WPS3408

China's (Uneven) Progress Against Poverty

Martin Ravallion and Shaohua Chen[1]

Development Research Group, World Bank
1818 H Street NW, Washington DC, 20433, USA

While the incidence of extreme poverty in China fell dramatically over 1980-2001, progress was uneven over time and across provinces. Rural areas accounted for the bulk of the gains to the poor, though migration to urban areas helped. The pattern of growth mattered; rural economic growth was far more important to national poverty reduction than urban economic growth; agriculture played a far more important role than the secondary or tertiary sources of GDP. Rising inequality within the rural sector greatly slowed poverty reduction. Provinces starting with relatively high inequality saw slower progress against poverty, due both to lower growth and a lower growth elasticity of poverty reduction. Taxation of farmers and inflation hurt the poor; external trade had little short-term impact.

Keywords: China, poverty, inequality, economic growth, policies

JEL: O15, O53, P36

World Bank Policy Research Working Paper 3408, September 2004

---

[1] The authors are grateful to the staff of the Rural and Urban Household Survey Divisions of China's National Bureau of Statistics for their invaluable help in assembling the data base we draw on in this paper. Helpful comments were received from David Dollar, Tamar Manuelyan Atinc, Justin Lin, Will Martin, Thomas Piketty, Scott Rozelle, Dominique van de Walle, Shuilin Wang, Alan Winters and seminar/conference participants at the National Bureau of Statistics, Beijing, the McArthur Foundation Network on Inequality, the Center for Economic Research, Beijing University, the Australian National University and the World Bank. Addresses for correspondence: mravallion@worldbank.org and schen@worldbank.org.

1. Introduction

This paper aims to document and explain China's record against poverty over the two decades following Deng Xiaoping's initiation of pro-market reforms in 1978. We apply new poverty lines to newly assembled distributional data — much of which has not previously been analyzed — and we address some of the data problems that have clouded past estimates. We thus offer the longest and most internally consistent series of national poverty and inequality measures, spanning 1980-2001. While data are less complete at the provincial level, we can estimate trends since the mid-1980s.

Armed with these new measures, we address some long-standing questions in development economics. How much did poor people share in the gains from growth? Did the sectoral and geographic pattern of growth matter? What role was played by urbanization of the population? How did initial distribution influence subsequent rates of growth and poverty reduction? What role was played by economic policies?

Our principal findings are as follows:

Finding 1: China has made huge overall progress against poverty, but it has been uneven progress. In the 20 year period after 1981, the proportion of the population living below our new poverty lines fell from 53% to 8%. However, there were many setbacks for the poor. Poverty reduction stalled in the late 1980s and early 1990s, recovered pace in the mid-1990s, but stalled again in the late 1990s. Half of the decline in poverty came in the first few years of the 1980s. Some provinces saw far more rapid progress against poverty than others.

Finding 2: Inequality has been rising, though not continuously and more so in some periods and provinces. In marked contrast to most developing countries, relative inequality is higher in China's rural areas than in urban areas. However, there has been convergence over time with a steeper increase in inequality in urban areas. Relative inequality between urban and rural areas has not shown a trend increase once one allows for the higher rate of increase in the urban cost of living. Absolute inequality has increased appreciably over time between and within both urban and rural areas, and absolute inequality is higher in urban areas.

Finding 3: The pattern of growth matters. While migration to urban areas has helped reduce poverty nationally, the bulk of the reduction in poverty came from within rural areas. Growth in the primary sector (primarily agriculture) did more to reduce poverty and inequality than either the secondary or tertiary sectors. Starting in 1981, if the same aggregate growth rate had been balanced across sectors, it would have taken 10 years to bring the poverty rate down to 8%, rather than 20 years. The geographic composition of growth also mattered. While provinces with higher rural income growth tended to have higher poverty reduction, growth did not tend to be higher in the provinces where it would have had the most impact on poverty nationally. The pattern of growth mattered to the evolution of overall inequality. Rural and (in particular) agricultural growth brought inequality down. Rural economic growth reduced inequality in both urban and rural areas, as well as between them.

Finding 4: Inequality has emerged as a concern for both growth and poverty reduction. With the same growth rate and no rise in inequality in rural areas alone, the number of poor in China would be less than one-quarter of its actual value (a poverty rate in 2001 of 1.5% rather than 8%). This calculation would be deceptive if the rise in inequality was the "price" of high economic growth, which did help reduce poverty. However, we find no evidence of such an aggregate trade off. The periods of more rapid growth did not bring more rapid increases in inequality. Nor did provinces with more rapid rural income growth experience a steeper increase in inequality. Thus the provinces that saw a more rapid rise in inequality saw less progress against poverty, not more. Over time, poverty has also become far more responsive to the (continuing) increase in inequality. At the outset of China's current transition period, levels of poverty were so high that inequality was not an important concern. That has changed. Furthermore, even without a further rise in inequality, the historical evidence suggests that more unequal provinces will face a double handicap in future poverty reduction; they will have lower growth and poverty will respond less to that growth.

2. Data on income poverty and inequality in China

We draw on the Rural Household Surveys (RHS) and the Urban Household Surveys (UHS) of China's National Bureau of Statistics (NBS).[2] NBS ceased doing surveys during the Cultural Revolution in 1966-76 and stated afresh in 1980 (for rural areas) and 1981 (urban). While virtually all provinces were included from the outset, 30% had sample sizes in the early surveys that NBS considered too small for estimating distributional statistics (though still adequate for the mean). However, this does not appear to be a source of bias; we could not reject the null hypothesis that the first available estimates of our poverty measures were the same for these "small sample" provinces as the rest.[3] While sample sizes for the early surveys were smaller, they are still adequate for measuring poverty; 16,000 households were interviewed for the 1980 RHS and about 9,000 for the 1981 UHS. Since 1985, the surveys have had nationally representative samples of about 70,000 in rural areas and 30-40,000 in urban areas.

An unusual feature of these surveys is that their sample frames are based on China's registration system rather than the population census. This means that someone with rural

[2] On the history and design of these surveys see Chen and Ravallion (1996) and Bramall (2001).

[3] Included provinces had a poverty rate by our main poverty lines that was 1.9% points higher, but this is not significantly different from zero (t-ratio=0.32). This held for all other poverty measures.

registration who has moved to an urban area is effectively missing from the sample frame. Migrants from rural areas gain from higher earnings (the remittances back home are captured in the RHS), but are probably poorer on average than registered urban residents. Against this likely source of downward bias in poverty estimates from the UHS, the UHS income aggregates do not capture fully the value of the various entitlements and subsidies received exclusively by urban residents, though these appear to be of declining importance over time.

While NBS has selectively made the micro data (for some provinces and years) available to outside researchers, the complete micro data are not available to us for any year. Instead we use tabulations of the distribution of income. The majority of these tabulated data are unpublished and were provided by NBS.[4] The income aggregates include imputed values for income from own-production, but exclude imputed rents for owner-occupied housing. (Imputation is difficult, given the thinness of housing markets.) The usual limitations of income as a welfare indicator remain. For example, our measures of inequality between urban and rural residents may not adequately reflect other inequalities, such as in access to public services (health, education, water and sanitation — all of which tend to be better provided in urban areas).

There was a change in the methods of valuation for consumption of own-farm production in the RHS in 1990 when public procurement prices were replaced by local selling prices.[5] To help us correct for this problem, NBS provided tabulations of the distribution in 1990 by both methods, allowing us to estimate what the income distributions for the late 1980s would have

---

[4] There are a number of tabulations in the NBS Statistical Yearbook, but they only provide the percentages of households in each income class; without the mean income for each income class and mean household size these tabulations are unlikely to give accurate estimates of the Lorenz curve. Some of these data are available in the Provincial Statistical Yearbooks or the Household Survey Yearbooks.

[5] Past estimates have used the "old prices" for the 1980s and the "new prices" for 1990 onwards, ignoring the change. Chen and Ravallion (1996) created a consistent series for 1985-90 for the micro data for a few provinces. However, this is not feasible without the complete micro data.

looked like if NBS had used the new valuation method. The Appendix describes the correction method in detail. Our corrections entail lower poverty measures in the late 1980s.

In measuring poverty from these surveys, we use two poverty lines. One is the long-standing "official poverty line" for rural areas of 300 Yuan per person per year at 1990 prices. (There is no comparable urban poverty line.) It has been argued by many observers that this line is too low to properly reflect prevailing views about what constitutes "poverty" in China. It can hardly be surprising that in such a rapidly growing economy, perceptions of what income is needed to not be considered poor will rise over time.[6]

In collaboration with the authors, NBS has been developing a new set of poverty lines that appears to better reflect current conditions. Region-specific food bundles are used, with separate food bundles for urban and rural areas, valued at median unit values by province. The food bundles are based on the actual consumption bundles of those between the poorest 15th percentile and the 25th percentile nationally. These bundles are then scaled to reach 2100 calories per person per day, with 75% of the calories from foodgrains.[7] Allowance for non-food consumption are based on the nonfood spending of households in a neighborhood of the point at which total spending equaled the food poverty line in each province (and separately for urban and rural areas). The methods closely follow Chen and Ravallion (1996) and Ravallion (1994).

For measuring poverty nationally we have simply used the means of these regional lines. With a little rounding off, we chose poverty lines of 850 Yuan per year for rural areas and 1200 Yuan for urban areas, both in 2002 prices. (Ideally one would build up all national poverty

---

6 Poverty lines across countries tend to be higher the higher the mean income of the country, though with an initially low elasticity at low income (Ravallion, 1994).

7 Without the latter condition, the rural food bundles were deemed to be nutritionally inadequate (in terms of protein and other nutrients) while the urban bundles were considered to be preferable. The condition was binding on both urban and rural bundles.

measures by applying the regional poverty lines to the provincial distributions and then aggregating. However, this would entail a substantial loss of information given that we have only 10-12 years of rural data at province level.) We use the 2002 differential between the urban and rural lines to calculate an urban equivalent to the 300 Yuan rural line. Finally, we convert to prices at each date using the rural and urban Consumer Price Indices produced by NBS.

We also use these urban and rural poverty lines as deflators for urban-rural cost-of-living (COL) adjustments in forming aggregate inequality measures and for measuring inequality between urban and rural areas. Past work in the literature on inequality in China has ignored the COL difference between urban and rural areas, and we will see that this does matter. However, our COL adjustments are not ideal, in that a common deflator is applied to all levels of income.

We provide three poverty measures: The headcount index (H) is the percentage of the population living in households with income per person below the poverty line. The poverty gap index (PG) gives the mean distance below the poverty line as a proportion of the poverty line (where the mean is taken over the whole population, counting the non-poor as having zero poverty gaps.) The third measure is the squared poverty gap index (SPG), in which the individual poverty gaps are weighted by the gaps themselves, so as to reflect inequality amongst the poor (Foster et al., 1984). For all three, the aggregate measure is the population-weighted mean of the measures found across any complete partition of the population into subgroups. Datt and Ravallion (1992) describe our methods for estimating the Lorenz curves and calculating these poverty measures from the grouped data provided by the NBS tabulations.

3. Poverty measures for China 1981-2001

It can be seen from Table 1 that the (census-based) urban population share rose from 19% in 1980 to 39% in 2002. This may be a surprisingly high pace of urbanization, given that there were governmental restrictions on migration (though less so since the mid-1990s). For example, in India (with no such restrictions) the share of the population living in urban areas increased from 23% to 28% over the same period. We do not know how much this stemmed from urban expansion into rural areas versus rural-urban migration.

The cost-of-living differential in Table 1 rises over time, from 19% to 41% in 2002. This reflects the fact that the urban inflation rate is higher than the rural rate; the index at base 1980 (=100) had risen to 438 in urban areas by 2001 versus 368 in rural areas.[8] This divergence between urban and rural inflations rates started in the mid-1980s and undoubtedly reflects the rising costs of urban goods that had been subsidized in the pre-reform economy.

Table 1 also gives our estimates of mean income for rural and urban areas. The large disparities in mean incomes between urban and rural areas echo a well-known feature of the Chinese economy, though our COL adjustment narrows the differential considerably.[9] We will return in section 5 to discuss the implications for urban-rural inequality.

Table 2 gives our rural poverty measures. Table 3 gives our estimates for urban areas, and Table 4 gives the national aggregates. Figure 1 plots the national headcount indices for both poverty lines. By the new lines, the headcount index falls from 53% in 1981 to 8% in 2001. Conservatively assuming the 1981 urban number for 1980, the national index was 62% in 1980.

For all years and all measures, rural poverty incidence exceeds urban poverty, and by a wide margin. Rural poverty measures show a strong downward trend, though with some reversals, notably in the late 1980s, early 1990s and in the last two years of our series. The urban measures also show a trend decline, though with even greater volatility.

---

[8] While there is a high correlation between the urban population share and the urban-rural COL differential, this appears to be spurious; there is no correlation between the changes over time.

[9] Since the latter adjustment is based on the poverty lines, it may not be appropriate for the mean (at least toward the end of the period). But it is our best available option.

There was more progress in some periods than others. There was a dramatic decline in poverty in the first few years of the 1980s, coming from rural areas. By our new poverty line, the rural poverty rate fell from 76% in 1980 to 23% in 1985. The late 1980s and early 1990s were a difficult period for China's poor. Progress was restored around the mid-1990s, though the late 1990s saw a marked deceleration, with signs of rising poverty in rural areas.[10]

We can decompose the change in national poverty into a "population shift effect" and a "within sector" effect.[11] Letting P_t denote the poverty measure for date *t*, while P_t^i is the measure for sector *i=u,r* (urban, rural), with corresponding population shares n_t^i, we can write an exact decomposition of the change in poverty between *t*=1981 and *t*=2001 as:

$$P_{01} - P_{81} = \underbrace{[n_{01}^r(P_{01}^r - P_{81}^r) + n_{01}^u(P_{01}^u - P_{81}^u)]}_{\textit{Within-sector effect}} + \underbrace{[(P_{81}^u - P_{81}^r)(n_{01}^u - n_{81}^u)]}_{\textit{Population shift effect}} \qquad (1)$$

The within-sector effect is the change in poverty weighted by final year population shares while the population shift effect measures the contribution of urbanization, weighted by the initial urban-rural difference in poverty measures. The "population shift effect" should be interpreted as the partial effect of urban-rural migration, in that it does not allow for any effects of migration on poverty levels within urban and rural areas.

Table 5 gives this decomposition. We find that the national headcount index fell by 45% points, of which 35% points were accountable to the within-sector term; within this, 33% points was due to falling poverty within rural areas while only 2% was due to urban areas. The population shift from rural to urban areas accounted for 10% points. The other poverty measures tell a very similar story, though the rural share is slightly higher for SPG than PG, and lowest for

[10] Using different measures and data sources, Benjamin et al., (2003) also find signs of falling living standards amongst the poorest in rural China in the late 1990s.

