

Poverty, inequality, and growth in urban China, 1986–2000

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Although urban China has experienced spectacular income growth over the last two decades, increases in inequality, reduction in social welfare provision, deregulation of grain prices, and increases in income uncertainty in the 1990s have increased urban poverty. Using a large repeated cross section household survey from 1986 to 2000, this study maps the changes in income, inequality, and poverty over the fifteen-year period and investigates the determinants of poverty. We find that the increase in poverty in the 1990s is associated with the increase in the relative food price and the need to purchase items that were previously provided free or at highly subsidized prices by the state, i.e., education, housing and medical care. In addition, the increased saving rate of poor households, which is due to an increase in income uncertainty, contributes significantly to the increase in poverty measured in terms of expenditure. *Journal of Comparative Economics* **33** (4) (2005) 710–729. Australian National University; Chinese National Statistical Bureau. © 2005 Association for Comparative Economic Studies. Published by Elsevier Inc. All rights reserved.

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1. Introduction

Although urban China has experienced unprecedented income increases over the last two decades, the radical reform measures implemented in the 1990s have increased income inequality, reduced social welfare provision, increased grain prices, and increased income uncertainty (Meng, 2003, 2004). These factors may have acted as a counter weight to income growth so that the net effect on poverty depends on whether income growth or the offsetting factors dominate.¹ Other studies of the relationship between economic growth and poverty often use cross-country data, which leads to two problems. First, the authors are unable to consider institutional and household behavioral details that may affect changes in poverty and economic growth within each country. Although this may not be a significant problem if changes within each country over time are minimal, China is a transitional economy in which institutions and household behavior are changing very rapidly. Second, cross-country data often have a limited number of data points for each country so that the results are largely driven by cross-country differences. As noted in Ravallion and Chen (1997), cross-country comparisons have many conceptual and practical problems arising from PPP currency conversions, different survey-based measures of living standards, and different levels of development.

The majority of studies on China focus on rural poverty (Lee and Ma, 1994; Jalan and Ravallion, 1998, 2002; Brown and Park, 2002). Due to the radical urban reform in the 1990s, urban poverty has begun to attract more attention from both policy makers and researchers (Gustafsson and Wei, 2000; Knight and Li, 2001; Khan and Riskin, 2001; Fang et al., 2002; CUPRG, 2003). Most studies of urban poverty use survey data from a few provinces or for a short period of time and tend to be descriptive. In this study, we utilize data from the National Statistical Bureau Urban Household Income and Expenditure Survey (UHIES) for the whole country, i.e., 29 provinces, and for the period 1986 to 2000. These data present a more general picture of urban poverty and the changes in inequality over the fifteen-year economic reform period.² More importantly, our data allow us to examine the association of changes in institutional settings and household behavior with changes in poverty. Given the unprecedented income growth in China during this period accompanied by significant interregional variations in growth, our study may also contribute to the understanding of growth, poverty, and inequality beyond China.

The paper is structured as follows. The next section discusses the data and the measurement of poverty. Section 3 presents estimated poverty lines and poverty head count indices. Section 4 investigates the relationships among poverty, inequality and income growth. Section 5 concludes with a summary of the results and some policy implications.

2. The data and poverty measurement

The UHIES began in 1956 but was suspended during the Chinese Cultural Revolution from 1966 to 1978; it was resumed in 1980 (Fang et al., 2002). The survey samples households with

¹ The early evidence on whether or not average income growth is sufficient to increase the income of the poor is mixed, as Fishlow (1972), Cline (1975), and Fields (1977) report. Recent studies, using 1980s and 1990s data, conclude that economic growth has benefited poor people. The current debate focuses on the degree to which economic growth reduces poverty. Ravallion and Chen (1997), Dollar and Kraay (2002), Ravallion (2001), Chen and Ravallion (2001), Sala-i-Martin (2002) and Bourguignon and Morrisson (2002) are examples. Deaton (2005) provides a detailed review of the literature.

² Although the UHIES may have problems with respect to its sampling procedures, especially in recent years as Gibson et al. (2003) indicate, the survey is still the most comprehensive nationwide survey available in China.

Urban Household Registration for every province so that it includes 29 provinces before 1990 and 30 after 1990, due to the newly established province of Hainan in 1990.³ The sample is based on several stratifications at the regional, provincial, county, city, town, and neighborhood community levels. Households are selected randomly within each chosen neighborhood community and are expected to keep a diary of all expenditure, disaggregated for hundreds of product categories, for each day during a full year. Enumerators visit sample households once or twice each month to review the records, assist the household with questions, and to collect household records for data entry in the local Statistical Bureau office (Han et al., 1995; Fang et al., 2002; Gibson et al., 2003). The earliest electronic data available is from 1986.

