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The Impacts of Growth and Inequality on Rural Poverty in China

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Abstract

This paper analyzes the evolution of poverty in China from the late 1980s to the late 1990s, employing a version of Shapley decomposition tailored to unit-record household survey data. The changes in poverty trends are attributed to two proximate causes—income growth and shifts in income distribution. Different datasets, poverty lines, poverty measures, and equivalence scales are used to examine the robustness of the results. Potential biases arising from ignoring differential regional prices and inflation are also investigated. Notwithstanding some ambiguities in the results, it is consistently found that rural poverty increased in the second half of the 1990s and adverse distributional changes are the main cause.

Keywords: poverty, Shapley decomposition, unit-record data, China

JEL classification: O15, O53

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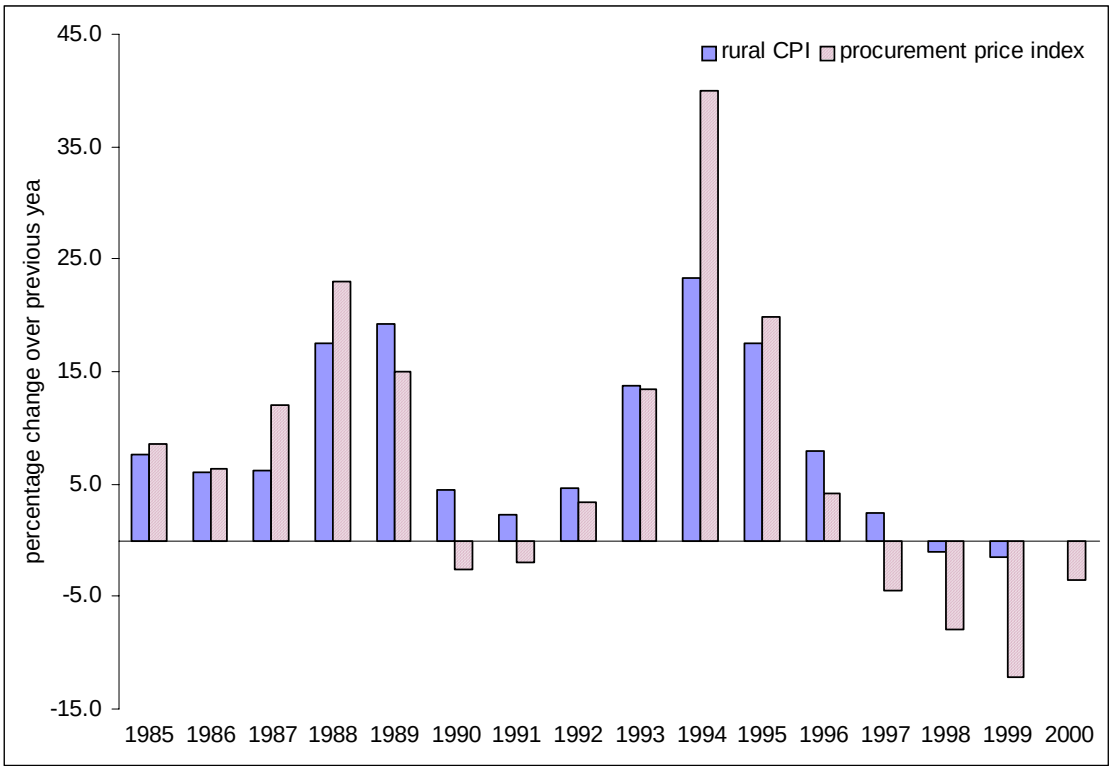
1 Introduction

East Asia is the first, and remains the only, region where the first target of the Millennium Development Goals (MDGs)—halving extreme poverty between 1990 and 2015—has been met (UN Millennium Project 2005). While the dramatic poverty reductions in China are essential to that attainment, as of 2001 around one-fifth of the world's poor still reside there (Chen and Ravallion, 2004). Within China, rural poverty dominates the scene. The overall reduction of rural poverty since the initiation of market-oriented reform has been nothing but impressive. Notwithstanding, some recent research suggests that the process slowed down significantly in the 1990s and has even shown signs of reversal (Chen and Ravallion, 2004). Success in battling rural poverty clearly holds the key to further progress toward poverty alleviation in China and the achievement of the MDG poverty target on a global scale. It is thus important to understand what drives the latest poverty trend in rural China.

The agricultural sector is where China's remarkable growth story started. By simply de-collectivizing production and allowing farmers to sell their surplus produce on the market, China propelled the annual growth rate of agriculture from an average of 2.5 percent in 1952–1977 to 7.4 percent in 1978–1984. As a result, rural per capita income rose by a stunning 270 percent. However, the agricultural sector moved down the government's priority list around the mid-1980s when the focus of reform was shifted to the urban area and industrial sector. Not only were government procurement prices of farm produce set below market prices, but they also failed to keep up with price increases in other sectors during 1989–1993 (Figure 1). Agricultural growth slowed down, and the growth of grain output suffered particularly severely. In 1993, a combination of floods and drought led to food shortage. Attempts to raise grain procurement prices to market levels in 1994 triggered a sharp increase in grain prices. Concerned about inflation pressures and grain self-sufficiency, the government responded by increasing investment in rural infrastructure and reasserting control over the production and marketing of several basic commodities. In addition, a governor's grain bag responsibility system was implemented in 1995, which made provincial governors personally responsible for ensuring adequate supply of domestic grain within their jurisdictions. These policies succeeded in stabilizing food prices and increasing grain reserves. In the late 1990s, government controls over the imports of agricultural products were gradually eased as China prepared for entry into the WTO. Increased imports along with consecutive years of good harvest boosted food supply. The demand for food, however, did not rise as fast, partly due to a declining share of food in household expenditure induced by higher income. Food prices slumped and rural income stagnated.

The above agricultural policies have implications for rural income growth as well as for its distribution. Comparing the trajectories of poverty reduction and GDP growth after the late 1980s with those in the earlier years, a number of studies have emphasized the role of rising income inequality in slowing down poverty reduction. These include, among others, Khan (1999), Gustafsson and Wei (2000), Yao (2000), Chen and Wang (2001), and Ravallion and Chen (2004). Given a poverty line, any poverty trend can always be attributed to income growth and shifts in the distribution of income. The decision facing policy makers is often one of allocating limited resources between

Figure 1. Changes in rural CPI and procurement price index of farm produce



growth promotion and redistribution toward the poor. This paper seeks to analyze the contributions to China's rural poverty trend attributable to income growth and distribution. Three features set this paper apart from previous studies on China's poverty. Firstly, most studies rely on household survey data from the National Bureau of Statistics (NBS). The NBS data from published sources are in grouped format. Estimating poverty measures from grouped data necessarily involves interpolation in order to generate data between group boundaries.[1] This entails errors unless the interpolation method happens to agree with the underlying income distribution.[2] Besides, the NBS data have been criticized for their exclusion of such important income items as imputed rents of owner-occupied housing, subsidies, income in kind, and so on (Khan, 1999). Exploring alternative data sources can therefore serve the useful purpose of checking the robustness of results based on the NBS data. The two datasets employed in this paper are such examples, both of which provide household-level income data and are from sources distinct from the NBS household survey.[3]

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1 In the rare case of the poverty line coinciding with one of the income group boundaries, grouped data lend themselves readily to the calculation of poverty measures such as the first three indices of the Foster–Greer–Thorbecke (FGT) family.

2 Some researchers gained access to household-level NBS data, but these are typically for isolated provinces and of limited years (e.g., Yao, 2000). The exception is a recent World Bank study (Ravallion and Chen, 2004), which has meticulously assembled from household-level NBS data the 1981–2001 series of three FGT indices both at the national level and separately for urban and rural areas.