[11] This is one of the decompositions for poverty measures proposed by Ravallion and Huppi (1991).

H. As can be seen from the lower panel of Table 5, the pattern is also similar for the period 1991-2001, the main difference being that the "within-urban" share falls to zero using the old poverty line, with the rural share rising to around 80%.

So we find then that 75-80% of the drop in national poverty incidence is accountable for poverty reduction within the rural sector; most of the rest is attributable to urbanization. Understanding what has driven rural poverty reduction is clearly of first-order importance to understanding the country's overall success against poverty.

4. Poverty reduction and economic growth

The rate of economic growth is a key proximate determinant of China's diverse performance over time against poverty. The regression coefficient of the log national headcount index on the log national mean is –1.43, with a t-ratio of 15.02. However, this regression is deceptive, given that both series are nonstationary; the residuals show strong serial dependence (the Durbin-Watson statistics is 0.62). Differencing the series deals with this problem.[12] Table 6 gives regressions of the log difference in each poverty measure against the log difference in mean income per capita. (All growth rates in this paper are annualized log differences.) There is a possible upward bias in the OLS estimates stemming from common measurement errors in the dependent and independent variable; when the mean is overestimated the poverty measure will be underestimated. Following Ravallion (2001) we use the GDP growth rate as the instrument for the growth rate in mean income from the surveys, under the assumption that measurement errors in the two data sources are uncorrelated. (China's national accounts have been based

[12] The correlograms of the first differences of the three log poverty measures shows no significant autocorrelations. While the first difference of the log mean still shows mild positive serial correlation, the residuals of the regression of the log difference of the poverty measure on the on the log difference of the mean shows no sign of serial correlation.

largely on administrative data.) Both the OLS and IVE results in Table 6 confirm studies for other countries indicating that periods of higher economic growth tended to be associated with higher rates of poverty reduction.[13] The implied elasticity of poverty reduction to growth is over three for the headcount index and around four for the poverty gap measures. The IVE elasticity is similar to that for OLS, suggesting that the aforementioned problem of correlated measurement errors is not a serious source of bias.

Notice that the intercepts are positive and significant in Table 6. Our OLS results imply that at zero growth, the headcount index would have risen at 11% per year (16% for PG and 19% for SPG). So falling poverty in China has been the net outcome of two strong but opposing forced: rising inequality and positive growth.

We also give regressions in Table 6 that include the rate of change in inequality. It is unsurprising that this has a strong positive effect on poverty. (The regression can be viewed as a log-linear approximation of the underlying mathematical relationship between a poverty measure and the mean and distribution on which that measure is based.) What is more interesting is that there is evidence of a strong time trend in the impact of inequality, as indicated by the positive interaction effect between time and the change in inequality (Table 6). Poverty in China has become more responsive to inequality over this period. Indeed, the size of the interaction effect in Table 6 suggests that the elasticity of poverty to inequality was virtually zero around 1980, but the elasticity rose to 3.7 in 2001 for the headcount index and 5-6 for the poverty gap measures.

While China's economic growth has clearly played an important role in the country's long-term success against absolute poverty, the data suggest that the sectoral composition of

---

13 Evidence on this point for other countries can be found in Ravallion (2001).

growth has mattered.[14] This can be seen clearly if we decompose the growth rates by income components. Consider first the urban-rural decomposition for the survey mean. The overall mean at date *t* is $\mu_t = n_t^r \mu_t^r + n_t^u \mu_t^u$ where μ_t^i is the mean for sector *i*=*r*,*u* for rural and urban areas. It is readily verified that the growth rate in the overall mean can be written as $\Delta \ln \mu_t = s_t^r \Delta \ln \mu_t^r + s_t^u \Delta \ln \mu_t^u + [s_t^r - s_t^u (n_t^r / n_t^u)] \Delta \ln n_t^r$ where $s_t^i = n_t^i \mu_t^i / \mu_t$ (for *i*=*r*,*u*) is the income share. We can thus write down the following regression for testing whether the composition of growth matters:

(2) $$\Delta \ln P_t = \eta_0 + \eta^r s_t^r \Delta \ln \mu_t^r + \eta^u s_t^u \Delta \ln \mu_t^u + \eta^n (s_t^r - s_t^u . \frac{n_t^r}{n_t^u}) \Delta \ln n_t^r + \varepsilon_t$$

where ε_t is a white-noise error term. The motivation for writing the regression this way is evident when one notes that if the η^i (*i*=*r*,*u*,*n*) parameters are the same then equation (2) collapses to a simple regression of the rate of poverty reduction on the rate of growth ($\Delta \ln \mu_t$). Testing H_0: $\eta^i = \eta$ for all *i* tells us whether the urban-rural composition of growth matters. Note that this regression decomposition is based on somewhat different assumptions to that used in equation (1). In particular, any systematic within-sector distributional effects of urbanization would now change the measured contribution to poverty.

Table 7 gives the results for all three poverty measures. The null hypothesis that $\eta^i = \eta$ for all *i* is convincingly rejected in all three cases. Furthermore, we cannot reject the null that only the growth rate of rural incomes matters.

---

[14] The literature has often emphasized the importance of the sectoral composition of growth to poverty reduction; for an overview of the arguments and evidence see Lipton and Ravallion (1995). The following analysis follows the methods introduced in Ravallion and Datt (1996), which found that the composition of growth mattered to poverty reduction in India.

A second decomposition is possible for GDP per capita which we can divide into n sources to estimate a test equation of the following form:

$$\Delta \ln P_t = \pi_0 + \sum_{i=1}^{n} \pi_i s_{it} \Delta \ln Y_{it} + \varepsilon_t \tag{3}$$

where Y_{it} is GDP per capita from source i, $s_{it} = Y_{it} / Y_t$ is the source's share, and ε_t is a white-noise error term. In the special case in which $\pi_i = \pi$ for i=1,..,n, equation (3) collapses to a simple regression of the rate of poverty reduction on the rate of GDP growth ($\Delta \ln Y_t$).

With only 21 observations over time there are limits on how far we can decompose GDP. We used a standard classification of its origins, namely "primary" (mainly agriculture), "secondary" (manufacturing and construction) and "tertiary" (services and trade). Figure 2 shows how the shares of these sectors evolved over time. The primary sector's share fell from 30% in 1980 to 15% in 2001, though not montonically. Almost all of this decline was made up for by an increase in the tertiary-sector share. However, it should not be forgotten that these are highly aggregated GDP components; the near stationarity of the secondary sector share reflects the net effect of both contracting and expanding manufacturing sectors.

Table 8 gives the estimated test equations for H and PG, while Table 9 gives the results for SPG (for which a slightly different specification is called for, as we will see). We find that the sectoral composition of growth matters to the rate of poverty reduction. The primary sector has far higher impact (by a factor of about four) than either the secondary or tertiary sectors. The impacts of the latter two sectors are similar (and we cannot reject the null that they have the same impact). For SPG we cannot reject the null hypothesis that only the primary sector matters and Table 9 gives the restricted model for this case. Our finding that the sectoral composition of growth matters echoes the findings of Ravallion and Datt (1996) for India, though tertiary sector growth was relatively more important in India than we find for China.

These aggregate results do not tell us about the source of the poverty-reducing impact of primary sector growth. With a relatively equitable distribution of access to agricultural land and higher incidence and depth of poverty in rural areas it is plausible that agricultural growth will bring large gains to the poor. There is evidence for China that this may also involve external effects at the farm-household level. One important source of externalities in rural development is the composition of economic activity locally. In poor areas of southwest China, Ravallion (2004) finds that the composition of local economic activity has non-negligible impacts on consumption growth at the household level. There are significant positive effects of local economic activity in a given sector on income growth from that sector. And there are a number of significant cross-effects, notably from farming to certain nonfarm activities. The sector that matters most as a generator of positive externalities turns out to be agriculture (Ravallion, 2004).

A natural counterfactual for measuring the contribution of the sectoral composition of growth is the rate of poverty reduction if all three sectors had grown at the same rate. We call this "balanced growth." Then the sector shares of GDP in 1981 would have remained constant over time, with 32% of GDP originating from the primary sector. From Table 8, the expected rate of change in the headcount index, conditional on the overall GDP growth rate, would then have been $0.155 - 4.039\Delta \ln Y_t$ (where 4.039=0.32 x 7.852 + 0.68 x 2.245, based on Table 8). For the same GDP growth rate, the mean rate of poverty reduction would then have been 16.3% per year, rather than 9.5%. Instead of 20 years to bring the headcount index down from 53% to 8% it would have taken about 10 years.

This assumes that the same overall growth rate would have been possible with balanced growth. There may well be a trade off, arising from limited substitution possibilities in production and rigidities in some aggregate factor supplies; or the trade-off could stem from aggregate fiscal constraints facing the government in supplying key public infrastructure inputs to private production. It is suggestive in this respect that there is a correlation of –0.414 between the two growth components identified from Table 8, $s_{1t}\Delta \ln Y_{1t}$ and $s_{2t}\Delta \ln Y_{2t} + s_{3t}\Delta \ln Y_{3t}$. However, this correlation is only significant at the 6% level, and it is clear that there were sub-periods (1983-84, 1987-88 and 1994-96) in which both primary sector growth and combined growth in the secondary and tertiary sectors were both above average.

We have seen that growth accounts for a sizeable share of the variance in rates of poverty reduction. When measured by survey means, growth accounts for about half of the variance. When measured from the national accounts, growth account for one fifth of the variance, though the share of variance explained is doubled when we allow for the sectoral composition of growth, with the primary sector emerging as far more important than the secondary or tertiary sectors (though again there may well be heterogeneity within these broad sectors).

5. Inequality and growth

The literature has provided numerous partial pictures of inequality in China, focusing on sub-periods (the longest we know of is for 1985-95, in Kanbur and Zhang, 1999) and/or sub-sectors or selected provinces. As we will see, these partial pictures can be deceptive. We begin by considering inequality between urban and rural sectors; then within sectors and in the aggregate. Finally we turn to the relationship between inequality and growth.

Has inequality risen between urban and rural areas? Figure 3 gives the ratio of the urban mean income to the rural mean. Without our adjustment for the cost-of-living difference, there is a significant positive trend in the ratio of urban to rural mean income. The regression coefficient of the ratio of means on time is 0.047, with a t-ratio of 3.12 (this is corrected for serial correlation in the error term). However, when using the COL adjusted means the coefficient drops to 0.021 and is not significantly different from zero at the 5% level (t=1.79). Notice also that there are still some relatively long sub-period trends in which the ratio of the urban to the rural mean was rising. This includes the period 1986 to 1994 studied by Yang (1999) who argued that there was a rising urban-rural disparity in mean incomes in post-reform China. However, this is clearly not a general feature of the post-reform period. Indeed, the ratio of means fell sharply in the mid-1990s, though re-bounding in the late 1990s.

There is a trend increase in absolute inequality between urban and rural areas. This can be measured by the absolute difference between the urban and rural means, as given in Figure 4 (normalized by the 1990 national mean). The trend in the absolute difference (again calculated as the regression coefficient on time) is 0.044 per year, with a t-ratio of 3.40 (again corrected for serial correlation in the error term). However, here too there were periods that went against the trend, including in the early 1980s and mid-1990s.

Turning to inequality within urban and rural areas, we find trend increases, though rural inequality fell in the early 1980s and again in the mid-1990s (Table 10). In marked contrast to most developing countries, relative income inequality is higher in rural areas, though the rate of increase in inequality is higher in urban areas; it looks likely that the pattern in other developing countries will emerge in China in the near future. Notice also that there appears to be a common factor in the changes in urban and rural inequality; there is a correlation of 0.69 between the first difference in the log rural Gini index and that in the log urban index. We will return to this.

In forming the national Gini index in Table 10 we have incorporated our urban-rural cost of living adjustment. The table also gives the unadjusted estimates (as found in past work). As one would expect, national inequality is higher than inequality within either urban or rural areas. And allowing for the higher cost-of-living in urban areas reduces measured inequality. By 2001, the COL adjustment brings the overall Gini index down by over five percentage points. While a trend increase in national inequality is evident (Figure 5), the increase is not found in all sub-periods: inequality fell in the early 1980s and the mid-1990s.

The rise in inequality is even more pronounced. Figure 6 gives the absolute Gini index, in which income differences are normalized by a fixed mean (for which we use the 1990 national mean). (The absolute Gini calculated this way is not bounded above by unity.) It is also notable that while relative inequality is higher in rural areas than urban areas, this reverses for absolute inequality, which is higher in urban areas at all dates.

Higher inequality greatly dampened the impact of growth on poverty. On re-calculating our poverty measures using the 2001 rural mean applied to the 1981 Lorenz curve, we find that the incidence of poverty in rural areas (by our upper line) would have fallen to 2.04% in 2001, instead of 12.5%. The rural PG would have fallen to 0.70% (instead of 3.32%) while the SPG would have been 0.16 (instead of 1.21). Repeating the same calculations for urban areas, poverty would have virtually vanished. But even with the same urban poverty measures for 2001 (so letting inequality within urban areas rise as it actually did), the national incidence of poverty would have fallen to 1.5% without the rise in rural inequality.

This begs the question of whether the same growth rate would have been possible without the rise in inequality. If de-controlling China's economy inevitably put upward pressure on inequality then we would be underestimating the level of poverty in 2001 that would have been observed without the rise in rural inequality, because the lower inequality would have come with a lower mean.

Inequality has certainly risen over time, in line with mean income. The regression coefficient of the Gini index on GDP per capita has a t-ratio of 9.22 (a correlation coefficient of 0.90). But this correlation is probably spurious; the Durbin-Watson statistic is 0.45, indicating strong residual auto-correlation. This is not surprising since both inequality and mean income have strong trends, though possibly associated with different causative factors.

A better test is to compare the growth rates with changes in inequality over time.[15] Then it becomes far less clear that higher inequality has been the price of China's growth. The correlation between the growth rate of GDP and log difference in the Gini index is –0.05. Now the regression coefficient has a t-ratio of 0.22 (and a Durbin-Watson of 1.75). This test does not suggest that higher growth *per se* meant a steeper rise in inequality.

The same conclusion is reached if instead of using annual data we divide the series into four sub-periods according to whether inequality was rising or falling at national level, as in Table 11. If there was an aggregate growth-equity trade-off then we would expect to see higher growth in the period in which inequality was rising. This is not the case; indeed; the two periods with highest growth were when inequality was falling.

These calculations do not reveal any sign of a short-term trade off between growth and equity. Possibly these time periods are too short to capture the effect. Another test is to see whether the provinces that had higher growth rates saw higher increases in inequality; we return to that question in section 7.