The UHIES questionnaire changed three times during the data period in 1988, 1992, and in 1997; the most relevant change occurred in 1992 with the introduction of more detailed food categories. Before 1992, 39 food items were included in the expenditure questions but this number was increased to 112 so that some discontinuity in the data series may occur. The total number of households in the survey per year ranges from 12,409 to 16,905 and the total number of individuals ranges from 35,895 to 55,867. The UHIES includes only households with Urban Household Registration so that rural migrants to urban cities are not included. Rural migrants are disproportionate in the lower end of the income distribution in urban China and excluding them may result in underestimates of urban inequality and poverty incidence. Therefore, our focus is on changes in *urban registered household* poverty and its responses to income growth and economic reforms.

The measurement of a poverty line is crucial and, although social conventions are important in defining poverty, the best empirical approach often depends on data availability. A commonly used measure is one or one and half US dollars per person per day. Despite its widespread use, this measure is not ideal. First, it ignores price variations among different regions and over different time periods within a particular country. Second, this poverty measure uses the purchasing power parity exchange rate, which is well known to be a poor measure of the local cost of living (Ravallion and Chen, 1997). An alternative measure is given in Ravallion (1994) and CUPRG (2003), i.e., the cost-of-basic-needs (CBN) method, which defines the poverty line in four steps.

The first step involves defining the minimum nutrition requirement (MNR), which we take to be the commonly used 2100 calories per person per day (Ravallion, 1994; Pradhan et al., 2001) and which is accepted as the MNR by the Chinese Academy of Preventive Medicine (CAPM, 2001). The second step involves choosing a reference group that purchases the MNR at the lowest possible price. The reference group used in this study is the poorest 20 percent of households, ranked by household expenditure excluding expenditure on durable goods, in each province for each survey year. Our choice is based on taking a sample size that is both representative of poor people and large enough to calculate the MNR for each province in each survey year.⁴

The third step involves computing the cost of acquiring the MNR by the reference group, which defines the food poverty line. Detailed information on both the quantity and expenditure of the food purchased is collected in UHIES. Hence, we can calculate the per capita nutrition intake for each household according to the composition of nutrients in each type of food as specified by the Chinese Academy of Preventive Medicine (CAPM, 2001). Food expenditure per capita for the reference group is divided by the per capita caloric intake for the same group to derive the average cost per calorie consumed by the reference group. This average cost is multiplied by 2100 to produce the food poverty line.

³ Chongqing became an independent administrative unit in 1998. In this paper, we group Chongqing and Sichuan together. We exclude Tibet due to its small sample size.

⁴ We have a minimum sample size of 40 to 60 households per year per province.

The fourth is to calculate the non-food component of the cost of basic needs (CBN) because human beings need other items, such as basic clothing and shelter, to survive. The derivation of the non-food component of the CBN is based on Ravallion (1994). The objective is to determine the amount of food expenditure that poor households, whose total expenditures are equal to the food poverty line, are willing to forego in order to obtain non-food consumption. This forgone food expenditure is added to the food poverty line to calculate the total poverty line.

To identify the non-food component of the CBN, we estimate a relationship between food and total expenditure from the following equation:

$$Y_i^F / Y_i^T = \alpha + \beta \log(Y_i^T / Z_j^F) + \gamma \log(N_i) + \varepsilon_i, \tag{1}$$

where Y_i^F and Y_i^T are the food and total expenditures of household i , respectively, Z_j^F is the food poverty line for province j , and N_i is the number of family members in household i , which is included to capture the impact of economies of scale. The parameters obtained are used to identify a lower and an upper bound for the poverty line.

