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How Important to India's Poor is the Urban-Rural Composition of Growth?

Martin Ravallion
Gaurav Datt

Rural economic growth in India in 1951–91 brought large benefits to both the rural and urban poor. By contrast, the urban economic growth process in this period left many of the urban poor behind—and had negligible impact on rural poverty.

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Summary findings

Views differ on how much India's poor have shared in the growth and contraction in the country's average standard of living since independence. Some have argued that the rural growth that accompanied the green revolution in the 1970s and 1980s brought few gains to the poor in the rural sector, while others have viewed agricultural growth as the key to rural poverty reduction. Views have also differed on how much urban growth has benefited the poor.

Ravallion and Datt used 33 household surveys spanning 1951–91 to examine the relative importance to India's poor of both urban and rural consumption growth. Among other things, they tested for spillover effects between sectors: Does urban growth have the same effects on the rural distribution of consumption as rural growth has on urban distribution?

Urban growth reduced poverty, but adverse distributional effects within the urban sector reduced the gains to the urban poor, and urban growth had no significant effect on rural distribution.

Rural growth was distribution-neutral within the rural sector and so brought sizable absolute gains to the rural poor. Rural growth also had propoor distributional effects on urban poverty.

Identifying the nature of these intra- and inter-sectoral effects reinforces the importance of rural growth to national poverty reduction.

Future progress in fighting poverty in India will depend on *both* the rate of rural economic growth and the country's success in switching to a more propoor process of urban growth.

This paper — a product of the Poverty and Human Resources Division, Policy Research Department — is part of a larger effort in the department to better understand the economywide and sectoral determinants of progress in fighting poverty. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Patricia Cook, room N5-061, extension 33902 (29 pages). December 1994.

How Important to India's Poor is the Urban-Rural Composition of Growth?

Martin Ravallion and Gaurav Datt*

Policy Research Department, World Bank

Abstract

We use 33 household surveys spanning 1951-91 to examine the relative importance to India's poor of urban versus rural consumption growth. Urban growth reduced poverty, but adverse distributional effects within that sector mitigated the gains to the poor, and urban growth had no significant effect on rural distribution. Rural growth was distribution neutral within that sector, and so brought sizable absolute gains to the rural poor; rural growth also had pro-poor distributional effects on urban poverty. The nature of these intra- and inter-sectoral effects thus reinforced the importance of rural growth to national poverty reduction.

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1 Introduction

Views differ on how much India's poor have shared in the growth and contraction in the country's average standard of living since Independence. Some observers have argued that the growth in average living standards in rural areas that accompanied the green revolution in the 1970s and '80s brought few gains to the poor within that sector, while others have pointed to agricultural growth as the key to rural poverty reduction. Views have also differed on how much urban economic growth has benefited the poor; for example, the optimism of many of India's post-independence planners that the country's (largely urban-based) industrialization would bring lasting longer-term gains to the poor has not been shared by many critics then and since. In all this, the cross-sectoral effects may be crucial to the distributional outcomes. The fortunes of the poor in each sector are linked in various ways—through trade, migration, and transfers—to the living standards of both poor and non-poor households in the other sector.

This paper endeavors to throw some new empirical light on the intra- and cross-sectoral effects of urban and rural economic growth on poverty in India, by an econometric analysis of new time series data spanning 40 years. We quantify the effects of changes in average consumption on poverty within each of the urban and rural sectors. But an important part of our motivation is also to test for the existence of spillover effects between sectors; does urban growth have the same effects on rural distribution as rural growth has on urban distribution?

To help motivate our empirical tests, the following section describes various ways that cross-sectoral spillover effects might occur. In section 3, we briefly describe our data, comprising our own estimates of a consistent time series of poverty measures for urban and rural areas of India for 1951-91. This is followed by a discussion of our econometric model in section 4, before presenting the results in section 5. Our conclusions are summarized in section 6.

2 Cross-sectoral spillover effects of growth on poverty

For the class of additively decomposable poverty measures, national poverty is a population-weighted sum of rural and urban poverty. The direct impact of urban (rural) growth on national poverty is thus limited by its population share. However, in principle, it is also well recognized that growth and contraction in the affluence of one sector or region of an economy can have pervasive spillover effects elsewhere, with potentially wide ranging implications for poverty reduction. An instance of this is the often heard view that an important cause of urban poverty in developing countries is rural poverty. By this view, the fortunes of the urban poor are closely linked to their rural counterparts through various forms of interaction with the effect that poverty is in part "shared". The vast urban slums of many third world cities are (by this view) simply the urban analogue of the deprivation (often on a larger scale) in the rural hinterland.[1]

The existence of such cross-sectoral spillover effects implies that the total impact of growth in one sector on aggregate poverty can exceed or fall short of its direct effect. It also implies that the significance of the urban-rural composition of growth for poverty goes beyond what is implicit in the sectoral population shares. We will be concerned with empirically assessing the direction and magnitude of such cross-sectoral distributional effects.

There are a number of ways in which spill-over effects between urban and rural distributions can occur: Labor mobility between the two sectors can yield an equilibrium relationship between the real wages of similar workers, entailing some degree of "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. Even without labor mobility, such

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[1] For a survey of the literature on poverty in developing countries, including comparisons between urban and rural poverty, see Lipton and Ravallion (1994).

integration can also arise through trade in goods; 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 eliminates differences in factor costs at the margin. Transfer behavior can also produce horizontal integration through income sharing of related households living in different sectors. All such effects may operate either through changes in the sector's own mean, or changes in the sector's distribution around the mean, which may be due to growth and contraction in the other sector's mean. Plainly, the existence of horizontal integration suggests that changes emanating from one sector may well have powerful effects on the absolute levels of living in another sector. The linkage can occur at any level; when it exists amongst the poor in different sectors one can interpret it as "shared poverty", a term borrowed from Geertz (1963) (who used it in an intra-rural context).

When the degree of horizontal integration varies by the level of living, one can also expect growth or contraction in one sector to induce shifts in the Lorenz curve in the other sector. There is no a priori reason to expect the integration to be uniform at all levels. And there is at least one good reason to expect that it will not be: 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 which simply has no counterpart in the rural sector.[2] 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 other sectors.

