

# Has India's Economic Growth Become More Pro-Poor in the Wake of Economic Reforms?

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## Abstract

The extent to which India's poor have benefited from the country's economic growth has long been debated. This paper revisits the issues using a new series of consumption-based poverty measures spanning 50 years, and including a 15-year period after economic reforms began in earnest in the early 1990s. Growth has tended to reduce poverty, including in the post-reform period. There is no robust evidence that the responsiveness of poverty to growth has increased, or decreased, since the reforms began, although there are signs of rising

inequality. The impact of growth is higher for poverty measures that reflect distribution below the poverty line, and it is higher using growth rates calculated from household surveys than national accounts. The urban-rural pattern of growth matters to the pace of poverty reduction. However, in marked contrast to the pre-reform period, the post-reform process of urban economic growth has brought significant gains to the rural poor as well as the urban poor.

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This paper—a product of the Director's Office, Development Research Group—is part of a larger effort in the department to monitor and explain progress against poverty in developing countries. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The author may be contacted at [mravallion@worldbank.org](mailto:mravallion@worldbank.org).

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# Has India's Economic Growth Become More Pro-Poor in the Wake of Economic Reforms?

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## 1. Introduction

India's post-independence planners in the 1950s must surely have expected better performance from the new country's economic strategy. Poverty has always figured prominently in assessments of India's economic performance. On average, slightly more than one person in two lived below the poverty line in India during the 1950s and '60s. By 1990 the proportion had fallen, but was still slightly more than one person in three; Figure 1 gives our estimates of the poverty rate for the date of each available survey as well as an estimate of the mean poverty rate by year.<sup>2</sup> There was no trend increase, or decrease, in consumption inequality over the period up to about 1990 (Bruno et al., 1998). So the (proximate) reason why poverty did not fall more rapidly was low rates of economic growth; GDP per capita grew at an annual rate of barely 1% in the 1960s and 1970s, though picking up to 3% in the 1980s.

There has been much hope that India's economic reforms starting in the early 1990s would bring more rapid poverty reduction. There has certainly been an acceleration of growth, with GDP per capita growing at 4-5% since 1991. However, we also know from past research that the sectoral pattern of India's growth matters to its impact on poverty. The green revolution appears to have stimulated pro-poor rural growth.<sup>3</sup> In past work, we found that both the urban and rural poor gained from growth within the rural sector, but that urban growth had adverse distributional effects within urban areas and no discernable impact on rural poverty (Ravallion and Datt, 1996). The disappointing outcomes for the poor from non-farm growth have also been traced back to India's antecedent socio-economic inequalities in access to schooling.<sup>4</sup> However, while past research pointed to the importance of rural economic growth to poverty reduction in India, the post-reform process of economic growth has not favored the rural sector. A number of observers have pointed to both geographic and sectoral divergence in India's post-reform growth process.<sup>5</sup> We have argued elsewhere that this has meant that much of the non-farm economic

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<sup>2</sup> The estimates use the data and methods described later; the estimates of the conditional mean by year (the bold line in Figure 1) are locally-weighted regression estimates. The mean (and median) poverty rate up to 1970 was 53% with a standard deviation of 6.3%

<sup>3</sup> Datt and Ravallion (1998) found that farm productivity growth reduced rural poverty. Earlier support for this view includes Ahluwalia (1978, 1985), van de Walle (1985), Bhattacharya et al. (1991) and Bell and Rich (1994). Dissenting views include Saith (1981) and Gaiha (1995).

<sup>4</sup> Ravallion and Datt (2002) found a strong interaction effect between the initial level of human development at state level and the non-farm growth rate in determining poverty reduction at state level.

<sup>5</sup> Bhattacharya and Sakthivel (2004), Jha (2000), Datt and Ravallion (2002) and Purfield (2006).

growth bypassed the sectors and states where it would have had the most impact on poverty based on a model calibrated to largely pre-reform data (Datt and Ravallion, 2002). By this view, the composition of the higher growth would mean that it by-passed many of India's poor.

Against this view, it can be conjectured that India's growth process has changed—implying a new set of parameters in the relationship between growth and poverty reduction. Ravallion and Datt (1996) studied a period in which the development strategy emphasized rapid development of the capital goods sector in a largely closed economy.<sup>6</sup> The strategy assumed that the capital stock and industrial structure could be manipulated exogenously through central planning, even in a largely market-based economy. The strategy was also founded on “trade pessimism”—the beliefs, grounded in the experiences of colonialism, that India could never compete in global markets until its domestic capital stock had been greatly expanded, coupled with a distrust of foreign (Western) countries as a source of essential goods. These assumptions were questioned in both academic and policy circles at the time, and with greater veracity as the years passed, in the light of the evidently poor economic performance.<sup>7</sup> The success of China's pro-market reforms starting in 1978 also fueled doubts in the 1980s about India's economic strategy. The policy debate raged for many years, but it was not until a balance of payments crisis that reforms started in earnest, in the early 1990s. (As is evident in Figure 1, the macroeconomic difficulties appear to have also stalled progress against poverty.) Trade liberalization was combined with efforts to support higher productivity in the private sector.<sup>8</sup> Supporters argued that these reforms would allow India to better exploit its comparative advantage in labor-intensive goods and services, and that this would directly benefit the poor; by this view, the reforms would “..favour the poor by beginning to remove the pervasive bias that exists against the employment of unskilled labour” (Joshi and Little, 1996, p.221). The hope was that the post-reform urban economy would be more effective in reducing both urban and rural poverty.

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<sup>6</sup> On the history of thought on development strategies and their implications for poverty, with specific reference to India, see Lipton and Ravallion (1995).

<sup>7</sup> Some observers in India at the time had questioned these assumptions, raising concerns about labor absorption (given high population growth) and (hence) poverty reduction; in particular see Vakil and Brahmanand (1956). Chakravarty (1987) provides an insightful account of the history of thought on India's (pre-reform) development strategy. For a broader analysis of industrial policy in developing countries, emphasizing the endogeneity of industrial structure to factor endowments, see Lin (2009).

However, there are also reasons to question whether the new policy environment would succeed in putting India on a new path of rapid poverty reduction. The greater openness to external trade came with sufficient productivity growth to assure a higher growth rate of national output.<sup>9</sup> But it appears that new inequality-increasing forces also emerged, and a number of observers have reported evidence of rising consumption inequality since the early 1990s.<sup>10</sup> This may well reflect the antecedent inequalities in other “non-income” dimensions, particularly in human capital, which can mean that the poorest are largely left behind; these inequalities were far greater in India around 1990 than China around 1980.<sup>11</sup>

Some observers have also questioned whether the post-reform growth process has fulfilled the expectations of reform advocates that it would increase aggregate demand for unskilled labor and (hence) help reduce poverty. The fastest growing sectors of India’s economy have tended to be more intensive in capital and skilled labor, notably the booming business-services sector. And the share of employment in agriculture has fallen much less than (say) China. This pattern of growth is hardly what the “comparative-advantage” arguments of reform advocates in the 1980s predicted as the outcome of India becoming a far more open economy.<sup>12</sup> However, it is also important to note that the non-farm sectors that are relatively intensive in unskilled labor—trade, construction and the informal manufacturing sector—fared better in the post-1991 period than earlier (Kotwal et al., 2009).<sup>13</sup> The non-farm sector’s aggregate demand

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<sup>8</sup> On India’s reform agenda since the early 1990s see Ahluwalia (2002) and Panagariya (2008).

<sup>9</sup> See the interesting discussion in Eswaran and Kotwal (1994, Chapter 7) who argue that domestic productivity growth is key to the outcomes for poor people from trade openness in India. Here the sequencing of reforms was important, and India’s reformers wisely emphasized domestic reforms (such as industrial de-licensing) prior to external reforms (Bhagwati, 1993).

<sup>10</sup> Evidence of rising inequality in India since 1991 is reported in Ravallion (2000), Deaton and Drèze (2002) and Sen and Hiamnshu (2004b).

<sup>11</sup> See the discussion in Drèze and Sen (1995) on the constraints stemming from India’s poor human development attainments at the outset of its current reform period, and the contrast with China. Also see Chaudhuri and Ravallion (2006) on the distinction between “good” and “bad” inequalities in both China and India, and the discussion of inequality of opportunity in World Bank (2005).

<sup>12</sup> Few people in the 1980s would have predicted that technological changes in the 1990s, combined with the required human skills, would entail that India developed a comparative advantage in sectors such as business services.

<sup>13</sup> The formal (“organized”) manufacturing sector has not seen rising employment after trade liberalization (Sen, 2009), although this is a moot point given that 80% of manufacturing employment is in the informal sector (Kotwal et al., 2009).

for unskilled labor appears to have increased after the reforms, even though the most dynamic sectors have been intensive in skilled labor.

Motivated by these observations, this paper addresses the following questions: *Have India's higher growth rates since the early 1990s delivered a higher pace of progress against absolute poverty? Have we seen any change in the responsiveness of poverty to growth in the post-reform period? Has the poverty impact of the urban-rural composition of growth changed? In particular, is there any sign that the post-reform urban economic growth process has been more pro-poor than the pre-reform process?*

The following section outlines the concepts and methods used in this study. Section 3 describes our data set, which updates that we constructed for Ravallion and Datt (1996) (with some improvements in the estimation methods, as described below). Section 4 then presents our results and discusses their implications. Section 5 concludes.

## 2. Concepts and methods

There are two ways in which economic growth can be considered “pro-poor.”<sup>14</sup> By the first, which we label Definition 1, “pro-poor growth” is growth that reduces an agreed measure of poverty, and the extent of poverty reduction is then the sole metric of “pro-poorness.”

Definition 2 says instead that “pro-poor growth” is growth that disproportionately benefits the poor when judged relative to the rate of growth; by this view the pro-poorness of growth is measured by the elasticity of the agreed poverty measure with respect to economic growth.

We use three poverty measures for implementing both definitions: The head-count index (H) is given by the percentage of the population who live in households with a consumption per capita less than the poverty line. The poverty gap index (PG) is 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; this can be interpreted as a measure of the depth of poverty. The squared poverty gap index (SPG), introduced by Foster et al. (1984), 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

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<sup>14</sup> For an overview of the various approaches to defining “pro-poor growth” see Ravallion (2004).