The lower bound is defined as the food poverty line plus the amount of food expenditure a household with total expenditures equal to the food poverty line is willing to forgo to buy non-food items. This may be indicated in Fig. 1, where the vertical and horizontal axes represent food and total expenditures, respectively. The curve Y^F is the estimated food expenditure curve; the point Z^F on the vertical axis indicates the food poverty line. On the basis of the food expenditure curve, households with total expenditure equal to Z^F spend the proportion α_0 , equal to $\alpha + \gamma \log(N)$, on food. The remaining proportion, $(1 - \alpha_0)$, is spent on non-food. Thus, $(1 - \alpha_0)Z^F$ is the amount of total expenditures that poor households at the food poverty line are willing to forego in order to obtain necessary non-food consumption. Therefore, the lower bound of the poverty line is defined as the food poverty line (Z^F) plus the necessary non-food component of consumption ($(1 - \alpha_0)Z^F$). From Eq. (1), if $Y_i^T = Z_j^F$, the food share of total expenditures is equal to α_0 . Thus, the lower bound of the poverty line Z^L can be derived as:

$$Z^L = Z^F (2 - \alpha_0). \tag{2}$$

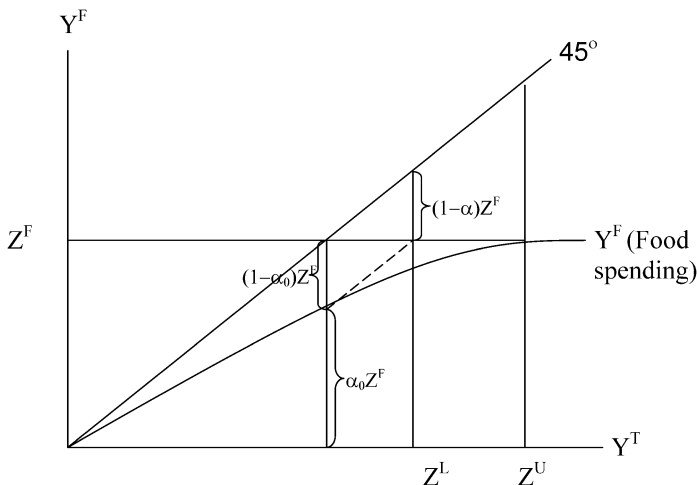


Fig. 1. Poverty measures.

The upper bound of the poverty line, Z^U in Fig. 1, is defined as the total expenditure at which a household spends Z^F on food. Formally, $Z^U = Z^F / (Y_i^F / Y_i^T)^*$, where, $(Y_i^F / Y_i^T)^*$ is the food share of the total budget at the point where $Y_i^F = Z_j^F$. Thus, Eq. (1) can be rewritten as:

$$(Y_j^F / Y_i^T)^* = \alpha_0 + \beta \log(Y_i^T / Y_j^F)^* \quad (3)$$

Following Ravallion (1994) and approximating $\log(Y_j^F / Y_i^T)^*$ by $(Y_j^F / Y_i^T)^* - 1$, the upper bound of the poverty line, Z^U , can be approximated as:

$$Z^U = Z^F (\alpha_0 + \beta) / (1 + \beta) \quad (4)$$

where β is the slope of the food consumption curve in Eq. (1). Then, we apply the bounds on the poverty line to income and expenditure distributions and compute the poverty rate as a head count index, i.e., the proportion of people whose income or expenditure, excluding durable good consumption, is less than the upper or lower bound of the poverty line.⁵

3. Poverty lines and poverty head count indices

Ravallion and Chen (2004) and others use estimated parameters of Eq. (1) from cross section data for one year to calculate a poverty line and then use changes in the Consumer Price Index (CPI) to adjust the CBN over time. The Chinese UHIES data are quite extensive so that we have sufficient data to estimate the poverty line directly for each province and each year. The benefits of calculating a CBN at a point of time and then applying CPI adjustments over time are that poverty is measured in terms of a fixed bundle of goods and that the data requirements for CPI adjustment are minimal. However, the analytical underpinnings of this technique require that the fixed bundle of goods, upon which the CBN is based, is always available over the data period, that institutional changes have not had significant implications for the way in which non-food necessities are acquired, and that changes in the CPI, which use the consumption bundle of the average income level as weights, parallel the changes in the hypothetical CBN price index, which uses weights derived from the consumption bundle of low-income households. Over this fifteen-year data period, income growth in urban China has been considerable. In addition, many institutional changes and substantial changes in relative prices make the appropriateness of these restrictive requirements questionable and cast doubt on the reliability of the CPI adjustment method.

First, rapid increases in urban income means that some low-price food products that are important for poor households and that are available at the beginning of the period may have disappeared from the market by the end of the period. For example, whole meal flour was a low-price staple for the urban poor in the 1980s but, by the mid-1990s, it was replaced by whole meal flour bread, which is sold in super markets as a luxury food. Conversely, food staples in the markets at the end of the period may not have been available at the beginning of the period. During a period of such rapid change, determining the appropriate fixed bundle of goods is difficult.

