEL

Inequality is measured by the familiar Gini coefficient. To check the confidence interval of the Gini coefficient values, Jackknife standard errors are calculated.[1] Poverty is measured by Poverty Headcount Ratio (PHR), Poverty Gap Ratio (PGR), and Squared Poverty Gap Ratio (SPGR). The importance of using these three poverty indices is well discussed in Hand Book of Poverty and Inequality (specifically in chapter 4) by Haughton and Khandker (2009).

2.1 Data used

Due to the non-availability of income data at the individual level, urban monthly per capita consumer expenditure (MPCE) data from the 61st round of National Sample Survey (NSS) 2004-05, is employed for the estimation of city level income inequality and poverty by considering total number of sample urban persons of the respective city district.[2] 61st Round on consumption expenditure survey follows both Uniform Recall Period (URP) and Mixed Recall Period (MRP).[3] To measure urban poverty, the new poverty lines as worked out by the Expert Group which was set up by the Planning Commission of India in 2009 under the Chairmanship of Prof Suresh Tendulkar to suggest a new poverty line, is considered.[4]

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[1] Jackknife estimate provides satisfactory approximation for estimation of Gini coefficient (where analytical standard errors may not exit).

[2] City district means the district in which the city located.

[3] The Uniform Recall Period refers to consumption expenditure data collected using the 30-day recall or reference period. The Mixed Recall Period refers to consumption expenditure data collected using the one-year recall period for five non-food items (i.e. clothing, footwear, durable goods, education, and institutional medical expenses) and 30-days recall period for the rest of items.

[4] Tendulkar's committee recommended methodology for poverty estimation is now a controversial issue in India and Govt. 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 on going.

However, as India's official estimates do not provide city level poverty line, state specific urban poverty lines are used for measuring city level poverty for the cities located in the corresponding states.[5] Following the Expert Group's suggestion, 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 URP.[6] On the other hand, to measure urban inequality, commonly used URP based estimation is considered, as data collected for 30 days recall period are more authentic due to higher response from the respondents.[7]

2.2 Status of poverty and inequality at district level

Gini Coefficients for 52 large city districts (see appendix Table 1 for details) are presented in Appendix Table 2. The lower values in the Gini coefficient are observed for the districts of Amritsar, Kamrup, Aligarh, Meerut and Jalandhar than other districts considered. In contrast, 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 urban area – as measured by the Gini coefficient is statistically highest for Ludhiana and lowest for Amritsar district among other districts.

The calculated values of PHR (see table 2 in Appendix) show that the five city districts of Aurangabad, Nasik, Khordha, Solapur, and Allahabad are at 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 the ascending order in regard to lower level of poverty. The calculated values of PGR show that among the 52 city districts under study, abject poverty is high in Aurangabad, Nasik, Solapur,

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[5] Survey data of several agencies have clearly brought out that prices of commodities and services vary significantly across different size class of cities/towns (see for detailed explanation Kundu and Sarangi, 2005).

[6] Sampling weights are used to derive population level for all the estimates.

[7] The URP distribution of MPCE has more extreme MPCE values than MRP which results higher values of inequality measures. As per the NSS report on "Level and Pattern of Consumer Expenditure, 2004-05", the Lorenz ratios for urban India is 0.37 (or 0.36) for MPCE based on URP (or MRP).

Khordha and Barddhaman. In contrast, Bangalore, Thiruvananthapuram, Mumbai, Chennai, and Kolkata have lower levels of poverty. The calculated values of SPGR show that 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 PHR, PGR, and SPGR. On the other hand, Aurangabad and Nashik have the highest and second highest level of poverty respectively among 52 large city districts as per PHR, PGR, and SPGR. However, other 49 city districts (except Bangalore, Aurangabad, and Nashik) are at different ranks (or different levels of poverty) according to value of PHR, PGR, and SPGR. The Spearman's rank correlation coefficients (or Spearman's rho) have been calculated to examine the changing relative ranks of cities by 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 higher urban poverty level by calculated values of PHR, the calculated values of PGR and SPGR will also be the identical.

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

**indicates statistical significance at 1% level.*

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

Table 2: Measurement of poverty and inequality

		All India Urban	Large cities (52 cities	Metropolitan 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

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

Notes: 1. Marginalized Group includes Scheduled Tribes, Scheduled Castes, and Other Backward Classes.

2. Metropolitan cities (population more than one million) and Mega cities (cities with five million-plus population) as per 2001 census.

3. All India urban poverty line for 2004-05 which is worked out by Tendulkar Methodology is used to calculate head count poverty index.