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[2] Similarly, when comparing countries at very different levels of development, there may be no counterpart in the richer country to the poorest strata of the other country.

Combining these observations, we postulate that the observed level of poverty in each sector depends on the mean consumptions in both sectors.

3 Data

The extent to which the poor share in a rising average standard of living has been a source of great debate in India, as elsewhere. Much of the debate has been informed by little more than anecdotal observations, or by systematic analyses of small non-representative samples. Fortunately, a sufficiently long time series of reasonably comparable and nationally representative consumption surveys exists for India to permit a systematic empirical investigation of the issue (Government of India, 1990; Bhattacharya et al., 1991); indeed, India is the only developing country for which one can say that.

3.1 The consumption distributions

We use a new time series of poverty measures for rural and urban India over the period 1951 to 1991. This is based on consumption distributions from 33 household surveys conducted by the National Sample Survey (NSS) Organization, beginning with the 3rd round for August to November 1951, we use distributions up to the 47th round for July to December 1991.[3] This series significantly improves upon the what has been the most widely-used time series on poverty measures in India to date[4], due to Ahluwalia (1978, 1985). The Ahluwalia series was a rural poverty series giving estimates of the headcount index and Sen's poverty measure for 13 rounds

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[3] The first two rounds of the NSS covered rural areas only.

[4] Including Griffin and Ghose (1979), Saith (1981), van de Walle (1985), Ahluwalia (1985), Desai (1985), and other papers in the collection edited by Mellor and Desai (1985).

spanning 1956-57 to 1977-78. Our new series provides a sectorally-disaggregated consistent time series for the entire period 1951-1991 on a range of poverty measures within the Foster, Greer, Thorbecke class (more on this later). Datt (1994) describes in detail how this series was estimated, so we will be brief here.

A number of intrinsic limitations of these data should be noted:

i) Poverty is measured solely in terms of consumption, though it is a comprehensive measure, following sound and consistent survey and accounting practices. 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.[5] 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.[6]

ii) We are solely concerned with the effects on poverty of growth in average consumption; in particular, we do not look at the direct effects of income growth. That distinction may be important, since the existence of inter-temporal consumption smoothing behavior may make poverty (in terms of consumption) less responsive to income growth than consumption growth, at least in the short-term. While current consumption may well be a good predictor of the trend in income,[7] deviations from current income must be expected, and the response of poverty measures to changes in current income may be of independent interest.

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[5] Particularly in this setting; for an overview of the arguments why see Ravallion (1994). Using village panel data from India, Chaudhuri and Ravallion (1994) find that current consumption and income are better indicators of chronic poverty than other measures tested, though the choice between consumption and income is less clear. Even so, it can be argued that current consumption is the better indicator of current level of living.

[6] For further discussion and references see Anand and Ravallion (1993).

[7] For supportive evidence (for the US) see Cochrane (1994).

However the nature of our data—notably that incomes were not surveyed, and that survey periods cannot be readily mapped into an annual time series for comparison with national accounts or other data—pretty much determines the choice.

iii) It should be noted that we do not decompose the sources of growth any further than the urban-rural spiit. We do not distinguish (for example) technical progress from expanding input usage. The NSS data do not allow such a breakdown, and other data sources are not easily integrated with the NSS survey rounds.[8]

iv) The average sample size over the 33 NSS surveys is 10,988 households in urban areas and 18,691 in rural areas. However there is considerable variation over time. The urban samples range from 514 to 58,162 while for rural areas the range is 1,361 to 99,766. In both cases, the smallest sample was in 1953 (though different rounds), while the largest was for 1977-78. From 1955 on, all samples exceeded 1,000.

v) We only use the classification of "urban" and "rural" areas built into the NSS tabulations.[9] However, over such a long period some rural areas would naturally have become urban areas.[10] 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

[8] In future work we plan to attempt sufficient integration with other data sources to allow further analysis of the impacts on the poor of different sources of growth.

[9] The NSS has followed the Census definition of urban areas which is based on a number of criteria including "(a) the population of the place should be greater than 5000; (b) a density of not less than 400 persons per sq. km.; (c) three-fourths of the male workers engaged in non-agricultural pursuits." (Government of India 1992).

[10] Indeed, for the Philippines, Balisacan (1994) finds that the bulk of that country's urbanization in the 1980s was actually due to this process of re-classification, rather than (as commonly thought) rural to urban migration. We do not know of any work on this question for India.

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 existing classification, given that the unit record data for India are unavailable. But nor is it clear what the best corrective action would be even with access to the raw data.

3.2 *The poverty line and deflators*

The poverty line we use is the line originally defined by the Planning Commission (1979), and recently endorsed by Planning Commission (1993). This poverty line is based on a nutritional norm of 2400 calories per person per day in rural areas and 2100 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 the caloric norms were typically attained in each of the two sectors, thus following what has been termed as the "food energy method" (Ravallion 1994). The rural poverty line was thus determined at a per capita monthly expenditure of Rs. 49, and the urban at Rs. 57 (rounded to the nearest rupee) at 1973-74 prices.

The food energy method need not yield consistent poverty lines (representing a uniform threshold in terms of the living standard indicator), especially if the average levels of living vary significantly across sectors (Ravallion 1994). Better-off regions or sectors will tend to have lower food shares, and hence reach caloric requirements at higher real expenditure levels. This can severely distort the poverty profile.[11] However, one can readily test the method for India using independent estimates of the urban-rural cost of living differential in conjunction with the

[11] A case study for Indonesia found that this method produced poverty lines which vary so much in terms of their basic-needs purchasing power that the method produced considerable re-ranking of regions and sectors; indeed there was no significant correlation between the two poverty profiles. See Ravallion and Bidani (1994).

rural poverty line to derive the equivalent urban line. For 1973-74, Bhattacharya et al. (1980) estimated that the cost-of-living for the poor was 16% higher in urban areas, exactly the same (to the nearest integer) as implied by the food energy method.[12] It can thus be argued that for India, the food energy method has not vitiated the urban-rural poverty comparison.[13]

A detailed discussion of the deflators used for comparisons over time can be found in Datt (1994). We will limit ourselves to only a brief description here. For the urban sector after August 1968, the all-India Consumer Price Index for Industrial Workers (CPIIW) is used. 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). We label the entire urban cost of living index series as CPIIW.