Second, institutional reforms led to large changes in the provision of many non-food necessities. For example, health care, education, and housing had been provided free of charge by the state or at highly subsidized prices but became subject to large price increases as the government

⁵ The income and expenditure data are measured at the household level. We use per capita income and expenditure weighted by household size to obtain the poverty head count indices.

adopted pay-for-use principles. As a result, households have been required to spend more on non-food necessities during the 1990s.⁶ Over the fifteen-year period, the proportion of expenditure on these three items has more than doubled for both mean-income households and households in the bottom 20th percentile. Hence, the increase in expenditure on these items is not due to an income effect. Therefore, the switch between food and non-food components of the consumption bundle results from institutional changes so that using a fixed bundle of goods is not appropriate for China during this period.

Third, reforms have caused significantly different price changes for different income groups. More than 50 to 60 percent of the calories of urban poor households in the 20th percentile and below of the income distribution are derived from grain products, according to the UHIES. Deregulation of the grain market during the early 1990s replaced ration coupons and administered prices by market prices and led to very large increases in grain prices relative to the CPI.⁷ The price impact of the grain reforms is depicted in Fig. 2, which presents a range of official price indices.⁸ Although all price indices move in a similar fashion during the 1980s, they begin to diverge rapidly during the reform period of the early 1990s. Between 1986 and 1996, the CPI increased approximately three fold and the urban food retail price index increased three and a half fold, but the urban grain retail price index increased six fold. Hence, CPI changes are not likely to represent price changes of the CBN during this period. Therefore, adjustments to poverty lines based on a CPI index are likely to overstate the growth of real income of poor households that spend a disproportionate share of their income on grain products and are particularly vulnerable to relative price increases for grain. This problem applies also to other goods that were considered necessities before the reforms.

Because of these three concerns, we calculate the CBN based poverty line for each province and each year rather than apply the CPI index to a base year CBN based poverty line.⁹ Two implications for our poverty line calculations follow. First, we allow poor households in each region, and over time, to change their pattern of food consumption in response to changes in food availability and prices. Second, we allow poor households to substitute non-food necessities for food in response to reforms that increase significantly the prices of non-food necessities such as education, healthcare, and housing. Hence, such poverty lines are not based on a fixed basket of

⁶ According to the 1988 and 2002 Income Distribution Surveys of the Chinese Academy of Social Sciences, the proportion of urban residents with health expenditure covered fully by the state was 66 percent in 1988 but had dropped to 20 percent in 2002.

⁷ From the mid-1950s, the Chinese urban population purchased food products at highly subsidized prices under a coupon ration system. Coupons were distributed according to the number of family members and their ages. In the late 1970s and early 1980s, a successful market-oriented economic reform in the agriculture sector led to a significant increase in agriculture production and the introduction of a two-tier food price system in urban areas from the mid-1980s. During this period, urban households still received subsidized coupons but they were also free to purchase better and more varieties of food in the market place. The two-tier price system lasted until the late 1980s after which the government gradually increased subsidized food prices so that the two-tier prices became almost equal to each other by 1992 (Tang, 1998). By 1993, 28 out of the 31 provinces had abolished the coupon ration system (Crook, 1997; Tang, 1998; People's Daily, 2002).

⁸ The urban CPI by detailed categories are only available from 1994. However, an urban retail price index by categories, which has both food and grain price indices, is available for the whole period. For continuity, we use this series. We compared the urban grain CPI and grain retail price indices for the period from 1994 and found that the difference between them is minimal.

⁹ Calculating the poverty line by city rather than by province is more appropriate but small sample sizes at city level make this impractical.