3 Another dataset featuring unit-record income data is the China Household Income Project (CHIP) dataset. It contains information from two household surveys conducted by the Chinese Academy of Social Sciences (CASS) in selected provinces in 1988, 1995, and 2002.

The second departure of this paper lies in our method of quantifying the relative importance of growth and distributional changes in forming poverty trend. Because income growth and distributional changes are interrelated, their unconditional correlation with poverty changes is uninformative of their marginal impact on poverty. Some studies regress the logarithms of a poverty index on those of the average income and an aggregate inequality measure, typically the Gini index, to obtain the marginal impacts of growth and redistribution (e.g., Khan, 1999; Yao, 2000; Ravallion and Chen, 2004). Implicitly, this assumes that the relationship among the three variables is approximately log-linear. The accuracy of this approximation aside,[4] a major problem with this approach is that the Gini index uniquely determines the Lorenz curve only under restricted conditions.[5] A given change in the Gini index may be caused by redistribution among the nonpoor, among the poor, or between the poor and the nonpoor. In the first case, poverty will not be affected at all. Poverty changes in the latter two cases will also differ. Hence, the regression coefficient on the Gini index does not identify the effects of distributional changes on poverty as it is purported to. Another, and also more appropriate in our review, approach to pinning down the relative contribution of growth and distributional changes is that proposed by Datt and Ravallion (1992) to decompose a change in a poverty measure into growth and redistribution components.[6] This paper adopts the Datt–Ravallion decomposition methodology with two extensions. First, we draw on the Shapley value decomposition framework propounded by Shorrocks (1999) to make the decomposition symmetric and exact. Second, in the Datt–Ravallion decomposition distributional changes are identified with changes in the estimates of Lorenz curve parameters. We shall show that, with microlevel data, decomposition can be conducted without resorting to parametric Lorenz functions.

Finally, measurement issues loom large in poverty research, especially for studies about transition and developing economies. Apart from the problems with the availability and quality of household survey data, there are often ambiguities about the appropriate poverty line, equivalence scale, poverty measure, and price index to use. As some arbitrariness is inevitable in making the choice, we examine the sensitivity of poverty trend and decomposition to alternative measurement assumptions rather than focusing exclusively on a particular one of them.

The remainder of the paper is organized as follows. The next section explains the decomposition methodology and discusses various uncertainties involved in assessing poverty trend and decomposition. Section 3 introduces the data and presents the time profiles of three poverty measures of the Foster–Greer–Thorbecke (FGT) family. In Section 4, we discuss the decomposition results. Particular attention is given to results that are consistent across different datasets and poverty measures and under alternative

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4 If the regression has a poor fit, much of the changes in poverty will be assigned to the residual term and thus go unaccounted for.

5 If the size distribution of income is log-normal, for example, then there is a one-to-one relationship between the Gini index and the Lorenz curve. However, empirical evidence shows that the log-normal distribution does not describe real income data well (McDonald, 1984).

6 For applications of the Datt–Ravallion decomposition to the Chinese context, see Fan *et al*. (2002) and Chen and Wang (2001).

assumptions about the poverty line and equivalence scale. Some concluding comments are offered in Section 5.

2 Growth–redistribution decomposition and the robustness of poverty measurement

A poverty measure P is a function of the income distribution Y and poverty line z, i.e., $P_t = P(Y_t, z_t)$. If the poverty line is held constant over time, a change in poverty between period 0 and period T can be written as

$$\Delta P = P(Y_t) - P(Y_0), \qquad (1)$$

where the letter z representing the poverty line is dropped for simplicity.[7] The basic idea behind the growth–redistribution decomposition is that, at any point of time t, the income distribution Y_t can always be fully described by its mean income μ_t and Lorenz curve L_t, the latter of which is uniquely determined by the probability density function (PDF) of relative income.[8] Thus, ΔP stems from changes in either of the two determinants of Y. If income growth is distribution neutral, or the income of every individual grows by the same proportion, then the Lorenz curve (or, equivalently, the PDF of relative income) will stay unchanged and ΔP is due entirely to changes in the mean income. Conversely, when the mean income neither grows nor contracts, a change in poverty will occur if and only if the Lorenz curve shifts, i.e., there is income redistribution among some individuals. Applied to the general case with both income growth and distributional changes, the preceding reasoning implies that ΔP can be separated into two components measuring respectively the growth and distributional effects. To express the two components mathematically, let $Y(\mu_i, L_j)$ be a hypothetical income distribution with mean income μ_i and Lorenz curve L_j taken from different distributions, i.e., $i = 0$ or T, $j = 0$ or T, and $i \neq j$. And let $P(\mu_i, L_j)$ represent the poverty level corresponding to $Y(\mu_i, L_j)$. The growth component of ΔP can be defined as

$$\text{growth component} \equiv P(\mu_T, L_0) - P(Y_0), \qquad (2)$$

or, alternatively, as

$$\text{growth component} \equiv P(Y_T) - P(\mu_0, L_T). \qquad (2A)$$

Similarly, the redistribution component can either be defined as

$$\text{redistribution component} \equiv P(\mu_0, L_T) - P(Y_0), \qquad (3)$$

or as

$$\text{redistribution component} \equiv P(Y_T) - P(\mu_T, L_0). \qquad (3A)$$

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7 Changes in the poverty line can be easily accommodated in the framework described below.

8 We use the term 'relative income' to refer to income values normalized by the mean income.

Four decompositions of ΔP can be formed by combining the alternative definitions of the growth and redistribution components differently. If definitions (2) and (3) are used, period 0 is the reference period; if, instead, definitions (2A) and (3A) are chosen, the reference period is period T. The results from the two decompositions need not agree, and both are inexact in that the growth and redistribution components do not add up to ΔP. If the combination (2) and (3A) or (2A) and (3) is used, the decomposition will be exact since

$P(Y_T) - P(Y_0)$ = growth component + redistribution component

$$= \left[P(\mu_T, L_0) - P(Y_0)\right] + \left[P(Y_T) - P(\mu_T, L_0)\right] \qquad (4)$$

$$= \left[P(Y_T) - P(\mu_0, L_T)\right] + \left[P(\mu_0, L_T) - P(Y_0)\right]. \qquad (5)$$

However, the growth and redistribution components in expressions (4) and (5) are measured against different reference periods. Again, the two decompositions produce different results in general, and thus are equally arbitrary or equally justified.

The decomposition methods used in previous studies, such as those of Datt and Ravallion (1992), Kakwani and Subbarao (1990), and Jain and Tendulkar (1990), essentially comprise one or two of the above decompositions. Hence, they are sensitive to the choice of the reference period, and are inexact or have a nonvanishing residual term whenever growth and distributional changes are both present. A solution to these problems created by the reference point is to take the average of expressions (4) and (5) to arrive at

$$\begin{aligned}\Delta P = {} & 0.5\left\{\left[P(\mu_T, L_0) - P(Y_0)\right] + \left[P(Y_T) - P(\mu_0, L_T)\right]\right\} \\ & +0.5\left\{\left[P(Y_T) - P(\mu_T, L_0)\right] + \left[P(\mu_0, L_T) - P(Y_0)\right]\right\}\end{aligned}. \qquad (6)$$

As argued in Shorrocks (1999) and Kolenikov and Shorrocks (2005), the decomposition in expression (6) is not an arithmetic gimmick, but has its theoretical roots in the cooperative game theory. Apart from notational difference, expression (6) is identical to what Shorrocks (1999) derived using the Shapley value. The growth component G and the redistribution component R of the Shapley value decomposition of ΔP are thus

$$G \equiv 0.5\left\{\left[P(\mu_T, L_0) - P(Y_0)\right] + \left[P(Y_T) - P(\mu_0, L_T)\right]\right\} \qquad (7)$$

$$R \equiv 0.5\left\{\left[P(Y_T) - P(\mu_T, L_0)\right] + \left[P(\mu_0, L_T) - P(Y_0)\right]\right\}. \qquad (8)$$

It can be easily seen that the Shapley decomposition is symmetric and exact.