Most importantly, among the six mega cities (population over five million) districts, the estimates of poverty is lowest in Bangalore and 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 area of the respective states. Appendix Figure 1 presents the result of the first order stochastic dominance, according to which Bangalore, Chennai, Kolkata, Hyderabad and Mumbai dominate the rest of the urban regions of Karnataka, Tamil Nadu, West Bengal, Andhra Pradesh, and Maharashtra, respectively. This conclusion is drawn as the poverty incidence curve (cumulative distribution function) of these five mega city districts is consistently below than the other urban regions of the respective states over a wide range of interval. However, in the case of Delhi city represented by North West Delhi District and the other region 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 (i.e. second-order) is tested; it is found that there is no clear dominance of North West Delhi District over the other regions of Delhi. Thus, mega cities show lower level of poverty situation than other cities (or urban regions) located in the corresponding states.

[8] In order to compute different poverty indices, whole Delhi is considered as a proxy of Delhi city, but for comparing poverty dominance, North West Delhi district is considered as a proxy of Delhi city and compared with rest of the Delhi.

3. INTER URBAN VARIATION IN INEQUALITY AND POVERTY

In order to find the linkages between urban inequality and poverty, urban India is divided in to the following six regions: *North* region (Haryana, Uttaranchal, Himachal Pradesh, Jammu and Kashmir, Uttar Pradesh, Delhi and Punjab), *North-East* region (Assam, Tripura, Manipur, Meghalaya, Nagaland, Arunachal Pradesh, and Mizoram), *West* region (Gujarat, Maharashtra, Goa, and Rajasthan), *South* region (Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, and Pondicherry), *East* region (West Bengal, Orissa, Bihar, Jharkhand, and Sikkim), and *Central* region (Madhya Pradesh and Chhattisgarh).

Appendix Table 3 gives the result of decomposition of the FGT index (for alpha =0) by the six zones. Over 29 per cent of total poverty is attributed to the population group that lives in *Northern* zone, although this zone comprises of about 27 per cent of the total population. On the other hand, with an identical size of population share, only 22 per cent of total poverty is attributed to the population group that lives in the *Western zone*. Appendix Figure 2 shows that within poor group has a lower contribution to the total inequality (measured by the Gini index) than that of 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 is decomposed by the six Indian geopolitical urban zones. It is seen that the within group inequality contributes (23 per cent) higher than the between group inequality (12 per cent) to total inequality. Most importantly, 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. It is important to note here that the group identification by a given indicator, like the household consumption expenditure, is high when populations groups are identified only by using this indicator.[9]

The distribution of consumption expenditure depends on average consumption expenditure, the between group inequality and the within group inequality. In Appendix Figures 3 and 4,

[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* (see for details explanation in Araar, 2006).

the magnitude of the contribution of each component is 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 incomes higher than the poverty line and others have incomes lower than the poverty line. In case of urban India when the poverty line (Rs. 578.8 in 2004-05) is below the average monthly per capita expenditure (Rs. 1052 based on URP), the contribution of this average is nil. For the headcount index, the contribution of inequality component is greater than zero when poverty line is below the average per capita consumption expenditure.

The decomposition of the FGT index by average monthly per capita expenditure and inequality components across zones is presented in Appendix Table 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, it contributes to total poverty is very high.

4. DETERMINANTS OF URBAN INEQUALITY AND POVERTY

4.1 Framework for estimation of determinants of urban inequality

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

$$\mathrm{G_i} = \alpha_0 + \alpha_1\mathrm{X_1} + \alpha_2\mathrm{X_2} + \alpha_3\mathrm{X_3} + \alpha_4\mathrm{X_4} + \mathrm{u_1} \qquad \text{-------------------------------- (1)}$$

G_i is Gini coefficient value of a city, X_1 refers to city population agglomeration, X_2 stands for per capita city output or city output growth, and X_3 refers to level of human capital accumulation of a city, and $\mathrm{X_4}$ refers to city poverty rate. Equation (1) is 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 urbanization process) at national level.[10]

[10] The relationship between economic growth, inequality and poverty are complex, non-linear, and follows a dynamic process. Kuznet (1955) examined the link between poverty, inequality and growth and found an inverted U shape relationship between growth and inequality. Ravallion (1997) suggests that higher growth with the high level of inequality may not reduce poverty level of a country.

As Glaeser et al. (2009) find an increasing positive relationship between area - population and the Gini coefficient across American metropolitan areas, the expected effect of city population agglomeration on city inequality is positive (i.e., $\alpha_1 > 0$). The effect of 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 paucity of city level data, large city district level primary gross enrollment ratio (PGER), upper primary gross enrollment ratio (UPGER) and literacy rate are considered as the basic measure of human capital accumulation of the city. Expected sign of α_3 can be positive or negative. A positive impact of poverty on inequality (i.e., $\alpha_4 > 0$) is expected, as Le (2010) finds a similar relationship in case of Vietnam from 1996 to 2004 by using the provincial data and data from household living standard surveys.