(Sen, 1976). SPG can be thought of as a measure of the severity of poverty. All three measures are members of the class of measures proposed by Foster, Greer and Thorbecke (1984):

$$P_{\alpha} = \frac{1}{N_t} \sum_{i=1}^{N_t} \max[(1 - y_{it}/z)^{\alpha}, 0] \quad (1)$$

in which  $y_{it}$  is consumption expenditure of the  $i$ 'th person at date  $t$  in a population of size  $N_t$ ,  $z$  is the poverty line, and  $\alpha$  is a non-negative parameter. It can be seen that H is obtained when  $\alpha=0$ , PG when  $\alpha=1$ , and SPG has  $\alpha=2$ . To simplify notation we drop the “ $\alpha$ ” from now on, but it should be recalled that there are three distinct poverty measures.

In implementing Definition 2, it is useful to note that virtually all poverty measures found in practice can be written as functions of the survey mean relative to the poverty line and the relative distribution of income, as represented by the Lorenz curve.<sup>15</sup> When the poverty line is fixed in real terms all such poverty measures are strictly decreasing functions of the mean ( $\mu_t$ ) for any given relative distribution (though the elasticity can vary greatly, depending on the initial mean and Lorenz curve). In the present setting, a higher growth rate may also entail a shift in distribution for or against the poor. Here we are interested in the total effect of growth on poverty, allowing distribution to change, rather than the partial effect, holding distribution constant.<sup>16</sup> More precisely we are interested in estimating:

$$\pi \equiv \frac{d \ln P_t}{d \ln \mu_t} \quad (2)$$

We call  $\pi$  the “growth elasticity of poverty reduction”, or “elasticity” for short.

We shall estimate  $\pi$  by the regression coefficient of  $\ln P_t$  on  $\ln \mu_t$  across the available time series, allowing the error term to be autocorrelated and heteroskedastic.<sup>17</sup> 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 one will tend to underestimate

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<sup>15</sup> See, for example, Datt and Ravallion (1992) and Kakwani (1993).

<sup>16</sup> 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).

<sup>17</sup> A dynamic model (with lags in  $\ln P_t$  and  $\ln \mu_t$ ) is not feasible given the uneven spacing of the time series. However, we have little choice but to assume even spacing when implementing the corrections to the standard errors for serial correlation.

poverty. (The sign of the bias is ambiguous in theory given that there is also an attenuation bias in the estimate of  $\pi$ .) We shall also use an Instrumental Variables (IV) estimator, in which the instruments exclude any variables derived from the same survey as the dependent variable. Instrumentation of the survey mean is also helpful for controlling the effect of changes in survey design.

We will also study the urban-rural composition of both growth and poverty reduction. In India, as in most other developing countries, the rural sector tends to have higher incidence of extreme poverty and accounts for a substantially higher share of absolute poverty than the urban sector (Ravallion et al., 2007). Also in common with most (growing) developing economies, India's trend rate of growth has been higher in the non-farm sectors than in agriculture.

The fortunes of poor people are linked between urban and rural areas. The scope for the urban economy to absorb wage labor from rural areas has long been seen as a key factor in poverty reduction. Labor mobility can yield an equilibrium relationship between the real wages of similar workers, entailing “horizontal integration” in the earnings and income distributions—the living standards of people in different sectors but at similar levels of living are causally related. Such integration can also arise without labor mobility. Proximity to urban areas enhances demand for the outputs of the rural economy.<sup>18</sup> The living standards of households in different sectors but sharing similar factor endowments will tend to move together to the extent that trade in goods attenuates differences in real factor prices. The fact that the rural sector produces food partly consumed in the urban sector can mean that agricultural growth raises urban welfare by lowering food prices (to the extent that domestic food markets are only weakly integrated with global markets). Transfer behavior can also produce horizontal integration.

The existence of such horizontal integration suggests that changes emanating from the urban (rural) sector can have powerful effects on levels of living in the rural (urban) sector. This can also entail distributional effects, notably when the distributions of absolute levels of living in different sectors tend to overlap imperfectly, i.e., they share a positive density over certain (compact) intervals of the range of living standards, but not others. The urban sector of a developing country will often include an elite that essentially has no counterpart in the rural

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<sup>18</sup> Lanjouw and Murgai (2009) and World Bank (2009) argue that India's urban economic growth has exerted a pull on the rural economy through rural nonfarm diversification.

sector. When combined with shared poverty in the overlapping interval of the distribution, this can have strong implications for how an increase in incomes in one sector will spill over to affect both average levels of living, and inequalities within the other sector.

We will be interested in the urban-rural decomposition of poverty. On exploiting the fact that the average level of poverty at date  $t$  can be additively decomposed using population weights, we have:

$$P_t = n_{ut}P_{ut} + n_{rt}P_{rt} \quad (t=1, \dots, T) \quad (3)$$

where  $n_{it}$  and  $P_{it}$  are the population shares and poverty measures for sector  $i = u, r$  (for "urban" and "rural"). We exploit additivity in testing whether the sectoral composition of growth matters by estimating the following regression on the discrete data:

$$\Delta \ln P_t = \pi_u s_{ut-1}^\mu \Delta \ln \mu_{ut} + \pi_r s_{rt-1}^\mu \Delta \ln \mu_{rt} + \pi_n (s_{rt-1}^\mu - s_{ut-1}^\mu n_{rt-1} / n_{ut-1}) \Delta \ln n_{rt} + \varepsilon_t \quad (t = 2, \dots, T) \quad (4)$$

where  $\Delta$  is the discrete-time difference operator,  $s_{it}^\mu = n_{it}\mu_{it}/\mu_t$  is sector  $i$ 's share of mean consumption at date  $t$  and  $\mu_{it}$  is the mean for sector  $i$ . The  $\pi_u, \pi_r$  parameters can be interpreted as the impact of (share-weighted) growth in the urban and rural sectors respectively, while  $\pi_n$  gives the effect of the population shift from rural to urban areas—interpretable as a “Kuznets effect” following Kuznets (1955). To motivate this test regression, notice that, under the null hypothesis that  $\pi_u + \pi_r + \pi_n = \pi$ , equation (4) collapses to:

$$\Delta \ln P_t = \pi \Delta \ln \mu_t + \varepsilon_t \quad (5)$$

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

We also test whether economic growth in one sector affects distribution in the other sector. For this purpose, we estimate the following system (dropping time subscripts for brevity):

$$s_u^P \Delta \ln P_u = \pi_{u1} s_u^\mu \Delta \ln \mu_u + \pi_{u2} s_r^\mu \Delta \ln \mu_r + \pi_{u3} (s_r^\mu - s_u^\mu n_r / n_u) \Delta \ln n_r + \varepsilon_u \quad (6.1)$$

$$s_r^P \Delta \ln P_r = \pi_{r1} s_u^\mu \Delta \ln \mu_u + \pi_{r2} s_r^\mu \Delta \ln \mu_r + \pi_{r3} (s_r^\mu - s_u^\mu n_r / n_u) \Delta \ln n_r + \varepsilon_r \quad (6.2)$$

$$(s_r^P - s_u^P n_r / n_u) \Delta \ln n_r = \pi_{n1} s_u^\mu \Delta \ln \mu_u + \pi_{n2} s_r^\mu \Delta \ln \mu_r + \pi_{n3} (s_r^\mu - s_u^\mu n_r / n_u) \Delta \ln n_r + \varepsilon_n \quad (6.3)$$

where  $s_{it}^P = n_{it}P_{it}/P_t$  and  $\pi_i = \pi_{ui} + \pi_{ri} + \pi_{ni}$ , so that summing (6.1), (6.2) and (6.3) yields (4). The first equation shows how the composition of growth and population shifts impact on urban poverty;

the second shows how they impact on rural poverty. The third equation gives the impact on the population shift component of  $\Delta \log P$ . We estimate (6.1) and (6.2).<sup>19</sup>

### 3. Data

In addressing the questions posed in the Introduction, it is clearly desirable to have a reasonable long time series of household surveys; a short series can be deceptive for inferring a trend.<sup>20</sup> Amongst developing countries, India has the longest series of national household surveys suitable for tracking living conditions of the poor. At the time of writing, we can assemble distributional data on household consumption in India from 47 surveys spanning 1951-2006, though some of the earliest surveys had smaller sample sizes and covered shorter periods. However, the surveys are large enough to be considered representative at the urban and rural levels as well as nationally, and they appear to be 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 for testing and quantifying the relationship between living standards of the poor and macroeconomic aggregates.

The period of analysis in Ravallion and Datt (1996) ended only two years after India's process of economic reform had started. This paper updates Ravallion and Datt (1996) by incorporating an extra 14 rounds of the National Sample Surveys (NSS). The data are not, of course, ideal. Imperfect matching between the survey periods and the annual accounting periods used in the national accounts makes it harder to detect the true effect of aggregate growth on poverty. There are also long-standing concerns about the rising gap between aggregate household consumption as measured from the NSS and the "private consumption" component of domestic absorption in the national accounts (NAS). New problems also emerge in the post-1991 period, including changes in survey design that we address later.

Notwithstanding these issues, we believe there is now sufficient data for the "post-reform" period to revisit the question of whether India's higher growth rates have delivered the

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<sup>19</sup> Equation (6.3) need not be estimated separately since the parameters can be inferred from the estimates of (6.1) and (6.2) and (4) using the adding-up restriction.

<sup>20</sup> For example, the first survey (1992) available in the post-reform period indicated a substantial increase in poverty and this fuelled much debate about the wisdom of reforms. We questioned this inference at the time arguing that the 1992 survey was deceptive about trends (Datt and Ravallion, 1997).

promise of a higher rate of progress against poverty. Attribution to reforms *per se* is clearly problematic. However, revisiting our earlier findings with these new data offers at least a clue as to whether the reform process has accelerated, or decelerated, India's progress against poverty. We also use these data revisit the results on the urban-rural composition of growth from Ravallion and Datt (1996) in the light of the extra 15 years of data for the post-reform period.

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 2006. This is based on consumption distributions from 47 household surveys conducted by the National Sample Survey Organization (NSSO); beginning with the 3rd round for August to November 1951, we use distributions up to the 62nd round for 2005/06. This series significantly improves upon the most widely-used time series on poverty measures in India to date.<sup>21</sup> The pre-1991 data also differ in some respects to the data set we constructed in Ravallion and Datt (1996), as noted below.