---

[15] There is still positive first-order serial correlation of 0.48 in the first difference of log GDP though the regression of the first difference of log Gini on log GDP shows no sign of serial correlation in the residuals. So the differenced specification is appropriate.

What role has the sectoral composition of growth played in the evolution of inequality?[16] Repeating our test based on equation (2) but this time using changes in the log Gini index as the dependent variable we find strong evidence that the urban-rural composition of growth matters to the evolution of the Gini index:

(4) $$\Delta \ln G_t = \underset{(1.285)}{0.020} - \underset{(-4.399)}{0.511}\, s_t^r \Delta \ln \mu_t^r + \underset{(2.651)}{0.466}\, s_t^u \Delta \ln \mu_t^u - \underset{(-0.208)}{0.366}[s_t^r - s_t^u (n_t^r / n_t^u)]\Delta \ln n_t^r + \hat{\varepsilon}_t^G$$

R^2=0.622; n=20

There is no sign of a population shift effect on aggregate inequality and the rural and urban coefficients add up to about zero. The joint restrictions $\eta^r + \eta^u = 0$ and $\eta^n = 0$ (borrowing the notation of equation 2) pass comfortably, giving the rate of change in inequality as an increasing function of the difference in (share-weighted) growth rates between urban and rural areas:

(5) $$\Delta \ln G_t = \underset{(2.507)}{0.015} + \underset{(5.405)}{0.499}(s_t^u \Delta \ln \mu_t^u - s_t^r \Delta \ln \mu_t^r) + \hat{\varepsilon}_t^G \quad R^2=0.619;\ n=20$$

If instead one looks at the components of China's GDP by origin, one finds that primary sector growth has been associated with lower inequality overall, while there is no correlation with growth in either the secondary or tertiary sectors. This can be seen from Table 12.

It is clear that an important channel through which primary sector growth has been inequality reducing is its effect on the urban-rural income disparity. There is a negative correlation between primary sector growth and the changes in the (log) ratio of urban to rural mean income; the correlation is strongest if one lags primary sector growth by one period, giving the following OLS regression for the log of the ratio of urban mean ($\overline{Y}_t^u$) to rural mean ($\overline{Y}_t^r$):

(6) $$\Delta \ln(\overline{Y}_t^u / \overline{Y}_t^r) = \underset{(2.657)}{0.044} - \underset{(-3.802)}{0.969}\, \Delta \ln Y_{1t-1} + \hat{\varepsilon}_t^Y \quad R^2=0.437;\ n=20$$

---

16 The literature on inequality and development has emphasized the importance of the sectoral composition of growth (see, for example, Bourguignon and Morrison, 1998).

Primary sector growth has also brought lower inequality within rural areas. At the same time, secondary sector growth has been inequality increasing within rural areas:[17]

(7) $$\Delta \ln G_t^r = \underset{(1.892)}{0.010} - \underset{(-4.516)}{0.219}(\Delta \ln Y_{1t} - \Delta \ln Y_{2t}) + \hat{\varepsilon}_t^r \quad R^2=0.346;\ n=21$$

Both secondary and tertiary sector growth were inequality increasing in urban areas, but there is no sign of an effect from primary sector growth (the bulk of which stems from rural areas). The secondary and tertiary effect is strongest with a one year lag, but is no different between the two sectors when share-weighted, giving a simple regression for the rate of change in urban inequality:[18]

(8) $$\Delta \ln G_t^u = -\underset{(-2.078)}{0.064} + \underset{(2.989)}{1.340}(s_{2t-1}\Delta \ln Y_{2t-1} + s_{3t-1}\Delta \ln Y_{3t-1}) + \hat{\varepsilon}_t^u \quad R^2=0.396;\ n=21$$

An alternative perspective on the pattern of growth is found in the survey means. Table 13 gives regressions of the log difference of the Gini index by urban and rural areas on the growth rates (log differences) of both rural and urban mean incomes. We find that growth in rural incomes is inequality reducing nationally, and this is so in both urban and rural areas. However, there is a strong and roughly offsetting lagged effect in rural areas, suggesting that it is the positive (negative) shocks to rural incomes that reduce (increase) inequality. Growth in urban incomes is inequality increasing in the aggregate and within urban areas, but not rural areas. This echoes the results of Ravallion and Datt (1996) for India.

What then is driving the co-movement of inequality between urban and rural areas? The answer appears to lie in the role of rural incomes. As we have seen, for both urban and rural areas, the first differences in the log Gini index are negatively correlated with rural income

---

17 The homogeneity restriction in the following regression passes comfortably; if one adds $\Delta \ln Y_{2t}$ to this regression its coefficient has a t-ratio of 0.45.

18 There is (negative) first-order serial correlation in the residuals of this regression. Correcting for this, the slope coefficient falls to 0.974, though the standard error falls more (giving a t-ratio of 3.942).

growth. The regression residuals for the changes in rural inequality in Table 13 show no significant correlation with those for urban inequality.[19]

6. Economy-wide policies and income distribution

The early 1980s saw high growth in primary sector output and rapid rural poverty reduction in the wake of de-collectivization and the privatization of land-use rights under the "household responsibility system." (Agricultural land had previously been farmed by organized brigades, in which all members shared the output more-or-less equally.) The literature has pointed to the importance of these reforms in stimulating rural economic growth at the early stages of China's transition (Fan, 1991; Lin, 1992; Chow, 2002). Since this was a one-off event, we cannot test its explanatory power against alternatives. However, it would appear reasonable to attribute the bulk of rural poverty reduction between 1981 and 1985 to this set of agrarian reforms. The rural headcount index fell from 64.7% in 1981 to 22.7% in 1985 (Table 2). After weighting by the rural population shares, this accounts for 77% of the decline in the national poverty rate between 1981 and 2001. Even if other factors accounted for (say) one third of the drop in rural poverty over 1981-85, we are left with the conclusion that China's agrarian reforms in the early 1980s accounted for half of the total decline in poverty over this 20 year period.

Agricultural pricing policies have also played a role. Until recently, the government has operated a domestic foodgrain procurement policy by which farmers are obliged to sell fixed quotas to the government at prices that are typically below the local market price. For some farmers this is an infra-marginal tax, given that they produce more foodgrains than their assigned

[19] Rural economic growth as measured from the surveys does a better job in accounting for the correlation between changes in urban and rural Gini indices than does primary sector GDP growth.

quota; for others it will affect production decisions at the margin. It has clearly been unpopular with farmers (see, for example, Kung's, 1995, survey of Chinese farmers' attitudes.)

Reducing this tax by raising procurement prices stimulated primary sector GDP. We find a strong correlation between the growth rate of primary sector output and the real procurement price of foodgrains (nominal price deflated by the rural CPI); see Figure 7. There is both a current and lagged effect; an OLS regression of the growth rate in primary sector GDP on the current and lagged rates of change in the real procurement price (*PP*) gives:

(9) $$\Delta \ln Y_{1t} = \underset{(5.937)}{0.045} + \underset{(2.152)}{0.210} \Delta \ln PP_t + \underset{(3.154)}{0.315} \Delta \ln PP_{t-1} + \hat{\varepsilon}_t \quad R^2{=}0.590;\ \text{D-W}{=}2.60;\ n{=}19$$

It is not then surprising that we find a strong negative correlation between the changes in the government's procurement price and changes in inequality; Figure 8 plots the two series (lagging the procurement price change by one year); the simple correlation coefficient is –0.609.

Cutting this tax has thus been an effective short-term policy against poverty. The regression coefficient of $\Delta \ln H_t$ on $\Delta \ln PP_{t-1}$ is –1.060 (t-ratio=3.043). The channel for this effect was through agricultural incomes, which (as we have seen) responded positively to higher procurement prices. (The regression coefficient changes little if one adds controls for secondary and tertiary sector growth.) The elasticities of national poverty to procurement price changes are even higher for the poverty gap indices; for PG the regression coefficient (of log differences on log differences) is –1.433 (t=2.929) and for SPG it is even higher at –1.708 (t=3.134).

Two other types of economy-wide policies have been identified as relevant to poverty in the literature, namely macroeconomic stabilization and trade reform. A number of studies in other developing countries have found evidence that inflation hurts the poor, including Easterly and Fischer (2001) and Dollar and Kraay (2002) both using cross-country data, and Datt and Ravallion (1998) using data for India. There were two inflationary periods in China, 1988-89 and 1994-95. Poverty rose in the former period and fell in the latter. However, when one controls for procurement price changes we find an adverse effect of lagged changes in the rate of inflation for all three poverty measures; for the headcount index:

(10) $$\Delta \ln H_t = -\underset{(-3.058)}{0.082} - \underset{(-3.688)}{1.257}\,\Delta \ln PP_{t-1} + \underset{(2.493)}{1.249}\,\Delta^2 \ln CPI_{t-1} + \hat{\varepsilon}_t$$ R^2=0.491; D-W=1.86; n=19

where *CPI* is the rural CPI. The regression was similar for the other poverty measures. There are also strong (pro-poor) distributional effects of procurement and inflationary shocks as can be seen by the fact that both regressors in (10) remain significant if one controls for the log difference in overall mean income:

(11) $$\Delta \ln H_t = \underset{(3.791)}{0.060} - \underset{(-8.049)}{1.040}\,\Delta \ln PP_{t-1} + \underset{(4.651)}{0.882}\,\Delta^2 \ln CPI_{t-1} - \underset{(-9.843)}{2.335}\,\Delta \ln \overline{Y}_t - \underset{(-3.775)}{0.739}\,\hat{\varepsilon}_{t-1} + \hat{\nu}_t$$
R^2=0.907; D-W=2.28; n=18

It has also been claimed that China's trade reforms helped reduce poverty (World Bank, 2002; Dollar, 2004). However, the timing does not suggest that they are a plausible candidate for explaining China's progress against poverty. Granted, trade reforms had started in the early 1980s as part of Deng Xiaoping's "Open-Door Policy" — mainly entailing favorable exchange rate and tax treatment for exporters and creation of the first special-economic zone, Shenzhen, near Hong Kong. However, the bulk of the trade reforms did not occur in the early 1980s, when poverty was falling so rapidly, but were later, notably with the extension of the special-economic zone principle to the whole country (in 1986) and from the mid-1990s, in the lead up to China's accession to the World Trade Organization (WTO); Table 14 shows that mean tariff rates fell only slightly in the 1980s and non-tariff barriers actually increased. And some of the trade policies of this early period were unlikely to have been good for either equity or efficiency.[20]

---

[20] For example, a two-tier price system allowed exporters to purchase commodities at a low planning price and then export them at a profit. For this reason, oil was a huge export item until 1986.

Nor does the times series on trade volume (the ratio of exports and imports to GDP) suggest that trade was poverty reducing, at least in the short term; the correlation between changes in trade volume and changes in the log headcount index is 0.00! Nor are changes in trade volume (current and lagged two-years) significant when added to either equations (10) or (11). Trade volume may well be endogenous in this test, though it is not clear that correcting for the bias would imply that it played a more important role against poverty. This would require that trade volume is positively correlated with the omitted variables. However, one would probably be more inclined to argue that trade volume is negatively correlated with the residuals; other (omitted) growth-promoting policies simultaneously increased trade and reduced poverty.

Other evidence, using different data and methods, also suggests that trade reform had had little impact on poverty or inequality. Chen and Ravallion (2004b) studied the household level impacts of the tariff changes from 1995 onwards (in the lead up to accession to the WTO). (The induced price and wage changes were estimated by Ianchovichina and Martin, 2004, using a CGE model.) There was a positive impact of these trade reforms on mean household income, but virtually no change in aggregate inequality and only slightly lower aggregate poverty in the short term.

7. Poverty at provincial level

So far we have focused solely on the national time series. We now turn to the less complete data available at province level. We focus solely on rural poverty. (Urban poverty incidence is so low in a number of provinces that it becomes hard to measure and explain trends.)

The series on mean rural incomes from NBS is complete from 1980. However, there are only 11-12 years of provincial distributions available. Table 15 gives summary statistics on the "initial" values of the mean, poverty and inequality. For the mean, the first observation is for

1980; for the distributional measures the first available year is 1983 in two-thirds of cases and 1988 for almost all the rest. There are marked differences in starting conditions. Even for inequality, the Gini index around the mid 1980s varied from 18% to 33% (Table 15).

Table 16 gives the trends based on the OLS estimates of $\log X_{it} = \alpha_i^X + \beta_i^X t + \nu_{it}^X$ for variable *X* and province *i*. We assume an AR(1) error term for mean income; for the (incomplete, discontinuous) distributional data we have little practical choice but to treat the error term as white noise. Trend growth rates in mean income vary from 1% per year (in Xinjiang) to almost 7% per year (in Anhui). Trends in the Gini index vary from near zero (Guangdong) to 3% (Beijing). Guangdong had an astonishing trend rate of decline in H of 29% per year. At the other extreme there are six provinces for which the trend was not significantly different from zero, namely Beijing, Tianjin, Shanghai, Yunnan, Ningxia, Xinjiang, though the first three of these started the period with very low poverty rates (Table 15).

The literature has pointed to divergence between the coastal and inland provinces.[21] This has been linked to the government's regional policies, which have favored coastal provinces through differential tax treatment and public investment. We confirm expectations that coastal provinces had significantly higher trend rates of poverty reduction.[22] The mean trend rate of decline in the headcount index was 8.43% per year for inland provinces (t=4.14) versus 16.55% for the coastal provinces (t=5.02); the t-statistic for the difference in trends is 2.10.

Poverty and growth at the provincial level

The association between rural income growth and poverty reduction is confirmed in the provincial data. Figure 9 plots the trend rate of change in the headcount index against the trend

---

[21] See Chen and Fleisher (1996), Jian et al. (1996), Sun and Dutta (1997), and Raiser (1998).

[22] The costal provinces are Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shangdong and Guangdong; following convention, we do not classify Guangxi as "coastal" though it has a costal area.

rate of growth in mean rural income across provinces. The figure also identifies the three observations with lowest initial poverty measures, for which there was also an increase (though statistically insignificant) in poverty over time, namely Beijing, Shanghai and Tianjin.

The regression coefficient of the trend in the headcount index on the trend in rural income is –1.58, which is significant at the 5% level (t = –2.05). The 95% confidence interval for the impact of a 3% growth rate on the headcount index is about (0, 9%). However, if one drops Beijing, Shanghai and Tianjin then the relationship is steeper and more precisely estimated. The regression coefficient is then –2.43 (t=4.29). The 95% confidence interval for the impact of a 3% growth rate is then about (4%,10%).

While higher growth meant a steeper decline in poverty, we see in Figure 9 considerable dispersion in the impact of a given rate of growth on poverty. This is also evident if we calculate the "growth elasticity of poverty reduction" as the ratio of the trend in the headcount index to the trend in the mean. This varies from –6.6 to 1.0, with a mean of –2.3.

