

NBER WORKING PAPER SERIES

GROWTH, URBANIZATION AND POVERTY REDUCTION IN INDIA

Gaurav Datt
Martin Ravallion
Rinku Murgai

Working Paper 21983
<http://www.nber.org/papers/w21983>

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2016

For comments the authors thank Frederico Gil Sander and seminar participants at the University of Waikato, New Zealand, and the World Resources Institute, Washington DC. These are the views of the authors and do not necessarily represent those of their employers, including the World Bank, any of its member countries, or the National Bureau of Economic Research.

NBER working papers are circulated for discussion and comment purposes. They have not been peer-reviewed or been subject to the review by the NBER Board of Directors that accompanies official NBER publications.

© 2016 by Gaurav Datt, Martin Ravallion, and Rinku Murgai. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

Growth, Urbanization and Poverty Reduction in India
Gaurav Datt, Martin Ravallion, and Rinku Murgai
NBER Working Paper No. 21983
February 2016
JEL No. I32,O15,O18,O47

ABSTRACT

Longstanding development issues are revisited in the light of our newly-constructed dataset of poverty measures for India spanning 60 years, including 20 years since reforms began in earnest in 1991. We find a downward trend in poverty measures since 1970, with an acceleration post-1991, despite rising inequality. Faster poverty decline came with both higher growth and a more pro-poor pattern of growth. Post-1991 data suggest stronger inter-sectoral linkages: urban consumption growth brought gains to the rural as well as the urban poor and the primary-secondary-tertiary composition of growth has ceased to matter as all three sectors contributed to poverty reduction.

Gaurav Datt
Dept. Economics
Monash University (Clayton Campus)
Melbourne, Australia
gaurav.datt@monash.edu

Rinku Murgai
World Bank
Lodi Estate
New Delhi
India
rmurgai@worldbank.org

Martin Ravallion
Center for Economic Research
Georgetown University
ICC 580
Washington, DC 20057
and NBER
mr1185@georgetown.edu

1. Introduction

Past thinking about the impacts of economic growth on poverty in developing countries has emphasized the role played by population urbanization.² Building on classic papers by Lewis (1954) and Kuznets (1955), a standard theoretical formulation of the migration process assumes that distributions are preserved within both the rural and urban sectors.³ In essence, a representative slice of the rural distribution is transformed into a representative slice of the urban distribution in the process of people moving from rural to urban areas. The “Kuznets hypothesis” implied by this model is often invoked in development policy discussions. A common view is that the hypothesis justifies the expectation that growth will inevitably be inequality increasing in poor countries, but that inequality will eventually start to decline.⁴ In theory, poverty measures will, however, fall steadily under the Kuznets process as long as rural poverty measures exceed urban measures (Anand and Kanbur, 1985).⁵ And the economy as a whole will grow as rural residents take up the more lucrative urban jobs.

It is clear that within-sector distributional neutrality is a strong assumption. The urbanization process in practice may well be quite selective, entailing significant distributional shifts within one or both of the urban and rural sectors. For example, relatively less poor rural workers may migrate, with gains, but be relatively poor in the destination urban sector; there is evidence consistent with this pattern for the developing world (Ravallion et al., 2007). The implications for inequality within each sector cannot be predicted easily.⁶

Even without population urbanization, within-sector growth processes are also relevant to the overall outcomes for poverty. Various strands of the development literature have examined these factors. One strand of the literature has questioned whether the agricultural growth processes have helped the rural poor, many of whom are landless, while others have argued that the benefits of rising farm productivity are passed on in due course through higher wage rates.⁷

² Overviews of the literature can be found in Fields (1980) and Ravallion (2016).

³ As in Robinson (1976), Fields (1980) and Anand and Kanbur (1985, 1993).

⁴ The existence of such a turning point requires certain conditions to hold, which are specific to the measure of inequality used; Anand and Kanbur (1993) derive those conditions for various measures.

⁵ This holds for all population-weighted measures, such as all those characterized by Atkinson (1987).

⁶ This is known from research on the effects of selective compliance in household surveys on measures of inequality; see the analysis of this closely related issue in Korinek et al. (2006).

⁷ Contributions to this debate are cited in Ravallion and Datt (1996) and Datt and Ravallion (1998, 2011).

No less contentious is the role played by urban economic growth—whether it helps absorb surplus rural labor and unemployed urban workers or merely benefits urban elites.⁸

Past research on these issues has relied mainly on cross-country comparisons, often in single cross-sections (such as in the many tests of the Kuznets hypothesis) but sometimes using panel data, though the typically short time-series has meant that the cross-country variability is dominant. (While one can track economic growth annually for almost all countries, the household surveys needed to monitor living standards are far less frequent.) In addressing these issues, it is clearly desirable to have a reasonably long time series of surveys; a short series can be deceptive for inferring a trend.

Amongst developing countries, India has the longest series of national household surveys suitable for tracking living conditions. The surveys are reasonably comparable over time since the basic survey instruments and methods have changed rather little (though we note, and address, some comparability problems). India thus provides rich time series evidence—uniquely so among developing countries—for testing and quantifying the relationship between living standards of the poor and macroeconomic aggregates.

All the substantive issues about growth and poverty in the general development literature have been prominent in the literature and policy debates on India. Famously, India's post-independence planners hoped that the country's urban-based industrialization process would bring longer-term gains to poor people, including through rural labor absorption.⁹ However, that hope was largely shattered by the evidence of the slow pace of poverty reduction in the period from Independence until the 1980s.¹⁰ In explaining this, a number of observers pointed to the slow pace of labor absorption from agriculture associated with the more inward-looking and capital-intensive development path of this period.¹¹

The urban population share has been rising steadily over time in India, from 17% in 1950 to 31% today. However, India's pace of population urbanization (proportionate increase in the urban population share) has been less than either South Asia as a whole or lower middle-income countries as a whole, and markedly slower than for (say) China.¹² The trend rate of growth in

⁸ See, for example, the discussion in Eswaran and Kotwal (1994).

⁹ For a review of these debates see Ravallion (2016, Ch. 2).

¹⁰ See Datt and Ravallion (2002, 2011).

¹¹ See, for example, Bhagwati (1993) and Eswaran and Kotwal (1994).

¹² Urban population shares can be found in World Bank (2015 and past issues). The urban population shares of China and India were about the same around 1990, but the share now exceeds 50% in China.

India's Net Domestic Product (NDP) per capita in the period 1958-1991 was under 2% per annum, but it was more than double this rate in the period since 1992.¹³ The picture that emerges from the accumulating evidence from India's National Sample Surveys (that started in the 1950s) indicates that economic growth in India had in fact been poverty reducing. Ravallion and Datt (1996) showed that the elasticity of the incidence of poverty with respect to mean household consumption was -1.3 over 1958-1991.¹⁴ Given the modest rate of growth over this period, success at avoiding rising inequality prior to the 1990s was key to this finding.¹⁵

Many observers came to the view that too little growth was the reason for India's slow pace of poverty reduction. However, a deeper exploration of the data suggests that the sectoral pattern of growth also played a role. Using data up to the early 1990s, Ravallion and Datt (1996) found that rural economic growth was more poverty reducing, as was growth in the tertiary (mainly services) and primary (mainly agriculture) sectors relative to the secondary (mainly manufacturing and construction) sector. They also found that spillover effects across sectors reinforced the importance of rural economic growth to national poverty reduction. Urban growth and secondary sector growth had adverse distributional effects that mitigated the gains to the urban poor, while urban growth brought little or no benefit to the rural poor. The slow progress against poverty reflected both a lack of overall growth and a sectoral pattern of growth that did not favor poor people.

There was much hope in India that the higher growth rates attained in the wake of the economic reforms that started in earnest in the early 1990s would bring a faster pace of poverty reduction.¹⁶ However, there have also been signs of rising inequality in the post-reform period, raising doubts about how much the poor have shared in the gains from higher growth rates.¹⁷

The changes in India's labor markets since around 2000 have potentially important implications. There has been a tightening of rural casual labor markets, with rising real wage

¹³ NDP is gross domestic product less depreciation of capital. In order to better approximate incomes at the household level, we use net rather than gross product series in our analysis, though the two are highly correlated. Note that per capita incomes in the national accounts are also based on net product series.

¹⁴ They also found higher absolute elasticities for measures of the depth and severity of poverty, indicating that those well below the poverty line have benefited from economic growth, as well as those near the poverty line.

¹⁵ For evidence on this point for developing countries more generally see Bruno et al. (1998).

¹⁶ For an overview of India's reform agenda since the early 1990s see Ahluwalia (2002) and Kotwal, Ramaswami and Wadhwa (2011).

¹⁷ Evidence of rising inequality in India since 1991 is reported in Ravallion (2000), Deaton and Drèze (2002), Sen and Himanshu (2004a,b) and Datt and Ravallion (2011).

rates, and also a narrowing of the urban-rural wage gap (Hnatkovska and Lahiri, 2013).¹⁸ Three factors appear to be in play here. First, schooling has expanded, thus reducing the supply of unskilled labor, especially in rural areas. Second, there has also been a decline in female labor-force participation rates (Klasen and Pieters, 2015). Third, there has been a construction boom across India, especially in (rural and urban) infrastructure, which had been neglected for a long period. In 1993-94, the construction sector accounted for only 3.2% of employment for rural males, but by 2011-12 this had risen to 13%.¹⁹ The shift of labor out of agriculture to the nonfarm sectors has been more rapid since the 1990s.²⁰ The shift has been to construction and services, and also to manufacturing, to a smaller degree. Jacoby and Dasgupta (2015) suggest that rising labor demand from construction has contributed to higher wages of unskilled labor relative to skilled labor within rural areas, as well as rising rural relative to urban wages (for male workers).

The combination of a lower supply of un-skilled labor and rising demand for that labor in construction, transport and other services is likely to have been a driving force in higher casual wages, in both farm and non-farm sectors and compressing the urban-rural wage gap. It is unclear how permanent this change will prove to be. It may be conjectured that (like China) India has reached its Lewis Turning Point. However, that is a conjecture, since there may well be other factors leading to higher wages even while there is still rural underemployment. And temporary reversals might be expected, notably if the current construction boom does not continue.²¹

With the backdrop of this history of recent economic change in India, this paper revisits the implications for poverty of both the higher rate of growth and the pattern of growth. The sectoral imbalance in India's post-reform growth would be a concern for poverty reduction if the model linking poverty to growth had remained the same, notably with the rural and agricultural sector contributing most to poverty reduction. However, previous research by Datt and Ravallion (2011) found signs that the process of economic growth is changing in India, making urban

¹⁸ Hnatkovska and Lahiri (2013) also show that the narrowing of the wage gap persists when one controls for education and occupation.

¹⁹ These are our estimates based on the NSS 50th and 68th employment-unemployment survey rounds.

²⁰ The share of agriculture, forestry and fishing in total (usual status) employment declined from 76% in 1993-94 to 49% in 2011-12 (Jacoby and Dasgupta, 2015).

²¹ At the time of writing (late 2015) lifted by public infrastructure investment, the construction sector has continued to expand overall, despite a slow-down in the residential building construction sector (Wilkes and Kumar, 2015). However, wage growth for construction workers has been lower than in other occupations.

economic growth more pro-poor in the post-reform period up to 2005-06. It is important to know whether this pattern has continued in more recent data—to assess whether stronger linkages from urban economic growth to rural poverty reduction have continued, alongside a more economically diversified rural economy.

For the purpose of this paper we have compiled a new data series on poverty and related data spanning 60 years, extending the period of analysis in past research.²² With the benefit of nearly two decades of post-1991 data, we believe there is now sufficient data for the post-1991 period to test the poverty implications of the new rate and pattern of growth in post-reform India. Attribution to reforms *per se* is problematic, but further scrutiny of the emergent properties of the changing growth process with respect to poverty reduction is clearly important.

The sectoral structure of NDP growth in the post-1991 period is also of interest, as is the role played by population urbanization, including the Kuznets process that has been so influential in past thinking about the distributional implications of economic growth in poor countries.²³ We provide a decomposition of poverty reduction by sector of NDP and a decomposition method that allows us to identify the difference between population urbanization effects with constant within-sector distribution (as in the Kuznets process) versus changing within-sector distributions.

This enquiry delivers the most robust evidence to date that economic growth has not only come with a lower incidence of absolute poverty in India but that there has been an acceleration in the pace of progress against poverty in the post-1991 period. The new pattern of growth has brought greater benefits to India's poor. While there has been rising inequality within the rural and (especially) urban sectors, growth within sectors has delivered sufficient gains to poor people to assure falling poverty measures. Population urbanization played a role, but not in the way assumed by the Kuznets process. Instead we find that urbanization came with distributional changes within sectors; these were pro-poor in the pre-91 period, but that has not been so since 1991. Another difference is that the sectoral pattern of growth in NDP mattered less to progress against poverty post-1991 than was the case in the pre-1991 period.

²² The period of analysis in Ravallion and Datt (1996) ended at about the time (1991) when India's process of economic reform started in earnest. Datt and Ravallion (2011) updated Ravallion and Datt (1996) by incorporating an extra 14 rounds of the National Sample Surveys (NSS) taking the series up to 2006. This paper extends the series to 2012.

²³ Datt and Ravallion (2011) did not study the sectoral structure of NDP or identify the role played by the Kuznets process.