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. The details of the model, tests of its performance, and the forecasts are given in Datt (1994).

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[12] This is the Fisher index, which gave a differential of 15.9%. The Laspeyres index gave 16.5%, while the Paasche gave 15.2%.

[13] This may well be because of the higher caloric requirement used for rural areas in the Planning Commission's poverty lines.

The CPIAL series thus constructed also dealt with another problem which has to do with the fact that the Labour Bureau used the same price of in 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.[14] 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 derived by assuming that firewood prices increased at the same rate as all other items in the Fuel and Light category (prior to 1970); Datt (1994) discusses this index further.

The final CPIIW and CPIAL indices we use in the estimation of poverty measures are averages of monthly indices corresponding to the exact survey period of each NSS round.[15]

3.3 Poverty measures: absolute and relative

By measures of "absolute poverty", we refer to poverty measures where the poverty line is fixed in terms of the living standards indicator over the period of analysis, and across both sectors (Ravallion, 1994). Following the now well-established and defensible practice for India and elsewhere, the standard of living is measured by real consumption expenditure.[16]

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[14]This is all the more questionable since the NSS values non-purchased firewood consumption at local market prices. Also see Minhas et al., (1987) for further discussion.

[15] We differ in this respect to Ahluwalia (1978) who uses averages of the CPIAL over the agricultural year (July to June), even for NSS rounds where the survey period was different. Given the seasonality in prices, an exact matching of the survey period is arguably a better procedure.

[16] This is true of most of the literature on poverty in India, reflecting in part the fact that the primary source of distributional data, namely the NSS, collects information on household expenditures only. Some distributional data on household incomes is available from surveys conducted by the National Council of Applied Economic Research (NCAER). But the NCAER surveys use a much smaller sample frame and have been conducted infrequently (only four such surveys between the 1960s and the 1980s). On the other hand, very few of the NSS rounds have

We use three poverty measures: i) The head-count index, given by the percentage of the population who live in households with a consumption per capita less than the poverty line. ii) The poverty gap index, 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. iii) The squared poverty gap index, introduced by Foster et al., (1984), and defined as the mean of the squared proportionate poverty gaps. Unlike the poverty gap index, this measure reflects the severity of poverty, in that it will be sensitive to distribution amongst the poor.[17] All three measures are members of the Foster-Greer-Thorbecke (FGT) class, for which the individual poverty measure is:

$$p_{\alpha,i} = \max[(1-x_i/z)^{\alpha},0] \qquad \alpha \geq 0 \tag{1}$$

in which x_i is consumption expenditure of the i'th person in a population of size n, z is the poverty line, and α is a non-negative parameter. Aggregate poverty is simply

$$P_{\alpha} = \sum_{i=1}^{n} p_{\alpha,i}/n \tag{2}$$

The head-count index is obtained when $\alpha=0$, the poverty gap index is obtained when $\alpha=1$, and the squared poverty gap index has $\alpha=2$. It will help for interpreting our results later to also note that the poverty gap indices can be written in a nested form:

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included information on access to public services, which is (arguably) the most important variable that will not be captured well by consumption expenditures.

[17] A transfer of income from a poor person to a poorer person (for example) will not alter either the head-count index or the poverty gap index, but it will decrease the squared poverty gap index. Furthermore (and unlike the Sen, 1976, or Kakwani, 1980, distribution sensitive measures of poverty), the squared poverty gap index satisfies the "sub-group consistency" property, namely that if poverty increases in any sub-group (say the urban sector), and it does not decrease elsewhere then aggregate poverty must also increase (Foster and Shorrocks, 1991).

$$P_1 = P_0(1 - \mu^p/z)$$

$$P_2 = P_1\left[1 + \mu^p/z + \frac{(\sigma^p/z)^2}{1 - \mu^p/z}\right] \tag{3}$$

where μ^p and σ^p are the mean and standard deviation of consumption by the poor.

The above poverty measures can also be written generically as

$$P_\alpha = P_\alpha(\mu/z, \pi) \tag{4}$$

which gives the poverty measure as a (non-increasing) function of the mean (μ) relative to the poverty line, and a vector of parameters $\pi = (\pi_1,...,\pi_n)$ for the Lorenz curve. Datt and Ravallion (1992) give explicit formulae for two parameterized Lorenz curves, namely the beta Lorenz curve (Kakwani, 1980) and the general quadratic model (Villasenor and Arnold, 1989). We chose the for each sector/date which fits the data best (both satisfied the theoretical conditions for a valid Lorenz curve in all survey rounds). The poverty measures were then calculated from the estimated parameters of the Lorenz curve and the mean per capita consumption expenditure.[18]

Following Datt and Ravallion (1992) we also construct the simulated poverty measures:

$$P_\alpha^* = P_\alpha(\bar{\mu}/z, \pi) \tag{5}$$

for fixed $\bar{\mu}$ but using the actual Lorenz curve; the poverty measures are thus purged of the direct effect of growth, leaving only the effect via changes in the Lorenz curve. One can interpret P_α^*

[18] A number of checks are made on the results, including both the theoretical conditions for a valid Lorenz curve, and consistency checks, such as that the estimated value of the head-count index must lie within the relevant class interval of the published distribution. The estimation technique has been set-up in a user-friendly computer program "POVCAL" (Chen, Datt and Ravallion, 1991) which is available on request, so interested readers can readily check our calculations and their sensitivity to our assumptions.

as a measure of "relative poverty" in which the poverty line is set as a fixed proportion of the mean, as distinct from the "absolute poverty measure" P_α, though P_α^* does not have much appeal as a poverty measure in its own right (since it is unaffected by distribution-neutral changes, even when they entail substantial gains or losses to poor people); rather it is an analytic construct to help understand the distributional effects of growth.