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

4.2 Framework for estimation of determinants of urban poverty

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

$$\mathrm{P_i} = \alpha_{00} + \alpha_{11}\mathrm{X}_{11} + \alpha_{22}\mathrm{X}_{22} + \alpha_{33}\mathrm{X}_{33} + \alpha_{44}\mathrm{X}_{44} + \mathrm{u}_{11} \qquad \text{------------------------------ (2)}$$

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

In equation (2), a negative impact of large city agglomeration on 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 tend to fall with higher economic growth combined with 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 poverty rate (i.e., $\alpha_{44} > 0$) is expected. Finally, a negative effect of human capital accumulation on city poverty rate is expected as higher share of school (or college) education is found to have created better work opportunity for the people and therefore could lead to reduction of poverty level (i.e., $\alpha_{33} < 0$).

Urban India is experiencing an increasing in trend of 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 large city population agglomeration, per capita city output and its growth, human capital accumulation on city poverty rate and a positive effect of higher inequality on city poverty rate are predicted.

4.3 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 equation (1) and (2).

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 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 enrollment ratio (Grades VI-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

4.4 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 correlation coefficients show higher level of positive correlation between primary and upper primary gross enrollment ratio (0.76), city population and city output (0.52), city output and its growth rate (0.37), and city population and city literacy rate (0.36). On the other hand, higher level of negative correlations are observed between city poverty rate and city output (-0.37), city poverty rate and city population (-0.31), and city inequality and primary gross enrollment ratio (-0.17). However, the value of correlations between the independent variables does not show presence of multicollinearity. Most importantly, Appendix Figure 5 shows the 19 percent positive correlation between logarithm of city population and city inequality. Appendix Figure 6 shows the 32 percent negative correlation between city PHR and logarithm of city population.

Key proxy variables in the estimation include the following: (i) 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) Primary and upper primary gross enrollment ratio as a second proxy variable of human capital accumulation, because high rate of enrollment in school makes faster growth in per capita income through rapid improvement in productivity (Bils and Klenow, 2000). (c) Growth rate of city population density is used as a proxy of internal urban agglomeration as it associated with higher productivity. (d) Non primary DDP as a proxy of city output as urban agglomeration mainly indicates the agglomeration of manufacture and service sectors (Krugman, 1991).

4.5 Results of the estimation

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

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

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

Table 4: Determinants of urban inequality and poverty

Independent Variables	Dependent variables				
	Log of Gini		Log of Poverty Head Count Ratio		
	(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 1%, 5%, and 10% level respectively.*
Source: Regression (1) and (2) are estimated using equation (1). Regression (3), (4), and (5) are estimated using equation (2).

Regression (3) shows that the elasticity (as the two variables are in log form) between city population and urban poverty is -0.24 implying that a 10 per cent increase in large city population causes a reduction in poverty by 2.4 per cent. The coefficient is significant (at 10 per cent) and has the expected sign. In contrast, city population growth has a significant (at 5 per cent level) negative effect on urban poverty. The result runs counter to the expected hypothesis. These results imply that though large population agglomeration reduces urban poverty, but over concentration (or 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 DDP per capita (or growth rate of DDP per capita) is negative and insignificant. The coefficients of PGER, UPGER, district literacy rate, and growth rate of population density do not show 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 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 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 total variation in urban poverty across cities.

The coefficient of growth rate of DDP per capita in regression (5) is negative and has a significant (at the 10 per cent level) effect on urban poverty. The result supports the hypothesis of a negative impact of per capita income (or growth rate of DDP per capita) on urban poverty. Among the proxy variables considered to capture the human capital accumulation, UPGER shows a significant (at the 10 per cent level) and a negative (as expected) effect on urban poverty. However, PGER again remains statistically insignificant. In contrast, the significance level of the coefficient of urban inequality has improved to 10 per cent level from regression (4). Moreover, the R^2 shows a marginal increase to 0.29.

5. MAJOR CONCLUSIONS AND IMPLICATIONS

This paper is intended to explore the following two important issues: First, to quantify the level of city inequality and poverty by establishing an empirical link between them. Second: to estimate the determinants of urban inequality and poverty by using 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.

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 rate. The different size of cities at the aggregate level analysis shows that marginalized group (or other group) has lower level of inequality (or higher level of inequality) and higher level of poverty (or lower level of poverty). The decomposition of Gini index by the six Indian geographical urban zones shows that within group inequality contributes higher than between group inequality to inequality. The decomposition of FGT index (for alpha =0) by these six zones show that more than 29 per cent of total poverty is attributable to the population group that live in *Northern zone*.

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

The empirical analysis involving linking of urban inequality with poverty shows that redistributive policies would be more effective for quick poverty alleviation rather than boosting the economy by increasing per capita GDP. It 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, introduction of subsidy programs for some goods that are largely consumed by poor households and a progressive income tax structure may result in significant reduction of total poverty in urban India.