What explains these diverse impacts of a given rate of growth on poverty? If inequality did not change then the elasticity will depend on the parameters of the initial distribution, roughly interpretable as the mean and "inequality." More generally, with changing distribution, the elasticity will also depend on the trend in inequality. On imposing data consistent parameter restrictions, the following regression is easily interpreted:[23]

(12) $$\beta_i^H / \beta_i^Y = (\underset{(-4.487)}{-5.935} + \underset{(2.560)}{0.0136}\, \bar{y}_{80i}^R)(1 - G_{83i}^R) + \underset{(2.392)}{1.365}\, \beta_i^G + \hat{\varepsilon}_t \quad R^2=0.386;\ n=29$$

[23] This specification is a variation on Ravallion (1997). Starting from an unrestricted regression of β^H / β^M on G_{83}^R, $\bar{y}^R$, $G_{83}^R.\bar{y}^R$ and β^G a joint F-test does not reject the null hypothesis (with prob.=0.17) that the joint restrictions hold that are needed to obtain (12) as the restricted form.

where $\bar{y}^R_{80i}$ is the initial mean for province *i* less the national mean. At zero trend in inequality and the mean residual, the elasticity is zero at $G^R_{83} = 1$ and becomes more negative as inequality falls. At $G^R_{83} = 0$, the elasticity at mean income is –6, but goes toward zero as income rises. So a given rate of growth had more impact on poverty in initially less unequal and poorer provinces.

Echoing our results using the national time series data, we find no evidence of a growth-equity trade off in the provincial data. Figure 10 plots the trends in the Gini index against the trend in the mean; the correlation coefficient is -0.188. With no evidence of an aggregate trade-off, we are drawn to conclude that rising inequality over time put a brake on the rate of poverty reduction at provincial level. Provinces with lower increases in inequality had higher rates of poverty reduction (Figure 11); the correlation coefficient is 0.517 (t=3.14).

A simple measure of the cost to the poor of rising inequality can be obtained by projecting the poverty measure in 2001 that one would have expected if the growth process had been distribution neutral, such that all levels of income grew at the same rate. Figure 12 compares this simulated poverty measure for rural areas in 2001 with the actual values.[24] The distributional shifts were poverty increasing; indeed. in 23 provinces the poverty rate in 2001 was more than three times higher than one would have expected without the rise in inequality.

One province stands out as an exception to this pattern of rising inequality, namely Guangdong (the hinterland of Hong Kong). Because inequality showed no upward trend, Guangdong was able to achieve the highest rate of poverty reduction with only a slightly above average rate of growth and despite relatively high initial inequality (Table 15).

---

24 The simulated poverty measure was obtained using the initial Lorenz curve and the 2001 mean.

How pro-poor was the geographic pattern of growth? This can be assessed by seeing whether there was higher growth in the provinces where growth had more impact on poverty nationally. Figure 13 gives the scatter plot of growth rates against the total elasticities (ratio of trend in H to trend in mean) weighted by the 1981 shares of total poverty. The weights assure that this gives the impact on national poverty of growth in a given province. It is plain that growth has not been any higher in the provinces in which it would have had the most impact on poverty nationally. This also echoes findings for India in the 1990s (Datt and Ravallion, 2002).

Explaining the provincial trends

It is instructive to see how much of the inter-provincial variance in trend rates of poverty reduction is explicable in terms of two sets of variables: (i) initial conditions related to mean incomes and their distribution, and (ii) location, notably whether the province is coastal or not (*COAST*). Guangdong is treated as a special case. In accounting for initial distribution, we include both the initial Gini index of rural incomes (G_{83}^{R}) and the initial ratio of urban mean income to rural mean (UR).[25] We postulate that these variables mattered to both the rate of growth and the growth elasticity of poverty reduction. Combining these variables, we obtain the following regression for the trend rate of change in the headcount index:[26]

$$(13)\quad \beta_i^H = \underset{(-6.239)}{-67.877} + \underset{(8.090)}{0.141}\,\overline{Y}_{80i} + \underset{(3.313)}{0.463}\,G_{83i}^{R} + \underset{(3.201)}{6.797}\,UR_i - \underset{(-5.292)}{9.291}\,COAST_i - \underset{(-15.160)}{25.012}\,GDONG_i + \hat{\varepsilon}_t$$

R^2=0.827; n=28

Initially poorer (in terms of mean income) and less unequal provinces (by both measures) had higher subsequent rates of poverty reduction. The effects are large; going from the lowest initial

---

25 This is defined as the ratio of urban mean in 1985 (the first available data point from the UHS) and the first available rural mean (in two-thirds of the cases 1983).

26 We also tried re-running this regression only using the 20 provinces for which the first year is 1983. The initial Gini index and the urban-rural income differential remained highly significant.

inequality to the highest cuts 7% points off the annual rate of poverty reduction. Controlling for the initial mean and distributional variables, being on the coast increased the trend rate of poverty reduction by 9% points; being in Guangdong raised it by (a massive) 25% points.

There are two ways in which initial inequality mattered. One is through growth; less unequal provinces had higher growth rates, consistent with a body of theory and evidence.[27] This can be seen if we switch to the trend in mean rural income as the dependent variable for equation (13), giving:

$$(14)\quad \beta_i^Y = \underset{(3.759)}{14.143} - \underset{(-1.294)}{0.007}\,\overline{Y}_{80i} - \underset{(-2.526)}{0.149}\,G_{83i}^R - \underset{(-2.682)}{1.632}\,UR_i + \underset{(0.913)}{0.507}\,COAST_i + \underset{(1.875)}{1.290}\,GDONG_i + \hat{\varepsilon}_t$$

R^2=0.423; n=28

Surprisingly, the dummy variables for coastal provinces and Guangdong are insignificant in the growth regression; their effect on poverty is largely distributional.

Secondly, initial distribution matters independently of growth, as we saw in equation (12). This is consistent with the fact that if one adds the trend rate of growth to equation (13) then both inequality measures remain significant, although the coefficients drop in size (by about one third) and the initial Gini index is only significant at the 10% level (the urban rural differential remains significant). Growth has less impact on poverty in more unequal provinces, consistent with cross-country evidence (Ravallion, 1997).

8. Conclusions

China's success against poverty since the reforms that began in 1978 is undeniable. But a closer inspection of the numbers holds some warnings for the future and some caveats on the implications for fighting poverty in the rest of the developing world.

---

27 For evidence on this point at county level for China see Ravallion (1998) and at village level see Benjamin et al., (2004); on the theory and evidence see Aghion et al., (1999) and Bardhan et al., (1999).

The specifics of the situation in China at the outset of the reform period should not be forgotten in attempting to draw implications for other developing countries. The Great Leap Forward and the Cultural Revolution had clearly left a legacy of pervasive and severe rural poverty by the mid-1970s. Yet much of the rural population that had been forced into collective farming (with weak incentives for work) could still remember how to farm individually. So there were some relatively easy gains to be had by undoing these failed policies — by de-collectivizing agriculture and shifting the responsibility for farming to households. This brought huge gains to the country's (and the world's) poorest. The halving of the national poverty rate in the first few years of the 1980s must be largely attributable to picking these "low-lying fruits" of agrarian reform. But this was a one-time reform.

An obvious, though nonetheless important, lesson for other developing countries that is well illustrated by China's experience is the need for governments to do less harm to poor people, by reducing the (explicit and implicit) taxes they face. In China's case, the government has until recently operated an extensive foodgrain procurement system that effectively taxed farmers by setting quotas and fixing procurement prices below market levels. This gave the Chinese government a powerful anti-poverty lever in the short-term, by raising the procurement price as happened in the mid-1990's, bringing both poverty and inequality down.

When so much of a country's poverty is found in its rural areas, it is not surprising that agricultural growth played such an important role in poverty reduction in China. Here too the past efficacy of agricultural growth in reducing poverty in China reflects (at least in part) an unusual historical circumstance, namely the relatively equitable land allocation that could be achieved at the time of breaking up the collectives. However, China's experience is consistent with the view that promoting agricultural and rural development is crucial to pro-poor growth in most developing countries.

We also find some support for the view that macroeconomic stability (notably by avoiding inflationary shocks) has been good for poverty reduction. The score card for trade reform is less clear. While the country's success in trade reform may well bring longer term gains to the poor — such as by facilitating more labor intensive urban economic growth — the experience of 1981-2001 does not provide support for the view that China's periods of expanding external trade brought more rapid poverty reduction.

Looking ahead, this study points to some reasons to think that it may well be more difficult for China to maintain its past rate of progress against poverty without addressing the problem of rising inequality. To the extent that recent history is any guide to the future, we can expect that the historically high levels of inequality found in many provinces today will inhibit future prospects for poverty reduction — just as we have seen how the provinces that started the reform period with (relatively) high inequality had a harder time reducing poverty. At the same time, it appears that aggregate growth is increasingly coming from sources that bring limited gains to the poorest. The low-lying fruits of efficiency-enhancing pro-poor reforms are getting scarce. Inequality is continuing to rise and poverty is becoming much more responsive to rising inequality.

It also appears that perceptions of what "poverty" means are evolving in China. It can hardly be surprising to find that the standards that defined poverty 20 years ago have lost relevance to an economy that quadrupled its mean income over that period. China could well be entering a stage of development in which relative poverty becomes a more important concern. Economic growth will then be a blunter instrument for fighting poverty in the future.

Appendix: Adjustments for the change in valuation methods in 1990

The change in valuation methods is clearly not a serious concern for the early 1980s when foodgrain markets had not yet been liberalized (Guo, 1992; Chow, 2002). Since virtually all foodgrain output was sold to the government, it would have been appropriate to value consumption from own-production at the government's procurement price. However, with the steps toward liberalization of foodgrain markets starting in 1985, a discrepancy emerged between procurement and market prices, with planning prices for foodgrain being substantially lower than market prices in the late 1980s (Chen and Ravallion, 1996).

The change in the methods of valuation for income-in-kind in 1990 (whereby planning prices were replaced by local selling prices) creates a problem in constructing a consistent series of poverty measures for China. Table A1 gives our calculations of the key summary statistics by both methods using the rural data for 1990 provided by NBS. This entailed about a 10% upward revision to NBS estimates of mean rural income and a downward revision to inequality estimates. On both counts, measured poverty fell, as can be seen by comparing the first two rows of numbers in Table A1.

To address this problem in the data for the late 1980s, we calibrated a simple "correction model" to the data for 1990. Note first that the data from the tabulations provided by NBS do not come in equal-sized fractiles. So we must first "harmonize' the data for the old and new prices. To do this we estimated parametric Lorenz curves for each distribution separately and used these to estimate the mean income of all those below each of 100 percentiles of the distribution ranked by income per person. Having lined up the distributions in common factiles, we estimated a flexible parametric model of the log ratio of mean income at new prices to that at the old prices. A cubic function of the percentile gave an excellent fit to the data, in the form of the following regression for the ratio of income valued at the new prices (*Y*(*new*)) to that at the old prices (*Y*(*old*)) (t-ratios in parentheses):

$$\text{(A1)}\quad Y(new)/Y(old) = \underset{(5421.5)}{1.19272} - \underset{(-111.8)}{0.20915}\,p + \underset{(54.5)}{0.23457}\,p^2 - \underset{(-44.9)}{0.12562}\,p^3 + \hat{\varepsilon} \quad R^2=0.99959$$

where p = cumulative proportion of the population ranked by income per person (i.e., $0<p<1$). On using this regression to estimate the distribution of income in 1990 at the new prices from that based on the old prices we obtained the estimates in the last row of Table A1. It can be seen that the estimates of summary statistics and poverty measures for the new prices accord quite closely to those obtained from the data directly.

We applied this method to estimate a corrected "as if new prices" series for the 1980s. However, since we know that foodgrain prices (as with most other consumer goods) were not freed up until 1985 we only applied this correction method to the "old price" series from 1985 onwards. It is also unlikely that this change happened overnight, so we smooth the transition in data. We do this by replacing the old price series by a weighted mean of the old price series and our estimates of what we would have obtained using new prices. The weight on the estimated new price series rises linearly over time from 0.2 in 1985 to 1.0 in 1989. This is admittedly *ad hoc*, but it seems the most defensible approach with the information available.

Figure A1 shows the effect of our correction method on the time series of headcount indices of rural poverty. Figure A2 shows the effect on the mean and Gini index.

Table A1: Performance of our adjustment method for rural China 1990

	Mean income (Yuan per person)	Gini index (%)	Headcount index (%)	Poverty gap index (%)	Squared poverty gap index (%)
Old valuation method	629.70	31.53	37.63	11.13	4.55
New method: actual	686.30	29.87	29.93	7.85	2.87
New method: Estimated using our correction model	688.05	30.05	29.86	7.86	2.88

Figure A1: Effect on headcount index of correction for the change in valuation methods