Some of the early NSS rounds (in particular rounds 4 to 12) had survey periods that were considerably shorter than a year. We opted to aggregate some of these rounds to broadly conform to a year-long survey period. The estimates for rounds 4 and 5, 6 and 7, 9 and 10, and rounds 11 and 12 were thus pair-wise aggregated using the number of survey months covered by the round as weights. For instance, the headcount index for combined rounds 6 (for May-September 1953) and 7 (for October 1953-March 1954) is 5/11-th of the headcount index for round 6 plus 6/11-th of the headcount index for round 7. Thus, with these combined rounds, for the full period from 1951 to 2006 our data set has 43 observations.

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. Nonetheless, there are various "non-income" dimensions 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

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<sup>21</sup> Prior to Ravallion and Datt (1996), past work on poverty and growth in India had relied on poverty measures presented in Ahluwalia (1978) giving estimates of poverty measures for rural areas only for 12 rounds spanning 1956-57 to 1973-74. This was extended to add one round (1977-78) in Ahluwalia (1985).

used a uniform recall period of 30 days for all consumption items, seven of the survey rounds over this period have used instead a mixed-recall period (MRP), with shorter (one week) recall for some items (for food in the 55<sup>th</sup> round) and longer (one year) for others (mainly non-food items).<sup>22</sup> On a preliminary investigation of the data we found that the use of a mixed recall period reduced the log of the headcount index at a given level of mean consumption by about 0.2 and the effect is (highly) significant.<sup>23</sup> All our regressions include a control for MRP survey rounds.

We use the NSSO's urban-rural classification.<sup>24</sup> 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 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 little choice but to use the NSSO's classification, given that the unit record data are unavailable for the full period covered by this exercise. But nor is it clear what the best corrective would be with access to that data.

Figure 2 gives the urban share of total consumption in the NSS data, which has risen steadily since about 1960. The increase clearly predates the reform period, but the share has increased appreciably since the 1980s.

The poverty line is based on the line defined by the Planning Commission (1979), and endorsed by Planning Commission (1993). This is based on a nutritional norm of 2,400 calories per person per day in rural areas and 2,100 calories for urban areas. The poverty lines for rural and urban sectors were defined as the level of average per capita total expenditure at which these caloric norms were typically attained. The rural poverty line was thus determined at a per capita monthly expenditure of Rs. 49, and the urban at Rs. 57 at 1973-74 prices.

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<sup>22</sup> Mixed reference periods have been used for rounds 55, 56, 57, 58, 59, 60 and 62.

<sup>23</sup> Regressing the change in the log of the headcount index across 42 rounds on the change in the log of the survey mean and the change in a dummy variable for MRP rounds, the latter had a regression coefficient of -0.20 with a t-ratio of 16.7. Similarly, MRP rounds tended to yield significantly lower inequality (as measured by the Gini index) in both rural and urban areas.

<sup>24</sup> The NSS has followed the Census definition of urban areas which is based on 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.

For the urban sector after August 1968, the all-India Consumer Price Index for Industrial Workers (CPIIW) is used as the deflator. For the earlier period, the Labour Bureau's Consumer Price Index for the Working Class is used, which is an earlier incarnation of the CPIIW albeit with a smaller coverage of urban centers (27 against 50). The rural cost of living index series was constructed in three parts. For the period since September 1964, the rural cost of living index is the all-India Consumer Price Index for Agricultural Laborers (CPIAL) published by the Labour Bureau. For the period September 1956 to August 1964 (for which an all-India CPIAL does not exist), a monthly series of the all-India CPIAL was constructed as a weighted average of the state-level CPIALs, using the same state-level weights as those used in the all-India CPIAL published since September 1964. For the initial period August 1951 to August 1956, forecasts were obtained from a dynamic model of the CPIAL as a function of the CPIIW and the Wholesale Price Index (see Datt, 1997, for details).

Our CPIAL series also dealt with a problem to do with the fact that the Labour Bureau used the same price of firewood in its published series since 1960-61. Firewood is typically a common property resource for agricultural laborers, but it is also a market good, and so the Labour Bureau's practice is questionable. Our CPIAL series corrects this by replacing the firewood sub-series in the CPIAL by one based on mean rural firewood prices (only available from 1970) and a series assuming that firewood prices increased at the same rate as all other items in the Fuel and Light category (prior to 1970). This correction to the CPIAL series is made for the period up to the 51<sup>st</sup> round for July 1994-June 1995 when the Labor Bureau re-based the series using a revised weighting diagram. The final CPIIW and CPIAL indices are averages of monthly indices corresponding to the exact survey period of each of the NSSO's rounds.

Our price indices also take account of an issue that has recently been raised in discussions of how the measurement of price trends influences the estimation of poverty in India (Deaton, 2007). It has been argued that the overall weight of food in the CPIAL is too large such that a rise (fall) in the relative price of food results in an overestimation (underestimation) of the rate of inflation. Potentially, the same problem also arises for the CPIIW. Hence, to deal with this issue we reweight the food and non-food components of the CPIAL (and CPIIW) for any round by the predicted food and the non-food shares for the rural (and urban) poor in the

preceding round, starting with round 15 for July 1959-June 1960 (and using the predicted food share for the poor from round 14 for July 1958-June 1959).<sup>25</sup> The reweighted indices for successive rounds are then combined to form chain price indices which give our preferred measures of inflation in rural and urban areas corresponding to the evolving food and non-food budget shares of the poor.

The population numbers are from the censuses and assume a constant growth rate between censuses. They are also centered at the mid-points of the NSSO's survey periods. The trend increase in the urban population share was 0.24 percentage points per year in the period 1951 to 2005-6 (with a robust standard error of 0.04). In the 40 years after 1950, the urban sector's population share rose from 17% to 26%, and by 2005 it rose to 29%.

We use private final consumption expenditure and net domestic product from the 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. We follow Ravallion and Datt (1996) in only using both NAS and NSS data in the same regressions for the period 1958 onwards, given the poor mapping between NSS rounds and NAS annual data prior to 1958 in view of the shorter survey periods of the early rounds.

While our use of household surveys, such as the NSS, in measuring poverty is standard practice, it has been questioned by some observers. Bhalla (2002), in particular, has argued that the NSS underestimates consumption levels, leading to an overestimation of the level of poverty in India and underestimation of the pace of poverty reduction. The main reason given is the large and rising gap between the measure of aggregate household consumption implied by the NSS and the estimate of private consumption that can be derived from India's national accounts (NAS). The gap is unusually large for India. The NSS data suggest a consumption aggregate that is only about half of the household consumption component of the NAS.

Figure 3 plots consumption per person from the NSS (urban and rural) and the private consumption component of the national accounts, also per person, and mapped into NSS rounds.

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<sup>25</sup> Predicted food shares are derived from grouped data on budget shares, using a regression for the previous round of food budget shares as a cubic function of the cumulative proportion of the population ranked by per capita monthly total expenditure. Food shares for the poor for the current round were then predicted at the estimated headcount index for the previous round. In the case of MRP survey rounds, the regression for the most recent round with a uniform recall period was used.

From the point of view of the present discussion, it is notable that the NSS series does not reflect fully the gains in mean consumption indicated by the NAS from the early 1990s onwards. Upon regressing consumption growth from the NSS on that from the NAS, with controls for changes in whether the round used MRP and changes in the log ratio of rural price index to the National Accounts deflator, the overall elasticity of the NSS mean consumption to NAS consumption is 0.48 ( $t=4.03$ ). The elasticity is significantly less than unity. The elasticity is also lower in the post-1991 period, declining to 0.45 ( $t=3.29$ ) from 0.57 (4.47) in the pre-1991 period. However, one cannot reject the null hypothesis that the elasticities for the two sub-periods are the same. To investigate further the source of divergence between NAS and NSS consumption in the two sub-periods, we also regressed the difference between NAS and NSS mean consumption growth rates on dummy variables for pre-1991 and post-1991 sub-periods, and on pre- and post-1991 per capita net domestic product (NDP) growth rates. (All regressions include controls for change in dummy variable for an MRP round as well as change in the log ratio of rural price index to the NA deflator.) These tests confirmed that the divergence in the NAS and NSS mean consumption growth rates has been greater in the post-1991 period, although the difference between the two sub-periods is not statistically significant. We also found that the divergence between NAS and NSS mean consumption growth rates tends to be higher the higher the per capita NDP growth rate, and this association between NAS-NSS divergence and per capita income growth is somewhat stronger in the post-1991 period.

We do not know what role NSS survey methods have played in this divergence from NAS consumption. By international standards, 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. This is something that should be reviewed in the future, in the light of international experience. However, it is notable that the MRP rounds of the NSS have helped close the gap between the NAS and NSS consumption aggregates. Regressing the log difference of the NSS mean on the log difference of NAS consumption and the change in the dummy variable for MRP rounds, the latter variable has a coefficient of 0.055 ( $t=4.14$ ). This suggests that NSS design may account for at least some of the discrepancy between the two data sources.

However, it is also important to note that the gap between the consumption aggregates from these two sources does not 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 should not be in a measure of household living standards.<sup>26</sup> 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 consumption by the rich than the poor.<sup>27</sup> While we cannot rule out the possibility that such problems lead us to overestimate poverty in India—and an external review of the procedures used by the NSS, in the light of international best practice, is called for in our view—it is hard to justify the practice used by some analysts of replacing the mean from the NSS by consumption per capita from the NAS, while assuming that inequality is correctly measured by the NSS.

For the for the same reason that the consumption aggregates from the NSS are diverging from the private consumption component of domestic absorption as estimated by the NAS, one cannot rule out the possibility that the increase in inequality in India is being underestimated by the NSS. That depends on why we are seeing the divergence between NSS and NAS aggregates; if it stems from a failure of the surveys to fully capture the rising consumptions of the rich then it is not clear that there will be much bias in the poverty measures based on the surveys.<sup>28</sup>

#### **4. Results**

We begin with an overview of the trends in the variables of interest, both for the 50 year period and the periods before and after 1991. We then present the estimated growth elasticities of poverty reduction, also looking separately at urban and rural areas and their interaction.

##### *Trends over time*

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<sup>26</sup> For further discussion of the differences between the two data sources see Sundaram and Tendulkar (2001), Ravallion (2000, 2003), Sen (2005) and Deaton (2005).

<sup>27</sup> There is evidence from other sources consistent with that expectation; see Banerjee and Piketty (2006) on income under-reporting by India's rich.

<sup>28</sup> For a more complete discussion of this issue see Korinek et al. (2006).