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

Annexure I

Indicators of economic inequality and poverty and link between them

1. Indicators of economic inequality

1.1 Gini Coefficient:

let x_i is 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 is the cumulated proportion of the income variable a point on the y-axis, for k = 0,...,n, with $y_0 = 0$, $y_n = 1$.
Then,

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

Jackknife standard errors: (As given in Haughton and Khandker, 2009)

Suppose that we have a statistic, θ and we consider the static is Gini coefficient. For calculating its standard error we estimate the statistic which is $\hat{\theta}$, provided the statistic is not highly nonlinear. 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

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

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:

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

= PR when α = 0

= PGR when α = 1

= SPGR when α = 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:

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

4. The link between Poverty and Inequality: (As given in Ararr and Timothy, 2006)

4.1 Poverty indices and inequality

Poverty indices can be decomposed as follows:

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

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 ($_{\Pi}$) with the observed average income. Formally, as in Ararr and Timothy (2006) the contribution of average income can be written as:

$$E_{\mu/\Pi=0} = 0, \quad \text{when } \mu > z \qquad \text{--------------------------------------- (6)}$$

$$= P(\mu,z), \quad \text{when } \mu < z \qquad \text{------------------------------------ (7)}$$

4.2 Gini index Lorenz curve and poverty

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

$$L'(H) = \frac{Z}{\mu} \qquad \text{------------------------------ (8)}$$

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:

$$P_1 = [Z - \mu_P]H \qquad \text{-------------------------------------- (9)}$$

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:

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

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

$$I = \varphi_p \psi_p I_p + \varphi_{np} \psi_{np} + \tilde{I} \quad \text{----------------------------- (11)}$$

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, i.e., each household have average income of its group. Based on this, the link between headcount index and the between group inequality is as follows:

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

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

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

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

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

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

4.3 Population Groups, Inequality and Poverty

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 total poverty, an excellent decomposition method has been proposed by Ararr and Timothy (2006), which takes the following form.

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

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

---------------------------- (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.

Appendix Table 1: Name 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], Ludhina (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]

* Delhi and Chandigarh were considered as a whole proxy of a city district.
[1] Indicates metropolitan cities.
Notes: Name in the first bracket indicates the name of the cities which is located in the corresponding district.

Appendix Table 2: Calculated values of inequality and poverty indices at district level –Urban

Sr. No.	Name of the Districts	Urban Inequality				Urban Poverty				Mean MPCE
		Gini	Standard error	95% confidence interval		State Urban Poverty Lines (2004-05)	FGT(0)	FGT(1)	FGT(2)	
				Lower bound	Upper bound					
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	Amrithar	0.226	0.005	0.216	0.237	642.51	17.5	2.4	0.5	917
5	Aurangabad	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	Barddh-aman	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 State	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	Eranakulam	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

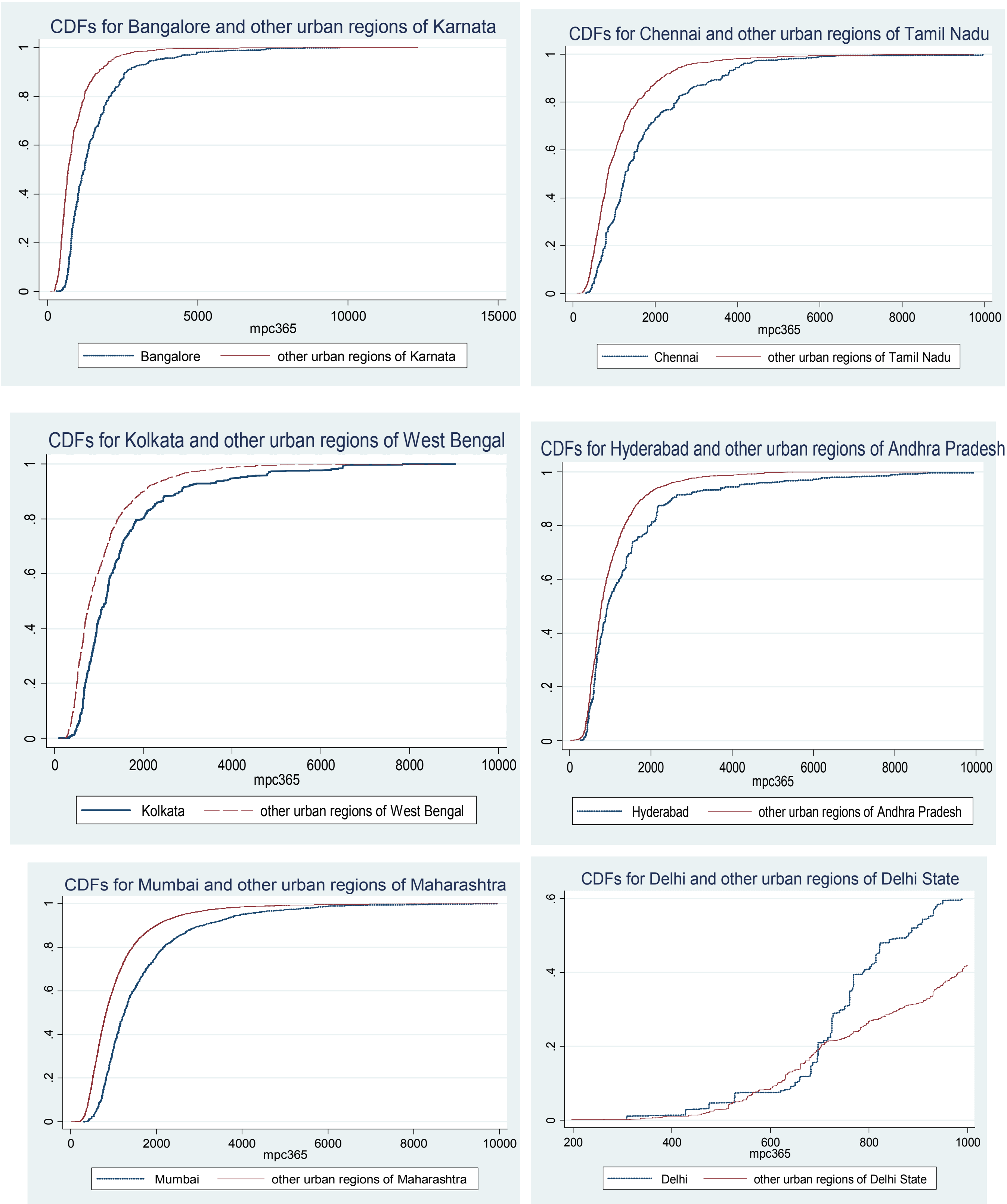
Appendix Table 2 (Continued)