The following section describes the data set we have created for this task. Section 3 provides some key summary statistics, and section 4 investigates the relationship between poverty and overall economic growth. Section 5 studies the poverty impact of urban-rural composition of growth in mean consumption, while Section 6 turns to the sectoral composition of growth in net domestic product. A key focus in sections 3-6 is on changing patterns across the pre-reform and post-reform periods. Section 7 concludes.

2. Data

For the purpose of this study, we have derived a new and consistent time series of poverty measures for rural and urban India over the period 1951 to 2012. This is based on consumption distributions from 51 household surveys conducted by the National Sample Survey Organization (NSSO); beginning with the 3rd round for August-November 1951 up to the 68th round for July 2011 to June 2012. We use the full period for descriptive purposes. Some of the earliest surveys had smaller sample sizes and covered shorter periods. The shorter periods also make for a more imprecise mapping between NSS rounds and the annual national accounts data. Hence, in our main analysis we dropped some of the early NSS rounds that had survey periods considerably shorter than a year, and our first observation for the poverty regressions in this paper is for the 13th round for 1957-58.²⁴ For the econometric analysis we restrict ourselves to the period 1957-2012 (from NSS round 11 to round 68), giving 41 observations including 18 for the post-1991 period.²⁵ This series significantly improves upon the most widely-used time series on poverty measures in India to date.

Following now well-established practice for India and elsewhere, a household's standard of living is measured by real consumption expenditure per person. The underlying NSS data do not include incomes, though it can be argued that current consumption is a better indicator of living standards than current income.²⁶ Nonetheless, there are various “non-income” dimensions

²⁴ Data from the earlier rounds are included in the graphs, though poverty measures for rounds 4 and 5, rounds 6 and 7, rounds 9 and 10 and rounds 11 and 12 are aggregated as survey-period-weighted averages. Thus, for instance, the headcount measure for combined rounds 11 (for August 1956-February 1957) and 12 (for March-August 1957) is 7/13-th of the headcount index for round 11 plus 6/13-th of the headcount index for round 11.

²⁵ Most of our regressions for changes in poverty are based on 40 observations; they exclude the 48th round for 1992, the year of the macroeconomic crisis that provided an impetus for economic reforms. Thus, effectively, the change in poverty between the 47th round (for July-December 1991) and 48th round is not included in either the pre-1991 or the post-1991 period.

²⁶ For an overview of these arguments see Ravallion (2016, Chapter 3).

of well-being that this measure cannot hope to capture, and we say nothing here about how responsive these other dimensions may be to growth.

While the NSS surveys are highly comparable over time by international standards, there is a comparability problem in the rounds since the early 1990s. While most of the surveys have used a uniform recall period of 30 days for all consumption items, seven of the survey rounds in the post-91 period have instead used a mixed-recall period (MRP), with longer (one year) recall for some (mainly non-food) items.²⁷ On a preliminary investigation of the data we found that the use of a mixed recall period increased the mean and reduced inequality, implying lower poverty measures. All our regressions below include a control for MRP survey rounds.

Poverty lines and price indices: We report results for two poverty lines. Following Datt and Ravallion (2011), one line is that originally defined by the Planning Commission (1979), and endorsed by Planning Commission (1993). This poverty line is anchored on a nutritional norm of 2400 calories per person per day in rural areas and 2100 calories for urban areas, and corresponds to a per capita monthly expenditure of Rs. 617 and Rs. 922 (rounded to the nearest rupee) in rural and urban areas respectively at 2011-12 prices.²⁸ The second poverty line corresponds to the rupee value of the international poverty line of \$1.25 per person per day at 2005 PPP dollars, and are equivalent to rural and urban per capita monthly expenditures of Rs. 732 and Rs. 1115 at 2011-12 prices.²⁹ The second set of lines are thus about 20% higher than the first set of lines.

The nominal values of the poverty lines for different NSS rounds are evaluated using separate urban and rural price indices. Our price indices are mainly based on the all-India Consumer Price Index for Industrial Workers (CPIIW) as the deflator for the urban sector, and the all-India Consumer Price Index for Agricultural Laborers (CPIAL) as the deflator for the rural sector. However, our final price indices also incorporate some adjustments aimed at constructing a consistent time series over the long period of analysis; these adjustments relate to

²⁷ In particular, one-year reference is used for clothing, bedding, footwear, education, medical (institutional) and durable goods. Mixed reference periods have been used for seven NSS rounds in our data, viz., rounds 55, 56, 57, 58, 59, 60 and 62.

²⁸ The original Planning Commission lines correspond to rural and urban per capita monthly expenditures of Rs. 49 and Rs. 57 at 1973-74 prices. At 2005 purchasing power parity (PPP), these lines have a value of \$1.03 per day in 2005. See Ravallion (2008) for further discussion, including comparisons with a higher international poverty line.

²⁹ Neither set of lines is directly comparable to India's current official "Tendulkar" poverty lines. At 2005 PPP, the Tendulkar lines have a value of \$1.17 per day in 2005, incorporating a lower cost of living differential rural and urban areas than the original Planning Commission lines on which our poverty line series is based. The Tendulkar poverty lines are only available after 1993-94.

the use of the Consumer Price Index for the Working Class for the period before August 1968 for which the CPIIW did not exist, a correction for the constant price of firewood for a part of the Labour Bureau's CPIAL series, and the use of a reweighted chain price index in both rural and urban areas to better approximate the weight of food in the consumption basket of the poor.³⁰ Our final rural and urban price indices are averages of monthly indices corresponding to the exact survey period of each NSS round.

Poverty measures: We use three poverty measures: the headcount index (H), given by the percentage of the population living in households with a consumption per capita less than the poverty line; the poverty gap index (PG), defined by the mean distance below the poverty line expressed as a proportion of that line, where the mean is formed over the entire population, counting the non-poor as having zero poverty gap; and the squared poverty gap index (SPG), defined similarly to PG except that it is the mean of the squared proportionate poverty gaps. Unlike PG, SPG is sensitive to distribution amongst the poor, in that it satisfies the transfer axiom for poverty measurement.³¹ In particular, to economize space we report results on H, PG and SPG for the higher line, and only H for the lower line.

The overall level of poverty at date t can be additively decomposed using population weights. We will be interested in the urban-rural decomposition of the aggregate measure for date t :

$$P_t = n_{ur}P_{ur} + n_{rr}P_{rr} \quad (t=1,\dots,T) \quad (1)$$

where n_{it} and P_{it} are the population shares and poverty measures for sectors $i = u, r$ for urban and rural areas respectively. "Time" (t) represents the ordering of the T survey rounds in time, which can differ from real time given the uneven spacing.³²

Demographic data: The population estimates are based on the Census population totals and assume constant growth rates for urban and rural populations between censuses. We use the NSSO's urban-rural classification.³³ Over such a long period, some rural areas would have become urban areas. To the extent that rural (non-farm) economic growth may help create such

³⁰ See Datt and Ravallion (2011) for further details on these adjustments.

³¹ All three measures are members of the class of measures proposed by Foster, Greer and Thorbecke (1984).

³² Controlling for unequal time interval between survey rounds made little difference to the results.

³³ The NSS follows the Census definition of urban areas which includes all places with a municipality, corporation, cantonment board or notified town area committee, and places that meet a number of criteria including a population greater than 5000, a density not less than 400 persons per sq. km. and three-fourths of the male workers engaged in non-agricultural pursuits. In the 2011 Census, 31.2% of the total population was classified as urban.

re-classifications, as successful villages evolve into towns, this process may produce a downward bias in our estimates of the (absolute) elasticities of rural poverty to rural economic growth. The impact on the urban elasticities could go either way, depending on the circumstances of new urban areas relative to the old ones. We have no choice but to use the NSSO/Census classification. The rural and urban population estimates are also centered at the mid-points of the NSSO's survey periods.

National accounts: We use private final consumption expenditure and net domestic product and its sectoral components from the National Accounts Statistics (NAS). To mesh the NAS data with the poverty data from the NSSO, we have linearly interpolated the annual national accounts data to the mid-point of the survey period for different rounds.

There has been a rising gap over time between NAS and NSS consumption aggregates.³⁴ From the point of view of the present discussion, it is notable that the NSS series does not fully reflect the large gains in mean consumption indicated by the NAS from the early 1990s onwards. The ratio of NSS-to-NAS consumption declined from about 70% in 1957 to 60% in 1991, and then steeply to 39% in 2011-12.

We do not know how much of the gap is due to errors in NAS consumption versus NSS survey methods. Until recently, the NSSO's methods appear to have changed rather little over many decades. That is probably good news for comparability reasons, although it does raise questions about whether their methods are in accord with international best practice. However, it is notable that the MRP rounds of the NSS have helped close the gap between the NAS and NSS consumption aggregates.³⁵ Regressing the log difference of the NSS mean ($\Delta \ln \bar{C}_t$) on the log difference of NAS consumption per capita ($\Delta \ln C_t$) and the change in the dummy variable for MRP rounds, we get:

$$\Delta \ln \bar{C}_t = \underset{(0.141)}{0.692} \Delta \ln C_t + \underset{(0.021)}{0.067} \Delta MRP_t$$

The positive and significant coefficient for *MRP* suggests that NSS design may account for at least some of the discrepancy between the two data sources.

³⁴ The gap is not only found in India, but it is larger there than most other countries (Ravallion, 2003).

³⁵ The MMRP (modified-mixed reference period) aggregate introduced in the 2009-10 and 2011-12 rounds has further closed the gap. The MMRP method which reduces the recall period for some food items to a 7-day recall (compared to a 30-day recall in the MRP) brings NSSO's practices closer to the more common practice of a two week or less recall period for food items in other countries.

However, it is also important to note that the gap between the consumption aggregates from these two sources does not necessarily imply that the NSS overestimates poverty. Some of the gap is due to errors in NAS consumption, which is determined residually in India, after subtracting other components of domestic absorption from output at the commodity level. There are also differences in the definition of consumption, and there are things included in NAS consumption that one would not use in measuring household living standards.³⁶ Some degree of under-reporting of consumption by respondents, or selective compliance with the NSS's randomized assignments, is inevitable. However, it is expected that this is more of a problem for estimating the levels of living of the rich than of the poor.³⁷ We will look into the implications of the growing drift between NAS and NSS consumption in regressions that use (sectoral) growth variables from the NAS.

3. Summary statistics

India's urban population share has risen steadily over the 60 years, at about 1% per annum (0.25 percentage points per annum) over the 60-year period; Figure 1 plots the urban population share. (The extent of the linearity is possibly deceptive given that interpolations are used between census years, as noted in Section 2.)

As can also be seen from Figure 1, poverty incidence showed no significant trend up to about 1970, but fell after that. (The series for the two poverty lines track each other closely.) Both higher growth rates and a higher pace of poverty reduction are evident in the post-1991 period; Table 1 provides the trend rates of growth.

Much of the faster growth post-1991 has occurred in the "tertiary" sector of India's economy, which is primarily services and trade. The growth rate of tertiary sector NDP per capita doubled in the post-1991 period (after 1992), from 3.1% per annum up to 1991 to 6.4%.³⁸ The secondary sector also picked up, from 2.9% per annum to 4.5%.³⁹ So too did the primary sector, but at a much lower level; the pre-1991 growth rate in primary NDP per capita was only

³⁶ For further discussion of the differences between the two data sources see Sundaram and Tendulkar (2001), Ravallion (2000, 2003), Sen (2005) and Deaton (2005).

³⁷ There is evidence from other sources consistent with that expectation; see Banerjee and Piketty (2003) on income under-reporting by India's rich.

³⁸ These are OLS regression coefficients on time; the standard errors are 0.04% and 0.2% respectively.

³⁹ The standard errors are 0.1% and 0.3% respectively.

0.2% per annum, while it rose to 0.8% in the post-1991 period.⁴⁰ As one would expect, the share of the primary sector in NDP has fallen appreciably from 55% in the early 1950s to 15% in 2012.

The acceleration in survey-based mean real consumption growth—from 0.6% per annum in the pre-1991 period to 2.0% in the post-1991 period—is significant. The urban and rural trends reveal a pattern that is similar to the national level, though there are some differences between the two segments of the economy (Table 2). The NSS mean consumption growth rates are appreciably higher (nearly twice as high) post-1991 in both rural and urban areas.

Faster growth post-1991 has also come with rising inequality within urban areas, but less so in rural areas. Figure 2 plots the indices over time. Note that these are the “raw” values, without adjustment for the effect of MRP rounds. When we add controls for MRP rounds, we also see rising inequality in rural areas post-1991. Table 2 gives the exponential trends for the Gini index. In contrast to a declining trend in rural Gini and no trend in urban Gini in the pre-1991 period, a significant positive trend in inequality emerged post-1991 in both sectors. The rise in inequality has been greater in urban areas. At the same time, inter-sectoral inequality has been generally rising. We see from Figure 3 that the ratio of urban mean to the rural mean has been rising since around 1970 (the early observations were volatile, and should probably be discounted), though with signs of levelling off and even decline since 2000. Controlling for MRP rounds, time trends in the ratio of real urban-to-rural mean consumption are similar pre- and post-91, with the ratio increasing at about 0.14% per annum in both periods. So the higher growth in the post-1991 period has come with generally rising consumption inequality, especially within sectors, but also to some extent between them.