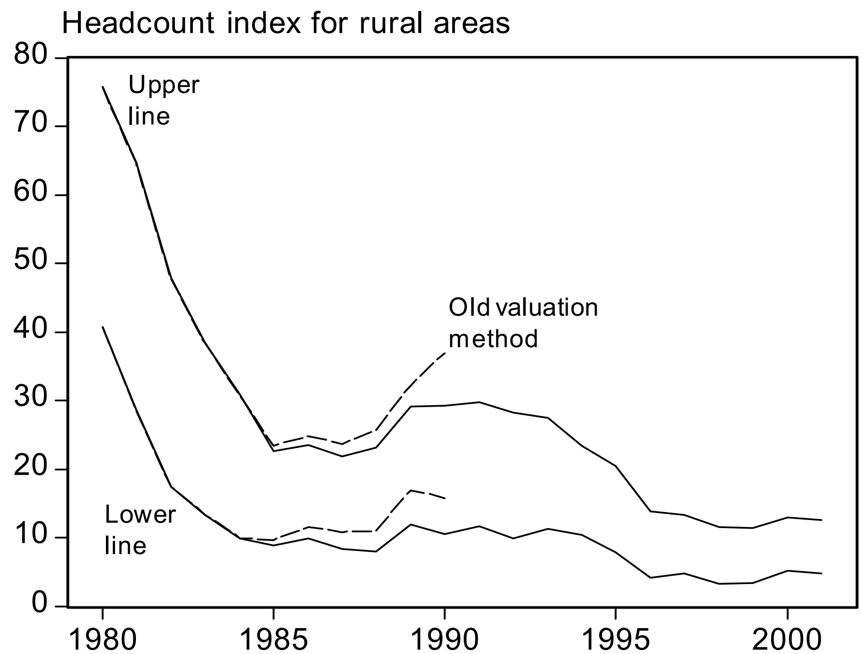
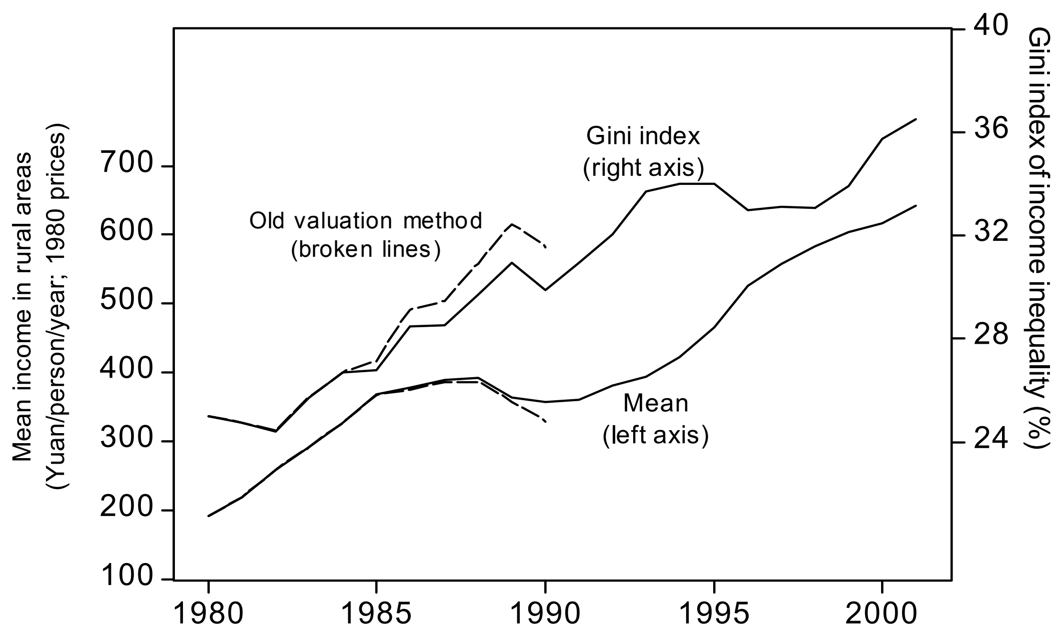


Figure A2: Effect on Gini index and mean of our corrections



References

Aghion, Philippe, Eve Caroli and Cecilia Garcia-Penalosa. 1999. "Inequality and Economic Growth: The Perspectives of the New Growth Theories", *Journal of Economic Literature* 37(4): 1615-1660.

Bardhan, Pranab, Samuel Bowles and Herbert Gintis (1999), 'Wealth Inequality, Wealth Constraints and Economic Performance,' in A.B. Atkinson and F. Bourguignon (eds) *Handbook of Income Distribution*, vol. I., Amsterdam: North-Holland.

Benjamin, Dwayne, Loren Brandt and John Giles. 2003. "The Evolution of Income Inequality in Rural China," mimeo, University of Toronto.

_______________, ___________ and _________. 2004. "The Dynamics of Inequality and Growth in Rural China: Does Higher Inequality Impede Growth?" mimeo, University of Toronto.

Bourguignon, Francois and C. Morrison. 1998. "Inequality and Development: The Role of Dualism." *Journal of Development Economics* 57 (2), 233-257.

Bramall, Chris. 2001. "The Quality of China's Household Income Survey." *China Quarterly* 167, 689-705.

Chen, Jian, and Belton M. Fleisher, 1996. "Regional Income Inequality and Economic Growth in China." *Journal of Comparative Economics,* 22: 141-164.

Chen, Shaohua and Martin Ravallion. 1996. "Data in Transition: Assessing Rural Living Standards in Southern China," *China Economic Review*, 7: 23-56.

_____________and _____________. 2004a. "How Have the World's Poorest Fared Since the Early 1980s?" *World Bank Research Observer*, forthcoming.

_____________and _____________. 2004b. "Household Welfare Impacts of WTO Accession in China." *World Bank Economic Review*, 18(1): 29-58.

Chow, Gregory C. 2002. *China's Economic Transformation*. Oxford: Blackwell Publishers.

Datt, Gaurav and Martin Ravallion. 1992. "Growth and Redistribution Components of Changes in Poverty Measures: A Decomposition with Applications to Brazil and India in the 1980s." *Journal of Development Economics*, 38: 275-295.

__________ and _____________. 1998. "Farm Productivity and Rural Poverty in India", *Journal of Development Studies* 34: 62-85.

__________ and _____________. 2002. "Has India's Post-Reform Economic Growth Left the

Poor Behind," *Journal of Economic Perspectives*, 16(3), 89-108.

Dollar, David. 2004. "Globalization, Poverty, and Inequality since 1980," Policy Research Working Paper 3333, World Bank.

Dollar, David and Aart Kraay. 2002. "Growth is Good for the Poor," *Journal of Economic Growth*, 7(3): 195-225.

Easterly, William and Stanley Fischer. 2001. "Inflation and the Poor," *Journal of Money Credit and Banking*, 33(2): 160-78.

Fan, Shenggen. 1991. "Effects of Technological Change and Institutional Reform on Growth in Chinese Agriculture," *American Journal of Agricultural Economics* 73: 266-75.

Foster, James., J. Greer, and E. Thorbecke. 1984. "A Class of Decomposable Poverty Measures", *Econometrica* 52: 761-765.

Guo, Jiann-Jong. 1992. *Price Reform in China, 1979-1986.* New York: St. Martin's Press.

Ianchovichina, Elena, and Will Martin. 2004. "Impacts of China's Accession to the WTO." *World Bank Economic Review* 18(1): 3-28.

Jian, Tianlun, Jeffrey Sachs and Andrew Warner. 1996. "Trends in Regional Inequality in China." *China Economic Review*, 7(1): 1-21.

Kanbur, Ravi and Xiaobo Zhang. 1999. "Which Regional Inequality? The Evolution of Rural-Urban and Inland-Coastal Inequality in China from 1983 to 1995," *Journal of Comparative Economics* 27: 686-701.

Khan, Azizur and Carl Riskin. 1998. "Income Inequality in China: Composition, Distribution and Growth of Household Income, 1988 to 1995." *The China Quarterly*, 154: 221-253.

Kung, James. 1995. "Equal Entitlement versus Tenure Security under a Regime of Collective Property Rights: Peasants' Preference for Institutions in Post-Reform Chinese Agriculture," *Journal of Comparative Economics* 21: 82-111.

Lin, Justin. 1992. "Rural Reforms and Agricultural Growth in China," *American Economic Review* 82: 34-51.

Lipton, Michael and Martin Ravallion. 1995. "Poverty and Policy", in *Handbook of Development Economics* Volume 3, (edited by Jere Behrman and T.N. Srinivasan) Amsterdam: North Holland.

Raiser, Martin. 1998. "Subsidizing Inequality: Economic Reforms, Fiscal Transfers and Convergence Across Chinese Provinces." *Journal of Development Studies*, 34: 1-26.

Ravallion, Martin. 1994. *Poverty Comparisons*. Harwood Academic Press, Chur, Switzerland.

______________. 1995. "Growth and Poverty: Evidence for Developing Countries in the 1980s," *Economics Letters*, 48, 411-417.

_____________ . 1997. "Can High Inequality Developing Countries Escape Absolute Poverty?", *Economics Letters*, 56, 51-57.

______________ . 1998. "Does Aggregation Hide the Harmful Effects of Inequality on Growth?" *Economics Letters*, 61(1), 73-77.

______________ . 2001. "Growth, Inequality and Poverty: Looking Beyond Averages," *World Development*, 29(11), 1803-1815.

______________, 2004, "Externalities in Rural Development: Evidence for China," in Ravi Kanbur and Tony Venables (eds) *Spatial Inequality and Development*, Oxford University Press, forthcoming.

Ravallion, Martin and Gaurav Datt. 1996. "How Important to India's Poor is the Sectoral Composition of Economic Growth?", *World Bank Economic Review*, 10: 1-26.

Ravallion, Martin and Monika Huppi. 1991. "Measuring Changes in Poverty: A Methodological Case Study of Indonesia During an Adjustment Period," *World Bank Economic Review*, 5: 57-82.

Sun, Haishun and Dilip Dutta. 1997. "China's Economic Growth During 1984-93: A Case of Regional Dualism." *Third World Quarterly*, 18(5): 843-864.

Tsui, Kai-yuen. 1998. "Trends and Inequalities in Rural Welfare in China: Evidence from Rural Households in Guangdong and Sichuan," *Journal of Comparative Economics* 26: 783-804.

United Nations Conference on Trade and Development (UNCTAD). 1994. *Directors of Import Regimes: Part 1: Monitoring Import Regimes*, UNCTAD, Geneva.

World Bank. 1997. *China 2020: Sharing Rising Income*, World Bank, Washington DC.

__________. 2000. *World Development Report: Attacking Poverty*, New York: Oxford University Press.

__________. 2002. *Globalization, Growth and Poverty*, World Bank, Washington DC.

__________. 2004. *World Development Indicators*, Washington DC: World Bank.

Yang, Dennis Tao. 1994. "Urban-Biased Policies and Rising Income Inequality in China," *American Economic Review (Papers and Proceedings)*, 89: 306-310.

Table 1: Summary statistics

	Urban pop. share (%)	Urban-rural COL diff.	Mean household income per person*			Mean (adjusted for COL differential)*	
			Rural	Urban	National	Urban	National
1980	19.39	19.35	191.33	n.a.	n.a.	n.a.	n.a.
1981	20.16	19.42	218.19	486.28	272.24	407.20	256.29
1982	21.13	19.50	258.86	514.94	312.97	430.92	295.22
1983	21.62	20.09	292.46	536.94	345.32	447.10	325.89
1984	23.01	20.03	326.35	598.46	388.96	498.59	365.98
1985	23.71	23.20	368.18	604.06	424.11	490.32	397.14
1986	24.52	26.67	377.29	686.49	453.11	541.97	417.67
1987	25.32	29.74	388.74	702.93	468.29	541.78	427.49
1988	25.81	33.30	391.83	686.51	467.89	515.01	423.62
1989	26.21	29.99	363.83	687.38	448.63	528.79	407.07
1990	26.41	25.94	357.20	744.90	459.59	591.48	419.07
1991	26.94	29.38	360.48	798.11	478.38	616.87	429.55
1992	27.46	34.23	381.03	875.78	516.89	652.44	455.56
1993	27.99	37.10	394.00	959.18	552.19	699.61	479.54
1994	28.51	38.90	423.05	1040.88	599.19	749.37	516.08
1995	29.04	38.08	465.25	1091.69	647.17	790.63	559.74
1996	30.48	39.24	526.41	1133.63	711.49	814.17	614.12
1997	31.91	40.05	557.32	1172.58	753.65	837.24	646.64
1998	33.35	40.62	582.30	1240.19	801.71	881.95	682.23
1999	34.78	40.90	604.39	1355.87	865.75	962.27	728.86
2000	36.22	42.17	616.79	1442.99	916.04	1014.95	761.00
2001	37.66	42.03	642.57	1565.20	990.03	1102.00	815.59
2002	39.09	41.18	n.a.	1775.41	n.a.	1257.58	n.a.

* Yuan/person/year at 1980 prices

Table 2: Poverty in rural China, 1980-2001

	Poverty measures (%)					
	Old poverty line			New poverty line*		
	H	PG	SPG	H	PG	SPG
1980	40.65	10.30	3.67	75.70	26.51	11.95
1981	28.62	6.84	2.35	64.67	19.99	8.44
1982	17.33	3.66	1.10	47.78	12.85	4.95
1983	13.34	2.50	0.65	38.38	9.89	3.63
1984	9.87	1.58	0.35	30.93	7.51	2.58
1985	8.82	1.46	0.34	22.67	5.23	1.71
1986	9.85	1.92	0.52	23.50	5.99	2.16
1987	8.29	1.44	0.35	21.91	5.33	1.83
1988	7.99	1.31	0.35	23.15	5.52	1.89
1989	11.88	2.38	0.66	29.17	7.98	3.05
1990	10.55	1.85	0.44	29.18	7.60	2.76
1991	11.66	2.84	1.17	29.72	8.52	3.43
1992	9.83	2.22	0.86	28.18	7.59	3.03
1993	11.29	2.42	0.71	27.40	7.84	3.13
1994	10.41	2.74	1.00	23.32	7.24	3.19
1995	7.83	2.13	1.01	20.43	5.66	2.16
1996	4.20	1.13	0.58	13.82	3.55	1.50
1997	4.83	0.80	0.18	13.33	3.45	1.23
1998	3.24	0.36	0.05	11.58	2.61	0.81
1999	3.43	0.42	0.07	11.40	2.66	0.85
2000	5.12	0.95	0.24	12.96	3.55	1.33
2001	4.75	0.81	0.19	12.49	3.32	1.21

* Poverty line is 850 Yuan per person per year in 2002; rural CPI used to deflate.

Table 3: Poverty in urban China, 1981-2002

	Poverty measures (%)					
	Old poverty line			New poverty line*		
	H	PG	SPG	H	PG	SPG
1981	0.82	0.22	0.14	6.01	1.01	0.35
1982	0.15	0.03	0.02	2.16	0.27	0.07
1983	0.12	0.03	0.01	1.56	0.20	0.05
1984	0.29	0.08	0.05	1.27	0.23	0.09
1985	0.23	0.07	0.05	1.08	0.21	0.09
1986	0.22	0.00	0.00	3.23	0.46	0.09
1987	0.78	0.31	0.30	1.62	0.48	0.33
1988	0.77	0.26	0.20	2.07	0.50	0.27
1989	3.66	1.49	0.86	7.05	2.72	1.55
1990	0.75	0.33	0.33	2.58	0.24	0.03
1991	0.00	0.00	0.00	1.66	0.53	0.38
1992	0.00	0.00	0.00	1.13	0.36	0.26
1993	0.50	0.16	0.11	1.01	0.25	0.14
1994	0.47	0.16	0.11	1.19	0.30	0.15
1995	0.31	0.13	0.11	0.85	0.24	0.15
1996	0.18	0.07	0.06	0.61	0.16	0.09
1997	0.20	0.09	0.08	0.70	0.19	0.11
1998	0.00	0.00	0.00	1.16	0.43	0.34
1999	0.00	0.00	0.00	0.57	0.18	0.12
2000	0.20	0.09	0.08	0.63	0.18	0.11
2001	0.00	0.00	0.00	0.50	0.16	0.11
2002	0.00	0.00	0.00	0.54	0.24	0.22

* Poverty line is 1200 Yuan per person per year in 2002; urban CPI used to deflate.