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	Ludhina	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
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	Visakhapatnam	0.467	0.019	0.43	0.504	563.16	9.6	1.8	0.6	1734

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

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

Appendix Figure 1: Poverty dominance curve for six mega cities districts



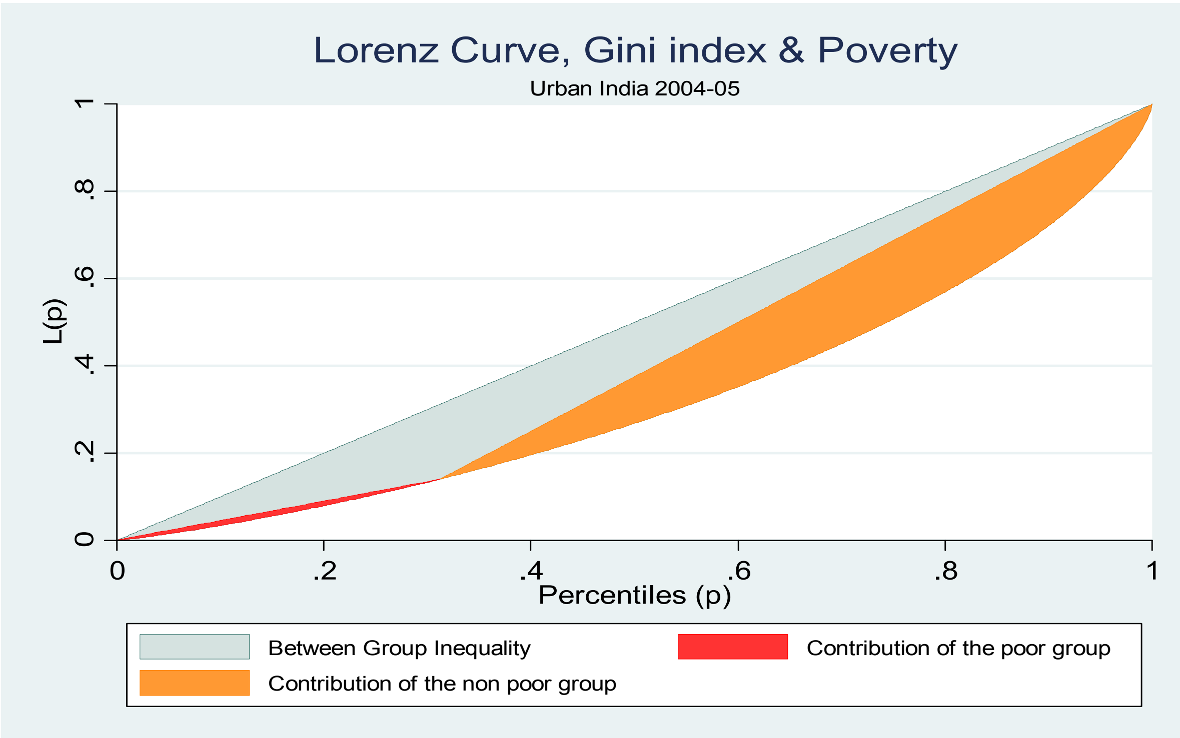
Source: Author's calculation using STATA 11 and individual level data from NSS 61st round on consumption expenditure survey.