Datt and Ravallion (2011) also found higher trend rates of poverty reduction in the post-1991 period, but the differences (compared to the pre-1991 period) were only statistically significant for the headcount index (nationally and for urban areas). Our new series provides a more statistically robust indication of acceleration in progress against poverty post-1991 for both poverty lines (Table 1). Over the 55-year period, the exponential trend decline (for the higher line) was 1.3% per annum for the headcount index, rising to 2.3% and 3.0% for the poverty gap index and squared poverty gap index respectively.⁴¹ For the period prior to 1991, the trends were 0.6%, 1.4% and 2.0% for H, PG and SPG, while the corresponding post-1991 trends were 3.6%,

⁴⁰ The standard errors are 0.05% and 0.2% respectively.

⁴¹ Similarly to the NDP growth rates reported in the introduction, the growth rates were estimated as parameters of a single regression, constrained to assure that the predicted values were equal in 1992.

5.2% and 6.3%. The differences between the pre- and post-1991 trends are statistically significant (Table 1). We also find a faster pace of poverty decline post-1991 in both rural and urban areas, and this is significant for all three measures (Table 2). Figure 4 plots the headcount indices for the lower line; the pattern over time is similar for the higher line and other measures.

Alternatively one can define the trend in the level of the poverty measure rather than its log. This again confirms the finding of an acceleration in the post-1991 period of both growth and poverty reduction as measured by H and PG (though not SPG). In other words, the post-1991 period has witnessed larger annual percentage point reductions in the incidence and depth of poverty while the annual percentage point reduction in the severity of poverty has remained about the same. As noted above, all poverty measures for both sets of poverty lines exhibit larger *proportionate* reductions in the post-1991 period.

Historically, poverty measures have been higher for rural India. However, as can be seen from Figure 4 that there has been a marked convergence of poverty measures between urban and rural areas. Figure 5 plots the difference between the rural and urban headcount indices for both poverty lines. Intuitively, since growth rates in mean consumption were slightly higher in urban areas, the poverty convergence between urban and rural areas is a distributional effect, stemming in part from the fact that inequality has risen more within urban areas and part from the fact that inequality was initially lower in rural areas, making growth more poverty reducing (Ravallion, 2007). Thus rural growth has had greater impact on rural poverty than for urban areas.

The convergence process started around 1980, but has been noticeably more rapid since 2000. This is consistent with related evidence on the narrowing urban-rural wage gap (Hnatkovska and Lahiri, 2013). Going forward, one implication of this sectoral poverty convergence is that the Kuznets process will contribute little to overall poverty reduction, and may even be poverty increasing. The next section will look more deeply into the urban-rural pattern of growth and poverty reduction, including the role played by the Kuznets process.

A further implication of these findings is that there has been a marked urbanization of poverty in India. Figure 6 gives the proportion of the poor living in urban areas over time for both poverty lines. In the early 1950s, 14% of the poor lived in urban areas; by 2012 this had risen to 35% for the lower line and 32% for the upper line. This is broadly consistent with the pattern found in other developing countries (Ravallion et al., 2007). There is a sign of acceleration in the pace of the urbanization of poverty since 2000.

4. Poverty and overall economic growth

Any poverty measure found in practice can be written as a function of the survey mean relative to the poverty line and the relative distribution of income, as represented by the Lorenz curve.⁴² When the poverty line is fixed in real terms, all such poverty measures are strictly decreasing functions of the mean (μ_t) for any given relative distribution (though the elasticity can vary greatly, depending on the initial mean and Lorenz curve). A higher growth rate may also entail a shift in distribution for or against the poor. In characterizing the overall poverty impact of growth, we are interested in the total effect of growth on poverty, allowing distribution to change, rather than the partial effect, holding distribution constant.⁴³ We call this the “growth elasticity of poverty reduction”, or “growth elasticity” for short.

We estimate the growth elasticities at the national level by the regression coefficient of log poverty measure ($\ln P_t$) on log mean per capita consumption ($\ln \mu_t$) across the available time series, allowing the error term to be autocorrelated and heteroskedastic. Whenever both the dependent and independent variable of such a regression are estimated from the same survey data the possibility arises of bias due to the fact that measurement errors in the survey can be passed onto both variables; when overestimating the mean, for instance, one will tend to underestimate poverty. (The sign of the bias is theoretically ambiguous since measurement error in the independent variable will also induce an attenuation bias in the least squares estimate of the elasticity.) We also provide an Instrumental Variables (IV) estimator, in which the instruments excluded any variables derived from the same survey as the dependent variable. Our estimates also control for the use of mixed reference periods for some of the NSS rounds.

Table 3 gives our estimates of the elasticities of all three poverty measures with respect to three measures of economic growth based on: (i) consumption per person from the NSS; (ii) consumption per person as estimated by the NAS and population census; and (iii) NDP ("income" for short) per person, also from the NAS and census. In all cases, the elasticities are estimated by regressing the log poverty measure on the log mean consumption or income. We also give an "adjusted" estimate in which a control variable was added for the first difference of

⁴² This follows from the fact that the mean and the Lorenz curve fully specify the cumulative distribution function.

⁴³ Analytic formulae for the partial elasticities are found in Kakwani (1993). On the conceptual distinction between the partial and total elasticities in this context, see Ravallion (2007).

the log of the ratio of the consumer price index to the national income deflator (i.e., the difference in the rate of inflation implied by the two deflators).⁴⁴ This was included to allow for possible bias in estimating the growth elasticity due to the difference in the deflator used for the national accounts data and that used for the poverty lines.

For the 1957-2012 period as a whole, the national poverty measures responded significantly to growth in all three measures. The IV estimates to address survey measurement errors (also likely to be negatively correlated between the dependent variable and the explanatory variable) are slightly lower than the corresponding OLS estimates. The (absolute) elasticities are higher if one uses the NSS estimate of mean consumption, rather than the national accounts estimate. The elasticities are lowest for per capita income. There are a few possible reasons. Inter-temporal consumption smoothing may make poverty (in terms of consumption) less responsive in the short-term to income growth than to consumption growth. Imperfect matching of the time periods between the NSS and the NAS could also be playing a role in attenuating the elasticities using NAS growth rates. A further reason for lower (absolute) elasticities with respect to NAS consumption or income has to do with the increasing divergence between NSS and NAS growth rates of mean consumption; significantly faster growth in NAS means relative to NSS means is reflected in the lower elasticities with respect to the former.

When we split the period into two at 1991, we find appreciably higher (absolute) elasticities of poverty indices with respect to the survey mean in the post-1991 period; the difference in the estimated elasticities over the two periods is statistically significant.⁴⁵ The pattern of higher post-1991 elasticities is similar for all poverty measures, for higher and lower poverty lines and for the OLS as well as the IV estimates (Table 3).

By comparison, we find that NAS-based growth of both income and consumption per capita indicate significantly higher (absolute) elasticities in the post-1991 period for the headcount index, but the difference between the two periods is not statistically significant for SPG, and for PG it is significant only for the per capita income growth elasticity. It is nevertheless notable how much difference there is in the elasticity based on the NSS

⁴⁴ The consumer price index is a consumption share-weighted average of the rural and urban price indices.

⁴⁵ See Table 3. These results are based on regressions of log poverty measures on log survey mean interacted with dummy variables for pre- and post-1991 periods, and a dummy variable for MRP surveys. The regressions also incorporate a kink at NSS round 47 (July-December 1991) such that there is no discontinuity in the predicted values of log poverty measures between the pre- and post-1991 periods.

consumption growth rates versus the NAS growth rates for the post-1991 period; the survey-based elasticities are about twice as high (in absolute terms) as the national accounts based elasticities. The much lower NAS elasticities reflect the NAS-NSS drift (much faster NAS-based growth relative to that based on the NSS) post-91.

Our results are qualitatively robust to the choice of poverty measure. However, it is notable that the growth elasticities tend to be highest (in absolute value) for SPG and higher for PG than H. The higher growth elasticity of PG than H implies that the depth of poverty (as measured by the mean poverty gap relative to the poverty line) is also reduced by growth. Similarly, the even higher elasticity of SPG implies that inequality amongst the poor (as measured by the squared coefficient of variation) is reduced by growth. Thus the impacts of growth within and between sectors are not confined to households in a neighborhood of the poverty line.

To summarize: The responsiveness of poverty to growth when measured from the surveys is generally greater in the post-1991 period. This is also true of the responsiveness of the headcount index to growth measured using the national accounts, but not for the two poverty gap indices (PG and SPG), which are similarly responsive to growth in the two periods.

5. Poverty and the urban-rural pattern of growth

Our proposed test for whether the sectoral composition of growth matters entails estimating the following regression equation on the discrete time-series data on poverty and growth:

$$\Delta \ln P_t = \alpha_u s_{ut-1} \Delta \ln x_{ut} + \alpha_r s_{rt-1} \Delta \ln x_{rt} + \alpha_n (s_{rt-1} - s_{ut-1} n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} + \epsilon_t \quad (t = 2, \dots, T) \quad (2)$$

Here Δ is the discrete-time difference operator (such that $\Delta x_t \equiv x_t - x_{t-1}$), $s_{it} = n_{it} / n_t$ is sector i 's share of mean consumption at survey round t and x_{it} is the mean consumption for sector i .

The α 's are parameters to be estimated. To motivate this test regression, notice that, under the null hypothesis that $\alpha_u + \alpha_r + \alpha_n = 1$, equation (2) collapses to:

$$\Delta \ln P_t = \Delta \ln x_t + \epsilon_t \quad (3)$$

Thus, under this null, it is the overall rate of growth that matters, not its composition. By testing that null we determine whether the composition of growth matters. If this null is rejected then the

pattern of growth matters and the s_u, s_r parameters can be interpreted as the impact of (share-weighted) growth in the urban and rural sectors respectively, while s_n gives the effect of the population shift from rural to urban areas.

We also test whether economic growth in one sector has cross-effects on distribution in the other sectors. Here we can decompose (2) for the rate of growth in average poverty into three components:

$$s_{ut-1}^P \Delta \ln P_{ut} = s_{uu} s_{ut-1} \Delta \ln n_{ut} + s_{ur} s_{rt-1} \Delta \ln n_{rt} + s_{un} (s_{rt-1} - s_{ut-1} n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} + s_{un} \quad (4.1)$$

$$s_{rt-1}^P \Delta \ln P_{rt} = s_{ru} s_{ut-1} \Delta \ln n_{ut} + s_{rr} s_{rt-1} \Delta \ln n_{rt} + s_{rn} (s_{rt-1} - s_{ut-1} n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} + s_{rn} \quad (4.2)$$

$$(s_{rt-1}^P - s_{ut-1}^P n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} = s_{nu} s_{ut-1} \Delta \ln n_{ut} + s_{nr} s_{rt-1} \Delta \ln n_{rt} + s_{nn} (s_{rt-1} - s_{ut-1} n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} + s_{nn} \quad (4.3)$$

where $s_{it}^P = n_{it} P_{it} / P_t$ for $i = u, r$, and $s_j = s_{uj} + s_{rj} + s_{nj}$ for $j = u, r, n$. So summing (4.1), (4.2) and (4.3) yields (2). By interpretation, (4.1) shows how the composition of growth and population shifts impact on urban poverty; (4.2) shows how they impact on rural poverty; and (4.3) gives the impact on the population shift component of $\Delta \log P$. We estimate (4.1) and (4.2); (4.3) need not be estimated separately since its parameters can be inferred from the estimates of (4.1) and (4.2) using the adding-up restriction. As before, since our main interest is in a comparison of the pre- and post-reform periods, we allow the parameters to differ across the two periods.

Table 4 presents our estimates of equations (2), (4.1) and (4.2), summarizing the poverty impact of the urban-rural composition of consumption growth. Table 5 gives the test statistics on whether the urban-rural composition of growth matters and whether the population shift effect is significant. Table 6 reports elasticities of poverty with respect to rural and urban growth. These results are presented for national poverty measures as well as separately for urban and rural areas, and for the two poverty lines.

The first point to note from Table 4 is that there is a significant structural break at 1991. The pre-91 and post-91 model parameters are significantly different from each other; the null of parameter equality is rejected in almost all cases in Table 4. Beginning with results at the national level, for the pre-1991 period we confirm the earlier finding of Ravallion and Datt (1996) that the growth effects on poverty for the pre-1991 period are largely attributable to rural

consumption growth, with virtually no contribution from urban growth, while the population urbanization process also contributes to poverty reduction.

We are also able to confirm the earlier finding of Datt and Ravallion (2011) that with the post-reform structural break this pattern has changed substantially. In the post-1991 period, while rural growth remains significant for poverty reduction, unlike the pre-1991 period, it is no longer the prime driver of national poverty reduction. The most notable change is that urban growth now has a significant impact on poverty. Thus, with additional recent data and also for a higher poverty line, we are able to confirm the emergence of a significant effect of urban consumption growth on national poverty as a striking feature of the post-1991 pattern of economic growth in India.

Also notable is the change in the sign of the population shift effect from being poverty-reducing in the pre-91 period to becoming poverty-increasing post-91. As this effect is estimated conditional on urban and rural mean consumption growth, it can be interpreted as picking up intra-sectoral distributional effects associated with the shift of population from rural to urban areas. The changing sign of this effect post-91 is indicative of the adverse distributional changes that have accompanied faster post-reform growth.