There remains the question of how to obtain the poverty indices $P(\mu_T, L_0)$ and $P(\mu_0, L_T)$ of the hypothetical distributions. The method used in previous studies is to assume a parametric Lorenz curve or PDF. Then, the formula for the poverty measure as a function of the mean income and parameters of the Lorenz curve or PDF is derived. The parameters are estimated econometrically for both periods 0 and T. Plugging into the derived formula the parameter estimates for period 0 and mean income of period T give $P(\mu_T, L_0)$. $P(\mu_0, L_T)$ is obtained similarly. The weakness of this parametric procedure is

that the specification and estimation of the Lorenz curve or PDF can give rise to errors that bias subsequent estimates of the poverty measure. When grouped data are all that is available, the Lorenz curve (and the PDF) will have to be estimated and the parametric procedure is at least a good place to start with. However, if unit-record data are available, which is the case of this study, a simpler solution exists. To keep the Lorenz curve of an income distribution intact but give it a new mean, one can simply scale every observation by the new mean divided by the old mean. In other words, the two hypothetical distributions can be constructed as $Y(\mu_0, L_T) = Y_T \times (\mu_0/\mu_T)$ and $Y(\mu_T, L_0) = Y_0 \times (\mu_T/\mu_0)$. The poverty indices $P(\mu_0, L_T)$ and $P(\mu_T, L_0)$ can then be calculated directly from the constructed distributions.

Even with unit-record data, assessing poverty trend is still subject to a host of uncertainties, which in turn affect poverty decomposition. We consider three such uncertainties here: poverty measures, poverty lines, and equivalence scales. The most widely used poverty measures are the first three FGT (Foster *et al.*, 1984) poverty indices that can be generically expressed as

$$P_\alpha = \frac{1}{N}\sum_{Y_i \le z}\left(\frac{z - Y_i}{z}\right)^\alpha, \qquad \alpha \ge 0. \tag{9}$$

P_0, the head-count ratio, gives the proportion of the population whose incomes fall below the poverty line z. The poverty gap index P_1 measures the average income shortfall in meeting the poverty line, where the shortfall is expressed as a proportion of the poverty line and the poverty gap of the nonpoor is assigned zero. The squared poverty gap index P_2 is the sum of the proportionate poverty gaps weighted by themselves, and is thus more sensitive to the income changes of poorer individuals. The three indices reflect different aspects of the same poverty experience, measuring respectively the incidence, depth, and severity of poverty. Therefore, the magnitude and direction of their changes need not always concur. This will then lead to different assessments of the relative role played by income growth and redistribution in affecting poverty.[9]

The evaluation of poverty trend may also be sensitive to where the poverty line is drawn. For example, if the poverty line happens to be near a local mode of the income distribution, an immaterial shift of the poverty line might cause a large swing of measured poverty, especially for poverty measures such as P_0 and P_1, which are not continuous at the poverty line. Given the inevitable arbitrariness in defining the poverty line, an assessment of the poverty trend that can be easily reversed by a slight change to the poverty line will hardly inspire much confidence. In this paper, we consider six national and international poverty lines.[10] These include the US$1.08 and US$2.15 per

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9 To take a simple example, suppose that an income distribution has changed from (1, 2, 3, 4) to (2, 2, 2, 4) and the poverty line is set at 2.5. The head-count ratio would indicate an increase in poverty (from 0.5 to 0.75) whereas the poverty gap index would show a decrease (from 0.2 to 0.15). Decomposing the change in the head-count ratio according to definitions (7) and (8) would put the contribution of growth at zero and the contribution of redistribution as poverty worsening ($R > 0$). The same decomposition applied to the change in the poverty gap index would give a negative redistribution component.

10 Poverty lines are sometimes defined relative to the mean income. We will confine ourselves to absolute poverty lines.

capita per day poverty lines in 1993 PPP, the US$1 and US$2 per capita per day poverty lines in 1985 PPP, the rural poverty line proposed in Ravallion and Chen (2004) (850 yuan in 2002 prices), and the official rural poverty line of 530 yuan in 1995 prices. Another concern about the poverty line is whether a poverty line should be applied uniformly to all regions under examination. The costs of living vary across Chinese provinces sometimes by wide margins. Official CPIs published by the NBS, available at the provincial level, allow one to trace changes in the costs of living within a province, but not the differences across provinces. Using official CPIs and price data for 1990, Brandt and Holz (2004) constructed several panels of provincial price levels. One of these is adopted in this paper to convert national poverty lines to their provincial counterparts or, equivalently, to convert nominal income figures to real incomes measured in national prices of the base year.[11]

In most poverty studies on China, the indicator of individual welfare is on a per capita basis—total household income (or consumption) divided by the number of people in the household. This practice assumes away the possibility that the per capita cost of semipublic goods such as housing, utilities, transportation, and so on is negatively related to household size. Even for rival goods such as food, the unit price paid by large households may be lower than that paid by small households because the former are more likely to make bulk purchases. It is also possible that the costs for reaching a given welfare level are different for demographically different but otherwise identical households. Studies on other developing countries show that the scope for economies of scale in household consumption can be considerably large by some measures but negligible by others, and that the effects of demographic compositions on household consumption are insignificant (Lanjouw and Ravallion, 1995). In a study of urban residents in 12 Chinese cities, Gustafsson *et al.* (2004) find that the size and age composition of households have a modest impact on households' perception of minimum living expenditure. Whether their finding also applies in rural areas is an open question, since rural households tend to be larger and have different consumption pattern than urban households.

The average household sizes of both our datasets exhibit a decline trend over the period of 1988 to 1999, one from 4.71 to 4.13 persons, and the other from 4.33 to 3.74. If there exist significant economies of scale and poor households are getting smaller on average, then a poverty trend based on per capita income will understate the increase (or overstate the reduction) in poverty.[12] To examine how allowing for economies of scale would affect the assessment of poverty trend and its decomposition, we employ three constant-elasticity equivalence scales to normalize household sizes. More specifically, if n_i represents the number of people in household i, the normalized household size is given by $k_i = n_i^{\theta}$, where θ is alternatively set to 1, 0.8, and 0.5.

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11 The rural price levels by provinces were obtained by applying to a 1990 rural consumption basket the official rural CPIs adjusted for consumption of self-produced products. Note that Brandt and Holz (2004) used the same composition of the consumption basket for all provinces throughout 1984–2000. As a result, regional differences in and changes over time of consumption patterns are ignored. In addition, the consumption basket used for deriving CPIs is meant to be representative of the consumption pattern of all rural residents, and hence may well differ from the consumption pattern of the rural poor.

12 We do not have sufficient information to investigate the existence of economies of scale in the datasets.

3 Data and poverty trend

In this section, we will examine poverty trend in rural China from the late 1980s to the end of 1990s, using household-level income data from two different surveys.[13] The first survey was administered annually by the Research Centre for Rural Economy (RCRE) of the Ministry of Agriculture of China in eight provinces between 1987 and 1999 except 1992 and 1994. The number of households covered by the survey was exceptionally small in 1990 and 1991. For the other years, it varied between 6200 and 6900 households.[14] Our second data source is the China Health and Nutrition Survey (CHNS).[15] Five rounds of CHNS were conducted in 1989, 1991, 1993, 1997, and 2000. Each round covered around 15,000 individuals from about 4000 households spread over nine provinces. Of these, about two-thirds of the households and 70 percent of the individuals are classified as rural. The income figures reported in each round appertain to the year immediately prior to the survey year.