4 The econometric models

The discussion in section 2 motivates a model which incorporates two sets of variables for explaining the evolution over time of the poverty measures for any one sector: i) variables describing the average standard of living of the sector, and ii) variables describing shifts in distribution relevant to how a given average standard of living maps into a measure of poverty. Only one variable is needed for i), namely the mean of the sector's distribution at that date, normalized by the poverty line.[19] As for ii), we are interested in the influence of the other sector's mean at that date. We postulate that the log of the absolute poverty measures for date $t=1,..,T$ are given by:

$$\log P_{\alpha t}^u = \pi_\alpha^{u0} + \pi_\alpha^{uu}\log\mu_t^u + \pi_\alpha^{ur}\log\mu_t^r + \epsilon_{\alpha t}^u \tag{6.1}$$

$$\log P_{\alpha t}^r = \pi_\alpha^{r0} + \pi_\alpha^{ru}\log\mu_t^u + \pi_\alpha^{rr}\log\mu_t^r + \epsilon_{\alpha t}^r \tag{6.2}$$

for the urban and rural sectors respectively, where μ_t^i is mean consumption in sector i at date t, while $\epsilon_{\alpha t}^i$ is a random error term at date t (specific to each sector and poverty measure) reflecting

[19] All poverty measures used here (and almost all others) are homogeneous of degree zero in the mean and poverty line; for further discussion see Ravallion (1994).

the effects of random measurement errors in the poverty measures and omitted determinants of changes in the poverty measures (the most important of which is likely to be shifts in relative inequalities which are not correlated with changes in mean consumption). Notice that we are testing for effects of the urban (rural) mean on rural (urban) poverty controlling for the rural (urban) mean. So the cross-sectoral effects (π_α^{ur} and π_α^{ru}) identified in (6.1) and (6.2) are distributional effects. For example, $\pi_\alpha^{ur}<0$ implies that rural growth has a favorable redistributive impact on the urban poor's consumption.

However, the effects of the own-sector mean on poverty could be due to either changes in the mean for a given Lorenz curve, or to systematic effects of the growth process on the Lorenz curve (see Ravallion and Datt, 1994, for further discussion). To distinguish these effects, and test for systematic cross-sectoral effects on distribution, it is of interest to re-estimate the above equations using the relative poverty measures described in section 3.1. Thus we also estimate:

$$\log P_{\alpha t}^{u*} = \pi_\alpha^{u0*} + \pi_\alpha^{uu*}\log\mu_t^u + \pi_\alpha^{ur*}\log\mu_t^r + \epsilon_{\alpha t}^{u*} \tag{7.1}$$

$$\log P_{\alpha t}^{r*} = \pi_\alpha^{r0*} + \pi_\alpha^{ru*}\log\mu_t^u + \pi_\alpha^{rr*}\log\mu_t^r + \epsilon_{\alpha t}^{r*} \tag{7.2}$$

in obvious notation.

We found that estimating equations (6) and (7) in first differences gave very good residual diagnostic tests (we tested for serial correlation of the errors, functional form, normality and heteroscedasticity using LM tests; see the Appendix for details) except that there was mild negative serial correlation in the residuals in a few cases; and AR1 correction was then applied. We also tested for a time trend independently of the sector means (by adding the time between survey rounds to the difference model) but this was insignificant in all cases, and had negligible impact on the coefficients of interest. Nor were the elasticities affected much by treating the current survey means as endogenous, using lagged values and current and lagged CPIs as IVs (Appendix). In all regressions we also tested for effects of sample size by adding the sector's log sample size to the model. This was (highly) insignificant in all cases. Nor were the squared residuals correlated significantly with sample sizes for any of the regressions, in either sector.

5 Results

5.1 Descriptive results

Figure 1 gives the urban and rural mean consumptions per person over the period. There have been sizable fluctuations, though some patterns are evident. There was a contraction in the early 1950s, followed by a long period of stagnation, with a reasonably sustained period of growth since the mid-1970s. Throughout the period, there is strong co-movement between the urban and rural means (the simple correlation coefficient is 0.84; the correlation coefficient of the first differences between survey rounds is 0.49). Thus the historical gap in average living standards between the sectors was maintained; there is no significant rime trend in the ratio of the rural to the urban mean.[20]

Figure 2 gives the headcount index and squared poverty gap for each sector.[21] There was neither a trend increase or decrease until about the mid 1970s, when a trend decrease emerged. This pattern also holds for urban poverty, although the fluctuations seem less

[20] Regressing the log of the ratio of the means on time and correcting for serial correlation in the errors the implied rate of growth in the ratio of the urban mean to the rural mean is -1.4% per year, but the t-ratio is only 1.2.

[21] The pattern of change over time is very similar for the poverty gap index; see Datt (1994) for details.