The last four columns of Table 4 help unpack these shifting patterns observed for national poverty measures by urban and rural areas. In qualitative terms, there is not much change between the pre- and post-91 periods in how urban and rural growth appear to have affected urban poverty, which was highly responsive to urban consumption growth in both periods, and generally unresponsive to rural growth except for the PG and SPG measures in the pre-91 period. The main change across the two periods with regard to urban poverty is quantitative; the marginal effects of urban growth on urban poverty are much larger post-91.

By comparison, there are important changes for rural poverty in both qualitative and quantitative terms. The most notable change is that while in the pre-91 period urban growth had no discernible impact on rural poverty, a significant and large impact emerged post-91. Rural growth has continued to be important for rural poverty reduction.

Taken together, these results suggest that the post-reform importance of urban growth for national poverty reduction is driven by urban poverty becoming more responsive to urban growth and even more importantly by the emergent and quantitatively substantial response of rural poverty to urban growth.

In light of the differential though changing effects of rural-urban growth and population urbanization, it is not surprising that the hypothesis that the rural-urban composition of growth does not matter for poverty reduction is rejected in most cases (Table 5). For urban poverty, it is rejected strongly in virtually every case.

Note that the estimates in Table 4 relate to the poverty effects of share-weighted urban and rural growth. In the estimation framework of equations (2), (4.1) and (4.2), the elasticities of poverty with respect to urban and rural growth are in fact not constant. They depend on the shares of urban and rural sectors in national consumption and national poverty. Table 6 reports these elasticities at mean shares for the pre-91 and post-91 periods. The contrast for the two periods for national poverty measures is notable. There is a reversal in the relative magnitudes of urban and rural growth elasticities. From being lower in absolute terms than elasticities for rural growth in the pre-91 period, the urban growth elasticities are higher post-91, despite the still smaller share of the urban sector in national consumption and national poverty. Indeed, with the exception of the headcount index at the higher poverty line, the elasticities of rural poverty measures with respect to urban growth are even higher than those with respect to rural growth.

A unified decomposition: The marginal effects of share-weighted growth or the growth elasticities do not by themselves tell us about the relative contributions of different components of growth and population urbanization to observed poverty reduction over the pre- and post-reform periods. To assess this, we now combine analytic and regression-based decomposition methods to provide a further insight into the changing sources of poverty reduction.

A starting point is to note that the population urbanization effect in equations (2) and (4) pertains to a fixed mean within each sector. In the development literature the Kuznets effect refers to the impact on overall inequality of population urbanization holding the levels distribution (and hence poverty levels) constant within both the urban and rural sectors.⁴⁶ Thus the population urbanization effect in (2) and (4.1) combines the “Kuznets effect” of urbanization processes with within-sector distributional changes associated with urbanization. We now separate the two—to see how much the pure Kuznets effect has contributed to poverty reduction in India, and its importance relative to intra-sectoral distributional changes as well as intra-sectoral growth. This

⁴⁶ This is in keeping with the argument of Kuznets (1955) and subsequent formalizations by Robinson (1976), Fields (1980) and (for a more general class of inequality measures) Anand and Kanbur (1993).

requires a unified decomposition, combining the analytic and regression-based decompositions as developed below.

Returning to equation (1) and taking the differential, the analytic (exact) decomposition of the change in the poverty measure can be written as:

$$\begin{aligned} \Delta \ln P_t &= s_{rt-1}^P \Delta \ln P_{rt} + s_{ut-1}^P \Delta \ln P_{ut} + s_{rt-1}^P \Delta \ln n_{rt} + s_{ut-1}^P \Delta \ln n_{ut} \\ &+ s_{rt-1}^P \Delta \ln P_{rt} \Delta \ln n_{rt} + s_{ut-1}^P \Delta \ln P_{ut} \Delta \ln n_{ut} \end{aligned} \quad (5)$$

where the first two terms refer to the contribution of within-sector poverty change, the third and the fourth to the contribution of population shift (urbanization), and the last two to the contribution of the interaction between sectoral poverty change and population shift. Note that the first two terms are already estimated in regressions (4.1) and (4.2), which can be embedded in (5).

Next, consistently with the idea of the Kuznets effect, imagine holding the poverty measures constant in both urban and rural areas while allowing for urbanization. This gives the Kuznets effect:

$$K_t \equiv (\Delta \ln P_t)_{\Delta P_u = \Delta P_r = 0} = s_{rt-1}^P \Delta \ln n_{rt} + s_{ut-1}^P \Delta \ln n_{ut} = (s_{rt-1}^P - s_{ut-1}^P n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} \quad (6)$$

Thus, the Kuznets effect is the same as the third and fourth terms in equation (5). Of course, population urbanization can also entail distributional changes within each sector, but these effects are already reflected in the population shift terms in equations (4.1) and (4.2). Collecting these terms, we can also define the following population effect controlling for the means within each sector and thus representing intra-sectoral distributional change:

$$N_t \equiv [\quad_{ur} (s_{rt-1} - s_{ut-1} n_{rt-1} / n_{ut-1}) + \quad_{rm} (s_{rt-1} - s_{ut-1} n_{rt-1} / n_{ut-1})] \Delta \ln n_{rt} \quad (7)$$

Equations (4.1) and (4.2) allow us to specify the effects of growth in mean consumption in the two sectors as:

$$G_t^r \equiv (\quad_{ur} s_{rt-1} + \quad_{rr} s_{rt-1}) \Delta \ln \quad_{rt} \quad (8.1)$$

$$G_t^u \equiv (\quad_{uu} s_{ut-1} + \quad_{ru} s_{ut-1}) \Delta \ln \quad_{ut} \quad (8.2)$$

Substituting into (5), the expected change in the (log) poverty measure (forming the expectation over the distribution of the error terms in (4.1) and (4.2)) is then given by:

$$E(\Delta \ln P_t) = G_t^r + G_t^u + N_t + K_t + I_t \quad (9)$$

where

$$I_t = s_{rt-1}^P \Delta \ln P_{rt} \Delta \ln n_{rt} + s_{ut-1}^P \Delta \ln P_{ut} \Delta \ln n_{ut} \quad (10)$$

is the interaction effect between changes in poverty and changes in population shares within each sector.

In summary, the total change in the poverty measure can be decomposed into four terms:

- i) G^r and G^u are the effects of rural and urban growth in mean consumption.
- ii) N is the effect of population shift, as from the regression model, controlling for growth in mean consumption within each of the urban and rural sectors. Thus this term picks up any within-sector distributional effects of population urbanization.
- iii) K is the classic Kuznets effect of population shift holding within-sector poverty levels constant.
- iv) I is the interaction effects between sectoral poverty change and population shift.

As noted in the introduction, while the Kuznets effect is poverty decreasing, when distributions shift within sectors, the overall impact on any standard measure of poverty, controlling for the change in the mean, is theoretically ambiguous. The outcome depends, in part, on which segments of the rural distribution become urban, and where they end up in the urban distribution. However, even in simple cases, such as when it is the rural non-poor who move to urban areas, the inequality impacts are theoretically ambiguous (Korinek et al., 2006).

The four components in (9) can be readily computed for the pre- and post-1991 periods from the foregoing analysis. Thus, the annual rate of poverty reduction and its components for the pre- (post-) reform period are obtained by summing up equation (5) over the pre- (post-) reform period and dividing by the length of the pre- (post-) reform period. Components K and I are directly computed as the last four terms in equation (5), while G^r , G^u and N are evaluated from the estimates of regressions (4.1) and (4.2) discussed earlier.

Table 7 presents the results of this unified decomposition. In the pre-1991 period, almost all the reduction in poverty comes from two sources: growth in rural mean consumption (45-46%) and population urbanization component (N), allowing distributions to change within sectors (48-52%). The Kuznets effect accounts for 3% or less of the overall reduction in the poverty, while urban growth contributes 6% or less (1% or less for the reduction in headcount index). In sharp contrast, during the post-1991 period, urban growth has played a much more important role (accounting for 63-84% of the decline in the national poverty), while rural growth

has continued to be important (accounting for 47-70%). Against these effects, there was a poverty increasing intra-sectoral distributional change (increasing the poverty measures by 23-33% of the overall change), while the Kuznets effect was even less quantitatively important.

6. Poverty and the sectoral structure of net domestic product

It is also of interest to know how the relationship between poverty and the sectoral structure of national output has evolved over time. By decomposing the overall growth rate of net domestic product (NDP) into its components we can investigate how the composition of NDP growth has mattered to poverty reduction. The national accounts do not of course have an “urban-rural” breakdown, so this dimension is now latent.

We divide NDP per capita, y_t , into k sources as $y_t = \sum_{i=1}^k y_{it}$. Taking the differences over time, we can write the growth rate of NDP as the share-weighted sum of the growth rates across the k sources, i.e., $\Delta \ln y_t = \sum_{i=1}^k s_{it-1} \Delta \ln y_{it}$ where $s_{it} = y_{it} / y_t$ is the share of NDP due to the i 'th source. (This uses the approximation that $\Delta y_t / y_{t-1} \cong \Delta \ln y_t$.) Given that the NDP data are annual (unlike the NSS data used in the last section to study the urban-rural pattern of growth), we can now test for a one-year lag in the effect of growth. We allow for sectorally-differentiated impact of growth by estimating a regression equation of the following form:

$$\Delta \ln P_t = \sum_{i=1}^3 \alpha_i s_{it-1} \Delta \ln y_{it} + \sum_{i=1}^3 \beta_i s_{it-2} \Delta \ln y_{it-1} + X_t + \epsilon_t \quad (11)$$

Here, $i=1,2,3$ denotes the primary, secondary and tertiary sector respectively, and X denotes controls (discussed further below). In the special case in which $\alpha_i = \alpha_0$ and $\beta_i = \beta_0$ for $i=1,2,3$, the above equation collapses to a simple regression of the rate of poverty reduction on NDP growth and its lag ($\Delta \ln y_t$ and $\Delta \ln y_{t-1}$), with the controls. Thus testing the null hypotheses H_0 :

$\alpha_i = \alpha_j$ ($j=0,1$) for all i tells us whether the composition of growth matters. We also allow the

parameters to differ across the pre-91 and post-91 periods, thus allowing us to separately test for growth composition effects for the two periods..

Our estimates of equation (11) are reported in Tables 8 (for H at both lower and higher poverty lines) and 9 (for PG and SPG at the higher line). There was no sign of a significant

lagged effect of NDP growth, so we dropped the corresponding lagged terms in (11). We give both the unrestricted model in Table 8 and the model with data-consistent restrictions imposed. Again we control for changes in whether the survey used a uniform or mixed recall period as well as changes in the ratio of the consumer price index and the NDP deflator.

Similarly to the results for urban-rural growth, there is a marked contrast between the two periods. For all three measures we find that the sectoral pattern of NDP growth mattered in the pre-1991 period. Growth in both the primary and tertiary sectors was poverty reducing, but this was not so for the secondary sector. Note that the coefficients on secondary and tertiary are of similar magnitude but opposite in sign. This suggests that it is really the difference in the growth rates between the two sectors that matters. Given that those working in the secondary sector pre-1991 are likely to be relatively well off compared to the tertiary sector, the pattern seen in these results can be interpreted as an effect of inequality on poverty reduction, whereby higher secondary sector growth relative to tertiary implies greater inequality and hence higher poverty.

By contrast, we find that the pattern of growth does not matter in the post-1991 period; instead, it is the overall rate of growth that drives poverty reduction. By implication, the most notable change is the significant poverty-reducing effect of secondary sector growth. A plausible explanation is the rapid growth in the labor-intensive construction sector during this period.

NAS-NSS drift: This result on the post-91 sector neutrality of poverty effects of growth is open to a potential empirical challenge. As noted in Section 2, there has been a growing drift between the series on consumption derived from NAS and that from the NSS, with the drift being particularly pronounced since the 1990s. If the drift is reasonably neutral to sector then our main conclusion will not alter. However, insofar as the drift may reflect “missing” growth in the surveys, then it is likely that this missing component is higher for the fastest growing sectors, in particular, the tertiary sector in the post-91 period. There is thus a concern that absent any control for the drift, the sector-neutrality result could be biased by the drift being correlated with the tertiary sector growth rate.

To test for this possibility we re-estimated (11) adding a control for the drift between NAS and NSS mean consumption. Here our reasoning is as follows: Suppose the true values poverty and growth variables are denoted with a *. Then, the regression specification (suppressing sectoral terms) in terms of the true data is:

$$\Delta \ln P_t^* = \alpha_0 \Delta \ln y_{it}^* + \alpha_1 \Delta \ln y_{it-1}^* + \epsilon_t \quad (12)$$

The true values are related to the observed values by $\Delta \ln P_t^* = \Delta \ln P_t + \epsilon_t^P$ and

$\Delta \ln y_t^* = \Delta \ln y_t + \epsilon_t^Y$. The gap between the NAS and NSS mean consumption is taken to be an indicator of the measurement errors, such that $\epsilon_t^i = \Delta^i \Delta \ln(C_t / \mu_t)$ for $i=P,Y$ where $\Delta^i < 0$, and C and μ are NAS and NSS mean consumption, respectively. Ignoring the lagged (C/μ) term (which turned out to be insignificant when included) the estimated model then takes the form:

$$\Delta \ln P_t = \alpha_0 \Delta \ln y_{it} + \alpha_1 \Delta \ln y_{it-1} + (\alpha_0 \Delta^Y - \Delta^P) \Delta \ln(C / \mu)_t + \epsilon_t \quad (13)$$

Motivated by this argument, we also estimated an augmented version of equation (11) including a control for $\Delta \ln(C / \mu)_t$. We only summarize the results here.⁴⁷ The augmented model indicated a slightly higher coefficient on tertiary-sector growth. We also found a stronger lagged effect of NDP growth, as in (11). However, it remained the case that we could not reject the null hypothesis that the sectoral composition of growth did not matter in the post-1991 period. Our main finding of the sector-neutrality of the poverty effects of the post-1991 growth process is robust to controlling for the drift between the NSS and NAS series.