There cannot be any doubt that growth has picked up in the post-reform period. The trend rate of growth in India's NDP per capita in the period 1958-1991 was 1.63% (with a robust standard error of 0.06%) while it was and 4.28% (0.18%) in the period 1992-2006 (Table 1).<sup>29</sup> Similarly, the rate of growth of private consumption per capita from the national accounts also increased 1.21% per annum in the first period to 3.13% in the second. The acceleration in the survey-based per capita consumption growth—though less than that in mean income or consumption from the national accounts—is also significant, from 0.68% per annum in the pre-1991 period to 1.33% in the post-1991 period. Looking at the composition of output by sectors, the highest growth rates in the period after 1991 has been in the tertiary sector (primarily services and trade), followed closely by the secondary (manufacturing) sector, while agriculture has continued to lag. Compared to the pre-reform period, the sector that gained the most was services, while agricultural growth rates showed little or no improvement (Chaudhuri and Ravallion, 2006). The main long-run structural shift in India's economy has been out of agriculture into services, and this continued after 1991.

Turning to the poverty measures, Figure 6 gives the headcount index and squared poverty gap for both urban and rural sectors. There was neither a trend increase nor decrease in rural poverty until about 1970, when a trend decrease emerged; sustained, though uneven, progress against poverty had clearly emerged in India prior to the economic reforms starting in the early 1990s. Co-movement is strong between the urban and rural measures and there is a clear indication of a declining absolute difference between the poverty measures for urban and rural areas after about 1970.<sup>30</sup> Indeed, the urban SPG overtakes the rural index by the end of the period. In common with other developing countries (Ravallion et al., 2007) poverty has been urbanizing over time, with a rising share of the poor living in urban areas. In the early 1950s, only about 15% of India's poor lived in urban areas, but this had risen to about 28% in 2005-6. However, given that more than 70% of the population is still in rural areas, the rural sector

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<sup>29</sup> These are based on regressions of log NDP per capita on time. Here and elsewhere we follow Boyce (1986) in estimating the two growth rates as parameters of a single regression, constrained to assure that the predicted values were equal in 1992 (to avoid an implausible discontinuity).

<sup>30</sup> The regression coefficient of rural H minus urban H on time after 1970 is -0.231% points per year (t-ratio=-4.617); for SPG it is -0.062 (t=-9.545).

accounts for the bulk of national poverty at the end of the period—72% of the total number of poor, 68% of the aggregate poverty gap and 65% of the aggregate squared poverty gap.

Table 1 also gives the growth rates of the poverty measures. Over the 50-year period, the exponential trend—the regression coefficient of the log poverty measure on time—was 1.3% per annum for H, rising to 2.2% and 3.0% for PG and SPG respectively. For the period prior to 1991, the trends were 1.1%, 2.1% and 2.8% for H, PG and SPG, while the corresponding post-reform trends were 2.4%, 3.4% and 4.2%. So we find higher exponential trends in poverty reduction the post-reform period. However, the difference between the pre- and post-1991 trends can only be considered statistically significant for the headcount index and then only at about the 8% level.

Alternatively one might prefer to define the trend in the level of the poverty measure or mean consumption/income rather than its log. This again confirms the same finding of an acceleration of growth (in mean income and consumption) in the post-1991 period, but yields no evidence of a parallel acceleration in poverty reduction; see bottom panel of Table 1.

Growth and poverty trends in urban and rural areas reveal a pattern that is similar to the national level. While the (survey-based) mean consumption growth rates are higher (nearly twice as high) in the post-1991 period than pre-1991 in both rural and urban areas, only the acceleration in urban growth is statistically significant (Table 2). There are some indications of a faster poverty decline post-1991, more notably in rural areas, but the increase is often not statistically significant. For instance, there is no significant acceleration in the trend decline in PG or SPG in either rural or urban areas. Only for the headcount index is the increase in the trend rate of poverty decline significant—at the 10% level in rural areas, and at the 3% level in urban areas.

Given that an important link in the argument for reform is that it would make India's growth more labor intensive, it is of interest to see what has happened to employment growth. The first large survey of employment by the NSSO after 1991 (for 1999-00) suggested a slight slow-down in the rate of growth of employment, although the latest available NSSO for 2004-05 suggests that the employment growth rate in the period 1993-94 to 2004-05 has been virtually the same as the preceding 10 years (Panagariya, 2008, p.146). These comparisons are clouded somewhat by the fact that a large share of employment is in the informal sector, for which

reliable measurement is more difficult, and that the reforms themselves may well induce output and employment to shift to the informal sector.

A part of the reason why the faster post-reform growth has not yielded comparably higher rates of poverty reduction is that this higher overall growth has been accompanied by a rise in inequality. As in any developing country, the gap between urban and rural living standards is an important dimension of overall inequality. The urban mean has risen over time relative to the rural mean. The trend rate of growth in mean consumption based on the NSS since 1958 has been 0.87% per annum (standard error of 0.10%) for urban areas versus 0.65% (standard error of 0.14%) for rural areas.<sup>31</sup> Figure 4 plots the ratio of urban mean consumption to the rural mean over time, which rose from 1.15 around 1960 to 1.30 around 2000. Fitting a linear trend to the post-1958 series in Figure 4 implies that the ratio increases by 0.03 per 10 years, and this is significant at the 1% level ( $t=4.01$ ;  $n=37$ ). So inequality increased between urban and rural areas.

What has happened to inequality within urban and rural areas separately? The Gini indices calculated from the relevant NSS rounds, but without an adjustment for the difference between the uniform versus mixed recall period, suggest that inequality within rural areas has tended to decline while that within urban areas declined up to about 1980 with a tendency to increase thereafter (Figure 5). However, this is no longer true once we control for the mixed reference periods of the several NSS rounds since the 1990s, which have a dampening effect on measured inequality; as can be seen in Figure 5, which also gives the predicted values when we control for the differences between surveys in their recall periods. We find evidence of an increase in inequality within both rural and urban areas after 1991, with a clear rising trend emerging in the post-1991 period (upon controlling for the influence of mixed reference period in several of the post-1991 rounds), which replaced a flat inequality level in urban areas and a declining trend in rural areas during the earlier (pre-1991) period (see Table 2 and Figure 5).

#### *Growth elasticities of poverty reduction*

Table 3 gives our estimates of the elasticities of all three poverty measures with respect to: (i) consumption per person from the NSS; (ii) consumption per person as estimated by the

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<sup>31</sup> The rural mean was rising relative to the urban mean during most of the 1950s (Figure 1). We exclude this period from the calculation since it is so unusual.

NAS and population census; and (iii) Net Domestic Product (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 the log of the ratio of the consumer price index for agricultural laborers to the national income deflator (i.e., the difference in the rate of inflation implied by the two deflators). 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 1958-2006 as a whole, the national poverty measures responded significantly to all three measures. This also holds when we use lagged survey means and national accounts and price data as instruments for the current survey mean, in an attempt to reduce the potential for spurious correlation due to common survey measurement errors. 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. This may be due to inter-temporal consumption smoothing, which 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. But probably the most important 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 or income. Note that:

$$\frac{d \ln P}{d \ln C} = \frac{d \ln P}{d \ln \mu} \cdot \frac{d \ln \mu}{d \ln C} \quad (7)$$

An elasticity of  $\mu$  w.r.t.  $C$  (NAS consumption per capita) of around 0.5 (Section 3) would yield a poverty elasticity w.r.t.  $\mu$  that is about double that w.r.t.  $C$ —roughly in accord with Table 3.

When we split the period into two at 1991, we find an appreciably higher (absolute) elasticity of the headcount index with respect to the survey mean in the post-1991 period; the difference in the estimated elasticities (1.58 and 2.07 respectively for the two periods) is statistically significant.<sup>32</sup> However, for the poverty gap measures, the difference in the

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<sup>32</sup> 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.

elasticities for the two periods is much smaller (2.63 and 2.94 respectively) and is not statistically significant. Finally, for the squared poverty gap measure, the elasticities are the same for the two periods (about 3.48). The pattern is similar when we use our IVE method to control for correlated measurement errors, however the difference between the two periods is narrower, and for the squared poverty gap measure the post-91 elasticity of 3.28 is in fact lower than the pre-91 elasticity of 3.52. The vanishing difference in post- and pre-91 elasticities for the higher-order measures of poverty is consistent with the increase in inequality during the latter period.

As a check on the internal consistency of our estimates, the estimated elasticities of poverty measures with respect to survey mean can be multiplied with the trend growth rates of survey mean to yield an estimate of the trend rates of decline in poverty measures. Table 4 reports the results of this calculation, which indicate that the trends in poverty measures estimated by using the elasticities track the actual trends in poverty measures reasonably well.

In contrast to the growth rates based on the survey means, we find that both NAS-based growth rates indicate lower (absolute) elasticities in the post-1991 period, although the difference between the two periods is generally not statistically significant; the exceptions to this pattern are for the “unadjusted” elasticities of PG and SPG which are significantly lower in the post-reform period. It is nevertheless notable how much difference there is in the elasticity based on the NSS consumption growth rates versus the NAS rates for the post-1991 period. The much lower NAS elasticities are reflective of the much faster NAS-based growth relative to that based on the NSS. Since the NAS-NSS growth divergence is more pronounced post-91, for the PG and SPG measures it even yields lower (absolute) elasticities for this period relative to the pre-91 period.

We also estimated the semi-elasticities, from the regression of  $P_t$  on  $\ln \mu_t$ . We found that the poverty impact of growth in the survey mean is lower in the post-91 period. The estimated semi-elasticities for the post-1991 period were -0.73 (t=-45.8) for H, -0.34 (t=-32.3) for PG, and -0.17 (t=-25.3) for SPG as compared with -0.63 (t=-15.7), -0.20 (t=-9.82) and -0.08 (t=-7.24) respectively in the pre-91 period.

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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.

To summarize: the responsiveness of poverty to growth when measured from the surveys has generally remained the same across the pre- and post-reform periods, while there are signs that the responsiveness to growth measured through the national accounts has declined during the post-reform period. This seems to be largely the product of the faster post-reform growth not being fully reflected in the surveys, and the increase in inequalities during the post-reform period.

#### *Urban-rural composition of consumption growth*

Table 5 summarizes the results in testing the poverty impact of the urban-rural composition of consumption growth. Table 6 gives the test statistics on whether the urban-rural composition of growth matters and whether the population shift effect is significant. These results on the relative effects of urban-rural growth are presented for national poverty measures as well as separately for urban and rural areas.