Observations in both datasets are checked for completeness and internal consistency. To retain as many data points as possible, only those with missing or dubious entries for household size or total income are dropped. We select from each survey 4 years of data to make the sample periods of the two datasets comparable. For CHNS, the four rounds chosen contain data for 1988, 1992, 1996, and 1999; for RCRE survey, the sample years are 1988, 1993, 1996, and 1999.

That the RCRE survey and the CHNS each cover only eight or nine provinces might raise concerns about how representative they are of the 30 odd Chinese provinces in total. The provinces included in the two datasets are given in Table 1. These provinces are diverse in economic structure, level of development, and growth performance during the sample period. A good few of them are among the most populous provinces. According to the end-of-year population statistics for 2003 (National Bureau of Statistics, 2004), the combined population of the eight provinces in the RCRE survey is about 40 percent of the national total, while the population share of the nine provinces in the CHNS exceeds 43 percent. The share of total rural population of the sampled provinces may be even higher. In our view, the surveyed provinces in each dataset constitute a fairly balanced representation of China's economic geography. The poverty trend in these provinces should also be able to convey the varied poverty reduction experience across the country. That said, it is necessary to stress that this section is not about establishing the exact values of certain poverty measures in the rural areas of China, though we do present estimates of the three FGT indices based on the two datasets. To undertake that task requires surveys with a much more expansive sampling frame both in geographical coverage and preferably in the number of participating households. At present, the NBS urban and rural household surveys are probably the only ones that are sufficiently comprehensive for such a purpose. Using the NBS survey

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[13] Since we are interested in poverty among individuals, individual-level income data would be ideal. The datasets do contain some information on individual earnings. However, household members usually pool their earnings, and little is known about intrahousehold redistribution. Following standard practice, we assume perfect income equality among individuals of the same household.

[14] A brief description of the history of the RCRE survey can be found in Wan and Zhou (2005).

[15] The data can be downloaded from http://www.cpc.unc.edu/projects/china.

Table 1. Provinces included in the datasets

RCRE	Anhui, Gansu, Guangdong, Henan, Jiangsu, Jilin, Shanxi, Sichuan
CHNS	1988, 1992: Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shandong 1996: Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Shandong 1999: Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shandong

data, Ravallion and Chen (2004) have done a meticulous job assembling long series of the FGT indices both at the national level and separately for the rural and urban areas. Rather than trying to better their estimates, the objective here is to assess the trend of income poverty in a broad spectrum of provinces. The results derived herein are indicative of whether the poverty trend observed in the NBS data is sensitive to geographical coverage and, since our data are not culled from the NBS surveys, whether the trend is survey specific. That the two datasets themselves come from different sources serves an analogous purpose—a sensitivity check on the poverty trend present in each dataset.

Table 2 provides the estimates of the head-count ratio, poverty gap, and squared poverty gap indices for the two datasets under different combinations of alternative assumptions about poverty measurement. The left half of the table shows the results for the RCRE data, and the right half for the CHNS data. Horizontally, the table is divided into two panels, each containing results based on a different equivalence scale.[16] Hence, in the upper-left block we find the values of P_0, P_1, and P_2 for the RCRE data when per capita income ($\theta = 1$) is the welfare indicator. Every poverty index is measured against the six poverty lines stated earlier. To explore the sensitivity of the results to interprovincial differences in the costs of living, nominal income values are alternately adjusted for provincial deflators constructed by Brandt and Holz (2004) and the rural CPI.

16 Setting θ to 0.5 does not change our major conclusion about the evolution of poverty trend in this period. However, given the current income level and expenditure pattern in rural China, the scope for scale economies is probably not large enough to justify $\theta = 0.5$. A value of 0.8 is arguably more appropriate. The results with $\theta = 0.5$ are available upon request.

Table 2. Alternative estimates of poverty indices

		RCRE data								CHNS data							
		1988	1993	1996	1999	1988	1993	1996	1999	1988	1992	1996	1999	1988	1992	1996	1999
		Provincial prices				National prices				Provincial prices				National prices			
		$\theta = 1$															
P_0	z_1	5.49	5.20	5.61	7.92	5.97	5.02	4.88	7.07	14.81	7.26	7.44	10.86	14.47	6.65	5.99	9.73
	z_2	19.83	17.94	15.28	17.95	20.67	17.82	13.96	16.93	27.71	17.82	15.11	20.35	27.22	16.18	12.47	17.98
	z_3	23.23	21.25	17.86	20.14	24.12	20.80	16.41	18.99	30.21	19.80	16.97	22.22	29.83	18.57	14.08	20.07
	z_4	27.17	25.33	21.28	23.01	27.99	24.61	19.46	21.65	32.61	21.91	19.42	24.08	32.33	20.31	15.99	21.53
	Z_5	66.61	63.77	58.61	55.85	64.05	60.62	55.57	52.83	59.39	49.33	43.94	45.74	58.45	46.54	39.47	43.28
	Z_6	71.20	68.56	63.22	60.65	68.15	64.95	59.74	57.51	63.17	52.98	47.49	49.38	62.45	50.64	43.08	46.31
P_1	z_1	1.40	1.48	2.01	3.29	1.49	1.36	1.45	2.59	5.68	2.77	2.42	4.40	5.45	2.68	1.99	3.97
	z_2	5.27	4.97	4.92	6.81	5.55	4.80	4.17	6.04	11.36	6.22	5.56	8.39	11.10	5.83	4.64	7.53
	z_3	6.35	5.93	5.69	7.63	6.67	5.76	4.89	6.83	12.52	7.04	6.25	9.25	12.25	6.61	5.21	8.30
	z_4	7.71	7.17	6.69	8.64	8.07	6.99	5.84	7.81	13.88	8.03	7.10	10.26	13.61	7.54	5.92	9.20
	Z_5	26.44	25.36	22.37	23.15	26.27	24.28	20.85	21.75	28.80	20.82	18.51	21.86	28.46	19.68	16.02	20.11
	Z_6	29.70	28.50	25.32	25.85	29.33	27.23	23.68	24.32	31.27	23.13	20.60	23.81	30.90	21.91	17.96	22.00
P_2	z_1	0.61	0.71	1.17	2.15	0.64	0.59	0.73	1.52	3.02	1.64	1.18	2.46	2.88	1.62	0.95	2.19
	z_2	2.17	2.15	2.52	3.89	2.30	2.02	1.94	3.20	6.40	3.34	2.89	4.85	6.19	3.19	2.40	4.35
	z_3	2.63	2.57	2.88	4.32	2.78	2.43	2.27	3.61	7.10	3.76	3.28	5.36	6.89	3.58	2.72	4.81
	z_4	3.25	3.12	3.34	4.85	3.42	2.98	2.70	4.13	7.96	4.29	3.75	5.97	7.73	4.07	3.12	5.36
	Z_5	13.62	12.94	11.55	13.01	13.80	12.48	10.52	12.02	18.06	11.88	10.49	13.57	17.79	11.19	8.90	12.32
	Z_6	15.76	15.00	13.37	14.71	15.87	14.44	12.26	13.64	19.82	13.37	11.82	14.93	19.54	12.61	10.10	13.61
		$\theta = 0.8$															
P_0	z_1	2.14	2.27	2.78	4.65	2.36	2.15	2.21	3.93	9.53	4.28	4.05	7.40	8.90	4.02	3.64	6.69
	z_2	8.02	7.87	7.64	10.76	8.65	7.57	6.62	9.85	18.21	9.64	9.49	13.44	17.58	9.20	8.06	12.05
	z_3	9.88	9.56	8.76	12.22	10.51	9.43	7.68	11.30	20.27	11.27	10.86	14.99	20.09	10.42	9.06	13.49
	z_4	12.43	11.83	10.45	13.82	13.00	11.71	9.42	12.96	22.17	12.52	11.65	16.82	21.91	12.07	10.02	15.01