Table 4: Poverty in China as a whole, 1981-2001

	Poverty measures (%)					
	Old poverty line			New poverty line*		
	H	PG	SPG	H	PG	SPG
1981	23.02	5.51	1.90	52.84	16.17	6.81
1982	13.70	2.89	0.87	38.14	10.19	3.92
1983	10.48	1.96	0.52	30.42	7.80	2.85
1984	7.67	1.24	0.28	24.11	5.83	2.01
1985	6.78	1.13	0.27	17.55	4.04	1.33
1986	7.49	1.45	0.40	18.53	4.63	1.65
1987	6.39	1.15	0.33	16.77	4.10	1.45
1988	6.13	1.04	0.31	17.71	4.23	1.47
1989	9.73	2.15	0.71	23.37	6.60	2.65
1990	7.96	1.45	0.41	22.15	5.65	2.04
1991	8.52	2.08	0.85	22.16	6.37	2.61
1992	7.13	1.61	0.63	20.75	5.61	2.27
1993	8.27	1.79	0.54	20.01	5.72	2.29
1994	7.58	2.00	0.74	17.01	5.26	2.32
1995	5.65	1.55	0.75	14.74	4.08	1.58
1996	2.97	0.81	0.42	9.79	2.52	1.07
1997	3.35	0.58	0.15	9.30	2.41	0.87
1998	2.16	0.24	0.04	8.10	1.88	0.65
1999	2.24	0.27	0.05	7.63	1.79	0.60
2000	3.34	0.64	0.18	8.49	2.33	0.89
2001	2.96	0.51	0.12	7.97	2.13	0.80

* Population weighted means of poverty measures from Tables 4 and 5.

Table 5: Decomposition of the change in poverty

	Poverty measures (% point change 1981-2001)					
	Old poverty line			New poverty line		
	H	PG	SPG	H	PG	SPG
			1981-2001			
Within rural	-14.88	-3.76	-1.35	-32.53	-10.39	-4.51
	(74.2)	(75.2)	(75.7)	(72.5)	(74.0)	(75.0)
Within urban	-0.31	-0.08	-0.05	-2.08	-0.32	-0.09
	(1.5)	(1.7)	(3.0)	(4.6)	(2.3)	(1.5)
Population shift	-4.87	-1.16	-0.39	-10.27	-3.32	-1.42
(rural to urban)	(24.3)	(23.2)	(21.7)	(22.9)	(23.7)	(23.6)
Total change	-20.06	-5.00	-1.78	-44.87	-14.04	-6.01
			1991-2001			
Within rural	-4.31	-1.27	-0.61	-10.74	-3.24	-1.38
	(77.5)	(80.9)	(83.7)	(75.7)	(76.4)	(76.2)
Within urban	0.00	0.00	0.00	-0.44	-0.14	-0.10
	(0.00)	(0.00)	(0.0)	(3.1)	(3.3)	(5.5)
Population shift	-1.25	-0.30	-0.13	-3.01	-0.86	-0.33
(rural to urban)	(22.5)	(19.1)	(17.2)	(21.2)	(20.3)	(18.2)
Total change	-5.56	-1.57	-0.73	-14.19	-4.24	-1.81

Note: % of total in parentheses.

Table 6: Regressions of the rate of poverty reduction on rate of growth in household mean income from the surveys

	OLS		IVE	
	Headcount index (log difference)			
Constant	0.111	0.037	0.132	0.039
	(3.923)	(3.200)	(2.098)	(3.312)
Mean income	-3.187	-2.660	-3.512	-2.682
(log difference)	(-8.745)	(-15.776)	(-3.886)	(-13.615)
Gini index		3.491		3.488
(log difference)		(10.715)		(10.858)
Gini index (log.diff.)		0.183		0.185
x (year-2000)		(6.445)		(6.183)
AR(1)		-0.701		-0.704
		(-4.200)		(-4.196)
R^2	0.644	0.935	0.637	0.935
DW	2.233	2.680	2.146	2.691
	Poverty gap index (log difference)			
Constant	0.159	0.029	0.179	0.037
	(3.365)	(1.244)	(2.016)	(1.576)
Mean income	-3.922	-2.881	-4.240	-2.995
(log difference)	(7.596)	(-11.865)	(3.538)	(-10.548)
Gini index		5.273		5.254
(log difference)		(7.031)		(7.121)
Gini index *x*		0.245		0.250
(year-2000)		(4.155)		(4.102)
AR(1)		-0.418		-0.432
		(-1.934)		(-2.120)
R^2	0.561	0.908	0.557	0.907
DW	2.039	2.252	1.990	2.270
	Squared poverty gap index (log difference)			
Constant	0.185	0.007	0.204	0.095
	(2.882)	(0.204)	(1.759)	(1.204)
Mean income	-4.270	-2.737	-4.569	-3.994
(log difference)	(-6.381)	(-6.496)	(-2.946)	(-4.099)
Gini index		6.025		5.781
(log difference)		(4.207)		(3.779)
Gini index *x*		0.212		0.239
(year-2000)		(2.090)		(2.231)
R^2	0.499	0.873	0.497	0.839
DW	2.070	2.221	2.047	2.175

Note: Poverty measures based on new poverty lines. t-ratios corrected for heteroscedasticity in parentheses. The Instrumental Variables Estimator (IVE) uses the growth rate (log difference) in GDP per capita as the instrument for the growth rate in the survey mean. An interaction effect between time and the change in the log mean was also tested but (highly) insignificant in all cases.

Table 7: Poverty reduction and the rural, urban composition of growth

	Headcount index	Poverty gap index	Squared poverty gap index
Constant	0.033	0.040	0.039
	(0.808)	(0.690)	(0.510)
Growth rate of mean	-2.563	-3.341	-3.722
rural income (share-weighted) (η^r)	(-8.432)	(-7.768)	(-6.637)
Growth rate of mean	0.092	0.519	0.744
urban income (share-weighted) (η^u)	(0.201)	(0.797)	(0.877)
Population shift	0.735	2.189	3.941
effect (η^n)	(0.159)	(0.335)	(0.462)
R^2	0.823	0.796	0.739
D-W	2.671	2.653	2.661

Table 8: Poverty reduction and the sectoral composition of growth: Headcount index and poverty gap index

	1	2	3
Headcount index (log difference)			
Constant	0.116	0.163	0.155
	(1.059)	(1.656)	(1.761)
Growth rate of GDP per capita	-2.595		
	(-2.162)		
Primary (π_1)		-8.067	-7.852
		(-3.969)	(-4.092)
Secondary (π_2)		-1.751	
		(-1.214)	
Tertiary (π_3)		-3.082	
		(-1.239)	
Secondary+ Tertiary			-2.245
			(-2.199)
R^2	0.207	0.431	0.423
D-W	1.553	1.725	1.768
Tests:			
$\pi_1 - \pi_2$		-6.317	-5.607
		(-3.231)	(-3.14)
$\pi_2 - \pi_3$		1.331	
		(0.405)	
Poverty gap index (log difference)			
Constant	0.160	0.233	0.216
	(1.140)	(1.856)	(1.955)
Growth rate of GDP per capita	-3.133		
	(2.104)		
Primary (π_1)		-11.251	-10.827
		(-3.87)	(-4.07)
Secondary (π_2)		-1.651	
		(-0.90)	
Tertiary (π_3)		-4.271	
		(-1.41)	
Secondary+ Tertiary			-2.623
			(-2.06)
R^2	0.173	0.456	0.439
D-W	1.538	1.721	1.772
Tests:			
$\pi_1 - \pi_2$		-9.600	-8.204
		(-3.388)	(-3.29)
$\pi_2 - \pi_3$		2.620	
		(0.644)	

Note: The dependent variable is the first difference over time in the log of the poverty measures based on new poverty lines. t-ratios corrected for heteroscedasticity in parentheses.

Table 9: Poverty reduction and the sectoral composition of growth: Squared poverty gap index

	1	2	3	4
Constant	0.184 (1.059)	0.272 (1.852)	0.252 (1.900)	0.033 (0.463)
Growth rate of GDP per capita	-3.376 (1.845)			
Primary (π_1)		-13.257 (-3.670)	-12.753 (-3.762)	-10.648 (-3.300)
Secondary (π_2)		-1.609 (-0.763)		
Tertiary (π_3)		-4.728 (-1.486)		
Secondary+ Tertiary			-2.767 (-1.88)	
R^2	0.151	0.466	0.448	0.344
D-W	1.517	1.754	1.765	1.721
Tests:				
$\pi_1 - \pi_2$		-11.648 (-3.599)	-9.986 (3.26)	
$\pi_2 - \pi_3$		3.119 (0.724)		

Note: The dependent variable is the first difference over time in the log of the SPG index; t-ratios corrected for heteroscedasticity in parentheses.

Table 10: Gini indices of income inequality

	Rural	Urban	National	
			Without adjustment for COL difference	With adjustment for COL difference
1980	24.99	n.a.	n.a.	n.a.
1981	24.73	18.46	30.95	27.98
1982	24.40	16.27	28.53	25.91
1983	25.73	16.59	28.28	26.02
1984	26.69	17.79	29.11	26.89
1985	26.80	17.06	28.95	26.45
1986	28.48	20.66	32.41	29.20
1987	28.53	20.20	32.38	28.90
1988	29.71	21.08	33.01	29.50
1989	30.96	24.21	35.15	31.78
1990	29.87	23.42	34.85	31.55
1991	31.32	23.21	37.06	33.10
1992	32.03	24.18	39.01	34.24
1993	33.70	27.18	41.95	36.74
1994	34.00	29.22	43.31	37.60
1995	33.98	28.27	41.50	36.53
1996	32.98	28.52	39.75	35.05
1997	33.12	29.35	39.78	35.00
1998	33.07	29.94	40.33	35.37
1999	33.91	29.71	41.61	36.37
2000	35.75	31.86	43.82	38.49
2001	36.48	32.32	44.73	39.45
2002	n.a.	32.65	n.a.	n.a.

Table 11: Inequality and growth by sub-periods

	Inequality	Annualized log difference (%/year)	
		Gini index	Mean household income
1. 1981-85	Falling	-1.12	8.87
2. 1986-94	Rising	2.81	3.10
3. 1995-98	Falling	-0.81	5.35
4. 1999-2001	Rising	2.71	4.47

Table 12: Inequality and GDP growth by origin

	1	2	3
Constant	-0.072	0.038	0.038
	(0.429)	(1.278)	(3.598)
Growth rate of	0.012		
GDP per capita	(0.544)		
Primary (π_1)		-1.798	-1.755
		(2.244)	(2.819)
Secondary (π_2)		0.170	
		(0.432)	
Tertiary (π_3)		-0.218	
		(-0.272)	
R^2	0.018	0.326	0.316
D-W	2.112	2.112	2.202
$\pi_1 - \pi_2$		-1.968	
		(2.263)	
$\pi_2 - \pi_3$		0.388	
		(0.381)	

Note: The dependent variable is the first difference over time in the log of the Gini

Table 13: Urban and rural inequality and growth in mean urban and rural incomes

	Rural		Urban	
Constant	0.013	0.019	0.006	-0.016
	(0.880)	(2.005)	(0.386)	(-0.853)
Growth rate in mean rural	-0.476		-1.430	
income	(-3.206)		(-5.808)	
Growth rate in mean rural	0.510		1.014	
income lagged	(4.322)		(4.635)	
Double-difference in rural		-0.504		-1.187
growth rates		(-5.878)		(-4.502)
Growth rate in mean urban	0.075		0.687	0.664
income	(0.830)		(3.305)	(2.693)
AR(1)	0.481	0.510		
	(2.208)	(2.554)		
	0.491	0.478	0.690	0.588
D-W			1.741	1.292

Table 14: China's external trade openness

	Mean tariff rates (%)				Incidence of non-tariff barriers (%)			
	1980-83	1984-87	1988-90	1991-93	1980-83	1984-87	1988-90	1991-93
Primary	22.7	20.6	19.1	17.8	n.a.	19.7	58.9	40.7
Manufactured	36.6	33.2	34.3	37.1	n.a.	16.1	34.4	19.2
All products	31.9	29.2	29.2	30.6	n.a.	17.2	42.6	26.4

Source: Weighted averages from UNCTAD (1994)

Table 15: Summary statistics for rural areas by province

Provinces by regional groupings (official codes)		Mean in 1980 (1980 prices)	No. years	First year	Distributional data: Value at first year of series			
					H (%)	PG (%)	SPG (x100)	Gini index (%)
North								
11	Beijing	290.46	10*	1988	0.35	0.14	0.13	24.84
12	Tianjin	277.92	12	1983	3.44	0.65	0.24	23.23
13	Hebei	175.78	12	1983	40.30	10.82	4.22	23.89
14	Shanxi	155.78	12	1983	30.04	7.61	2.75	27.48
15	Inner Mongolia	181.32	12	1983	42.51	10.96	4.07	26.01
Northeast								
21	Liaoning	273.02	11	1988	21.69	6.19	2.48	30.94
22	Jilin	236.30	12	1983	16.79	3.49	1.18	25.90
23	Heilongjian	205.38	11	1988	31.81	9.71	4.24	30.12
East								
31	Shanghai	397.35	12	1983	0.77	0.18	0.09	19.82
32	Jiangsu	217.94	12	1983	19.51	3.90	1.14	20.83
33	Zhejiang	219.18	12	1983	28.04	6.02	1.89	21.33
34	Anhui	184.82	12	1983	25.75	5.13	1.51	19.39
35	Fujian	171.74	11	1988	35.46	7.87	2.49	21.53
36	Jiangxi	180.94	12	1983	30.08	5.39	1.41	17.88
37	Shandong	194.33	12	1983	33.21	6.96	2.03	23.57
Central								
41	Henan	160.78	12	1983	55.58	14.46	5.30	21.47
42	Hubei	169.88	12	1983	24.08	4.45	1.18	20.30
43	Hunan	219.71	12	1983	7.58	0.90	0.19	18.72
44	Guandong	274.37	11	1988	21.69	4.35	1.29	31.22
45	Guangxi	173.68	12	1983	54.08	14.63	5.53	24.81
46	Hainan	n.a.,	10	1990	50.08	15.52	6.79	28.89
Southwest								
51	Sichuan	187.90	12	1983	40.59	8.32	2.50	19.33
52	Guizhou	161.46	11	1988	34.85	7.83	2.64	23.42
53	Yunnan	150.12	12	1983	34.20	6.84	1.91	22.73
Northwest								
61	Sha'anxi	142.49	12	1983	27.35	5.52	1.63	19.83
62	Gansu	153.33	12	1983	39.34	9.55	3.21	26.18
63	Qinghai	156.10**	11	1988	23.42	6.09	2.38	32.93
64	Ningxia	198.45	12	1983	22.08	5.32	1.81	25.25
65	Xinjiang	232.10	11	1988	22.84	6.23	2.32	33.10