Despite this sector-neutrality of the poverty effects of growth rates, the implied sectoral growth elasticities of poverty measures are nonetheless different as they also depend on sectoral NDP shares. These sectoral growth elasticities evaluated at mean sectoral NDP shares for the two periods are shown in Table 10. The tertiary sector has the highest (absolute) elasticity for all three measures and both periods. The growth elasticity for the primary sector has declined in absolute terms in the post-91 period, reflecting in part the rapid decline in the share of primary sector in NDP. The most notable change across the two periods is in the elasticity for secondary sector growth, which switches sign from positive to negative before and after the reform process started. With this change, the growth elasticities for primary and secondary sectors are of similar magnitude in the post-reform period.⁴⁸

Decomposition by sector: As before, neither the marginal poverty effects in Tables 8 and 9 nor the elasticities in Table 10 tell us how much each sector's growth contributed to observed poverty reduction in the two periods. For instance, the contribution of growth in a sector with high (absolute) elasticity to poverty reduction could be low if that sector is experiencing little

⁴⁷ Details are available from the authors.

⁴⁸ Overall, in the post-91 period, the primary and secondary sectors accounted for roughly similar shares of output—23% and 25% of NDP, respectively. The share of the tertiary sector in NDP rose sharply from 35% in the pre-1991 to 52% in the post-1991 period.

growth. However, we can run a poverty-growth accounting for the two periods resorting to a decomposition of observed poverty changes by sectoral output growth using our estimates of equation (11). Similar to the rural-urban decomposition, this decomposition is implemented by summing up equation (11) over the two periods and dividing by the respective lengths of the two periods, but with one difference. Note that y_{it} in (11) is the sector's output normalized by the national population (N_t). We thus do not have an analogue of population shifts across sectors in this model. In the light of this, it is more meaningful to identify the contribution of aggregate (rather than per capita) output growth in each sector. On noting that $\Delta \ln y_{it} = \Delta \ln Y_{it} - \Delta \ln N_t$ (where Y_{it} denotes aggregate output of sector i), these aggregate sector output contributions are evaluated using terms such as ${}_0i s_{it-1} (\Delta \ln y_{it} + \Delta \ln N_t)$.

The resulting decompositions in Table 11 indicate that primary sector output growth contributed 39-44% of the total poverty reduction net of the impact of population growth in the pre-1991 period, while the combined contribution of secondary and tertiary sector growth was 58-63%. By contrast, in the post-1991 period, primary sector's contribution declined to about 9%, with the combined contribution of secondary and tertiary sector rising to 87%. The tertiary sector growth has been the prime source of post-reform poverty reduction accounting for more than 60% of the total decline in poverty over this period. The changing nature of the growth process and the large structural transformation of the economy (itself related to the growth process) have dislodged primary sector growth as the main driver of poverty reduction in India.

7. Conclusions

What have we learnt from this extended account of poverty, urbanization and growth in India? With more recent data, our analysis has confirmed some findings from past research and also provided some new insights.

India's long-run progress against absolute poverty is evident from our findings using data spanning nearly six decades from 1957 to 2012. The trend decline in the national incidence of poverty for our upper line was 0.65% points per annum, accumulating to a sizeable fall in the poverty rate of more than 35% points. In proportionate terms, poverty incidence declined at the rate of 1.3% per annum. The long-run poverty decline is evident in both urban and rural areas, and is higher for the poverty gap and squared poverty gap indices, reflecting gains to those living

well below the poverty line. Rural poverty measures, that were historically higher than for urban areas, have been converging with urban measures over time, and the (distribution-sensitive) squared poverty gap index for urban India has actually overtaken that for rural India in recent years. There has been a marked urbanization of poverty in India over this period, from about one-in-eight of the poor living in urban areas in the early 1950s to one-in-three today.

Even though a trend decline in poverty emerged around the early 1970s, the year 1991-92 – the benchmark year for economic reforms in India – stands out as the year of the great divide. Markers of a structural break are many, even as an attribution to the reforms remains unclear. There was a significant spurt in economic growth, driven by growth in the tertiary sector and to a lesser extent, secondary sector. The pace of poverty reduction also accelerated, with a 3-4 fold increase in the proportionate rate of decline in the post-91 period. The acceleration in rural poverty decline was even higher than that for urban poverty. This happened alongside a significant increase in inequality both within and between urban and rural areas, in contrast with a decline in rural inequality and no trend in urban inequality pre-91. Despite the increase in inequality, we find greater post-91 responsiveness of poverty to growth in the aggregate, regardless of whether growth is measured based on national accounts or survey-based consumption. Thus, faster growth also appears to have been more pro-poor when the latter is measured by the growth elasticity of poverty reduction.

Even more striking has been the structural break in the relationship between poverty and the composition of growth. Both urban-rural and sectoral (output) decompositions are suggestive of stronger inter-sectoral linkages, whereby growth in one sector transmits its gains elsewhere. Post-91, urban growth has emerged as the primary driver of poverty reduction. Urban poverty has become significantly more responsive to urban growth, but (even more importantly) urban growth has become significantly more rural poverty reducing since 1991. This is in sharp contrast to the pattern prior to 1991, when urban growth had no impact on rural poverty.

Also striking is that our post-1991 data point to sector-neutrality (by output) in the poverty reducing effect of growth in net domestic product. Unlike the pre-91 period, when only primary and tertiary sector growth contributed to poverty reduction, after 1991 all three sectors have had a significant impact. The tertiary sector has the highest (absolute) growth elasticity of poverty reduction, about twice as high as those for the primary and secondary sector. This reflects both the changing nature of the growth process as well as the large structural

transformation of the Indian economy over the last two decades with the secondary and tertiary sectors now accounting for much larger shares of national output and employment. By the same token, the post-91 sector-neutrality of marginal poverty impacts need not be an enduring result as the process of structural change in the economy continues.

The consequences of these marked differences in the impacts of different sources of growth on poverty are borne out by our poverty-growth accounting exercises for the two periods. Pre-91, poverty reduction was almost entirely driven by rural growth and favourable distributional changes; the contribution of urban growth was negligible. Post-91, rural growth, though still important, has been displaced by urban growth as the most important contributor to the observed (and more rapid) poverty reduction, even though urban growth has had adverse distributional effects. Seen through the lens of growth by output sectors, the contribution of primary sector growth has rapidly dwindled from accounting for about two-fifths of the total poverty decline pre-91 to less than 10 percent of the total (and larger) poverty decline post-91. The tertiary sector alone has contributed over 60% of the post-91 poverty reduction. The secondary sector growth has contributed about a quarter. India's construction boom since 2000 has clearly helped assure a more pro-poor growth process from the secondary sector.

Our poverty-growth accounting also helps us understand the role played by urbanization. The classic Kuznets process *per se*, envisaging a shift of population from rural to urban areas without change in rural or urban distributions, has had very little role in poverty reduction in either period. This reflects in part the relatively slow rise in the share of India's urban population and the relatively small and shrinking differences in rural and urban poverty rates. But the population shift has been associated with significant distributional changes that were favourable during the pre-91 phase of slower growth and adverse in the latter phase of more rapid growth. Thus, the role of urbanization seen as a population shift appears to have been a mixed one. However, if the urbanization process is interpreted broadly to encompass urban economic growth as well as population growth, its contribution to poverty reduction in post-reform India has been clearly important.

References

- Ahluwalia, Montek S., 2002. "Economic Reforms in India: A Decade of Gradualism," *Journal of Economic Perspectives* 16(2): 67-88.
- Anand, Sudhir, and Ravi Kanbur, 1985, "Poverty Under the Kuznets Process," *Economic Journal* 95: 42-50.
- _____, and _____, 1993, "The Kuznets Process and the Inequality-Development Relationship," *Journal of Development Economics* 40:25-52.
- Atkinson, Anthony B., 1987, "On the Measurement of Poverty," *Econometrica* 55: 749-764.
- Banerjee, Abhijit and Thomas Piketty, 2003, "Top Indian Incomes: 1956–2000," *World Bank Economic Review* 19(1):1-20.
- Bhagwati, Jagdish, 1993, *India in Transition. Freeing the Economy*. Oxford: Clarendon Press.
- Bruno, Michael, Martin Ravallion and Lyn Squire, 1998, "Equity and Growth in Developing Countries: Old and New Perspectives on the Policy Issues", in *Income Distribution and High-Quality Growth* (edited by Vito Tanzi and Ke-young Chu), Cambridge, Mass: MIT Press.
- Datt, Gaurav and Ravallion, Martin, 1998, "Farm Productivity and Rural Poverty in India," *Journal of Development Studies* 34: 62-85.
- _____ and _____, 2002, "Has India's Post-Reform Economic Growth Left the Poor Behind," *Journal of Economic Perspectives* 16(3): 89-108.
- _____ and _____, 2011, "Has India's Economic Growth Become More Pro-Poor in the Wake of Economic Reforms?" *World Bank Economic Review* 25(2): 157-189.
- Deaton, Angus, 2005, "Measuring Poverty in a Growing World (or Measuring Growth in a Poor World)," *Review of Economics and Statistics* 87: 353-378.
- Deaton, Angus, and Jean Drèze, 2002, "Poverty and Inequality in India: A Re-Examination," *Economic and Political Weekly*, September 7: 3729-3748.
- Eswaran, Mukesh and Ashok Kotwal, 1994, *Why Poverty Persists in India: A Framework for Understanding the Indian Economy*, Delhi: Oxford University Press.
- Fields, Gary S., 1980, *Poverty, Inequality and Development*. Cambridge: Cambridge University Press.

- Foster, James, J. Greer, and Erik Thorbecke, 1984, "A Class of Decomposable Poverty Measures," *Econometrica* 52: 761-765.
- Hnatkovska, Viktoria, and Amartya Lahiri, 2013, "Structural Transformation and the Rural-Urban Divide," Working Paper, International Growth Center, London School of Economics.
- Jacoby, Hanan, and Basab Dasgupta, 2015, "Changing Wage Structure in India in the Post-reform Era: 1993-2011," *Policy Research Working Paper 7426*, World Bank.
- Kakwani, Nanak, 1993, "Poverty and Economic Growth with Application to Côte D'Ivoire," *Review of Income and Wealth* 39: 121-139.
- Klasen, Stephan and Janneke Pieters, 2015, What Explains the Stagnation of Female Labor Force Participation in Urban India? *World Bank Economic Review* 29(3): 449-478.
- Korinek, Anton, Johan Mistiaen and Martin Ravallion, 2006, "Survey Nonresponse and the Distribution of Income," *Journal of Economic Inequality* 4(2): 33-55.
- Kotwal, Askok, Bharat Ramaswami and Wilma Wadhwa. 2011. "Economic Liberalization and India Economic Growth: What's the Evidence?," *Journal of Economic Literature* 49:4, 1152-1199.
- Kuznets, Simon, 1955, "Economic Growth and Income Inequality." *American Economic Review* 45:1-28.
- Lewis, Arthur, 1954, "Economic Development with Unlimited Supplies of Labor," *Manchester School of Economic and Social Studies* 22: 139-191.
- Planning Commission, 1979, *Report of the Task Force on Projections of Minimum Needs and Effective Consumption*. Government of India. New Delhi.
- _____, 1993, *Report of the Expert Group on Estimation of Proportion and Number of Poor*. Government of India. New Delhi.
- Ravallion, Martin, 2000, "Should Poverty Measures be Anchored to the National Accounts?" *Economic and Political Weekly*, 34(35&36), August 26: 3245-3252.
- _____, 2003, "Measuring Aggregate Economic Welfare in Developing Countries: How Well do National Accounts and Surveys Agree?," *Review of Economics and Statistics* 85: 645-652.
- _____, 2007, "Inequality is Bad for the Poor," in *Inequality and Poverty Re-Examined*, edited by John Micklewright and Steven Jenkins, Oxford: Oxford

- University Press.
- _____, 2008, "A Global Perspective on Poverty in India," *Economic and Political Weekly* 43(October 25): 31-37.
- _____, 2016, *The Economics of Poverty. History, Measurement and Policy*, Oxford and New York: Oxford University Press.
- Ravallion, Martin, Shaohua Chen and Prem Sangraula, 2007, "New Evidence on the Urbanization of Global Poverty," *Population and Development Review*, 33(4): 667-702.
- Ravallion, Martin and Gaurav Datt, 1996, "How Important to India's Poor is the Sectoral Composition of Economic Growth?," *World Bank Economic Review* 10: 1-26.
- Robinson, Sherman, 1976, "A Note on The U-Hypothesis Relating Income Inequality and Economic Development," *American Economic Review* 66:437-440.
- Sen, Abhiit, 2005, "Estimates of Consumer Expenditure and its Distribution. Statistical Priorities after the NSS 55th Round," in Angus Deaton and Valerie Kozel (eds) *The Great Indian Poverty Debate*, Delhi: Macmillan Press.
- Sen, Abhijit, and Himanshu, 2004a, "Poverty and Inequality in India 1," *Economic and Political Weekly*, 39 (September 18): 4247–4263.
- _____ and _____, 2004b, "Poverty and Inequality in India 2: Widening Disparities During the 1990s," *Economic and Political Weekly*, 39 (September 25): 4361–4375.
- Sundaram, K., and Suresh D. Tendulkar, 2001, "NAS-NSS Estimates of Private Consumption for Poverty Estimation: A Disaggregated Comparison for 1993-94," *Economic and Political Weekly*, (January 13): 119-129.
- Wilkes, Tommy, and Manoj Kumar, 2015. "[The Peak is Over: What the End of India's Construction Boom Means for the Country's Economy](#)," *Financial Post*, August 26.
- World Bank, 2015, *World Development Indicators*. Washington DC: World Bank.