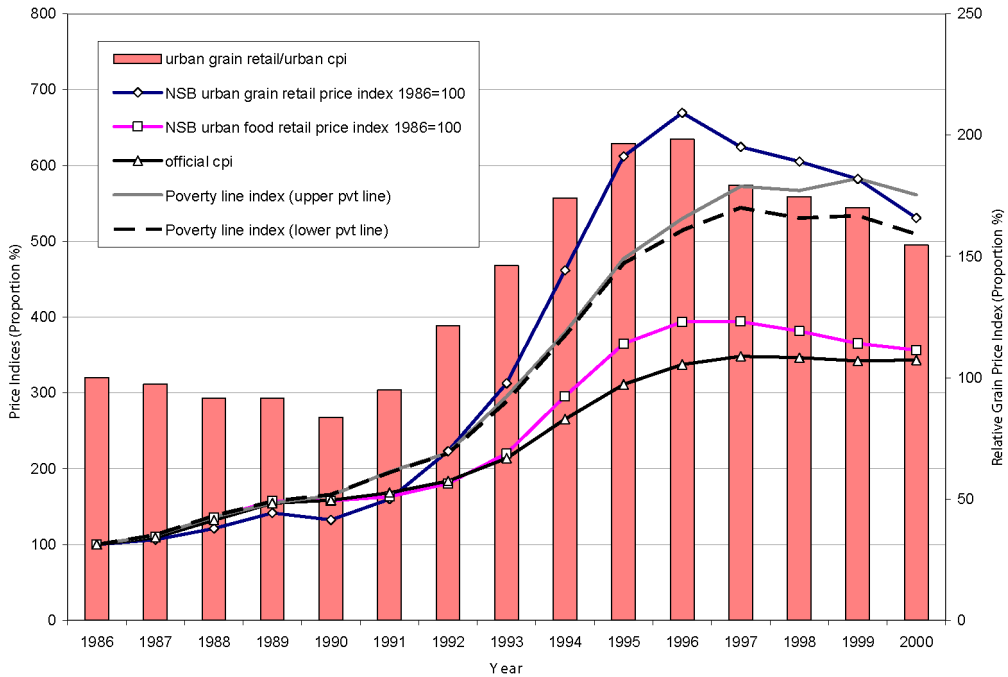


Fig. 2. Comparison of price indices and poverty indices. *Sources:* Poverty indices are calculated by dividing each year's poverty lines averaged across provinces by 1986 average poverty lines. For the NSB urban food and grain retail price indices, the 1986 to 1994 data are from the 1994 China Statistical Yearbook: Table 8-6. The 1995 to 2000 data are from the China Statistical Yearbooks from 1995 to 1997: Table 8-4 and the data for 1998 to 2001 are from Table 9-4 in each volume of the relevant Yearbook (NSB).

goods.¹⁰ Allowing for substitution within and between food products and non-food necessities is essential during a period of such rapid and extensive institutional change.¹¹

For each year and province, we calculate the food poverty line, together with lower and upper bounds poverty line, measured in nominal prices, according to Eqs. (2) and (4).¹² The variation in the food poverty lines and the lower and upper bounds poverty lines among provinces and over time reflect both responses to differences in food and non-food prices and changes in preferences. However, the changes over time are similar across provinces. To determine the average change in the poverty line, we aggregate poverty lines across provinces. As Fig. 3 indicates, the national average food poverty line increases steadily until 1992 and then increases rapidly between 1992 and 1997 after which it exhibits a slight decline. The upper and lower poverty lines, which include

¹⁰ Statistical agencies do not usually maintain fixed CPI weights during periods of rapid change but we do not know how the official CPI weights were determined for urban China or how often the weights were changed during this period.

¹¹ Deaton (1998) provides a good discussion of some of these issues; he claims that not allowing inflation rates to vary across the income distribution is a serious omission. For the US, Boskin et al. (1998) argue that the best price indices would be collected specifically for poor households and would use variable weights, changing from year to year.

¹² These calculations are available on request from the corresponding author. The ADB (2002) uses the same method and the same data to calculate the poverty line for different provinces in urban China in 1998. Comparing our results for 1998 with those in ADB (2002), we observe some small discrepancies. The differences come mainly from the calculation of α_0 ; in our calculation, we use $\alpha_0 = \hat{a} + \hat{\gamma} \log(\bar{N})$ whereas, in ADB (2002), α_0 is defined as $\hat{a} + \hat{\gamma} \log(\bar{N})$.