	Z_5	45.32	44.91	38.30	37.87	45.05	43.07	36.20	36.24	44.91	34.57	30.56	34.72	44.27	33.38	26.36	32.14
	Z_6	50.47	50.42	43.86	42.61	49.76	47.91	41.46	40.77	48.33	37.11	33.96	37.57	47.44	35.62	29.99	35.16
P_1	z_1	0.61	0.73	1.20	2.29	0.64	0.60	0.79	1.66	3.36	1.80	1.32	2.89	3.18	1.79	1.05	2.56
	z_2	2.08	2.15	2.61	4.16	2.23	2.01	2.02	3.45	7.05	3.62	3.26	5.59	6.81	3.46	2.69	5.04
	z_3	2.54	2.58	2.98	4.64	2.71	2.44	2.36	3.92	7.85	4.07	3.72	6.16	7.61	3.88	3.07	5.55
	z_4	3.15	3.15	3.46	5.24	3.37	3.03	2.80	4.51	8.81	4.65	4.26	6.86	8.56	4.40	3.54	6.17
	Z_5	14.92	14.40	12.69	14.46	15.30	14.03	11.63	13.48	20.29	13.42	11.94	15.67	20.03	12.55	10.07	14.16
	Z_6	17.45	16.94	14.86	16.43	17.75	16.45	13.72	15.40	22.30	15.14	13.50	17.23	22.00	14.23	11.46	15.65
P_2	z_1	0.30	0.40	0.80	1.68	0.30	0.28	0.43	1.07	1.69	1.13	0.59	1.53	1.60	1.13	0.46	1.35
	z_2	0.90	0.99	1.45	2.59	0.94	0.87	0.99	1.95	3.84	2.07	1.60	3.19	3.68	2.02	1.31	2.86
	Z_3	1.08	1.17	1.62	2.82	1.14	1.04	1.14	2.17	4.30	2.30	1.84	3.53	4.13	2.23	1.51	3.17
	z_4	1.32	1.40	1.84	3.12	1.40	1.28	1.34	2.46	4.87	2.59	2.14	3.95	4.68	2.50	1.76	3.54
	Z_5	6.84	6.60	6.22	7.99	7.12	6.43	5.46	7.21	12.13	7.27	6.48	9.41	11.89	6.83	5.44	8.48
	Z_6	8.22	7.94	7.33	9.09	8.51	7.73	6.52	8.27	13.48	8.31	7.40	10.44	13.24	7.80	6.22	9.42

Notes: (1) z_1 = the official rural poverty line of 530 yuan in 1995 prices, z_2 = 850 yuan in 2002 prices, equivalent to 833.85 yuan in 1995 rural prices, z_3 = US$1.08 per day in 1993 PPP, equivalent to 892.85 yuan in 1995 rural prices, z_4 = US$1 per day in 1985 PPP, equivalent to 962.39 yuan in 1995 rural prices, z_5 = US$2.15 per day in 1993 PPP, equivalent to 1777.40 yuan in 1995 rural prices, z_6 = US$2 per day in 1985 PPP, equivalent to 1924.80 yuan in 1995 rural prices. (2) See section 2 for definitions of P_0, P_1, and P_2.

It can be seen from the estimated head-count ratios (P_0) that the six poverty lines represent roughly three different classes of poverty. The lowest poverty line z_1 (530 yuan in 1995 prices) cuts the income distribution at the bottom 5 to 15 percent of the population, thus can be viewed as the threshold for extreme poverty in this context. Using the second, third, or fourth poverty line, around 20 to 30 percent of the sampled rural residents would be classified as poor, an assessment in agreement with the general perception of rural poverty in China. The other two lines, US$2.15 in 1993 PPP and US$2 in 1985 PPP per person per day, designate 60 to 70 percent of the population as poor. They seem rather too high at the present stage to serve as poverty thresholds for policy purpose.[17]

Poverty trends appear to differ when measured against the three classes of thresholds. For example, in the first four columns of the upper-left block where interprovincial price differences are factored in, the prevalence (P_0) of extreme poverty (measured against z_1) started rising as early as 1993. The downward trend in the second poverty class (measured against z_2– z_4) did not reverse until 1996, whereas the decline in the third poverty class (measured against z_5– z_6) was sustained throughout this period. The choice of a poverty index can also affect the assessment of poverty trend. Judging by the head-count ratio, for instance, a sizable reduction in poverty can be concluded for the entire period (1988–1999) against a fairly wide range of poverty lines.[18] If, instead, P_1 and P_2 are chosen to measure poverty trend, one would conclude that there was no (or a reversal in) poverty reduction unless the poverty line is set at a relatively high income level. Regardless of which poverty line or poverty index is used, however, all estimates suggest that the early to mid-1990s saw divergent fortunes among the poor: while some of the poor forged ahead, the circumstances of the poorest group (those with incomes falling short of the lowest poverty line) worsened. In addition, poverty went up on nearly all accounts between 1996 and 1999.

The next four columns of the upper-left block show the values of the poverty indices when the nominal incomes of all households are deflated by the rural CPI regardless of their places of residence. Interestingly, whilst ignoring provincial price differences tends to raise the values of the poverty indices for 1988, it reduces the values of the indices for all the other years. The cause for these contrasting effects turns out to be that in 1988 the local price levels in the majority of the eight provinces (except the relatively well-off Guangdong and Jiangsu provinces) were lower than or close to the national average. Such was not the case in the later years when the price levels in Anhui and Gansu, two of the low-income provinces, stood above the national average. As can be seen, this change to a uniform nominal income deflator affects the assessment of poverty trend both quantitatively and, in some occasions, qualitatively. For instance, with province-specific deflators, the changes in P_1 and P_2 between 1988 and 1993 for the lowest poverty line are positive, indicating an increase in poverty; using the rural CPI as the deflator, the corresponding values are negative, suggesting a decrease in poverty. Apparently, much of this would turn on the differentials between the provincial and national inflation rates. It also seems that whether such inflation differentials are acknowledged bears more on the distribution-sensitive measure P_2.

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17 We thank an anonymous referee for highlighting this point.

18 Nevertheless, the head-count ratio for z_1 increased over this period. The increase is statistically significant with the *t*-statistic at 11.73. The standard errors are calculated following Kakwani (1993).

Moving down to the other block on the left side of Table 2, the values of the poverty measures become smaller with the decrease of the size elasticity of the equivalence scale, θ. This is only to be expected. A smaller θ allows for greater economies of scale, which results in higher income per equivalent adult for a given amount of household income. With a smaller θ, the signs of poverty changes, whether in the three shorter time intervals or over the entire period, are also more likely to suggest increased poverty for lower poverty lines. Underlying this tendency is the aforementioned diminishing of household sizes over the sample period. As a household becomes smaller, it loses some of the benefits from economies of scale. The loss grows with the decrease in θ. It is thus of little surprise that the indication for a rise in poverty in 1996–99 and in 1988–99 is stronger from the results with θ at 0.8.

Poverty estimates for the CHNS data are reported in the right half of Table 2. In comparison with the results for the RCRE data, the following points are noteworthy. First, the two datasets are sourced from independent surveys. Even the geographic coverage of the surveys overlaps only slightly (see Table 1). In view of the distinctness of data sources, the two sets of estimates, especially those for 1996 and 1999, are surprisingly close. Second, applying province-specific deflators increases the values of the poverty indices, but only marginally. In fact, several estimates are statistically indistinguishable from their counterparts based on nominal incomes deflated by the rural CPI.[19] This is because, as in the RCRE survey, provincial price levels in the CHNS typically hover above the national average. However, the discrepancies between the local and national prices are not large enough to significantly affect the values of poverty measures. Third, consistent with the results for the RCRE data, the CHNS data manifested a decline in all three poverty indices from the late 1980s to the early 1990s and a reversal between 1996 and 1999. The decline in the head-count ratio and the poverty gap index continued up to 1996. Finally, the two sets of results share the characteristic that the qualitative assessment of poverty trend is by and large indifferent to the choice of poverty line, poverty measure, and equivalence scale. Nonetheless, it is advisable to be cautious when drawing conclusions at low poverty lines.