For the pre-1991 period, the hypothesis that it is only the overall rate of growth that matters for poverty reduction is strongly rejected (Table 6). The weaker hypothesis of uniform poverty effects of urban and rural growth is also strongly rejected. This echoes the results from Ravallion and Datt (1996). Thus, we confirm our earlier finding that the growth effects on poverty for pre-1991 are largely attributable to rural consumption growth, with virtually no contribution from urban growth and a only limited contribution from the Kuznets process.

However, there is a significant structural shift between the pre-91 and post-91 periods. The hypothesis of similar growth effects during the two-periods is rejected (at the 8% level of significance or better; see Table 5). In the post-1991 period, the rural growth rate remains significant for poverty reduction (with the possible exception of the squared poverty gap measure) though the growth effects are smaller in absolute terms. Unlike the pre-1991 period, rural growth does not appear to be the prime driver of national poverty reduction. The most notable change is that the (share-weighted) urban growth variable is now highly significant. We can also mostly reject the null that only the overall growth rate matters for poverty reduction in the post-1991 period (Table 6), although the evidence for a Kuznetz effect during this period is weaker and only limited to the headcount index of poverty.

The emergence of a significant effect of urban growth on national poverty is the most striking feature of the post-reform economic growth in India. Table 7 reports the elasticities of national H, PG, and SPG measures with respect to urban and rural growth. The contrast between

the pre-1991 and post-1991 periods is compelling. While pre-1991 urban growth did not seem to matter for national poverty reduction, after 1991 not only did a significant urban growth effect emerge, but the urban growth elasticities of all three national poverty measures were higher (in absolute terms) than the corresponding elasticities with respect to rural growth.

The urban-rural decomposition of the rate of poverty reduction reveals something about the source of the evident structural break between the pre- and post-reform periods. The hypothesis of no structural change is rejected for measures of depth and severity of poverty in urban areas, but only for the headcount index in rural areas. However, for rural PG and SPG too, the hypothesis of similar effects of urban growth for the two sub-periods is rejected.

For the pre-1991 phase, we find that urban growth reduced urban poverty (Table 5), but so too did rural growth, which had a significant impact on poverty in both sectors for all three poverty measures. Indeed, for SPG, the (absolute) elasticity of urban poverty to rural growth (0.77) is virtually the same as it is to urban growth (0.78); see Table 7. The effect of urban growth, which for this period is confined to urban poverty, appears to be too small to be detected in the national average poverty measures in the pre-1991 period.

The data for the post-1991 period look very different. Now we find that the urban-economic growth not only reduced urban poverty (as it did before), but had a positive feedback effects on rural poverty, especially the rural headcount index. Indeed, the estimated elasticities of rural poverty measures with respect to urban growth are even higher than those with respect to rural growth. On the other hand, rural economic growth remains important to rural poverty reduction (in particular for the incidence and depth of rural poverty), but its spillover effect to the urban poor has become considerably weaker in the post-1991 period for H and PG, though it remains strong for SPG, suggestive of a continuing (positive) distributional effect in urban areas of rural economic expansion (Table 7).

Figure 7 shows the estimated impact of urban economic growth in both the pre-1991 and post-1991 periods. For each period, the figure plots the change in log national headcount index that remains unexplained by rural growth against the change in log urban mean consumption. We see that there was no significant poverty-reducing effect of growth in mean urban consumption in the pre-1991 period, but a significant impact emerges after 1991.

It can be seen from Tables 3-7 that our qualitative results are generally robust to the choice of poverty measure. Similarly to Ravallion and Datt (1996), the growth elasticities tend to be highest (in absolute value) for SPG and higher for PG than H. As we show in the 1996 paper, 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 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.

There are two notable exceptions to this pattern. The first is found in the pre-1991 data for urban areas, where we find a slightly lower elasticity for SPG than PG in the effects of urban growth on urban poverty (Table 7). This is suggestive of underlying adverse distributional effects amongst the poor in the urban economic growth process of the pre-reform period. The second exception is in the impacts of rural economic growth on rural poverty in the post-1991 period, for which we find a lower elasticity for SPG than PG in the post-1991 period (Table 7). It appears that an adverse distributional effect amongst the rural poor has emerged in the rural growth process of the pre-reform period.

Compared to our earlier findings, the most striking new result is the evidence that the urban economic growth process since 1991 has been appreciably more effective in reducing rural (and national) poverty. Since the regressions for rural poverty include rural mean consumption, the urban growth effect can be interpreted as a distributional effect. Evidence in support of such a distributional effect is provided by the following regression of changes in the rural log Gini index ( $G$ ) of inequality on the (share-weighted) urban and rural growth rates:<sup>33</sup>

$$\begin{aligned} \Delta \ln G_t^r = & \underset{(1.75)}{1.54}(1 - d_t^{91})s_{ut-1}^\mu \Delta \ln \mu_{ut} - \underset{(-1.68)}{3.64}d_t^{91}s_{ut-1}^\mu \Delta \ln \mu_{ut} \\ & - \underset{(-1.13)}{0.20}(1 - d_t^{91})s_{rt-1}^\mu \Delta \ln \mu_{rt} + \underset{(2.50)}{1.48}d_t^{91}s_{rt-1}^\mu \Delta \ln \mu_{rt} - \underset{(-1.67)}{0.08} \Delta MRP_t + \hat{\varepsilon}_t \end{aligned} \quad R^2=0.32; n=41$$

It can be seen that, unlike the pre-1991 period, higher growth rates of mean urban consumption since 1991 have reduced inequality within rural areas (significant at the 10% level). Rural consumption growth on the other hand has had the opposite effect.

<sup>33</sup> We included the population shift effects (as in equation 6.2), but these were insignificant and are not reported. The share-weighted urban and rural growth terms are instrumented as in Table 5.

## 5. Conclusions

We have studied a new time series of survey-based poverty measures for urban and rural India spanning 50 years, including 15 years after economic reforms started in earnest in the early 1990s. While progress against poverty has been highly uneven over time, we find a long-run trend decline in all three of the poverty measures we have used. Exponential (proportionate) trends are higher for the poverty gap and squared poverty gap indices than the headcount index, reflecting gains to those living well below the poverty line. Both urban and rural poverty measures have shown a trend decline; rural poverty measures have historically been higher than for urban areas, though the urban and rural poverty measures have been converging over time, and in recent years the squared poverty gap index for urban India has started to exceed that for rural India.

Progress against poverty has been maintained in the post-reform period. Indeed, we find a higher proportionate rate of progress against poverty after 1991, although the difference in trend rates of change between the two periods is only statistically significant for the headcount index. The linear trend—the annual percentage point reduction in the poverty measures—has remained about the same in the post-reform period. We also find that the responsiveness of poverty to growth in the survey mean—the growth elasticity of poverty reduction—has generally remained the same between the two periods; only for the headcount index do we find a significant increase in the absolute growth elasticity in the post-reform period. When we use growth as measured in the national accounts there are signs that the post-reform growth process has become less pro-poor in the sense of attaining a lower proportionate rate of poverty reduction from a given rate of growth. Overall, while the higher rate of growth in the post-reform period has come with a higher proportionate rate of progress against poverty, we do not see in these data a robust case for saying that the growth elasticity of poverty reduction has risen since the reforms began.

Recognizing that the fortunes of the poor in each of the urban and rural sectors are linked in various ways—through trade, migration, and transfers—we have also revisited our earlier (pre-reform) findings on the relative importance of growth in the two sectors to poverty reduction in both sectors and nationally. Like our 1996 study, we find that that the pattern of growth matters for poverty reduction. But we find that the post-reform period has seen a striking change in the relative importance of urban versus rural economic growth. Our 1996 study found

that urban economic growth helped reduce urban poverty but brought little or no overall benefit to the rural poor; in fact, the main driving force for overall poverty reduction was rural economic growth. We confirm this finding for the data up to 1991, but the picture looks different after 1991. As before, urban growth reduced urban poverty, and rural growth reduced rural poverty. But we find much stronger evidence of a feedback effect from urban economic growth to rural poverty reduction than we had found in the pre-1991 data.

The relatively weak performance of India's agricultural sector and the widening disparities between urban and rural living standards remain important concerns, including for India's poor. However, it is encouraging that rising overall living standards in India's urban areas in the post-reform period appear to have had significant distributional effects favoring the country's rural poor. While the attribution to the reforms is hardly conclusive—since we can have no comparison group, to observe India after 1991 but without the reforms—these findings are consistent with the view that India's efforts to create a more open and productive market economy have come with a reversal in the historical pattern of weak feedback effects of urban economic growth on rural living standards.

This may be a surprising conclusion given that the most dynamic sectors of India's post-reform economy have been more intensive in skilled than unskilled labor. However, the more relevant observation is that the non-farm sectors that use unskilled labor more intensively—notably trade, construction and the “unorganized” manufacturing sectors—have seen higher employment growth in the post-reform period. It is a plausible conjecture that this is the main reason why we have found stronger spillover effect on the rural distribution of urban economic growth since 1991.

This encouraging finding comes with a warning, however. While the rural poor have benefited more from urban economic growth in the post-reform economy, it can be expected that the reverse also holds: India's rural poor will be more vulnerable in the future to urban-based economic shocks.