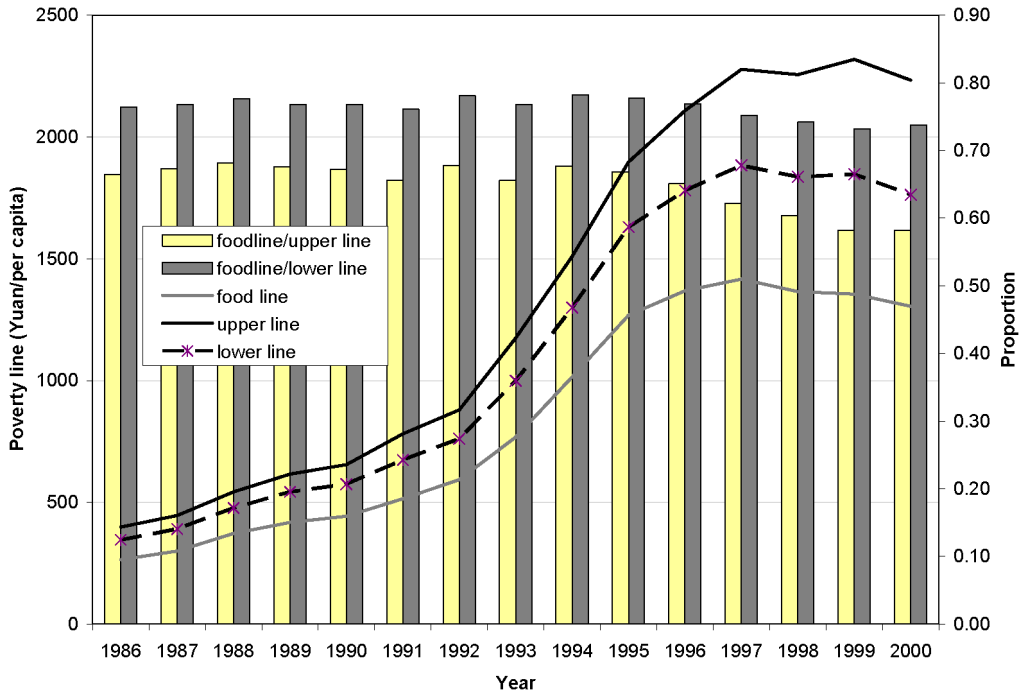


Fig. 3. Food poverty lines: 1986 to 2000.

non-food necessities, follow a similar path. Figure 3 also includes the aggregate food poverty line as a proportion of the upper and lower poverty line on the right-hand scale. The food proportions are more or less constant until the mid 1990s and then decline slightly over the period, which indicates an increase in the substitution of non-food necessities for food.

The aggregate poverty lines, measured in nominal prices, are also included in Fig. 2 as indexes with 1986 = 100 so that they can be compared with official price indices. The two most interesting comparisons are with the CPI and the urban grain price index because poverty lines are based on 2100 calorie consumption and the reference group spends a considerable proportion of their income on grain products. Over the entire period, the CPI index increases three fold and the poverty lines increase five fold, which is approximately the same increase as the urban grain price index. Therefore, our poverty line increases considerably more than the price level of the bundle of goods included in the CPI, but, more or less, in accord with the change in the urban grain price index.

It is evident from Fig. 2 that the period can be divided into three distinct sub-periods. First, between 1986 and 1991, all price indices and poverty lines increase slowly and in a similar fashion. Second, in a period of general inflation and rapid reform of the urban grain market from 1991 to 1995, the urban grain price index increases six fold while the CPI approximately doubles. In this period, changes in our poverty lines are considerably different from changes in the CPI. Finally, as the grain price index falls over the third period from 1996 to 2000, the rapid growth of the poverty lines ceases and the effect of the falling urban grain price index on the poverty lines appear to be offset by the increased need to buy non-food necessities. These comparisons indicate that the choice of adjusting a fixed CBN by the CPI or adopting our method of calculating a new

Table 1
National urban poverty rate: 1986 to 2000

	Expenditure measured poverty rate based on		Income measured poverty rate based on	
	upper line	lower line	upper line	lower line
1986	5.34	2.40	2.09	1.10
1987	5.78	2.85	2.21	1.03
1988	6.10	2.92	2.63	1.50
1989	7.09	3.32	2.62	1.59
1990	6.50	3.05	1.91	0.97
1991	6.83	3.41	2.49	1.29
1992	10.12	5.12	3.62	1.72
1993	14.91	7.50	5.33	2.30
1994	12.88	6.94	5.11	2.63
1995	13.10	6.71	5.35	2.57
1996	12.88	6.20	4.94	2.28
1997	13.55	6.03	5.28	2.48
1998	13.06	5.50	4.83	1.85
1999	12.11	5.04	4.21	1.70
2000	10.19	3.92	3.97	1.71

CBN for each year makes a considerable difference, particularly during the period from 1991 to 1995.