Table 1: Trend growth rates in poverty measures and means, 1957-2012

	Whole period: 1957/58- 2011/12	Pre- 1991	Post- 1991	H ₀ : pre-91 trend = post-91 trend F(1, 37) prob > F
Exponential trends				
Poverty measures:				
Headcount index: lower line	-0.019 (-4.49)	-0.009 (-3.57)	-0.049 (-6.74)	21.17 0.000
Headcount index: higher line	-0.013 (-4.28)	-0.006 (-3.31)	-0.036 (-6.55)	20.80 0.000
Poverty gap index: higher line	-0.023 (-5.43)	-0.014 (-4.59)	-0.052 (-7.12)	18.65 0.000
Squared poverty gap index: higher line	-0.030 (-6.19)	-0.020 (-5.25)	-0.063 (-7.46)	16.92 0.000
Mean consumption/income:				
Mean consumption per capita from NSS	0.009 (5.53)	0.006 (3.96)	0.020 (8.84)	18.56 0.000
Mean private cons. per capita from NAS	0.019 (12.07)	0.011 (15.45)	0.038 (13.94)	66.78 0.000
Mean net domestic product per capita	0.025 (17.28)	0.018 (27.45)	0.043 (18.27)	81.68 0.000
Linear trends				
Poverty measures:				
Headcount index: lower line	-0.66 (-6.35)	-0.50 (-4.43)	-1.21 (-8.08)	10.19 0.003
Headcount index: higher line	-0.65 (-5.59)	-0.44 (-4.01)	-1.36 (-7.70)	14.35 0.001
Poverty gap index: higher line	-0.34 (-7.61)	-0.29 (-5.17)	-0.49 (-8.20)	4.03 0.052
Squared poverty gap index: higher line	-0.19 (-8.18)	-0.18 (-5.54)	-0.21 (-7.93)	0.42 0.520
Mean consumption/income:				
Mean consumption per capita from NSS	8.49 (4.77)	4.59 (3.74)	21.38 (7.84)	24.89 0.000
Mean private cons. per capita from NAS	35.23 (7.25)	12.71 (5.32)	90.27 (8.13)	35.3 0.000
Mean net domestic product per capita	56.37 (8.19)	23.65 (7.54)	136.33 (9.56)	45.41 0.000

Notes: Number of observations =41. Growth trends based on regressions of (log) poverty measures or (log) mean consumption/income on time to estimate (exponential) linear trends. Robust (heteroscedasticity and autocorrelation consistent) t-statistics in parentheses. In the levels case, poverty measures are in percentages, mean consumption from NSS surveys is at constant rural 2011-12 prices (corresponding to the survey period for NSS 68th Round), mean private consumption and net domestic product per capita are from national accounts and also at constant 2011-12 prices. Regressions for poverty measures and mean NSS consumption also control for mixed reference period rounds of the NSS. Growth rates for pre- and post-1991 sub-periods were estimated as parameters of a single regression, constrained to assure that the predicted values were equal in 1992.

Table 2: Trend growth rates in rural and urban poverty, mean consumption and inequality, 1957-2012

	Whole period: 1957/58- 2011/12	Pre- 1991	Post- 1991	H ₀ : pre-91 trend = post-91 trend F(1, 37) prob > F
Rural: exponential trends				
Poverty measures:				
Headcount index: lower line	-0.019 (-4.01)	-0.008 (-2.81)	-0.053 (-6.43)	21.08 0.000
Headcount index: higher line	-0.013 (-3.80)	-0.005 (-2.53)	-0.038 (-6.06)	19.42 0.000
Poverty gap index: higher line	-0.023 (-4.93)	-0.013 (-3.87)	-0.057 (-6.88)	19.00 0.000
Squared poverty gap index: higher line	-0.031 (-5.70)	-0.019 (-4.55)	-0.069 (-7.41)	18.05 0.000
Mean consumption/inequality:				
Mean consumption per capita	0.008 (4.79)	0.005 (3.08)	0.019 (7.67)	15.26 0.000
Gini index	-0.001 (-1.68)	-0.003 (-3.09)	0.003 (3.18)	12.59 0.001
Urban: exponential trends				
Poverty measures:				
Headcount index: lower line	-0.018 (-6.30)	-0.012 (-6.62)	-0.038 (-7.41)	19.66 0.000
Headcount index: higher line	-0.014 (-6.08)	-0.009 (-6.34)	-0.031 (-8.22)	24.97 0.000
Poverty gap index: higher line	-0.021 (-7.18)	-0.015 (-7.77)	-0.041 (-7.40)	16.44 0.000
Squared poverty gap index: higher line	-0.027 (-7.79)	-0.020 (-8.64)	-0.049 (-7.13)	13.57 0.001
Mean consumption/inequality:				
Mean consumption per capita	0.010 (7.06)	0.007 (6.29)	0.021 (10.92)	26.9 0.000
Gini index	0.001 (2.51)	0.0001 (0.12)	0.006 (8.57)	30.17 0.000

Notes: Number of observations =41. These are exponential trends based on regressions of log of poverty indices/ mean consumption/ inequality measures on time. All dependent variables are based on data from various rounds of the NSS. Robust (heteroscedasticity and autocorrelation consistent) t-statistics are in parentheses. The regressions control for mixed reference period rounds of the NSS. The growth rates for pre- and post-1991 sub-periods were estimated as parameters of a single regression, constrained to assure that the predicted values were equal in 1992.

Table 3: Elasticities of national poverty measures to economic growth in India, 1957-2012

Elasticity of poverty measure with respect to:	Mean consumption per capita (NSS)				Mean private consumption per capita (NAS)				Mean NDP per capita (NAS)			
	OLS		IV		Unadjusted		Adjusted		Unadjusted		Adjusted	
	Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat
Headcount: lower line												
Whole period	-2.00	11.5	-1.86	-21.2	-1.09	-11.9	-1.00	-9.3	-0.82	-7.7	-0.75	-6.4
Pre-1991	-1.56	-16.9	-1.55	-27.7	-1.09	-6.9	-1.04	-20.9	-0.67	-5.2	-0.68	-18.7
Post-1991	-2.69	-28.5	-2.66	-41.5	-1.38	-13.2	-1.37	-11.0	-1.24	-10.9	-1.22	-8.4
H0 : pre-91= post-91 elasticity prob > F(1,35) or F(1,34)		0.00		0.00		0.13		0.02		0.00		0.00
Headcount: higher line												
Whole period	-1.45	-10.8	-1.32	-19.3	-0.79	-10.8	-0.73	-8.4	-0.59	-7.2	-0.54	-5.9
Pre-1991	-1.13	-18.2	-1.11	-31.4	-0.77	-6.4	-0.73	-15.2	-0.47	-4.8	-0.48	-13.8
Post-1991	-1.99	-34.2	-1.98	-37.8	-1.02	-13.0	-1.01	-10.7	-0.92	-10.6	-0.90	-8.2
H0 : pre-91= post-91 elasticity prob > F(1,35) or F(1,34)		0.00		0.00		0.08		0.01		0.00		0.00
Poverty gap: higher line												
Whole period	-2.34	-17.8	-2.26	-26.0	-1.27	-16.1	-1.17	-14.0	-0.97	-10.1	-0.88	-8.7
Pre-1991	-1.99	-15.1	-1.96	-23.0	-1.44	-8.0	-1.39	-25.0	-0.90	-6.0	-0.91	-24.2
Post-1991	-2.79	-30.3	-2.71	-40.0	-1.43	-13.6	-1.41	-10.9	-1.28	-11.1	-1.25	-8.2
H0 : pre-91 = post-91 elasticity prob > F(1,35) or F(1,34)		0.00		0.00		0.94		0.88		0.05		0.04
Squared poverty gap: higher line												
Whole period	-3.00	-24.0	-2.98	-31.5	-1.63	-18.3	-1.49	18.9	-1.25	-12.3	-1.13	-11.1
Pre-1991	-2.65	-13.2	-2.57	-18.0	-1.98	-8.8	-1.91	-25.1	-1.25	-6.5	-1.26	-25.7
Post-1991	-3.30	-26.1	-3.18	-35.7	-1.68	-13.3	-1.66	-10.7	-1.51	-11.1	-1.48	-8.0
H0 : pre-91 = post-91 elasticity prob > F(1,35) or F(1,34)		0.01		0.00		0.26		0.16		0.27		0.26

Notes: Based on regressions of log poverty measures against log consumption or net product per person using 40 surveys spanning 1957/58-2011/12 (except 48th round for the crisis year 1992). All regressions include a control (dummy variable) for surveys that used a mixed-recall period. IVs for the survey mean regressions include lagged survey means (split urban and rural), interval between mid-points of survey periods, time trend, and current and lagged variables for: mean consumption from the national accounts, rural and urban CPIs, and rural population shares. The “adjusted” estimates control for the difference in the rates of inflation implied by the CPI and the NDP deflator. T-statistics are based on heteroscedasticity and autocorrelation-consistent standard errors.

Table 4: Impacts on poverty of the urban-rural composition of growth, 1957-2012

		Change in log poverty measure					
		National		Urban		Rural	
		Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
HEADCOUNT: Lower line							
Pre-91	Urban growth	0.200	0.30	-0.612	-4.73	0.566	1.00
Pre-91	Rural growth	-1.277	-11.1	-0.042	-1.39	-1.224	-12.2
Pre-91	Pop. urbanization	-0.233	-2.76	-0.025	-2.02	-0.164	-1.98
Post-91	Urban growth	-6.399	-4.26	-1.839	-6.49	-4.618	-3.62
Post-91	Rural growth	-1.957	-3.59	-0.224	-1.38	-1.617	-3.49
Post-91	Pop. urbanization	0.259	1.30	0.087	1.29	0.175	1.09
R ²		0.870		0.811		0.860	
Pre91=Post91	prob.> F(2,33)	0.000		0.002		0.000	
Pre91=Post91	prob.> F(3,33)	0.000		0.003		0.000	
HEADCOUNT: Higher line							
Pre-91	Urban growth	-0.023	-0.04	-0.624	-7.54	0.694	1.39
Pre-91	Rural growth	-0.940	-12.2	-0.014	-0.65	-0.921	-15.4
Pre-91	Pop. urbanization	-0.146	-3.47	-0.015	-1.84	-0.121	-3.32
Post-91	Urban growth	-3.590	-4.37	-1.244	-9.01	-2.423	-3.24
Post-91	Rural growth	-2.076	-7.41	-0.165	-1.68	-1.918	-7.37
Post-91	Pop. urbanization	0.195	2.47	-0.039	1.04	0.173	2.66
R ²		0.905		0.850		0.900	
Pre91=Post91	prob.> F(2,33)	0.000		0.006		0.000	
Pre91=Post91	prob.> F(3,33)	0.000		0.005		0.000	
POVERTY GAP: Higher line							
Pre-91	Urban growth	-0.739	-1.10	-0.523	-3.73	-0.163	-0.26
Pre-91	Rural growth	-1.548	-11.6	-0.072	-2.36	-1.457	-10.6
Pre-91	Pop. urbanization	-0.224	-2.09	-0.373	-2.12	-0.163	-1.68
Post-91	Urban growth	-6.827	-4.19	-2.392	-7.83	-4.273	-3.13
Post-91	Rural growth	-1.768	-3.15	-0.231	-1.53	-1.498	-3.08
Post-91	Pop. urbanization	0.241	1.25	0.127	1.92	0.081	0.55
R ²		0.875		0.828		0.856	
Pre91=Post91	prob.> F(2,33)	0.002		0.000		0.004	
Pre91=Post91	prob.> F(3,33)	0.001		0.000		0.001	
SQUARED POVERTY GAP: Higher line							
Pre-91	Urban growth	-1.212	-1.10	-0.394	-1.30	-0.387	-0.41
Pre-91	Rural growth	-1.990	-7.68	-0.130	-2.71	-1.876	-7.64
Pre-91	Pop. urbanization	-0.259	-1.59	-0.051	-2.16	-0.221	-1.48
Post-91	Urban growth	-8.482	-3.44	-3.609	-9.05	-5.311	-2.79
Post-91	Rural growth	-1.772	-2.03	-0.356	-1.84	-1.388	-2.00
Post-91	Pop. urbanization	0.269	1.04	0.252	3.46	0.080	0.40
R ²		0.840		0.819		0.810	
Pre91=Post91	prob.> F(2,33)	0.020		0.000		0.063	
Pre91=Post91	prob.> F(3,33)	0.012		0.000		0.071	

Notes: Number of observations = 40. Autocorrelation and heteroscedasticity consistent IV-GMM estimates of models which also include pre-91 and post-91 population shift variables and a control for MRP survey rounds. IVs for the survey mean regressions include lagged survey means (split urban and rural), interval between mid-points of survey periods, time trend, and current and lagged variables for: mean consumption from the national accounts, rural and urban CPIs, and rural population shares. F(2,33) tests for pre-91 urban and rural growth parameters being the same as those for post-91. F(3,33) in addition also tests for the population urbanization parameter to the same pre- and post-91. Log points ($100\Delta\ln n_t$) for the population urbanization term.