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**Table 1: Trend growth rates in national poverty measures, mean consumption and income: 1958-2006**

	Whole period 1958-2006	Pre-1991	Post-1991	H <sub>0</sub> : pre-91 trend = post-91 trend F(1, 33) (Prob.)
Exponential trends				
Mean consumption/income:				
Mean consumption from NSS	0.76 (5.75)	0.68 (4.27)	1.33 (5.39)	3.40 (0.07)
Mean private consumption from national accounts	1.64 (17.43)	1.21 (23.68)	3.13 (22.85)	118.89 (0.00)
Mean net domestic product	2.22 (18.19)	1.63 (25.69)	4.28 (23.71)	132.65 (0.00)
Poverty measures:				
Headcount index	-1.29 (-6.69)	-1.14 (-4.84)	-2.36 (-4.51)	3.25 (0.08)
Poverty gap index	-2.23 (-8.08)	-2.06 (-6.06)	-3.42 (-4.56)	2.02 (0.16)
Squared poverty gap index	-2.98 (-8.64)	-2.80 (-6.58)	-4.23 (-4.59)	1.47 (0.23)
Linear trends				
Mean consumption/income:				
Mean consumption from NSS	0.17 (6.04)	0.15 (4.45)	0.34 (5.87)	6.25 (0.02)
Mean private consumption from national accounts	159.1 (11.74)	97.1 (16.70)	377.7 (18.46)	127.92 (0.00)
Mean net domestic product	252.6 (10.67)	140.9 (16.33)	645.7 (17.77)	139.54 (0.00)
Poverty measures:				
Headcount index	-0.56 (-6.23)	-0.53 (-4.67)	-0.77 (-3.86)	0.78 (0.38)
Poverty gap index	-0.27 (-6.97)	-0.27 (-5.52)	-0.26 (-3.58)	0.01 (0.94)
Squared poverty gap index	-0.14 (-6.91)	-0.14 (-5.66)	-0.11 (-3.33)	0.48 (0.49)

Source and notes: Authors' calculations. These are "least-squares growth trends" based on regressions of poverty measures or mean consumption/income on time. Robust (heteroskedasticity and autocorrelation consistent) t-statistics are in parentheses except for the final column, which gives the probability in parentheses. For estimating exponential trends, logs of poverty measures or mean consumption/income are used, while their levels are used for estimating linear trends. In the levels case, poverty measures are in percentages, mean consumption from NSS surveys is constant rural prices of NSS round 14 (July 1958-June 1959), mean private consumption per capita from national accounts and NDP per capita are at constant 1999-2000 prices. The trends regressions for poverty measures and mean NSS consumption also 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 2: Trend growth rates in rural and urban poverty, mean consumption and inequality: 1958-2006**

	Whole period 1958-2006	Pre-1991	Post-1991	H <sub>0</sub> : pre-91 trend = post-91 trend F(1, 33) (Prob.)
Rural (exponential trends)				
Poverty measures:				
Headcount index	-1.21 (-5.91)	-1.05 (-4.14)	-2.36 (-3.85)	2.83 (0.10)
Poverty gap index	-2.21 (-7.73)	-2.01 (-5.34)	-3.68 (-4.16)	2.23 (0.15)
Squared poverty gap index	-3.01 (-7.89)	-2.77 (-5.80)	-4.67 (-4.54)	2.01 (0.16)
Mean consumption/inequality:				
Mean consumption (NSS)	0.65 (4.70)	0.58 (3.41)	1.17 (4.13)	2.21 (0.15)
Gini index	-0.17 (-2.33)	-0.25 (-3.02)	0.45 (2.69)	9.26 (0.00)
Urban (exponential trends)				
Poverty measures:				
Headcount index	-1.41 (-9.66)	-1.30 (-7.66)	-2.16 (-7.88)	5.11 (0.03)
Poverty gap index	-2.15 (-11.83)	-2.09 (-9.64)	-2.58 (-6.49)	0.90 (0.35)
Squared poverty gap index	-2.77 (-13.19)	-2.75 (-11.23)	-2.93 (-4.18)	0.05 (0.83)
Mean consumption/inequality:				
Mean consumption (NSS)	0.87 (8.34)	0.79 (6.58)	1.49 (8.39)	7.59 (0.01)
Gini index	0.08 (1.60)	0.00 (0.02)	0.61 (4.13)	11.86 (0.00)

Source and notes: Authors' calculations. See notes to Table 1.

**Table 3: Elasticities of national poverty measures to economic growth in India: 1958-2006**

		Elasticity of poverty measure with respect to:					
		Mean consumption from NSS		Mean private consumption from national accounts		Mean net domestic product	
		OLS	IVE	Unadjusted	Adjusted	Unadjusted	Adjusted
<b>Headcount index</b>							
	Whole period	-1.62 (-26.0)	-1.60 (-61.4)	-0.90 (-9.57)	-0.50 (-9.76)	-0.65 (-9.20)	-0.35 (-9.27)
	Up to 1991	-1.58 (-27.8)	-1.57 (-75.2)	-0.98 (-6.77)	-0.51 (-7.35)	-0.73 (-6.07)	-0.36 (-6.35)
	After 1991	-2.07 (-21.4)	-2.07 (-22.9)	-0.70 (-5.10)	-0.62 (-2.99)	-0.49 (-4.13)	-0.42 (-2.70)
H <sub>0</sub> : pre-91 elasticity = post-91 elasticity	F(1,34 or 32) (Prob.)	16.08 (0.00)	24.91 (0.00)	1.50 (0.23)	0.25 (0.62)	1.43 (0.24)	0.12 (0.73)
<b>Poverty gap index</b>							
	Whole period	-2.66 (-21.8)	-2.68 (-35.5)	-1.53 (-10.6)	-0.95 (-11.5)	-1.11 (-10.3)	-0.68 (-11.5)
	Up to 1991	-2.63 (-20.3)	-2.66 (-33.5)	-1.75 (-8.74)	-1.09 (-10.6)	-1.31 (-7.97)	-0.80 (-9.88)
	After 1991	-2.94 (-12.2)	-2.78 (-11.5)	-0.97 (-4.94)	-0.80 (-2.43)	-0.69 (-4.17)	-0.56 (-2.24)
H <sub>0</sub> : pre-91 elasticity = post-91 elasticity	F(1,34 or 32) (Prob.)	1.10 (0.30)	0.19 (0.66)	5.96 (0.02)	0.67 (0.42)	5.21 (0.03)	0.67 (0.42)
<b>Squared poverty gap index</b>							
	Whole period	-3.48 (-19.7)	-3.48 (-31.8)	-2.03 (-10.7)	-1.31 (-10.7)	-1.48 (-10.5)	-0.94 (-10.9)
	Up to 1991	-3.48 (-18.0)	-3.52 (-26.3)	-2.37 (-9.63)	-1.58 (-10.6)	-1.79 (-8.86)	-1.16 (-10.3)
	After 1991	-3.49 (-8.20)	-3.28 (-7.73)	-1.17 (-4.74)	-0.95 (-2.20)	-0.84 (-4.17)	-0.69 (-2.10)
H <sub>0</sub> : pre-91 elasticity = post-91 elasticity	F(1,34 or 32) (Prob.)	0.00 (0.99)	0.26 (0.61)	9.51 (0.00)	1.78 (0.19)	8.36 (0.01)	1.56 (0.22)

**Source and notes:** Authors' calculations. Based on regressions of log poverty measures against log consumption or net product per person using 37 surveys spanning 1958-2006. All regressions include a control for surveys that used a mixed-recall period (by adding a dummy variable for such surveys). The "adjusted" estimates control for the difference in the rates of inflation implied by the rural consumer price index and the national income deflator (Ravallion and Datt, 1996). The instrumental variables for the survey mean regressions included lagged survey means (split urban and rural), current and lagged mean consumption from the national accounts, current and lagged rural and urban consumer price indices, current and lagged rural population shares, interval between mid-points of survey periods and a time trend. The t-ratios in parentheses are based on heteroskedasticity and autocorrelation-

consistent standard errors. 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.

**Table 4: Actual and estimated rates of poverty reduction using growth elasticities of poverty measures: 1958-2006**

		Growth elasticity of poverty reduction (1)	Trend annual growth in survey mean (%) (2)	Annual rate of poverty reduction (%)	
				Estimated =(1)*(2)	Actual
Headcount index	Pre-91	-1.57	0.68	-1.07	-1.14
	Post-91	-2.07	1.33	-2.75	-2.36
Poverty gap index	Pre-91	-2.66	0.68	-1.81	-2.06
	Post-91	-2.78	1.33	-3.70	-3.42
Squared poverty gap index	Pre-91	-3.52	0.68	-2.39	-2.80
	Post-91	-3.28	1.33	-4.36	-4.23
Headcount index	Full period	-1.60	0.76	-1.22	-1.29
Poverty gap index	Full period	-2.68	0.76	-2.04	-2.23
Squared poverty gap index	Full period	-3.48	0.76	-2.64	-2.98

Source and notes: Authors' calculations based on Table 1 and 3.

**Table 5: Impacts on poverty of the urban-rural composition of growth: 1951-2006**

Poverty measure	Period		National poverty		Urban poverty		Rural poverty	
			Coeff.	t-ratio	Coeff.	t-ratio	Coeff.	t-ratio
Headcount index	Up to 1991	Urban growth	-0.38	-1.03	-0.64	-11.42	0.46	1.47
		Rural growth	-1.45	-21.79	-0.08	-4.16	-1.38	-34.32
	After 1991	Urban growth	-3.73	-2.40	-0.94	-3.47	-2.96	-2.07
		Rural growth	-0.98	-3.88	-0.03	-0.25	-1.01	-5.18
H <sub>0</sub> : Pre-91 coefficient = Post-91 coefficient		F(2,34) (prob.)	2.78 (0.08)		0.52 (0.60)		3.44 (0.04)	
H <sub>0</sub> : All Pre-91 coeffs. = Post-91 coeffs.		F(3,34) (prob.)	2.16 (0.11)		0.97 (0.42)		2.96 (0.05)	
Poverty gap index	Up to 1991	Urban growth	0.21	0.27	-0.67	-4.54	0.90	1.16
		Rural growth	-2.19	-26.32	-0.14	-4.04	-2.06	-16.82
	After 1991	Urban growth	-8.19	-2.79	-2.24	-3.84	-5.31	-1.88
		Rural growth	-1.59	-3.72	0.00	0.03	-1.59	-3.27
H <sub>0</sub> : Pre-91 coefficient = Post-91 coefficient		F(2,34) (prob.)	4.12 (0.02)		3.25 (0.05)		2.13 (0.13)	
H <sub>0</sub> : All Pre-91 coeffs. = Post-91 coeffs.		F(3,34) (prob.)	2.79 (0.06)		4.50 (0.01)		1.47 (0.24)	
Squared poverty gap index	Up to 1991	Urban growth	0.47	0.44	-0.58	-3.55	1.51	1.48
		Rural growth	-2.69	-15.27	-0.17	-4.13	-2.54	-11.80
	After 1991	Urban growth	-11.64	-2.33	-3.95	-4.77	-7.45	-1.70
		Rural growth	-1.66	-1.54	-0.33	-1.27	-1.19	-1.35
H <sub>0</sub> : Pre-91 coefficient = Post-91 coefficient		F(2,34) (prob.)	2.73 (0.08)		11.03 (0.00)		2.33 (0.11)	
H <sub>0</sub> : All Pre-91 coeffs. = Post-91 coeffs.		F(3,34) (prob.)	1.86 (0.15)		7.42 (0.00)		1.56 (0.22)	

Source and notes: Authors' calculations. These are the  $\pi$  coefficients in the regressions in equations (5) and (6) rather than elasticities. All regressions include a control for surveys that used a mixed-recall period (by adding the change between surveys in a dummy variable for such surveys). The regressions are estimated using a 2-stage GMM estimator. The instruments for the urban and rural growth variables included lagged survey means (split urban and rural), current and lagged mean consumption from the national accounts, current and lagged rural and urban consumer price indices, current and lagged rural population shares, interval between mid-points of survey periods and a time trend. The t-ratios are based on heteroskedasticity and autocorrelation-consistent standard errors.