* 1990 missing; ** 1981

Table 16: Trends for rural areas by province

	Mean (1980-2001)	Gini index	Head-count index	Poverty gap index	Squared poverty gap index
Beijing	3.51	3.01	3.46	1.81	0.12
	(3.75)	(3.28)	(0.95)	(0.38)	(0.02)
Tianjin	5.75	1.73	0.94	2.94	0.94
	(4.09)	(4.24)	(0.18)	(0.49)	(0.13)
Hebei	3.36	0.70	-14.11	-14.21	-14.30
	(2.95)	(1.39)	(5.97)	(5.09)	(4.51)
Shanxi	4.16	1.07	-8.26	-7.23	-5.76
	(7.6)	(3.47)	(3.98)	(2.74)	(1.74)
Inner Mongolia	3.94	1.77	-8.03	-6.76	-4.96
	(6.65)	(3.21)	(4.01)	(2.08)	(1.07)
Liaoning	3.34	1.53	-7.19	-4.22	-0.58
	(3.5)	(2.48)	(2.39)	(1.02)	(0.12)
Jilin	4.39	1.28	-5.36	-1.90	1.35
	(-6.05)	(3.00)	(2.19)	(0.56)	(0.29)
Heilongjian	3.24	1.45	-6.78	-4.40	0.86
	(6.24)	(3.86)	(3.96)	(1.89)	(0.22)
Shanghai	5.43	2.07	2.24	3.79	3.04
	(6.44)	(2.27)	(0.38)	(0.46)	(0.36)
Jiangsu	6.01	1.65	-20.02	-18.29	-14.35
	(15.98)	(3.21)	(5.64)	(5.04)	(3.76)
Zhejiang	2.74	1.92	-11.68	-12.61	-13.34
	(2.78)	(4.24)	(9.38)	(6.35)	(4.02)
Anhui	6.66	0.87	-14.36	-14.81	-13.01
	(19.74)	(2.19)	(4.60)	(4.03)	(3.07)
Fujian	4.40	2.35	-22.06	-23.38	-22.87
	(11.29)	(4.03)	(5.13)	(6.25)	(9.81)
Jiangxi	4.48	2.40	-12.29	-9.90	-5.83
	(4.96)	(5.79)	(5.08)	(3.42)	(1.71)
Shandong	5.50	1.25	-12.74	-13.41	-12.32
	(8.17)	(3.75)	(6.38)	(5.66)	(3.45)
Henan	3.09	1.04	-16.10	-18.47	-19.27
	(3.49)	(2.26)	(7.49)	(6.80)	(5.72)
Hubei	2.64	1.87	-13.32	-12.57	-9.76
	(3.71)	(9.67)	(7.36)	(5.84)	(4.60)
Hunan	5.21	1.99	-6.90	-4.01	-0.87
	(12.96)	(9.19)	(3.20)	(1.56)	(0.22)
Guandong	4.32	-0.36	-28.58	-26.46	-21.74
	(16.28)	(1.00)	(12.29)	(9.51)	(5.88)

Guangxi	5.75	0.45	-11.54	-13.24	-14.41
	(9.42)	(1.13)	(4.82)	(4.14)	(3.86)
Hainan	5.39*	2.12	-10.03	-12.26	-13.47
	(20.46)	(4.75)	(7.60)	(5.88)	(4.75)
Sichuan	3.58	1.76	-11.03	-10.36	-8.17
	(7.08)	(5.81)	(6.51)	(5.23)	(4.02)
Guizhou	2.06	1.05	-6.49	-7.76	-8.35
	(5.38)	(3.47)	(4.98)	(3.66)	(2.85)
Yunnan	1.09	2.55	-0.61	1.39	3.61
	(1.86)	(21.00)	(0.79)	(1.26)	(2.64)
Sha'anxi	2.43	2.41	-3.43	-2.48	-1.32
	(6.56)	(6.47)	(3.74)	(1.85)	(0.74)
Gansu	3.66	1.75	-6.65	-7.35	-7.95
	(5.53)	(5.51)	(4.89)	(3.47)	(2.76)
Qinghai	2.08	1.46	-4.72	-2.98	-1.18
	(3.00)	(1.60)	(2.06)	(0.89)	(0.27)
Ningxia	2.85	2.06	-2.94	-3.27	-3.44
	(2.44)	(4.84)	(1.72)	(1.04)	(0.75)
Xinjiang	0.97	1.39	0.37	1.62	3.21
	(1.66)	(4.72)	(0.25)	(0.68)	(0.97)
Rural China	3.36	1.72	-5.66	-5.39	-5.21
	(4.15)	(12.73)	(-6.10)	(-4.36)	(-3.33)

Note: 22 annual observations 1980-2001 for provincial means except * series which starts in 1990; 10-12 unevenly spaced observations for distributional data. All trends for the mean incorporate an AR(1) error term, while trends for the distributional data are based on OLS regressions.