Table 5: Test statistics on the significance of the pattern of growth

		National	Urban	Rural
Headcount: Lower line				
Pre-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1, 33)	0.051	0.001	0.005
H ₀ : Pattern of growth does not matter	prob.>F(2, 33)	0.026	0.000	0.011
Post-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1, 33)	0.025	0.000	0.077
H ₀ : Pattern of growth does not matter	prob.>F(2, 33)	0.062	0.000	0.155
Headcount: Higher line				
Pre-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1, 33)	0.133	0.000	0.004
H ₀ : Pattern of growth does not matter	prob.>F(2, 33)	0.010	0.000	0.002
Post-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1,33)	0.152	0.000	0.606
H ₀ : Pattern of growth does not matter	prob.>F(2,33)	0.032	0.000	0.019
Poverty gap: Higher line				
Pre-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1,33)	0.261	0.009	0.062
H ₀ : Pattern of growth does not matter	prob.>F(2,33)	0.143	0.000	0.075
Post-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1,33)	0.019	0.000	0.130
H ₀ : Pattern of growth does not matter	prob.>F(2,33)	0.054	0.000	0.301
Squared poverty gap: Higher line				
Pre-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1,33)	0.532	0.447	0.175
H ₀ : Pattern of growth does not matter	prob.>F(2,33)	0.349	0.002	0.213
Post-1991				
H ₀ : Urban growth effect = rural growth effect	prob.>F(1,33)	0.043	0.000	0.129
H ₀ : Pattern of growth does not matter	prob.>F(2,33)	0.110	0.000	0.308

Table 6: Elasticities of poverty with respect to urban and rural growth, 1957-2012

		National		Urban		Rural	
		Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat
Headcount: Lower line							
Pre-91	Urban growth	0.05	0.30	-0.79	-4.73	0.16	1.00
Pre-91	Rural growth	-0.98	-11.10	-0.18	-1.39	-1.14	-12.15
Post-91	Urban growth	-2.13	-4.26	-2.37	-6.49	-2.07	-3.62
Post-91	Rural growth	-1.31	-3.59	-0.58	-1.38	-1.45	-3.49
Headcount: Higher line							
Pre-91	Urban growth	-0.01	-0.04	-0.79	-7.54	0.20	1.39
Pre-91	Rural growth	-0.72	-12.2	-0.06	-0.65	-0.87	-15.37
Post-91	Urban growth	-1.19	-4.37	-1.65	-9.01	-1.08	-3.24
Post-91	Rural growth	-1.39	-7.41	-0.44	-1.68	-1.71	-7.37
Poverty gap: Higher line							
Pre-91	Urban growth	-0.17	-1.10	-0.65	-3.73	-0.05	-0.26
Pre-91	Rural growth	-1.18	-11.56	-0.29	-2.36	-1.37	-10.63
Post-91	Urban growth	-2.27	-4.19	-2.89	-7.83	-1.96	-3.13
Post-91	Rural growth	-1.18	-3.15	-0.56	-1.53	-1.38	-3.08
Squared poverty gap: Higher line							
Pre-91	Urban growth	-0.29	-1.10	-0.49	-1.30	-0.11	-0.41
Pre-91	Rural growth	-1.52	-7.7	-0.52	-2.71	-1.77	-7.64
Post-91	Urban growth	-2.82	-3.44	-4.11	-9.05	-2.50	-2.79
Post-91	Rural growth	-1.18	-2.03	-0.81	-1.84	-1.31	-2.00

Note: Elasticities are evaluated at means for the pre- and post-1991 periods using the parameter estimates reported in Table 4.

Table 7: Decomposition of change in national poverty measures for the pre- and post-reform periods

	Total change in poverty	Total predicted change in poverty	Components of predicted change in poverty:				
			G^R	G^U	N	K	I
			Rural growth	Urban growth	Population shift with intra-sector distributional change	Population shift holding intra-sectoral distribution constant (Kuznets effect)	Interaction between sectoral poverty change and population shift
Headcount: lower line							
Pre-91							
Annual percentage change	-1.38	-1.61	-0.72	-0.01	-0.84	-0.05	0.00
Share of pred. annual change		100.0	44.5	0.5	52.2	2.9	-0.1
Post-91							
Annual %age change	-6.47	-6.15	-2.88	-5.16	1.90	-0.02	0.01
Share of pred. annual change		100.0	46.9	83.9	-30.9	0.4	-0.2
Headcount: higher line							
Pre-91							
Annual percentage change	-0.90	-1.16	-0.53	0.01	-0.60	-0.04	0.00
Share of pred. annual change		100.0	45.7	-1.0	52.0	3.2	0.1
Post-91							
Annual percentage change	-4.79	-4.67	-3.26	-2.93	1.55	-0.04	0.01
Share of pred. annual change		100.0	69.8	62.7	-33.1	0.9	-0.2
Poverty gap: higher line							
Pre-91							
Annual percentage change	-1.90	-1.86	-0.86	-0.12	-0.89	0.00	0.00
Share of pred. annual change		100.0	46.3	6.3	47.7	-0.2	-0.2
Post-91							
Annual percentage change	-6.82	-6.49	-2.71	-5.32	1.52	0.01	0.01
Share of pred. annual change		100.0	41.7	82.0	-23.4	-0.2	-0.2

Squared poverty gap: higher line**Pre-91**

Annual percentage change	-2.68	-2.47	-1.13	-0.13	-1.21	0.01	0.01
Share of pred. annual change		100.0	45.9	5.4	49.2	-0.3	-0.3

Post-91

Annual percentage change	-8.16	-7.42	-5.05	-4.80	2.42	0.01	0.01
Share of pred. annual change		100.0	68.1	64.7	-32.6	-0.1	-0.1

Table 8: Impacts of the sectoral composition of growth on the headcount index, 1957-2012

Variable or statistic	Change in log Headcount (Lower Line)				Change in log Headcount (Higher Line)			
	Unrestricted model		Restricted model		Unrestricted model		Restricted model	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Pre-91 variables:								
Primary sector growth	-1.138	-4.59	-1.143	-4.58	-0.823	-3.41	-0.817	-3.43
Secondary sector growth	4.496	2.71	4.510	2.75	2.941	2.64	2.921	2.66
Tertiary sector growth	-3.582	-3.20	-3.581	-3.28	-2.395	-3.30	-2.396	-3.42
Post-91 variables:								
Primary sector growth	-1.965	-0.22			-2.053	-0.33		
Secondary sector growth	-1.637	-0.32			-0.548	-0.15		
Tertiary sector growth	-1.510	-1.07			-1.360	-1.33		
NDP growth			-1.551	-2.79			-1.199	-2.95
Variables common to both periods:								
Change in log ratio of CPI to NDP deflator	1.224	4.44	1.235	4.22	0.847	4.08	0.831	3.76
Change in binary var. for an MRP estimate	-0.320	-4.73	-0.321	-5.45	-0.219	-4.91	-0.224	-5.56
Number of observations	40		40		40		40	
R ²	0.656		0.655		0.660		0.658	
Wald test of restrictions: prob > F(2, 32)								
Pre-91: $\pi_1 = \pi_2 = \pi_3$	0.002				0.008			
Post-91: $\pi_1 = \pi_2 = \pi_3$	0.999				0.977			

Note: The Table gives least squares estimates with heteroscedasticity and autocorrelation-consistent standard errors.

Table 9: Impacts of the sectoral composition of growth on poverty gap and squared poverty gap indices, 1957-2012

Variable or statistic	Change in log Poverty Gap (Higher Line)				Change in log Squared Poverty Gap (Higher Line)			
	Unrestricted model		Restricted model		Unrestricted model		Restricted model	
	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Pre-91 variables:								
Primary sector growth	-1.378	-5.47	-1.367	-5.56	-1.763	-5.13	-1.751	-5.30
Secondary sector growth	4.931	2.66	4.899	2.72	6.354	2.38	6.319	2.45
Tertiary sector growth	-4.128	-3.50	-4.129	-3.64	-5.376	-3.30	-5.377	-3.43
Post-91 variables:								
Primary sector growth	-0.217	-0.02			1.747	0.15		
Secondary sector growth	-1.349	-0.25			-2.104	-0.30		
Tertiary sector growth	-1.856	-1.28			-2.138	-1.18		
NDP growth			-1.624	-2.86			-1.880	-2.71
Variables common to both periods:								
Change in log ratio of CPI to NDP deflator	1.427	4.46	1.403	4.73	1.864	4.38	1.837	4.94
Change in binary var. for an MRP estimate	-0.354	-4.68	-0.351	-5.59	-0.458	-4.32	-0.448	-5.19
Number of observations	40		40		40		40	
R ²	0.668		0.666		0.652		0.648	
Wald test of restrictions: prob > F(2, 32)								
Pre-91: $\pi_1 = \pi_2 = \pi_3$	0.005				0.019			
Post-91: $\pi_1 = \pi_2 = \pi_3$	0.981				0.945			

Note: The Table gives least squares estimates with heteroscedasticity and autocorrelation-consistent standard errors.

Table 10: Elasticities of poverty with respect to sectoral components of NDP, 1957-2012

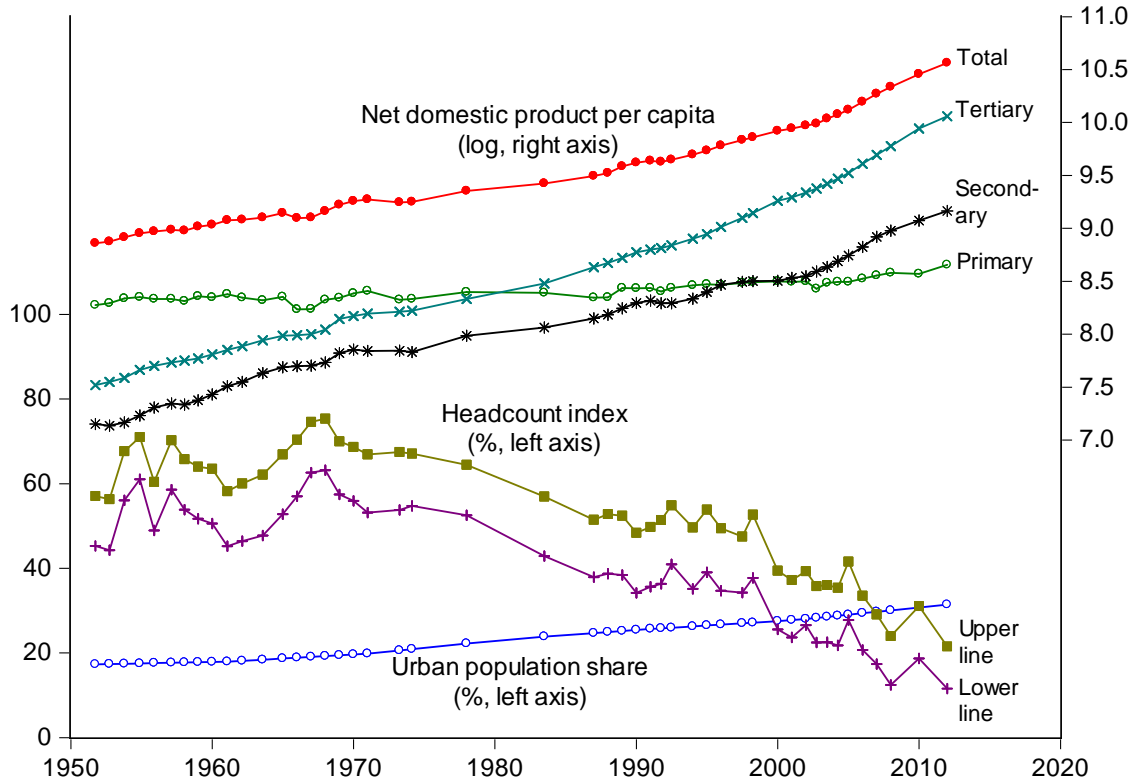
	Sector's share of NDP	Headcount (Lower line)		Headcount (Higher line)		Poverty gap (Higher line)		Squared poverty gap (Higher Line)	
		Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat	Elasticity	t-stat
Pre-91:									
Primary sector growth	0.416	-0.48	-4.58	-0.34	-3.43	-0.57	-5.56	-0.73	-5.30
Secondary sector growth	0.237	1.07	2.75	0.69	2.66	1.16	2.72	1.50	2.45
Tertiary sector growth	0.347	-1.24	-3.28	-0.83	-3.42	-1.43	-3.64	-1.87	-3.43
Post-91:									
Primary sector growth	0.228	-0.35	-2.79	-0.27	-2.95	-0.37	-2.86	-0.43	-2.71
Secondary sector growth	0.253	-0.39	-2.79	-0.30	-2.95	-0.41	-2.86	-0.48	-2.71
Tertiary sector growth	0.519	-0.80	-2.79	-0.62	-2.95	-0.84	-2.86	-0.98	-2.71

Note: Elasticities are evaluated at means for the pre- and post-1991 periods using the parameter estimates of the restricted model reported in Tables 8 and 9.