Figure 1: Average consumption in India, 1951-91

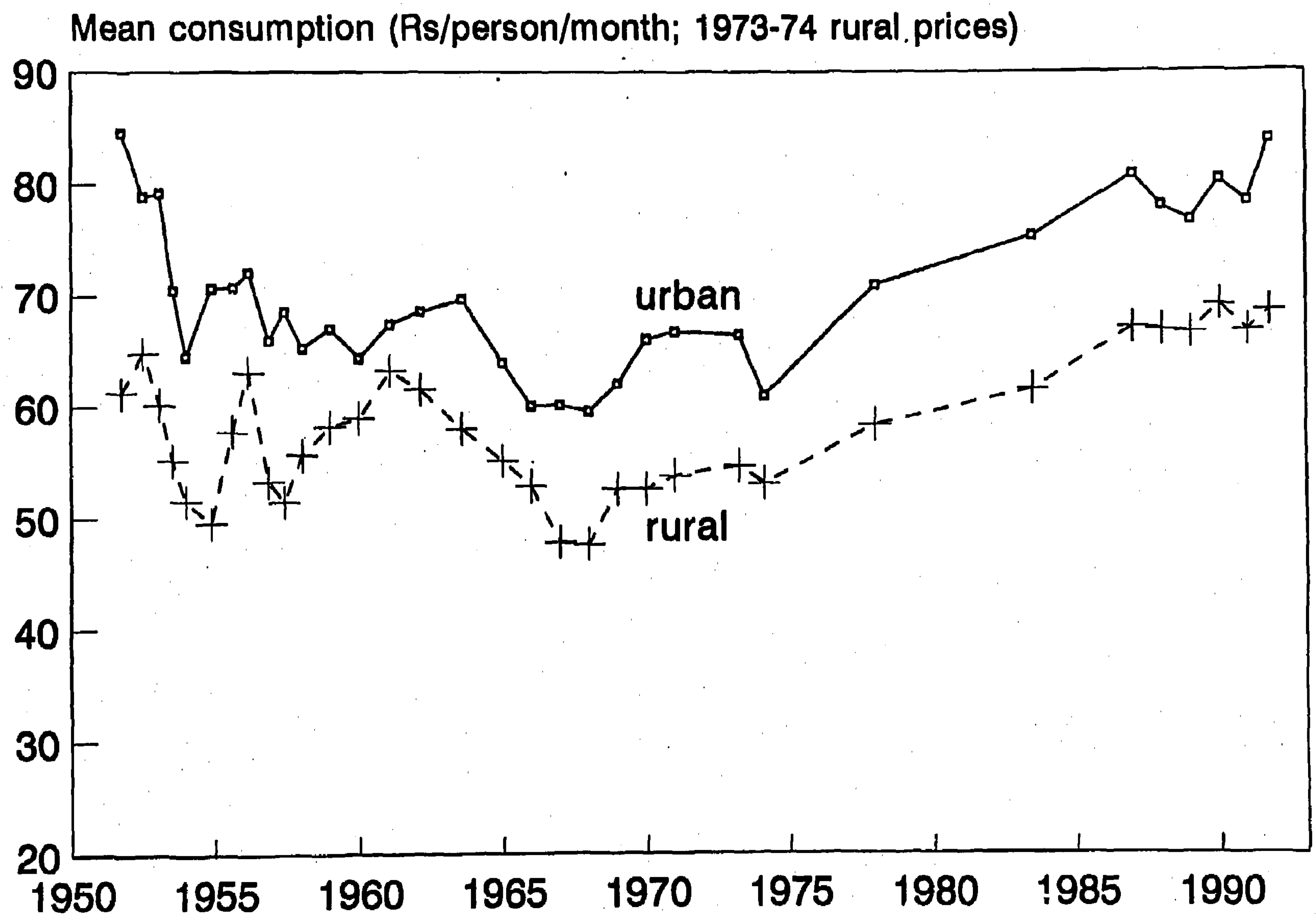

Figure 2: Poverty measures for India, 1951-91

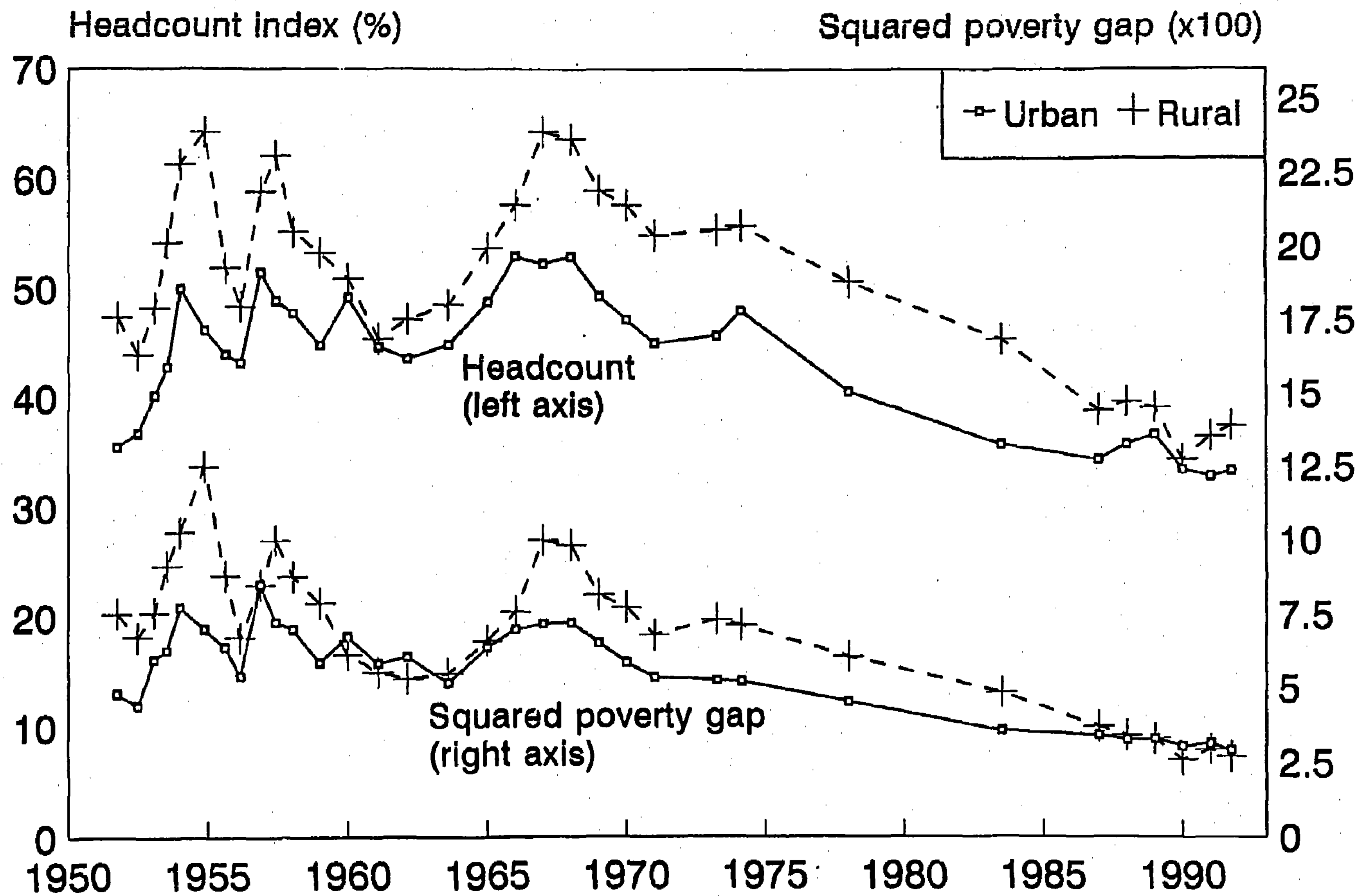

Table 1: Elasticities of urban poverty to both urban and rural growth

	Elasticity wiih respect to	
	Urban mean	Rural mean
<u>Absolute measures</u>		
Headcount index (α=0)	-0.93 (7.42)	-0.35 (3.44)
Poverty gap index (α=1)	-1.05 (5.72)	-0.67 (4.57)
Squared poverty gap index (α=2)	-1.01 (3.87)	-0.98 (4.72)
<u>Relative measures</u>		
Headcount index (α=0)	0.39 (3.38)	-0.24 (2.37)
Poverty gap index (α=1)	0.89 (4.61)	-0.50 (2.94)
Squared poverty gap index (α=2)	1.45 (5.56)	-0.77 (3.59)

Note: Absolute t-ratios in parentheses. Based on regressions of first differences of the poverty measures against first differences of both the urban and rural means. Correction for serial correlation applied when necessary. Otherwise all regressions comfortably passed residual diagnostics tests for serial correlation, functional form, normality, and heteroscedasticity.

pronounced. Co-movement is strong; the simple correlation coefficient between the contemporaneous sector values of the log headcount index is 0.92 (0.68 between the first differences). There are also signs of convergence between urban and rural areas by the end of the period, with the urban squared poverty gap overtaking the rural index. However, the rural sector still accounts for 74% of the total number of poor at the end of the period, 70% of the aggregate poverty gap index, and 68% of the aggregate squared poverty gap index.

5.2 *The elasticities*

The first main panel of Table 1 (under "urban") gives our estimates of equation (6.1) (for urban areas) and each of the three absolute poverty measures. The second panel gives the corresponding estimates of equation (7.1), for the relative poverty measures. The measures of absolute poverty in urban areas responded to urban growth with an elasticity of about -1.0. They also responded to rural growth, with elasticities ranging from -0.4 to -1.0, being higher in absolute value for higher values of α. Since one includes the urban mean, the latter effects are distributional effects. This is also evident in the lower panel, where we also find that (i) growth in the urban mean was associated with worsening relative poverty, with elasticities ranging from 0.4 to 1.5, and increasing with α, and (ii) growth in rural mean reduced relative poverty, with absolute elasticities increasing in α and ranging between 0.2-0.8.

Table 2 gives the corresponding elasticities of rural poverty. Here the picture is much simpler; urban growth had little effect on rural poverty and rural growth was distribution neutral, as indicated by the elasticities for the relative poverty measures in the lower panel. The elasticities of absolute rural poverty to rural growth ranged from -1.3 to -2.3, being higher in absolute value for higher values of α.

Table 2: Elasticities of rural poverty to both urban and rural growth

	Elasticity with respect to	
	Urban mean	Rural mean
<u>Absolute measures</u>		
Headcount index (α=0)	-0.05 (0.41)	-1.26 (13.02)