Using the upper and lower bound poverty lines, we calculate poverty head-count indices in terms of income and expenditure for urban China and report these in Table 1. Figure 4 plots the poverty rate changes over time for the upper and lower bound poverty lines. Although the changes are similar, the levels vary considerably.¹³ The first feature to note is that the poverty rate is higher in the 1990s than in the 1980s, especially for expenditure-measured poverty. The proportion of households below the upper and lower poverty lines is above 10 and 5 percent, respectively, for most of the 1990s, whereas, in the 1980s, these ratios are around 6 and 3 percent, respectively. The most obvious changes occurred between 1991 and 1993. After 1993, the average urban poverty rate remained high until 1997 and then began to fall slightly.¹⁴

The significant increase in poverty in the early 1990s is due to a combination of factors, including the increasing need to spend on non-food necessities and the increase in non-food and food price levels. In addition, income inequality increased more in 1993 than it had previously. The high poverty rate persisted between 1993 and 1997 perhaps because of lower income growth relative to that in the earlier period due to increase in unemployment during this period. Based on the UHIES data, household real income per capita increases by 5.2 percent per annum over the entire period; however, between 1994 and 1997, the annual growth rate is only 3.6 percent.

¹³ The changes in the poverty head-count indices by provinces are available on request from the corresponding author. Some variation occurs across provinces with regard to the timing of poverty rate changes due to variation in the timing of the reforms.

¹⁴ The questionnaire changed in the 1992 survey and the most significant increase in the expenditure-measured poverty rate is observed in 1993. Hence, it is unlikely that the change in the poverty rate is due to any inconsistency in data collection.

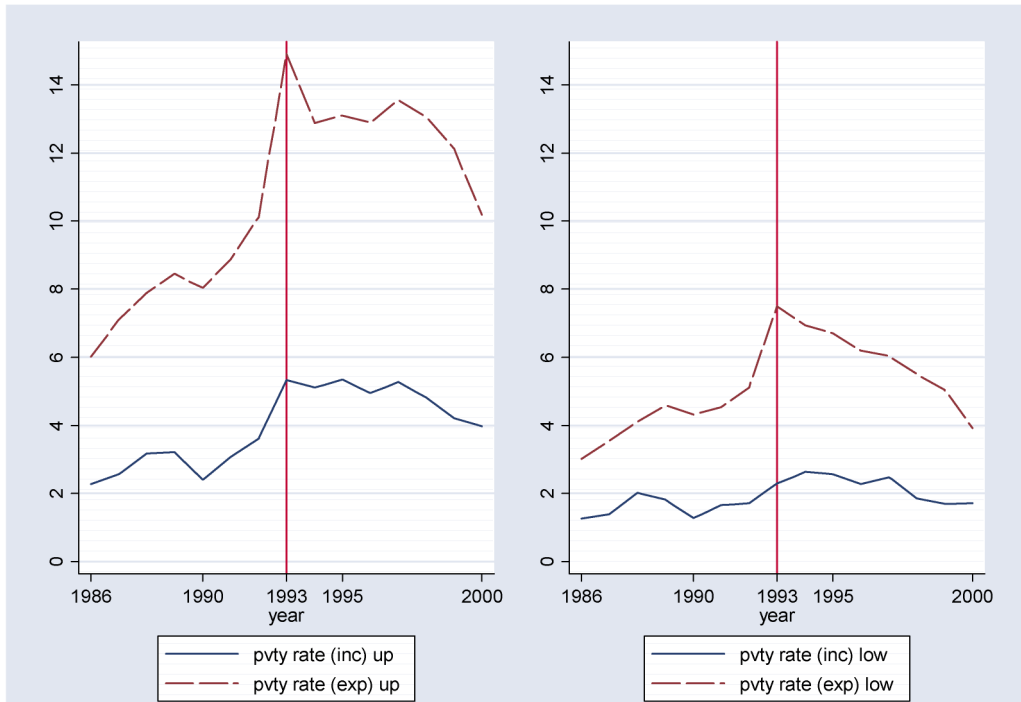


Fig. 4. Poverty rate change at the national level: 1986 to 2000.

The second interesting feature in Fig. 4 is the large discrepancy between poverty rates measured by income and expenditure. In most countries, the income distribution is more unequal than the expenditure distribution and, in any cross section, poor households normally spend more than they earn (Cutler and Katz, 1992; Barrett et al., 2000). Thus, the poverty head-count measured in income is usually higher than if it is measured in expenditure. However, we find the opposite in China for two reasons.