Table 11: Decomposition of change in national poverty measures for the pre- and post-reform periods (by NDP sector)

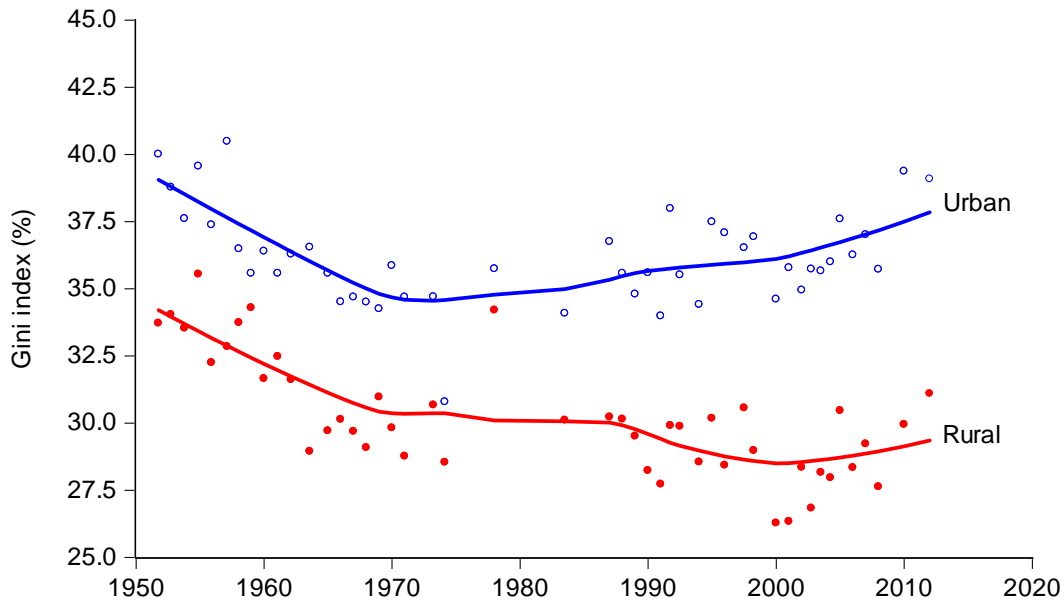
	<u>Components of predicted change in poverty:</u>						
	Total change in poverty	Total predicted change in poverty	Total predicted change in poverty without population growth	Primary sector NDP growth	Secondary sector NDP growth	Tertiary sector NDP growth	NA Deflator-CPI drift
Headcount: lower line							
Pre-91							
Annual percentage change	-1.38	-1.06	-2.45	-1.08	5.26	-6.69	0.07
Share of predicted annual change			100.0	44.4	-215.1	273.6	-2.8
Post-91							
Annual percentage change	-6.47	-7.63	-10.24	-0.94	-2.42	-6.45	-0.37
Share of predicted annual change			100.0	9.2	23.6	63.0	3.6
Headcount: higher line							
Pre-91							
Annual percentage change	-0.90	-0.78	-1.80	-0.78	3.41	-4.47	0.05
Share of predicted annual change			100.0	43.1	-189.6	249.0	-2.6
Post-91							
Annual percentage change	-4.79	-5.87	-7.89	-0.73	-1.87	-4.99	-0.25
Share of predicted annual change			100.0	9.3	23.7	63.3	3.1
Poverty Gap: higher line							
Pre-91							
Annual percentage change	-1.90	-1.42	-3.22	-1.30	5.71	-7.71	0.08
Share of predicted annual change			100.0	40.3	-177.6	239.7	-2.4
Post-91							
Annual percentage change	-6.82	-8.02	-10.76	-0.99	-2.54	-6.76	-0.42
Share of predicted annual change			100.0	9.2	23.6	62.8	3.9
Squared Poverty Gap: higher line							
Pre-91							
Annual percentage change	-2.68	-1.89	-4.23	-1.66	7.37	-10.04	0.10
Share of predicted annual change			100.0	39.3	-174.1	237.2	-2.4
Post-91							
Annual percentage change	-8.16	-9.35	-12.52	-1.14	-2.94	-7.82	-0.54
Share of predicted annual change			100.0	9.1	23.4	62.5	4.3

Figure 1: Net domestic product by sector and poverty rate



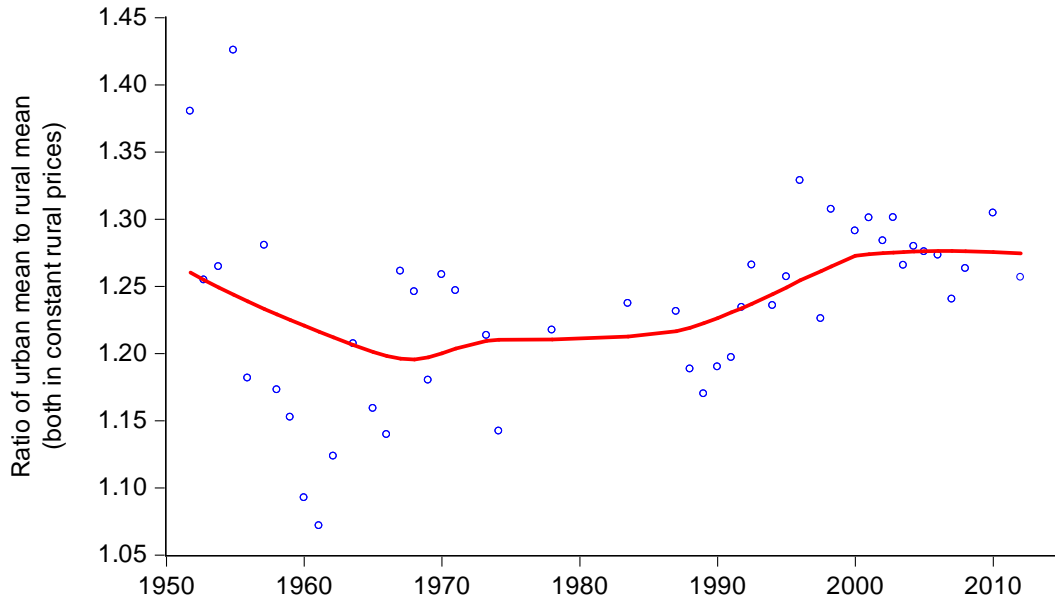
Source: Authors' calculations.

Figure 2: Trends in urban and rural inequality



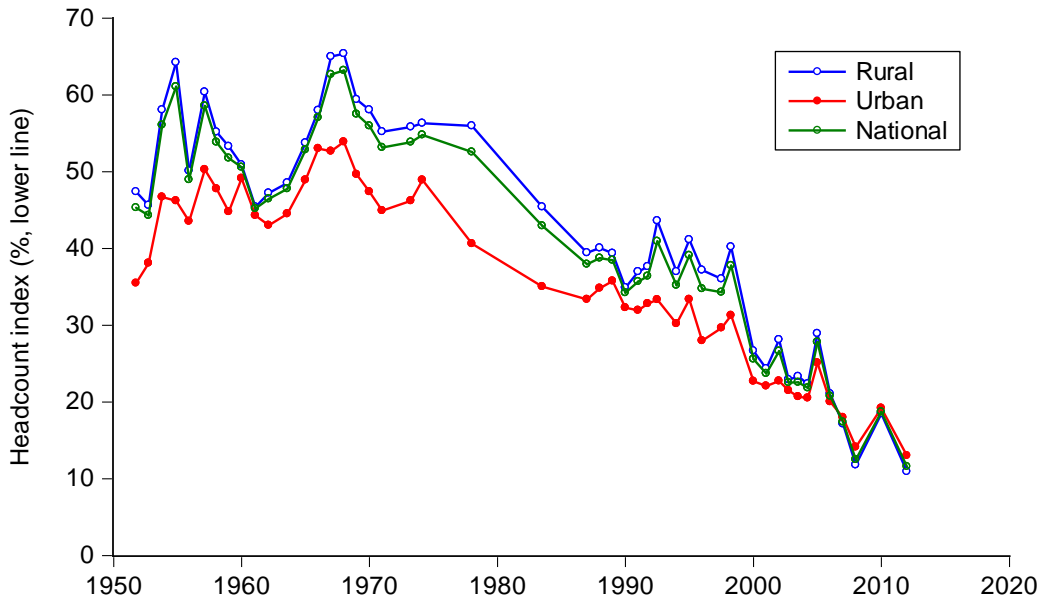
Source and notes: Authors' calculations. Locally-weighted smoothed scatter plots.

Figure 3: Ratio of urban mean to rural mean consumption



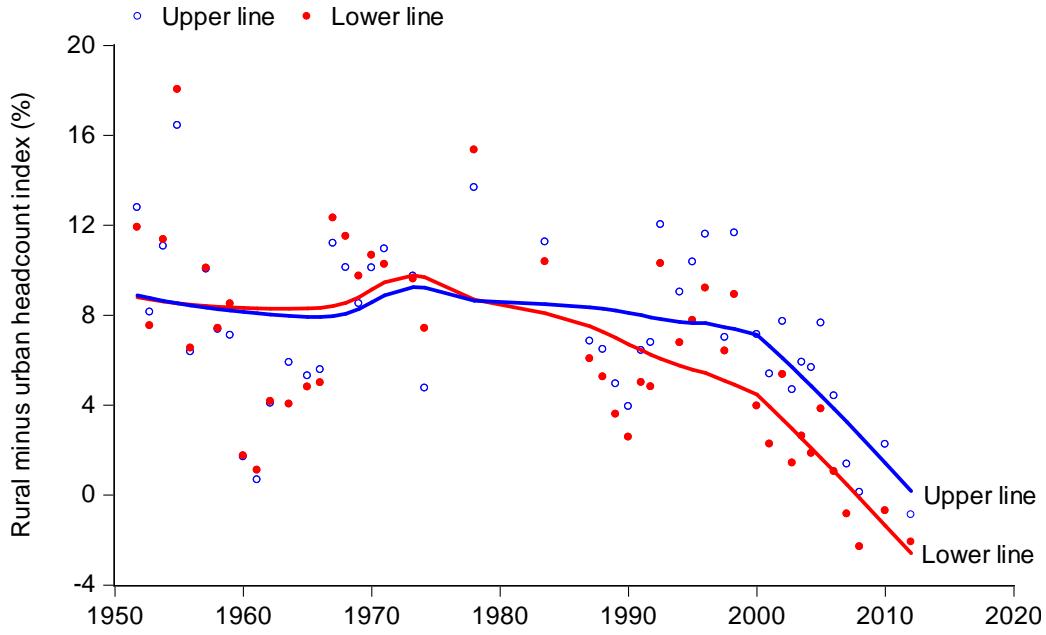
Source: Authors' calculations.

Figure 4: Poverty measures for India



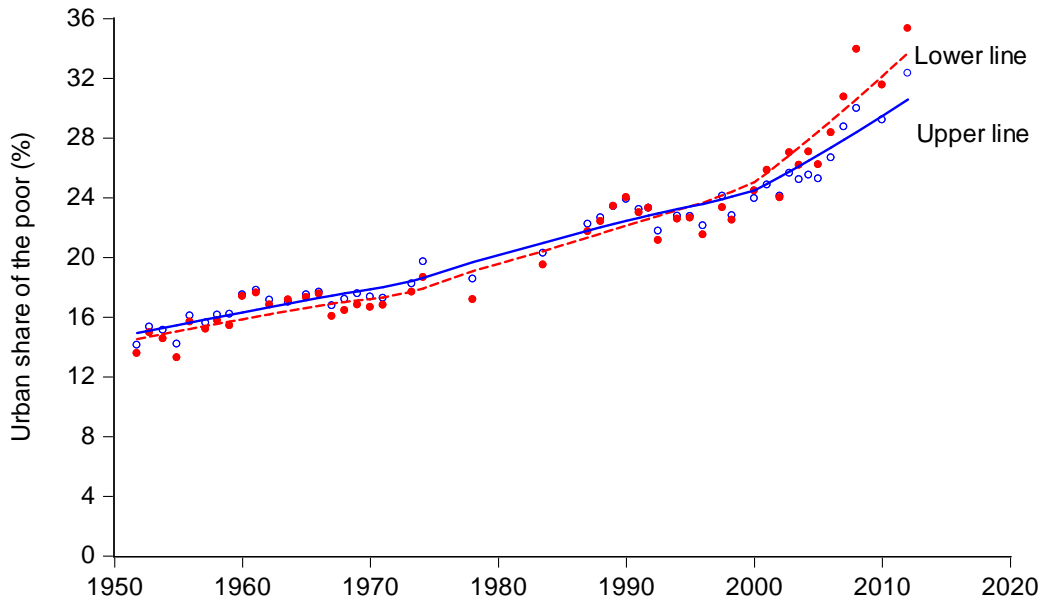
Source: Authors' calculations.

Figure 5: Convergence between rural and urban poverty measures



Note: Locally-weighted smoothed scatter plots.

Figure 6: Urbanization of poverty



Source: Authors' calculations.