Poverty gap index (α=1)	0.03 (0.17)	-1.82 (10.82)
Squared poverty gap index (α=2)	0.16 (0.54)	-2.25 (8.84)
<u>Relative measures</u>		
Headcount index (α=0)	-0.01 (0.11)	0.07 (0.69)
Poverty gap index (α=1)	0.27 (1.39)	0.17 (0.99)
Squared poverty gap index (α=2)	0.46 (1.59)	0.22 (0.86)

Note: Absolute t-ratios in parentheses. Based on regressions of first differences of the poverty measures against first differences of both the urban and rural means. Correction for serial correlation applied when necessary. Otherwise all regressions comfortably passed residual diagnostics tests for serial correlation, functional form, normality, and heteroscedasticity.

5.3 Discussion

The following observations can be made on the results in Tables 1 and 2:

i) The nature of the cross-sectoral distributional effects reinforces the importance of rural growth to poverty reduction in India. An increase in the rural mean has an elastic effects on rural poverty <u>and</u> spillovers to differentially benefit the urban poor; increases in the urban mean have a less pronounced effect on urban poverty due to accompanying adverse distributional effects of urban growth, and do not improve rural distribution. To assess the overall poverty impact of growth in each sector, we assume that the population shares are unaffected by that growth (though we comment on this assumption below). Using the fact that the national value of P_α is the population weighted mean of the urban and rural values, the elasticities of the national poverty with respect to growth in the means are:

$$\frac{\partial \log P_\alpha}{\partial \log \mu^u} = s_\alpha^u \pi_\alpha^{uu} + s_\alpha^r \pi_\alpha^{ru} \tag{9}$$

$$\frac{\partial \log P_\alpha}{\partial \log \mu^r} = s_\alpha^u \pi_\alpha^{ur} + s_\alpha^r \pi_\alpha^{rr} \tag{10}$$

for the urban and rural means respectively, where $s_\alpha^i = n^i P_\alpha^i / P_\alpha$ is sector i's share of total poverty, and the sector's share of total population is n^i. Evaluating the shares at the sample means over the period (giving an urban share of 17% for each poverty measure, which is also the share in 1970, the mid-point of the series) and setting insignificant elasticities to zero, we find that the elasticities of national poverty with respect to the urban mean are -0.16, -0.18, -0.17 for α=0,1,2 respectively, while for the rural mean they are -1.11, -1.62, and -2.03. Using the means at the end of the period (an urban poverty share of 28%) the elasticities of national poverty to the urban mean are -0.26, -0.29 and -0.26 for α=0,1 and 2, while for the rural mean they are -1.02, -1.52, and -1.92 respectively. Given the lack of any sign in our results of an impact of urban growth on rural distribution, the low elasticities of national poverty to the urban mean are to be expected. The high elasticities for rural growth reflect both the intra-sector effect and the spillover effect, though it is the intra-sector effect that dominates; the spillover effect accounts for only 5%, 7% and 8% of the total elasticity of national poverty to the rural mean for α=0, 1, and 2 respectively at the mean urban share of poverty.