Appendix Table 3: Decomposition of the FGT index according to the geopolitical zones. (α = 0; z = 578.8 Rupees)

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 National Sample Survey in 2004-05 on consumer expenditure.

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



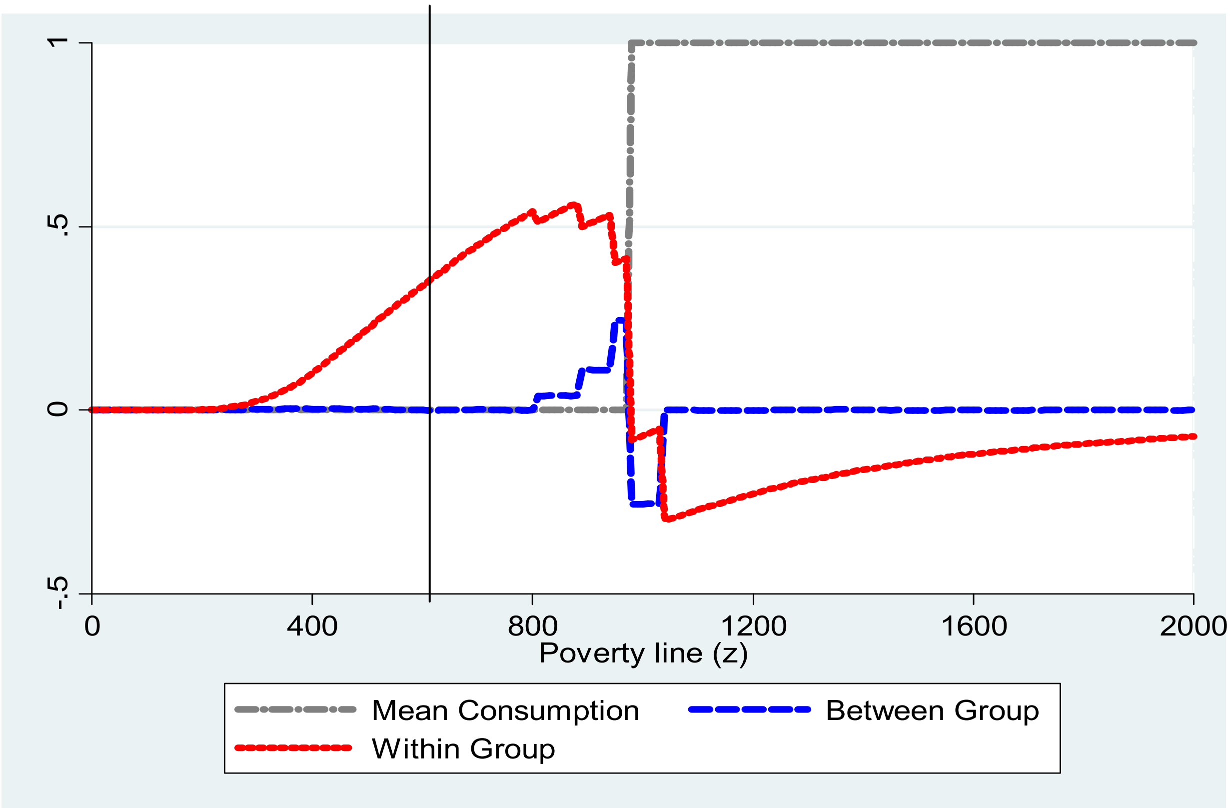
Source: Drawn by author using DASP software and NSS 61st Round unit level data of National Sample Survey in 2004-05 on consumer expenditure.