How do the results here compare with the findings in other studies? Ravallion and Chen (2004) provide estimates of the three FGT indices in the rural areas for 1980–2001. The two poverty lines used in their study are the same as the first two poverty lines in Table 2, and their welfare indicator is income per capita. More importantly, their estimates are based on the unit record data (at the household level) from the NBS rural household survey. A comparison of the estimates in Table 2 with theirs is, therefore, of interest. Before proceeding further, however, it is necessary to bear in mind that the NBS survey has nationwide coverage, which precludes direct comparability of the values of the poverty indices. Also, Ravallion and Chen use the rural CPI as the deflator. Interprovince price differences are thus not taken into account in their study. With regard to changes in poverty, their estimates indicate little reduction or even increases in poverty in the late 1980s and early 1990s, rapid reduction in the early to mid-1990s, and a slowdown of the reduction in the late 1990s with rising poverty in 1999–2001. See Table 2 in Ravallion and Chen (2004). Hence, despite some discrepancies in the timing and magnitude of poverty changes, the estimates in Table 2 and those in Ravallion and Chen (2004) agree that poverty decreased in the mid-1990s

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19 The *t*-test results are available upon request.

and increased in the later years of the decade. Regarding the poverty trend from the late 1980s to the early 1990s, however, the assessments offered in the two studies do not square well with each other.

Two other studies of relevance are Khan (1999) and Khan (2004), which examine poverty changes in rural and urban areas between 1988 and 1995 and between 1995 and 2002, respectively. Both utilize unit-record household data from CASS surveys (see footnote 3). Rural poverty is measured by the FGT indices against two poverty thresholds: the lower one is about 5 percent below the second poverty line in Table 2, and the upper one is about 20 percent above the fourth poverty line. The estimated FGT indices for 1988 and 1995 in Khan (1999) are largely in line with the estimates for 1988 and 1995/1996 in Table 2. However, the estimates for 2002 in Khan (2004) imply rapid poverty reduction between 1995 and 2002.[20] Technically speaking, this in itself does not constitute contradiction to the finding in Table 2 that rural poverty increased in the late 1990s, as poverty reduction could have occurred after 1999. Nonetheless, the magnitude of the reduction in Khan (2004) points to major discrepancies between the post-1996 income data collected in CHNS and RCRE surveys and those collected in CASS surveys. It is worth mentioning that Khan (2004) considers more vigorous income redistribution by the government after the 1997 Asian financial crisis as the major contributor to the poverty trend between 1995 and 2002. This conjecture effectively assigns the bulk of poverty reduction as exhibited by the CASS data to the years after 1997, and hence is at odds with the poverty estimates in Ravallion and Chen (2004), which show rising poverty around the turn of the century.

4 Impacts of growth and redistribution

As stated in Section 2, temporal changes in poverty indices can be apportioned between distribution-neutral income growth and shifts in the distribution of relative income. Applying to the RCRE and CHNS data the Shapley value decomposition procedure produces the results in Table 3, where the poverty trends in the three time intervals (1988–92/93, 1992/93–96, 1996–99) and during 1988–99 are decomposed into contributions by income growth and those by redistribution according to expressions (7) and (8), respectively. Table 3 is structured in the same way as Table 2 except that the column category in each block is now the poverty lines instead of the sample years.[21] For a given time interval, the growth components under alternative poverty lines are arrayed in the row labeled *G* and the redistribution components in the row labeled *R*. Note that negative values in the table denote reductions in poverty, and positive values denote increases in poverty.

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20 The latest CHNS income data are from the 2000 round, and hence provide no information on how poverty has evolved since 1999. However, data for 2000–2002 are available in the RCRE dataset. The FGT indices based on these data indicate that poverty indeed declined between 1999 and 2002, albeit at an anemic rate.

21 As the estimates in Table 2 indicate that the two $2 per day poverty lines are too high for measuring China's rural poverty, their decomposition results are omitted here to avoid cluttering up the table.

The results in the upper-left block show how growth and redistribution would have affected the poverty trends in the RCRE data if there were no economies of scale within households. As can be seen, the growth components in the first four columns are negative across all poverty lines and poverty measures. This implies that if nominal incomes are measured against local prices, an average household in the RCRE survey would have experienced growth in real per capita income throughout the sample period. By contrast, the redistribution components are mostly positive. Only in the decompositions for 1993–96 are negative redistribution components present, and then only for higher poverty lines.[22] Hence, while the changes in the distribution of relative income during the sample period of 1988–99 were hardly favorable to the poor, it was the poorest group who saw sustained worsening of their relative positions in the income distribution. The relative magnitudes of the two components indicate that the reduction of poverty in 1988–93 was driven by income growth. Since then, however, distributional changes had become the dominant factor. The increase in poverty at lower poverty lines in 1993–96, as well as the increase in 1996–99, was fully attributable to adverse distributional changes.

It is seen in Table 2 that replacing provincial prices with national average prices can affect not only the estimated values of the poverty indices but also the assessment of poverty trend. When it comes to poverty decomposition, ignoring regional price differentials is not inconsequential, either, as the results in the other four columns in the upper-left block show. Between 1988 and 1993, the inflation rates in most of the provinces in the RCRE survey were higher than the national average. Using the rural CPI as the deflator thus results in an exaggeration of the growth effects relative to the redistribution effects. The opposite inflation scenario occurred in the two intervals after 1993, when the inflation rates in most of the sampled provinces were below the national average. Using the rural CPI in these two cases leads to an understatement of the growth components. For the 1993–96 interval, in particular, because the actual growth of real income was rather weak, the average of the 1996 income figures are smaller than that of the 1993 figures after being deflated by the rural CPI. Consequently, the growth components based on the overdeflated income values are positive, suggesting a contraction in real income when there is in fact real growth.

Comparing the decomposition results under $\theta = 0.8$ with those under $\theta = 1$, it is clear that allowing for economies of scale within households tends to dampen the poverty-reducing effects of the growth component. As discussed earlier, this is because household sizes had been shrinking during the sample period. With the presence of economies of scale, the diminution of household sizes offsets some of the growth in household income so that the growth of income per equivalent adult is lower than the growth of income per capita. How greater economies of scale, working in combination with diminishing household sizes, affect the redistribution component and its relative importance vis-à-vis the growth component is not readily clear from Table 3. Part of the answer will depend on how household sizes are correlated with the growth of real income per capita.

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[22] A possible explanation for the respite from worsening distribution is, as mentioned earlier, government intervention intensified in the grain market after 1993. As low-income rural households are heavily reliant on farming incomes, measures such as raising procurement prices, ensuring the supply of agricultural inputs and guaranteeing the purchase of contracted quotas tend to benefit them especially.