ii) We do not believe that these conclusions would be affected much by a plausible correction for induced effects on population shares. It is beyond our scope to go deeply into the determination of the population shares, but we can offer the following observations. The small difference in poverty measures by the end of the period means that a high elasticity of the population share to the sector means would be needed to have much effect on the above calculations. To test for such effects we regressed the log of the urban population share on its own lagged value, a time trend, and the current and lagged values of the logs of both the urban and rural means. On correcting for serial correlation in the models residuals, neither mean nor its lag were significant at even the 10% level. These results do not suggest that the elasticities of national poverty calculated by assuming negligible effects of changes in the sector means on population shares will be far off the mark.

iii) It may also be argued that urban growth has an important effect on rural poverty through its effect on the rural mean. We are skeptical of this possibility. We examined whether there were any significant cross-sectoral effects of urban and rural mean consumptions on one another; in particular, we tested for whether the urban (rural) mean Granger-causes the rural (urban) mean. Recognizing that mean consumption in the two sectors may be simultaneously determined, we estimated a vector autoregression (VAR) of order 2 for urban and rural means; the VARs also allowed for a time trend. We found no signs of cross-sectoral causation: the lagged urban means were found jointly insignificant in the equation for rural mean, and lagged rural means were jointly insignificant in the equation for urban mean. The time trend and the own-sector lagged mean consumption were found significant in both cases.[22] We also found that while both rural and urban means were integrated to order one, they were not cointegrated.

iv) Our results also suggest that the growth elasticities tend to be higher (in absolute value) for higher values of α. This implies that the impacts of growth within and between sectors are not confined to households in a neighborhood of the poverty line. As can be seen from equation (2), the higher growth elasticity of P_1 than P_0 implies that the depth of poverty (as measured by the average distance below the poverty line $1-\mu^p/z$) is also reduced by growth. Similarly, the even higher elasticity of P_2 implies that inequality amongst the poor—as measured by the coefficient of variation—is reduced by growth. (Noting that a higher growth elasticity for P_1 than P_0 implies that μ^p must be increasing in μ in which case a higher elasticity for P_2 than P_1 must imply that σ^p is decreasing in μ).

6 Conclusions

Poverty in India is still overwhelmingly rural. Around 1991, 74% of the country's poor lived in rural areas. That fact alone does not imply that urban economic growth is unimportant. The nature of intra- and inter-sectoral effects of growth on poverty may well mean that rural

[22] The diagnostic tests for on each equation of the VAR showed no signs of serial correlation, non-normality, heteroskedasticity or arbitrary functional misspecification.

economic growth is far less important than the sheer size of the rural sector would suggest. The principal conclusion of this paper is that if anything the opposite is true: the relative effects of growth within each sector, and its distributional spillover effects to the other sector, actually reinforce the importance of rural economic growth to national poverty reduction in India.

We have investigated the historical links between the sectoral composition of changes in average living standards and the evolution of poverty in India, using a new time series of poverty measures over the period 1951 to 1991. We find strong and robust evidence that consumption growth was an important factor in the evolution of poverty measures within each sector, though the relative distributional effects of the urban growth process worked against the poor, resulting in an appreciably lower gain from that growth than would have been possible otherwise; by contrast the rural growth process was at least distribution neutral. There is also strong evidence of a significant response of urban poverty measures to rural consumption growth (separately to the impact of urban growth), though the reverse is not true: urban growth did not reduce rural poverty controlling for the rural mean. Such asymmetry in the impacts of rural versus urban economic growth on poverty in a dual economy can arise from horizontal integration or "shared poverty", combined with the existence of an urban elite, with no counter-part in rural areas.

The elasticities involved are not small; urban poverty measures had elasticities to urban growth of around -1.0, and their response to rural growth varied from -0.4 to -1.0 depending on the poverty measure. The distribution-sensitive measure of urban poverty used here is found to have been equally responsive to rural growth as to urban growth. The rural poverty measures were also quite responsive to rural growth, with elasticities of -1.3 to -2.3, again depending on the poverty measure. Furthermore, the elasticities were higher for the more distribution-sensitive measure, implying that the benefits of higher growth were also being felt well below the poverty line. National poverty measures responded quite elastically to rural growth, though (even with sizable spillover effects on the urban poor) the bulk of this was due to the intra-sectoral effect. Urban growth and contraction had little effect on national poverty.

Our investigation points clearly to the quantitative importance of fostering rural economic growth to poverty reduction in both urban and rural India. Despite the rising urbanization of Indian poverty, it is likely to remain true for many years to come that—from the point of view of India's poor—it is the dog (the rural economy) that wags the tail (the urban sector), not the other way round. But there is another more subtle implication for the future. We have studied the historical experience in a period in which India's development strategy (starting from the Second Plan in the 1950s) emphasized capital-intensive industrialization concentrated in the urban areas of a largely closed economy. One may not be surprised that urban economic growth fuelled by such industrialization brought few gains to the poor. This underlines the importance of successful transition to an alternative industrialization process; even then (we suspect) the tail will not wag the dog, but it could surely do a lot more to help it move.

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Appendix: Details on the regressions used for Tables 1 and 2

The following six tables give our estimates of equations (6) and (7) for all three poverty measures. All equations are estimated in first differences. Absolute t-ratios are in parentheses in upper panel. LM tests on the residuals (lower panel) are all Chi-square with degrees of freedom in parentheses. The * denotes that the test fails. The estimates with an AR1 correction (by maximum likelihood) are given when the serial correlation test fails. Current survey means for both sectors are treated as endogenous in IVE estimates. The IV's are the lagged means for both sectors, the current and lagged CPIs, a time trend, and the time between surveys.