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**

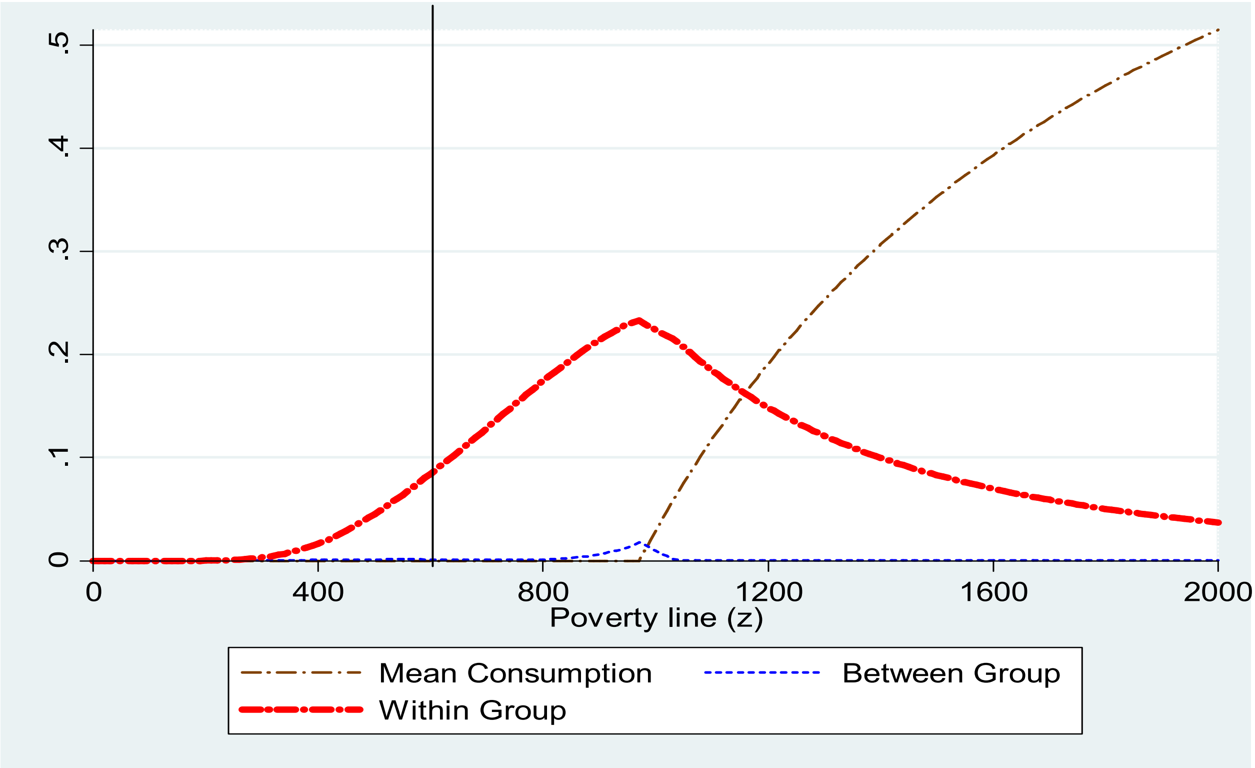
Source: Author's calculation using DASP software and NSS 61st Round unit level data of National Sample Survey in 2004-05 on consumer expenditure.

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 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 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 National Sample Survey in 2004-05 on consumer expenditure.

Appendix Table 6: Decomposing the FGT index (α = 1) by average expenditure and inequality components

	Poverty line = Rs. 578.8		
Components	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 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