Table 3. Shapley value growth–redistribution decomposition

			RCRE data								CHNS data							
			Provincial prices				National prices				Provincial prices				National prices			
			z_1	z_2	z_3	z_4	Z_1	z_2	z_3	z_4	z_1	z_2	z_3	z_4	z_1	z_2	z_3	z_4
										$\theta = 1$								
P_0	1988–92/3	G	–1.46	–4.05	–4.62	–4.75	–2.26	–5.85	–6.32	–6.99	–5.21	–9.24	–10.05	–10.41	–5.59	–10.06	–10.85	–11.52
		R	1.16	2.16	2.63	2.91	1.30	3.01	3.00	3.61	–2.34	–0.65	–0.36	–0.30	–2.23	–0.97	–0.42	–0.51
	1992/3–96	G	–0.22	–0.58	–0.72	–0.96	0.26	0.66	0.81	0.57	–0.86	–2.22	–2.14	–2.21	–1.16	–2.67	–3.11	–3.10
		R	0.62	–2.07	–2.67	–3.09	–0.40	–4.52	–5.20	–5.71	1.04	–0.49	–0.69	–0.28	0.50	–1.04	–1.39	–1.22
	1996–99	G	–0.62	–1.43	–1.71	–1.79	–0.61	–1.23	–1.46	–1.57	0.58	1.09	1.02	1.20	0.70	1.15	1.63	1.42
		R	2.94	4.09	3.99	3.52	2.80	4.20	4.04	3.76	2.85	4.15	4.23	3.47	3.03	4.36	4.37	4.12
	1988–99	G	–2.45	–5.68	–6.25	–7.10	–2.50	–5.40	–6.40	–6.63	–5.77	–9.30	–9.88	–10.28	–6.27	–10.20	–10.70	–11.77
		R	4.88	3.80	3.16	2.94	4.15	2.15	1.75	0.76	1.82	1.93	1.88	1.75	1.52	0.96	0.94	0.96
P_1	1988–92/3	G	–0.34	–1.22	–1.43	–1.66	–0.52	–1.79	–2.08	–2.41	–1.96	–3.96	–4.34	–4.77	–2.06	–4.19	–4.59	–5.06
		R	0.42	0.92	1.01	1.12	0.39	1.04	1.17	1.33	–0.96	–1.18	–1.14	–1.08	–0.71	–1.08	–1.04	–1.01
	1992/3–96	G	–0.06	–0.18	–0.21	–0.25	0.06	0.20	0.23	0.27	–0.34	–0.75	–0.84	–0.94	–0.43	–0.96	–1.10	–1.24
		R	0.58	0.13	–0.03	–0.24	0.03	–0.83	–1.10	–1.42	–0.01	0.09	0.04	0.01	–0.26	–0.23	–0.31	–0.38
	1996–99	G	–0.18	–0.46	–0.52	–0.60	–0.15	–0.38	–0.44	–0.52	0.23	0.43	0.48	0.53	0.29	0.54	0.60	0.66
		R	1.46	2.34	2.46	2.56	1.29	2.26	2.38	2.48	1.74	2.40	2.52	2.63	1.69	2.35	2.49	2.62
	1988–99	G	–0.64	–1.83	–2.10	–2.43	–0.63	–1.78	–2.05	–2.37	–2.41	–4.38	–4.72	–5.11	–2.57	–4.75	–5.13	–5.58
		R	2.53	3.37	3.38	3.36	2.31	2.82	2.76	2.65	1.12	1.42	1.45	1.48	1.09	1.19	1.18	1.17
P_2	1988–92/3	G	–0.14	–0.52	–0.62	–0.75	–0.21	–0.77	–0.92	–1.11	–1.05	–2.24	–2.48	–2.77	–1.10	–2.36	–2.62	–2.93
		R	0.23	0.50	0.56	0.63	0.16	0.50	0.57	0.67	–0.33	–0.82	–0.86	–0.90	–0.16	–0.64	–0.69	–0.74
	1992/3–96	G	–0.02	–0.08	–0.09	–0.11	0.03	0.09	0.10	0.12	–0.17	–0.39	–0.45	–0.51	–0.22	–0.51	–0.58	–0.66
		R	0.48	0.45	0.40	0.32	0.11	–0.16	–0.26	–0.40	–0.29	–0.05	–0.04	–0.03	–0.45	–0.29	–0.28	–0.29
	1996–99	G	–0.08	–0.22	–0.26	–0.30	–0.07	–0.19	–0.22	–0.25	0.13	0.25	0.27	0.31	0.16	0.31	0.35	0.39
		R	1.07	1.60	1.70	1.81	0.86	1.44	1.55	1.68	1.16	1.71	1.81	1.92	1.08	1.64	1.74	1.86
	1988–99	G	–0.29	–0.86	–1.00	–1.18	–0.28	–0.84	–0.98	–1.15	–1.42	–2.65	–2.90	–3.18	–1.51	–2.85	–3.12	–3.43
		R	1.83	2.58	2.68	2.78	1.74	2.31	2.37	2.42	0.86	1.11	1.15	1.20	0.83	1.02	1.04	1.06
										$\theta = 0.8$								

P_0	1988–92/3	G	–0.50	–1.72	–2.24	–2.41	–0.77	–2.80	–3.22	–3.78	–3.20	–6.37	–7.23	–7.97	–3.15	–6.54	–7.50	–8.14
		R	0.63	1.57	1.92	1.81	0.56	1.72	2.13	2.49	–2.05	–2.20	–1.78	–1.67	–1.74	–1.84	–2.17	–1.70
	1992/3–96	G	–0.01	–0.10	–0.13	–0.17	0.12	0.56	0.67	0.69	–0.39	–0.92	–0.99	–0.94	–0.38	–1.61	–1.48	–1.76
		R	0.52	–0.13	–0.66	–1.20	–0.06	–1.51	–2.42	–2.99	0.16	0.76	0.58	0.07	0.00	0.47	0.12	–0.29
	1996–99	G	–0.22	–0.71	–0.61	–0.99	–0.22	–0.60	–0.67	–0.80	0.28	0.82	0.76	1.07	0.36	1.03	1.13	1.22
		R	2.09	3.83	4.07	4.36	1.93	3.83	4.28	4.35	3.07	3.13	3.37	4.10	2.69	2.97	3.29	3.77
	1988–99	G	–0.87	–2.41	–2.89	–3.55	–0.84	–2.43	–2.82	–3.38	–3.66	–6.62	–7.06	–7.52	–3.64	–7.06	–7.60	–8.40
		R	3.38	5.15	5.22	4.94	2.98	4.16	4.13	3.85	1.53	1.86	1.77	2.17	1.43	1.54	1.00	1.50
P_1	1988–92/3	G	–0.11	–0.44	–0.54	–0.67	–0.19	–0.71	–0.86	–1.05	–1.15	–2.37	–2.65	–3.00	–1.18	–2.53	–2.83	–3.19
		R	0.23	0.50	0.58	0.67	0.15	0.49	0.59	0.72	–0.42	–1.06	–1.12	–1.16	–0.22	–0.82	–0.90	–0.97
	1992/3–96	G	–0.01	–0.03	–0.04	–0.04	0.04	0.14	0.17	0.21	–0.15	–0.36	–0.40	–0.45	–0.22	–0.51	–0.58	–0.65
		R	0.48	0.49	0.44	0.35	0.15	–0.14	–0.26	–0.44	–0.33	–0.01	0.04	0.06	–0.51	–0.26	–0.23	–0.21
	1996–99	G	–0.08	–0.23	–0.26	–0.31	–0.06	–0.19	–0.22	–0.26	0.17	0.34	0.37	0.41	0.22	0.41	0.46	0.50
		R	1.17	1.78	1.92	2.09	0.94	1.62	1.78	1.97	1.40	1.99	2.07	2.19	1.29	1.94	2.02	2.12
	1988–99	G	–0.24	–0.75	–0.87	–1.04	–0.24	–0.74	–0.86	–1.02	–1.47	–2.69	–2.97	–3.28	–1.59	–2.97	–3.26	–3.60
		R	1.92	2.82	2.98	3.13	1.83	2.53	2.64	2.73	0.99	1.24	1.28	1.33	0.97	1.20	1.20	1.20
P_2	1988–92/3	G	–0.05	–0.18	–0.22	–0.27	–0.08	–0.28	–0.35	–0.43	–0.61	–1.31	–1.46	–1.65	–0.64	–1.38	–1.55	–1.75
		R	0.15	0.27	0.31	0.35	0.05	0.21	0.25	0.31	0.06	–0.46	–0.54	–0.62	0.18	–0.28	–0.35	–0.43
	1992/3–96	G	0.00	–0.01	–0.02	–0.02	0.02	0.06	0.07	0.09	–0.08	–0.19	–0.21	–0.24	–0.12	–0.26	–0.30	–0.34
		R	0.41	0.47	0.47	0.46	0.13	0.06	0.03	–0.02	–0.46	–0.29	–0.25	–0.21	–0.56	–0.45	–0.42	–0.40
	1996–99	G	–0.04	–0.11	–0.13	–0.15	–0.03	–0.09	–0.10	–0.12	0.10	0.20	0.22	0.24	0.12	0.24	0.26	0.29
		R	0.92	1.25	1.33	1.42	0.67	1.05	1.13	1.23	0.84	1.39	1.47	1.56	0.77	1.31	1.40	1.49
	1988–99	G	–0.11	–0.34	–0.40	–0.47	–0.11	–0.33	–0.39	–0.46	–0.85	–1.60	–1.76	–1.95	–0.92	–1.74	–1.92	–2.13
		R	1.49	2.03	2.14	2.27	1.46	1.91	1.99	2.09	0.69	0.94	0.99	1.03	0.66	0.92	0.96	0.99