Table A1: Estimates of the first differences of equations (6.1) and (6.2) for $\alpha=0$

	Urban			Rural	
	OLS	AR1	IVE/AR1	OLS	IVE
Urban mean	-0.824 (6.320)	-0.931 (7.416)	-0.781 (4.307)	-0.045 (0.412)	-0.005 (0.040)
Rural mean	-0.386 (3.346)	-0.349 (3.442)	-0.410 (2.349)	-1.255 (13.016)	-1.336 (11.058)
R-squared	0.757	0.802	0.735	0.884	0.881
F	93.584	58.600	38.732	227.538	221.620
SEE	0.039	0.036	0.042	0.033	0.033
Autocorrelation (1)	5.586*	n.a.	n.a.	1.926	2.313
Functional form (1)	0.002	n.a.	n.a.	0.276	0.250
Normality (2)	1.314	n.a.	n.a.	0.057	0.035
Heteroscedasticity (1)	0.296	n.a.	n.a.	0.164	0.035
Instrumental variables (6/7)	n.a.	n.a.	3.063	n.a.	3.294

Table A2: Estimates of the first differences of equations (6.1) and (6.2) for $\alpha=1$

	Urban			Rural	
	OLS	AR1	IVE/AR1	OLS	IVE
Urban mean	-0.930 (3.993)	-1.051 (5.721)	-0.908 (2.936)	0.032 (0.169)	0.074 (0.315)
Rural mean	-0.724 (3.529)	-0.667 (4.574)	-0.786 (3.018)	-1.818 (10.822)	-1.903 (9.107)
R-squared	0.646	0.791	0.782	0.831	0.829
F	54.629	55.030	50.180	147.007	145.521
SEE	0.069	0.054	0.056	0.057	0.057
Autocorrelation (1)	13.195*	n.a.	n.a.	0.338	0.494
Functional form (1)	0.692	n.a.	n.a.	1.694	1.586
Normality (2)	1.105	n.a.	n.a.	0.727	0.875
Heteroscedasticity (1)	2.514	n.a.	n.a.	0.055	0.002
Instrumental variables (6/7)	n.a.	n.a.	8.102	n.a.	8.907

Table A3: Estimates of the first differences of equations (6.1) and (6.2) for $\alpha=2$

	Urban			Rural	
	OLS	AR1	IVE/AR1	OLS	IVE
Urban mean	-0.911 (2.684)	-1.013 (3.870)	-1.073 (2.466)	-0.157 (0.543)	-0.142 (0.403)
Rural mean	-1.071 (3.582)	-0.979 (4.719)	-1.017 (2.777)	-2.247 (8.837)	-2.283 (7.249)
R-squared	0.557	0.749	0.754	0.754	0.754
F	37.750	43.337	42.990	92.117	91.956
SEE	0.101	0.077	0.078	0.086	0.086
Autocorrelation (1)	13.773*	n.a.	n.a.	0.066	0.130
Functional form (1)	2.020	n.a.	n.a.	1.267	1.295
Normality (2)	0.820	n.a.	n.a.	0.278	0.306
Heteroscedasticity (1)	2.229	n.a.	n.a.	0.267	0.138
Instrumental variables (6/7)	n.a.	n.a.	9.172	n.a.	9.668

Table A4: Estimates of the first differences of equations (7.1) and (7.2) for $\alpha=0$

	Urban		Rural	
	OLS	IVE	OLS	IVE
Urban mean	0.387 (3.379)	0.343 (2.435)	0.119 (0.966)	0.216 (1.406)
Rural mean	-0.239 (2.365)	-0.241 (1.922)	0.788 (0.729)	-0.031 (0.228)
R-squared	0.287	0.282	0.085	0.050
F	12.078	11.792	2.801*	1.593*
SEE	0.034	0.034	0.037	0.037
Autocorrelation (1)	0.893	0.709	3.938	3.533
Functional form (1)	1.609	1.241	0.799	1.346
Normality (2)	0.541	1.099	0.561	0.653
Heteroscedasticity (1)	0.209	0.013	0.010	0.298
Instrumental variables (7)	n.a.	5.906	n.a.	3.392

Table A5: Estimates of the first differences of equations (7.1) and (7.2) for $\alpha=1$

	Urban		Rural	
	OLS	IVE	OLS	IVE
Urban mean	0.889 (4.606)	0.957 (4.026)	0.266 (1.388)	0.336 (1.421)
Rural mean	-0.500 (2.939)	-0.467 (2.204)	0.167 (0.987)	0.057 (0.271)
R-squared	0.420	0.414	0.142	0.129
F	21.743	21.224	4.946	4.457
SEE	0.057	0.058	0.057	0.057
Autocorrelation (1)	2.511	2.581	0.612	0.793
Functional form (1)	1.482	1.791	0.022	0.158
Normality (2)	1.289	1.570	0.958	0.968
Heteroscedasticity (1)	0.091	0.017	0.119	0.710
Instrumental variables (7)	n.a.	5.143	n.a.	7.564

Table A6: Estimates of the first differences of equations (7.1) and (7.2) for $\alpha=2$

	Urban			Rural	
	OLS	AR1	IVE/AR1	OLS	IVE
Urban mean	1.344 (5.170)	1.447 (5.563)	1.464 (4.000)	0.455 (1.593)	-0.461 (1.313)
Rural mean	-0.768 (3.353)	-0.767 (3.590)	-0.797 (2.583)	0.217 (0.861)	0.133 (0.424)
R-squared	0.477	0.542	0.412	0.139	0.135
F	27.345	17.150	9.870	4.858	4.697
SEE	0.077	0.074	0.082	0.085	0.085
Autocorrelation (1)	3.844*	n.a.	n.a.	0.164	0.346
Functional form (1)	1.383	n.a.	n.a.	0.162	0.042
Normality (2)	0.854	n.a.	n.a.	0.534	0.515
Heteroscedasticity (1)	0.641	n.a.	n.a.	0.361	0.225
Instrumental variables (6/7)	n.a.	n.a.	6.771	n.a.	8.550

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