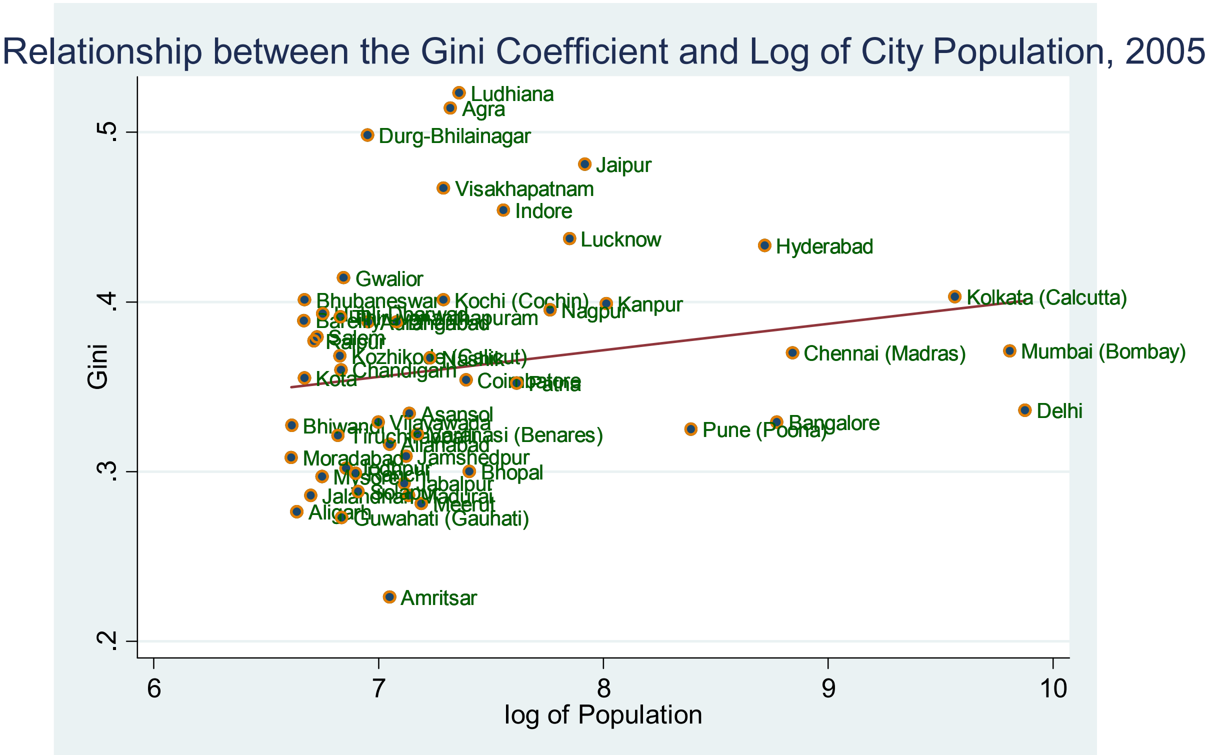
Source: Author's Computation

Appendix Table 8: Correlations between dependent and independent variables

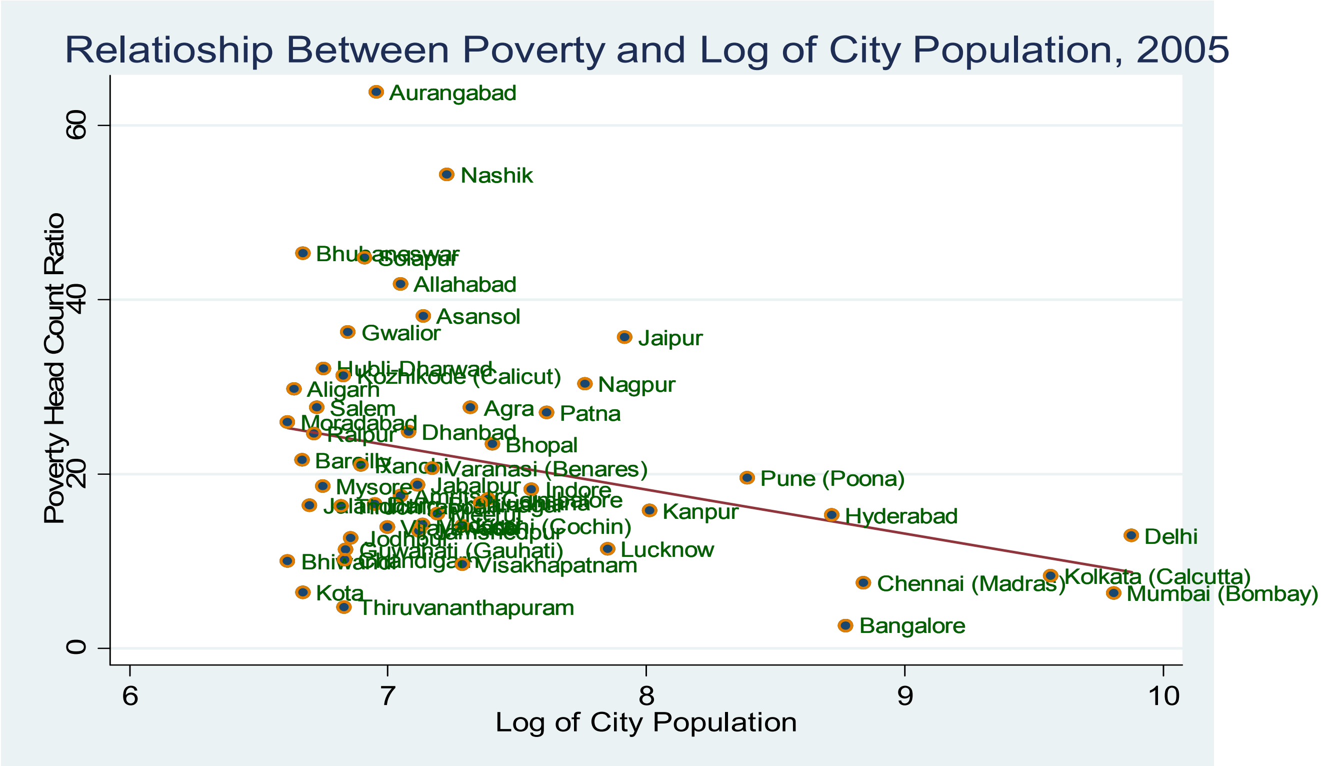
	GC	PHCR	CY	GCY	CP	PGER	UPGER	DLR	CPG	CPDG
GC	1									
PHCR	0.06	1								
CY	0.00	-0.37	1							
GCY	0.08	-0.13	0.37	1						
CP	0.08	-0.31	0.52	0.09	1					
PGER	-0.17	0.16	-0.23	-0.05	-0.28	1				
UPGER	-0.01	-0.06	0.1	-0.06	-0.01	0.76	1			
DLR	0.13	-0.22	0.6	0.19	0.36	-0.15	0.23	1		
CPG	0.05	0.33	0.14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



Appendix Figure 6



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