Figure 1: National incidence of poverty in China 1981-2001

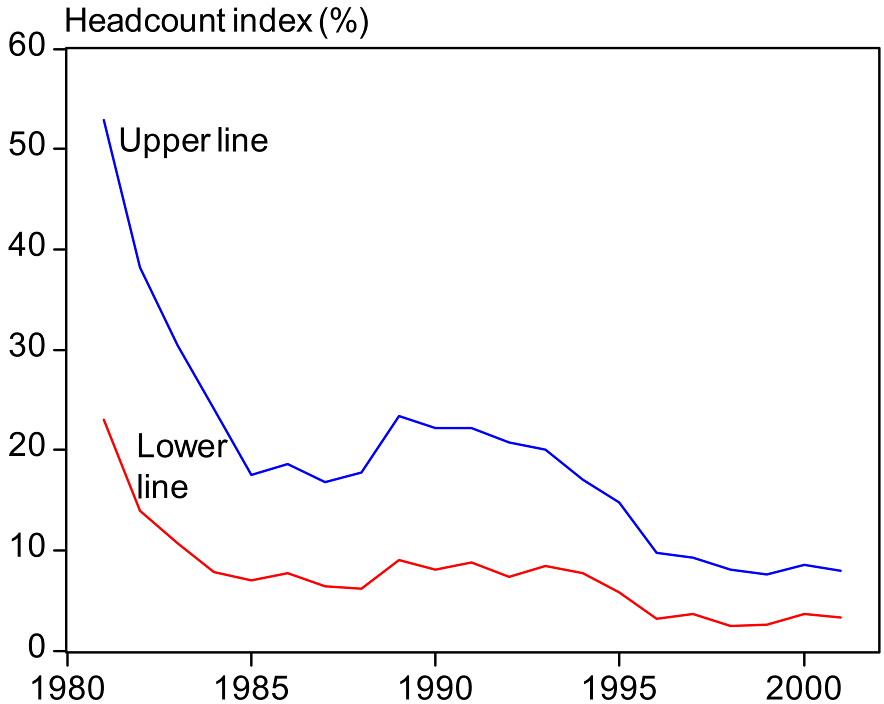


Figure 2: Shares of GDP by sector

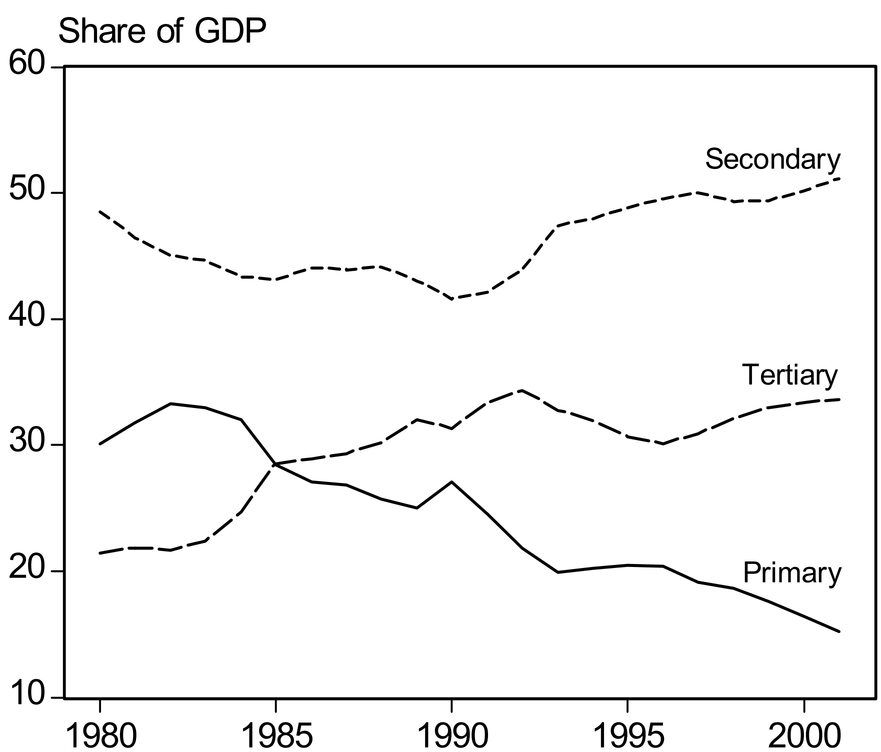


Figure 3: Relative inequality between urban and rural China

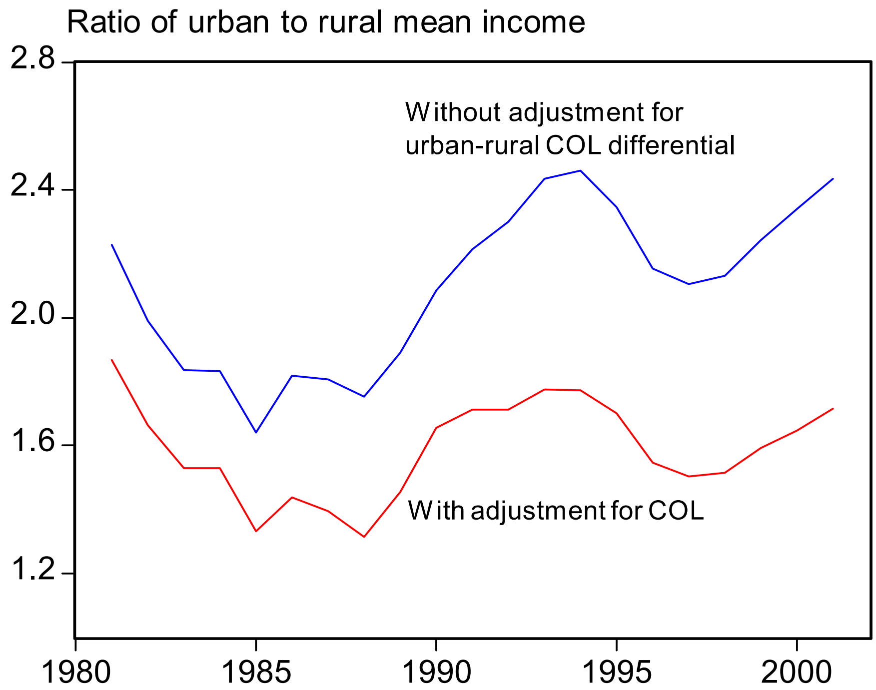


Figure 4: Absolute inequality between urban and rural China

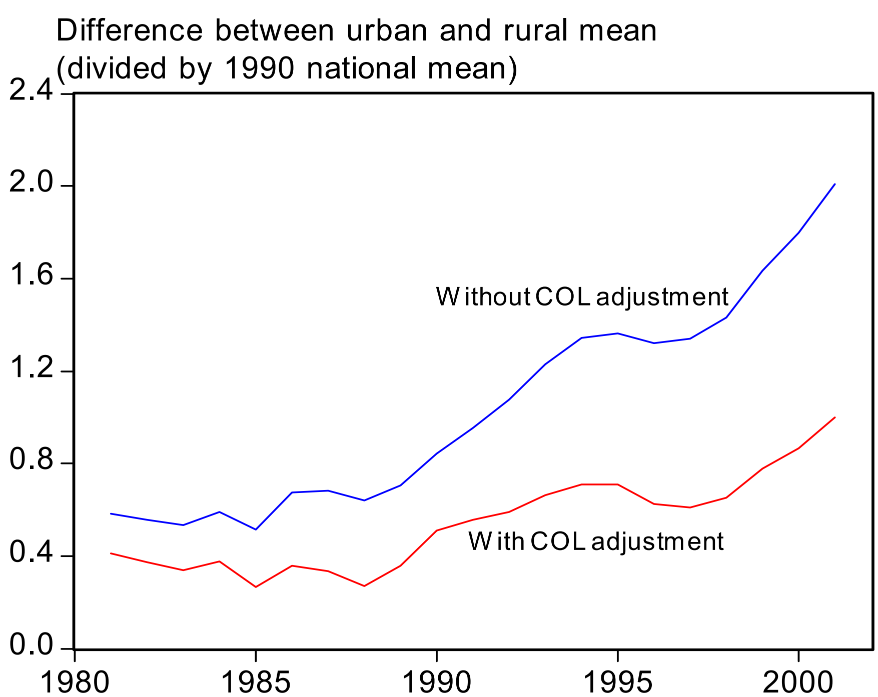


Figure 5: Income inequality in rural and urban areas and nationally

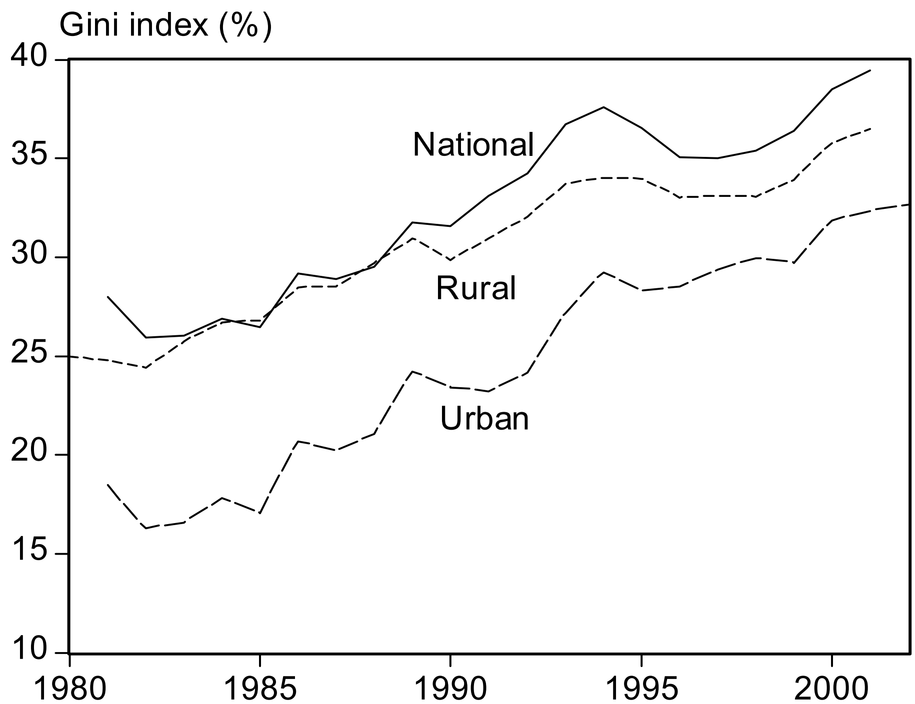


Figure 6: Absolute inequality

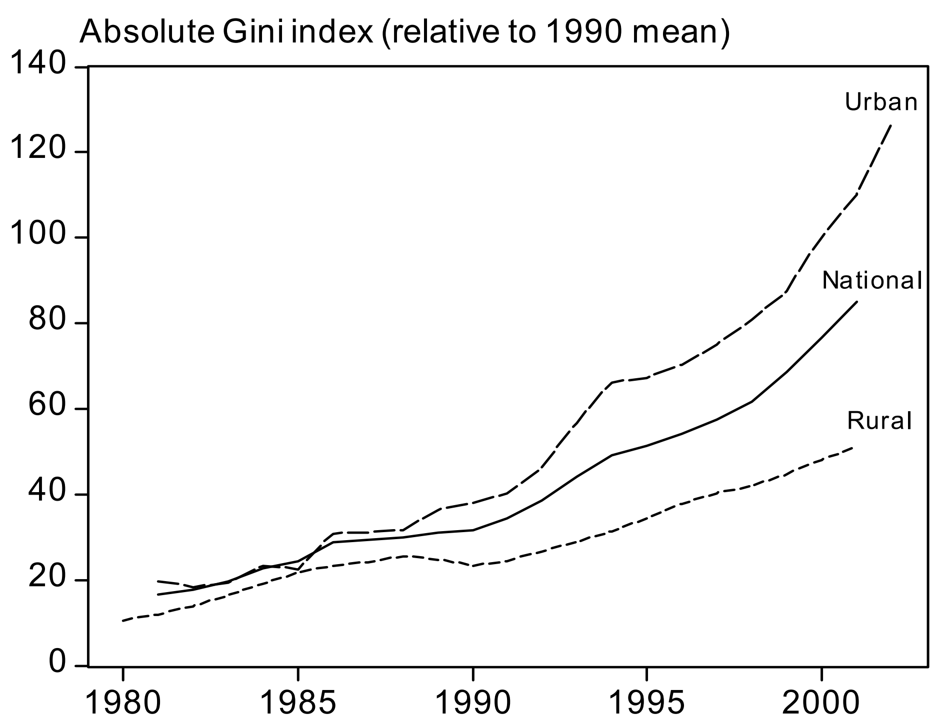


Figure 7: Primary sector growth and foodgrain procurement prices

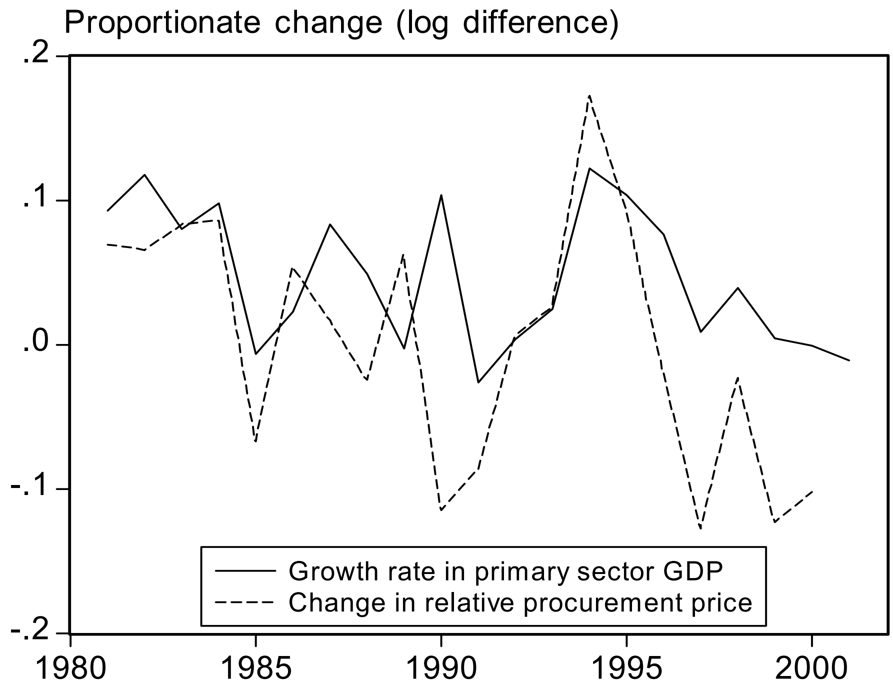


Figure 8: Inequality and the procurement price of foodgrains

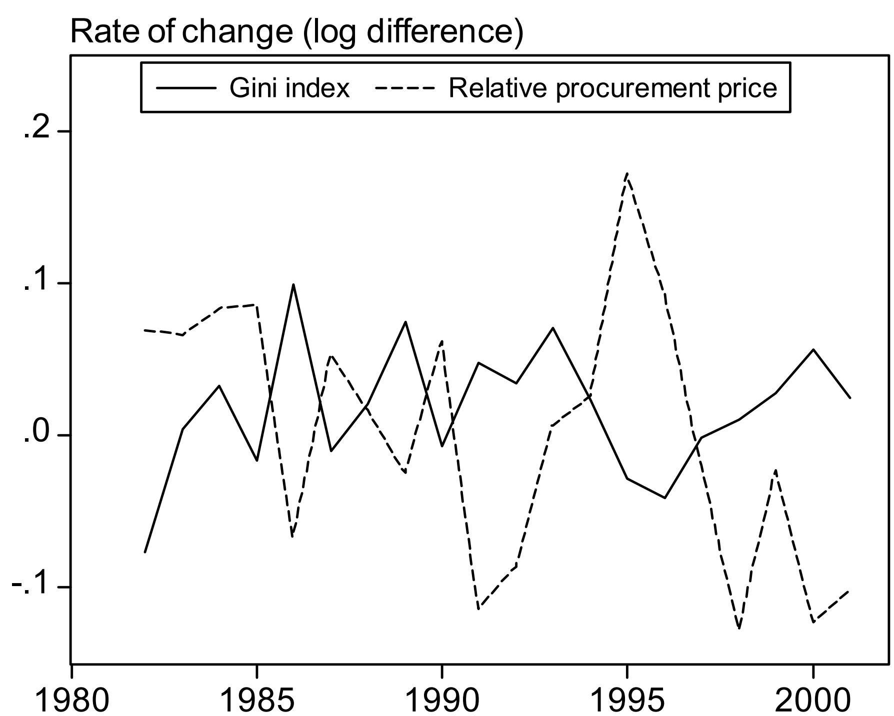


Figure 9: Trend rate of change in rural poverty against trend growth rate in mean rural income across 29 provinces

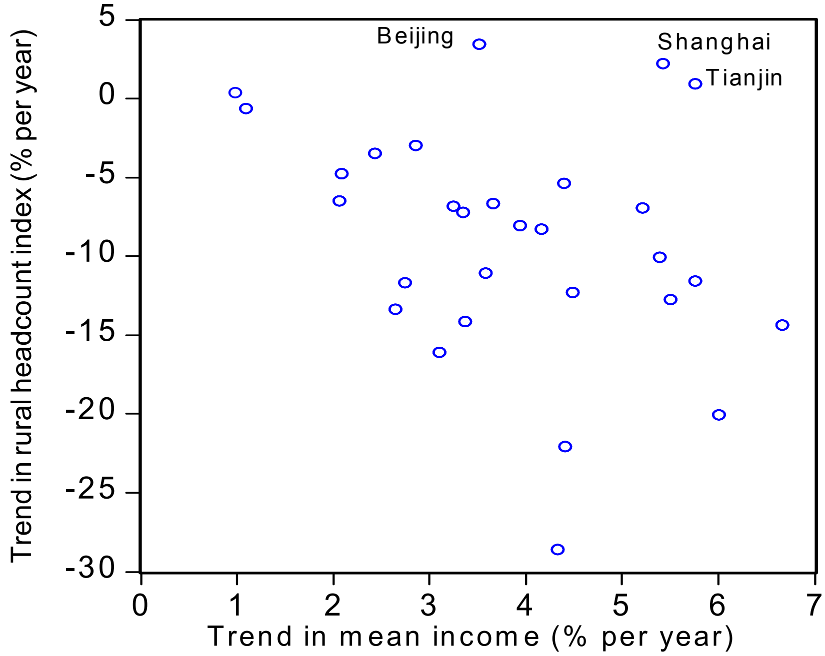


Figure 10: Trend in rural Gini index against trend in mean income

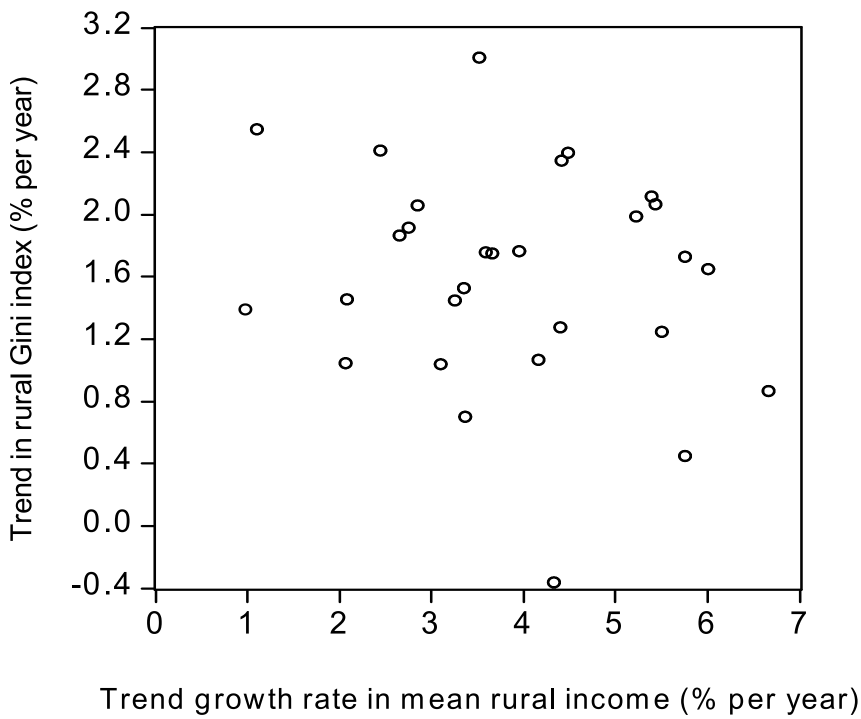


Figure 11: Trend in headcount index against trend in Gini index

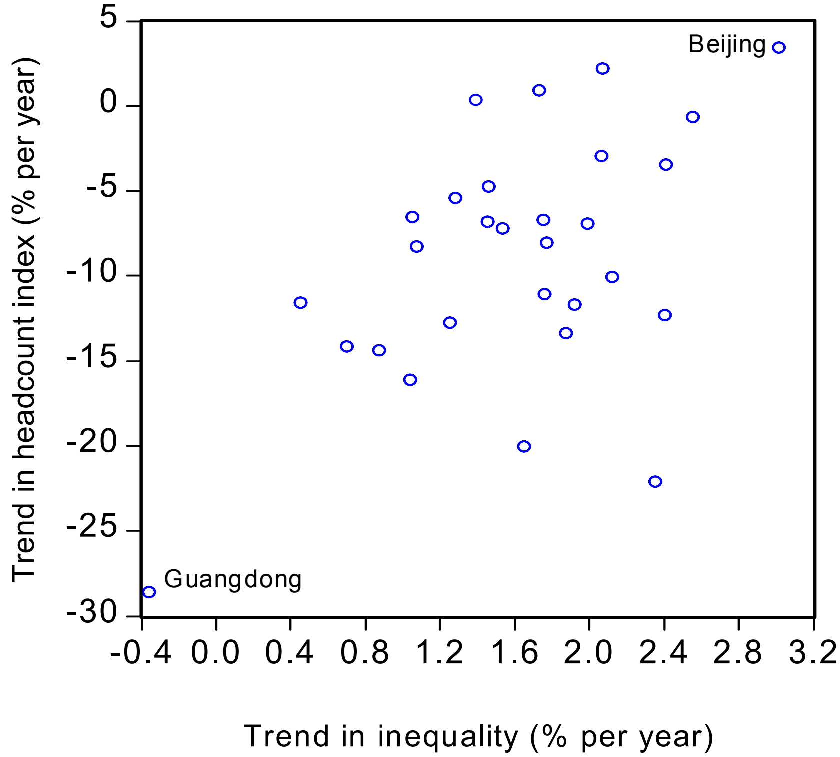


Figure 12: Actual poverty in 2001 and simulated level without the rise inequality

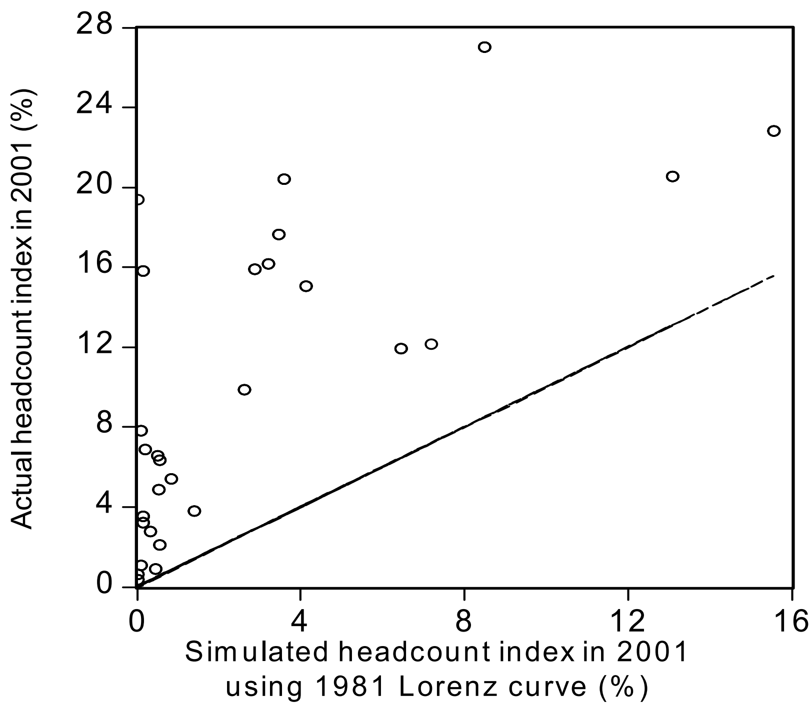


Figure 13: Growth did not occur where it would have most impact on poverty