**Table 6: Test statistics on the significance of the pattern of growth and the Kuznets effect**

		Pattern of growth matters		Pattern of growth matters		Kuznets effect	
		$H_0: \pi_u = \pi_r$		$H_0: \pi_u = \pi_r = \pi_n = \pi$		$H_0: \pi_n = 0$	
		F(1,34)	Prob.	F(2,34)	Prob.	t ratio	Prob.
Headcount index							
Pre-1991	National	7.55	0.01	7.31	0.00	-2.18	0.04
	Urban	63.05	0.00	32.36	0.00	-1.32	0.20
	Rural	32.17	0.00	22.27	0.00	-1.76	0.09
Post-1991	National	2.55	0.12	4.06	0.03	-1.76	0.09
	Urban	7.71	0.01	4.25	0.02	0.47	0.64
	Rural	1.60	0.21	4.85	0.01	-1.77	0.09
Poverty gap index							
Pre-1991	National	7.77	0.01	12.76	0.00	-3.94	0.00
	Urban	9.38	0.00	5.63	0.01	-1.69	0.10
	Rural	11.74	0.00	12.04	0.00	-3.33	0.00
Post-1991	National	4.72	0.04	2.78	0.08	0.28	0.78
	Urban	10.84	0.00	9.10	0.00	1.62	0.12
	Rural	1.56	0.22	1.24	0.30	0.25	0.81
Squared poverty gap index							
Pre-1991	National	6.98	0.01	8.49	0.00	-3.08	0.00
	Urban	4.37	0.04	8.52	0.00	-3.48	0.00
	Rural	11.74	0.00	9.74	0.00	-2.72	0.01
Post-1991	National	3.54	0.07	1.82	0.18	0.31	0.76
	Urban	13.56	0.00	10.09	0.00	1.68	0.01
	Rural	1.81	0.19	1.38	0.27	-0.31	0.76

Source and notes: Authors' calculations. See equations (5), (6.1), (6.2) and discussion in text.

**Table 7: Elasticities of poverty with respect to urban and rural growth: 1951-2006**

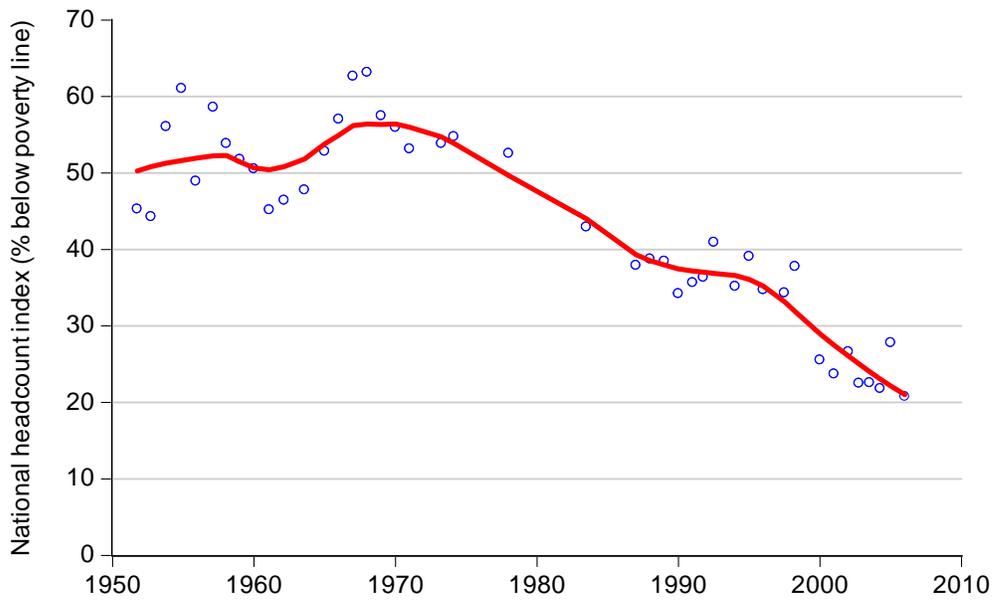
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		National poverty	Urban poverty	Rural poverty
<hr/>				
Headcount index				
Urban growth	Pre-91	-0.09	-0.85	0.13
Rural growth	Pre-91	-1.11	-0.35	-1.29
Urban growth	Post-91	-1.21	-1.26	-1.26
Rural growth	Post-91	-0.66	-0.08	-0.90
Poverty gap index				
Urban growth	Pre-91	0.05	-0.89	0.25
Rural growth	Pre-91	-1.68	-0.61	-1.91
Urban growth	Post-91	-2.65	-2.79	-2.32
Rural growth	Post-91	-1.08	0.01	-1.46
Squared poverty gap index				
Urban growth	Pre-91	0.11	-0.78	0.43
Rural growth	Pre-91	-2.07	-0.77	-2.36
Urban growth	Post-91	-3.77	-4.73	-3.31
Rural growth	Post-91	-1.12	-0.83	-1.11

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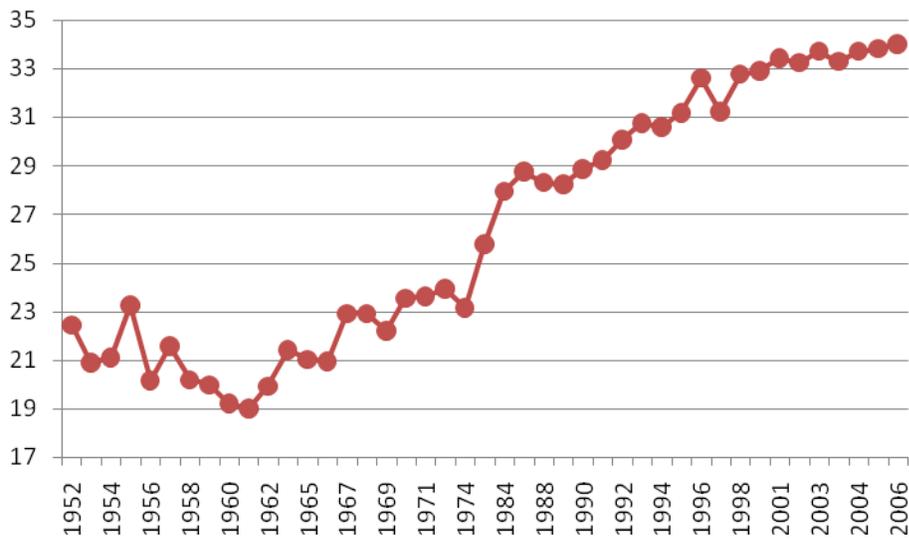
Source and notes: Authors' calculations. Elasticities are evaluated at means for the pre- and post-1991 periods using the parameter estimates reported in Table 5.

**Figure 1: Headcount index of poverty for India 1951-2006**



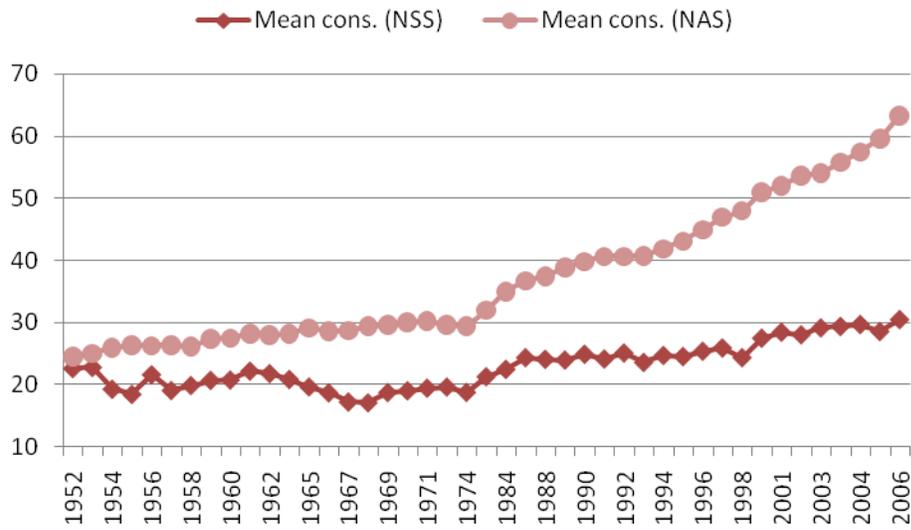
Source: Author's estimates using the data and methods described in section 3.

**Figure 2: Urban share of total consumption, 1951-2006 (%)**



Source and notes: Authors' calculations.

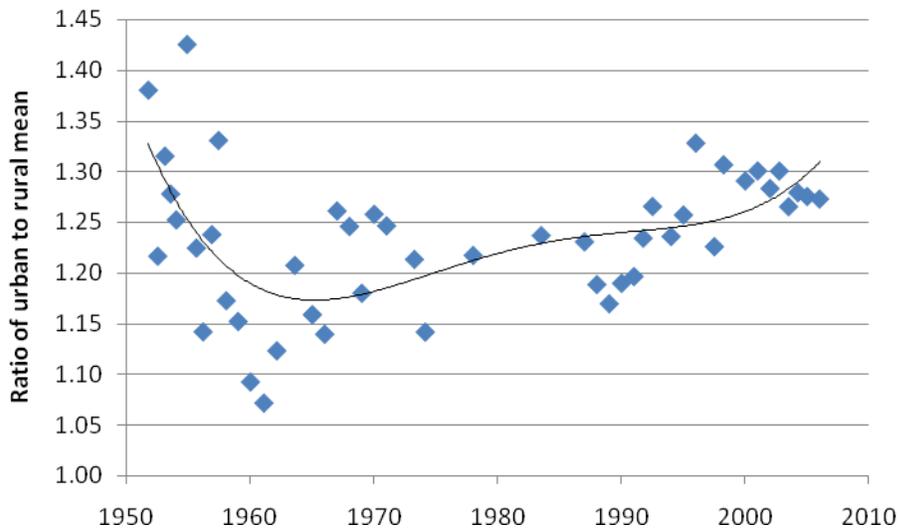
**Figure 3: Average consumption in India, 1951-2006**



Source and notes: Authors' calculations.