Note: see notes to Table 2.

The decomposition results of using CHNS data, presented in the right half of Table 3, have many similarities to the results using the RCRE data. Both show that the reduction in poverty in 1988–92/93 was primarily driven by income growth whilst the increase in poverty in 1996–99 was mainly attributable to adverse distributional shifts. As in the RCRE results, the use of smaller size elasticities of equivalence scale detracts from the poverty-reducing effects of income growth. However, there also exist some major differences between the CHNS and RCRE results. For the CHNS data, the redistribution components of the 1988–92 interval are mostly negative except for the two highest poverty lines. This indicates that distributional changes between these years were favorable to the poor (at least to those at the very bottom of the income distribution, if not all the poor), though the ameliorative effects of these changes seem rather small. For the RCRE data, the redistribution components of the comparable interval 1988–93 are positive across poverty lines and poverty indices, exhibiting no sign of pro-poor distributional changes. For the 1992/3–96 interval, the RCRE and CHNS results differ in the relative importance of the growth and redistribution components. The RCRE results point to the dominance of the redistribution component whereas the opposite is true for the CHNS results. Yet another difference concerns the causes for the increase in poverty in the 1996–99 interval. Both sets of results indicate that distributional shifts are mainly to blame. However, the CHNS results also suggest that stagnation or negative growth of real income compounded the problem. The RCRE results, in contrast, suggest that income growth was still positive, but the poverty-reducing effects of growth were outweighed by the poverty-increasing effects of deteriorating income distribution.

To sum up, the decomposition results in Table 3 indicate that the years between the late 1980s and the late 1990s saw changing balance of importance between income growth and distributional shifts in affecting poverty trend. The poverty-reducing effects of income growth diminished, giving prominence to the impacts of distributional changes. The evolution of rural income growth partly reflects the cyclical fluctuations of aggregate growth in this period, as the growth of real GDP per capita declined from just under 13 percent in 1992 to a little over 6 percent in 1999. It is however also indicative of the shrinking GDP share of agriculture, from 25.7 percent in 1988 to 17.6 percent in 1999. As can be discerned from Figure 1, the relative prices of agricultural products have been on the decline except for the period of 1993–96 when the government temporarily shelved the liberalization of markets of some strategically important crops.

The perennial relative decline of agriculture entails that rural income growth has to come increasingly from nonfarm activities. However, not all rural households in all regions are equally equipped to make that transition. Table 4 shows the changes of poverty incidences in three provinces in the RCRE data. The coastal Jiangsu province, where township and village enterprises (TVEs) flourished during this period, saw the percentage halved of those with income below US$1 per day. In Jilin, part of China's heavy-industry heartland, the same ratio more than doubled probably because the large state industrial sector did not leave much room for the development of rural industry. The southwestern Sichuan province had one of the nation's highest poverty incidences historically. Its poverty rate in 1999 remained high by national standard, but had come down substantially from the 1988 level. Sichuan was not particularly successful in promoting TVEs during these years, but it had the largest number of migrant workers whose remittances in 1995 already amounted to 7 percent of the provincial GDP (Gilley, 1996).

Table 4. Changes in poverty incidences in three provinces

	z_1		z_3	
	1988	1999	1988	1999
Jiangsu	0.87	1.39	13.50	6.30
Jilin	5.00	21.20	14.53	38.83
Sichuan	7.69	2.34	40.05	17.00

Notes: For definitions of z_1 and z_3, see notes to Table 2.

Hence, during the period of 1988–99 real incomes from agricultural production, traditionally the mainstay of rural income, stagnated and sometimes even decreased. In the meantime, regions that were able to diversify into nonfarm activities still achieved large poverty reduction. This suggests that slow income growth and unfavorable distributional changes identified in Table 3 are both related to changes in the rural economy at large. Poverty alleviation policies should therefore be formulated within the same context.

5 Concluding remarks

This paper has examined the changes in China's rural poverty from the late 1980s to the late 1990s, employing two datasets that provide household-level income data. To quantify the relative contributions of income growth and redistribution, we adopted the Shapley value version of the growth–redistribution poverty decomposition advanced by Datt and Ravallion (1992), and extended it for the use with unit-record data. We also explored the sensitivity of results to the choice of poverty measures, poverty lines, and equivalences scales, and to differential provincial prices.

Our results reveal that both the assessment of poverty trend and its decomposition can be qualitatively affected by different measurement assumptions. Nonetheless, some results appear to be robust. The period of 1988–99 is found to be one of progress and reversal in rural poverty reduction. Income growth ensured substantial poverty reduction in the early years of the period. As income growth tapered off in the late 1990s, the impact of adverse distributional changes either outweighed the effects of weak income growth or aggravated those of falling incomes, leading to a rise in poverty. All these compare rather unfavorably with China's experience in the late 1980s when agriculture-led growth raised rural income, improved income distribution, and, as a result, achieved unprecedented reduction in rural poverty.[23] Could that experience be the model for designing poverty alleviation policy today to resurrect rural income growth and arrest worsening distribution?

[23] Ravallion and Chen (2004) estimate that the head-count ratio of rural poverty declined from 41 percent in 1980 to 9 percent in 1985 by the official poverty line, and from 76 percent to 23 percent by their rural poverty line.

Not likely. China's rural economy is much different now than it was in the early 1980s. The GDP share of agriculture dropped to 13 percent in 2004, yet the agricultural sector still employs 50 percent of the labor force. If economic history is any guide, the agricultural sector will continue its relative decline. Relying on agricultural growth to raise rural income is not sustainable. Given the constraints of land, water, and other natural resources, the ultimate way of raising agricultural labor productivity (and hence per capita agricultural income) is to transfer labor from agriculture to industry and services.

Unlike the agriculture-based growth in the early 1980s where equalized allocation of land kept income gaps at bay, the process of diversification into nonagricultural activities tends to increase disparity both between regions and between individuals. This is because not all rural households are endowed with the financial and human capital required for making that transition, and not all regions are well positioned to have easy access to international and urban markets. It appears, therefore, that among the forces responsible for flagging growth and increasing disparity in rural China in the late 1990s, at least some share the same origin. That origin is the age-old development problem of surplus rural labor. Thus, policies that enable, encourage, and facilitate the transfer of rural labor can have a positive impact on both growth and distribution, thereby helping restore momentum to rural poverty reduction.

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