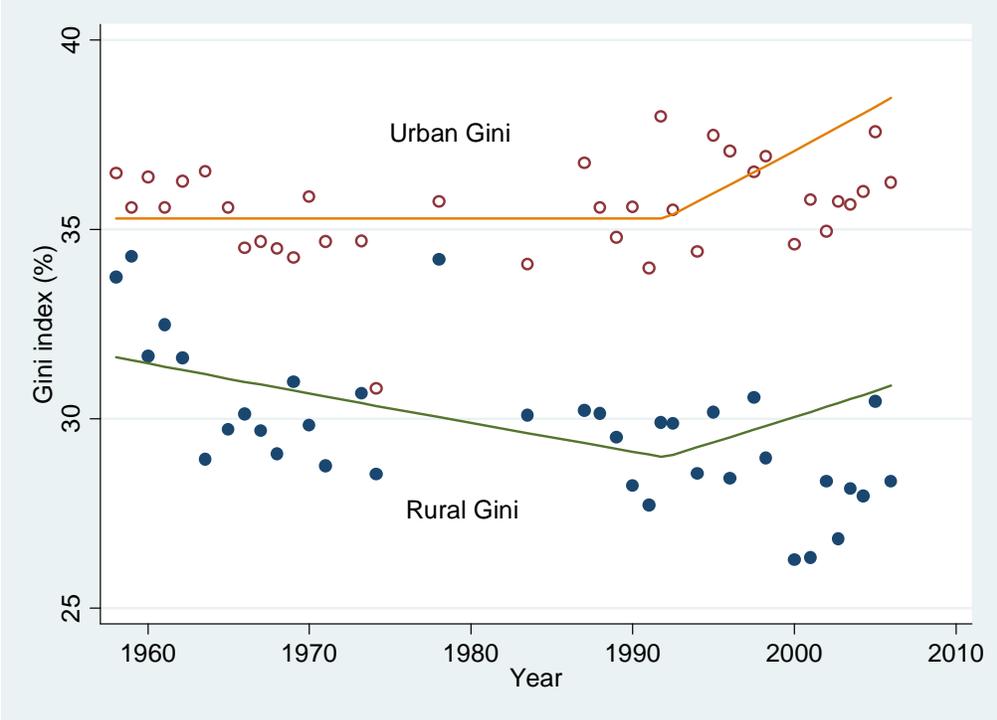
Mean consumption refers to per capita monthly consumption in Rs. at constant 1958-9 (Round 14) prices.

**Figure 4: Ratio of urban mean consumption to rural mean consumption, India 1951-2006**



Note: Fitted values are a 4<sup>th</sup> degree polynomial

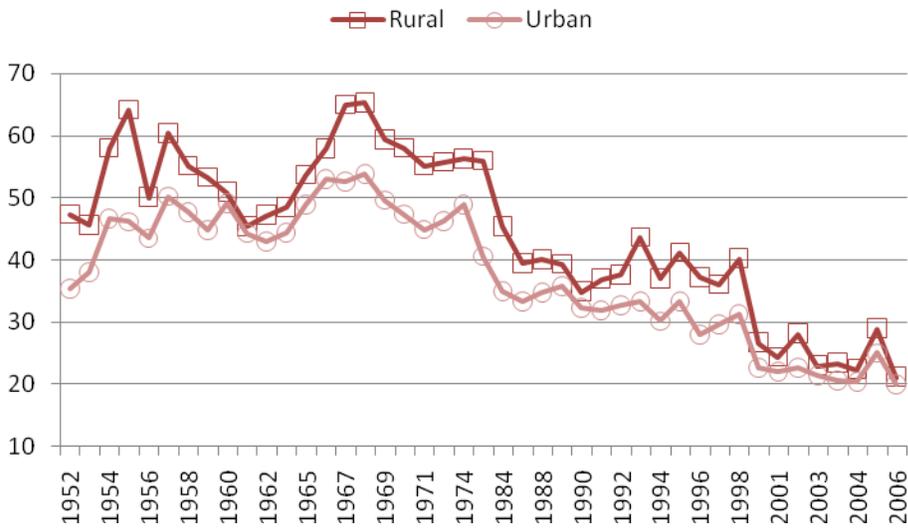
**Figure 5: Trends in urban and rural inequality, 1951-2006, controlling for changes in survey reference periods**



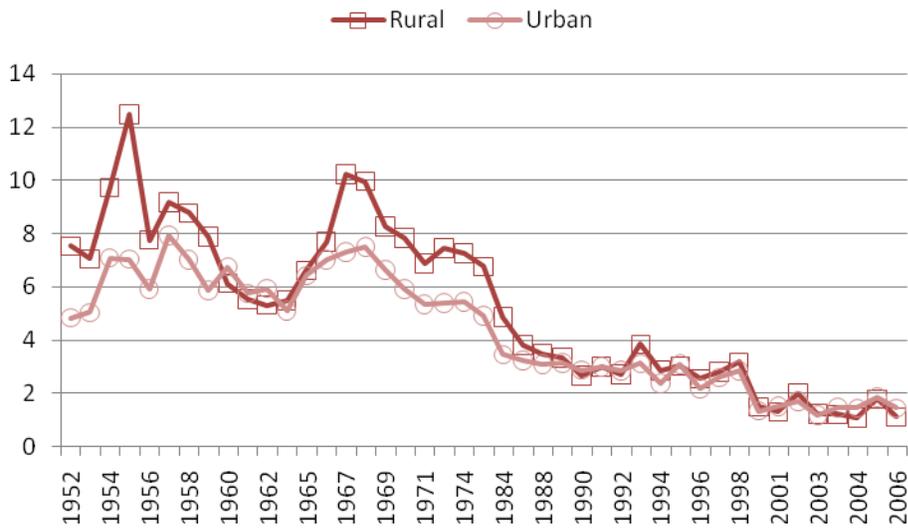
Source and notes: Authors' calculations. The lines show predicted Gini indices after controlling for the effect of MRP rounds (as distinct from predicted values without controls).

**Figure 6: Poverty measures for India, 1951-2006**

**Headcount index (%)**

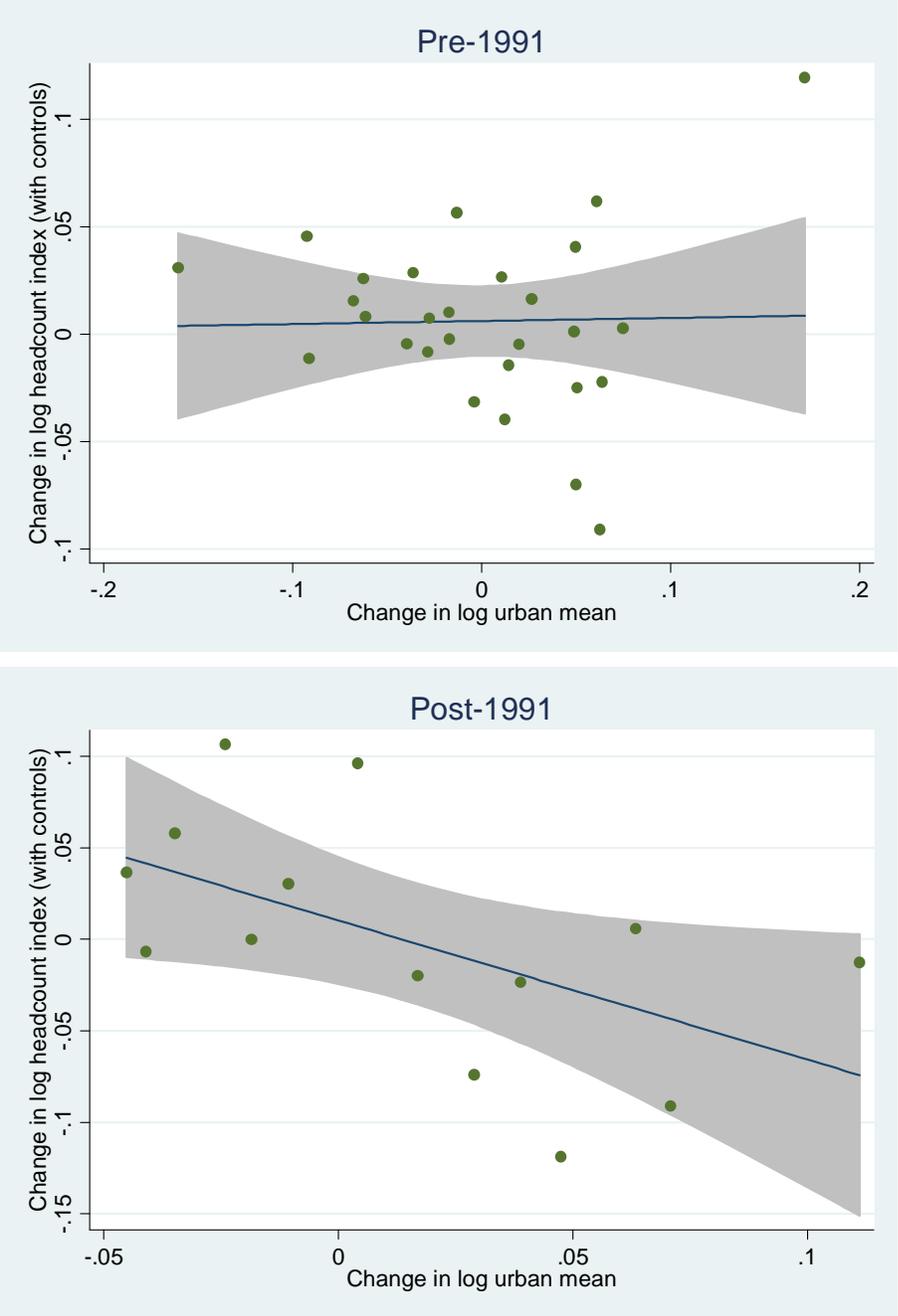


**Squared poverty gap index (%)**



Source and notes: Authors' calculations.

**Figure 7: Poverty impacts of urban economic growth**



Source and notes: Authors' calculations. The shaded area shows the 95% confidence interval.