First, most surveys face a serious problem of under-reporting of income by poor households. However, due to the institutional setting in which the data are collected, this problem may not plague the UHIES. Expenditure and income are collected from a year-long diary and the statistical agency visits each household each month to check the income and expenditure records.¹⁵

Second, saving patterns among households with relatively low income may have changed. In the 1990s, most households in urban China began to save more in response to anticipated increased future expenditures and to income uncertainty. During this time, many urban state sector employees were being laid off. In addition, housing rental subsidies were reduced considerably and the majority of households began preparing to buy their own housing. Health coverage changed from 66 percent payment by the state in 1988 to 22 percent in 2002. School tuition fees at the primary, secondary, and tertiary levels were increased significantly. Furthermore, the state pension system was changed to an individual account system, which inevitably meant decreased pension coverage for a larger segment of the population. As Meng (2003) documents,

¹⁵ In addition, Chinese households rarely borrowed before the late 1990s when the housing market became well developed.

these changes signal a sudden drop in permanent income and a significant increase in future income uncertainty. Urban households began to realize that their future welfare would depend heavily on their own savings given the lack of development of credit markets, especially for poor households. The need to save more was so great that a large number of households suppressed current consumption to such a degree that it fell below the poverty line, even though their income was sufficient to place them above the poverty line.

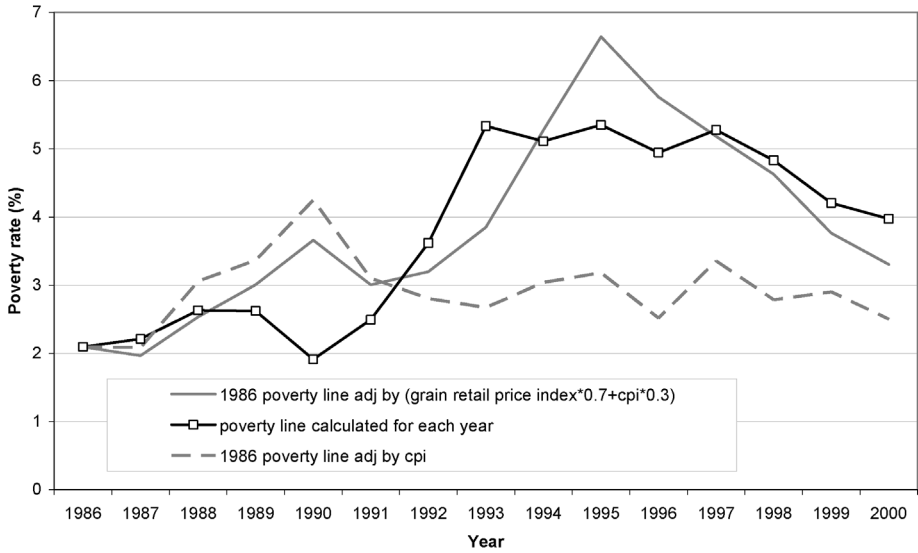
The poverty head-count indices presented in this study tend to be higher than those in many previous studies, which typically report poverty levels of around one percent for urban China (World Bank, 1992, 1997, 2000; Yao, 2000; Chen and Wang, 2001).¹⁶ However, using 1988 and 1995 Urban Household Survey data from the Chinese Academy of Social Sciences, Khan and Riskin (2001) compute higher urban poverty figures similar to ours.¹⁷ Moreover, using one US dollar as the benchmark and six years of UHIES for a sample of 3600 households in each year in 1992 and from 1994 to 1998, Fang et al. (2002) find poverty incidences of 2.09, 2.73, 1.65, 1.69, 2.00, and 2.06 percent for the six years, respectively, which are comparable to our income-measured poverty rates based on the lower poverty line for the same period. In addition, Xue and Wei (2003) report urban poverty rates measured in terms of income for 1988, 1995, and 1999 of 3.6, 5.0, and 6.7 percent, respectively, which are quite similar to our poverty rates measured in terms of income for the respective years using the upper poverty line.¹⁸ Although the definition of poverty is somewhat arbitrary and poverty levels will vary across studies, the changing levels of poverty over time are important. Our data, combined with CBN calculations for each province and each year, reveal a distinctive pattern of poverty changes over time in China.

To conclude, we return to our decision to use the extensive UHIES data base to estimate a poverty line based on the basket of goods consumed by the poor in each year rather than to estimate a poverty line for one of the fifteen years and adjust it over time by an official CPI. Figure 5 compares our poverty rates with those calculated from two base poverty lines, 1986 and 2000; and with those calculated from the same base line but adjusted over time by two different price indices, i.e., the urban CPI and a price index consisting of the sum of 70 percent of the urban retail grain price index and 30 percent of the urban CPI. As panel (a) of Fig. 5 indicates, the poverty rate using the CPI adjustment differs considerably from the one calculated from the combined price index adjustment. The CPI-adjusted poverty rate lies below our poverty rate throughout the 1990s and increases marginally over the entire period but does not reflect the

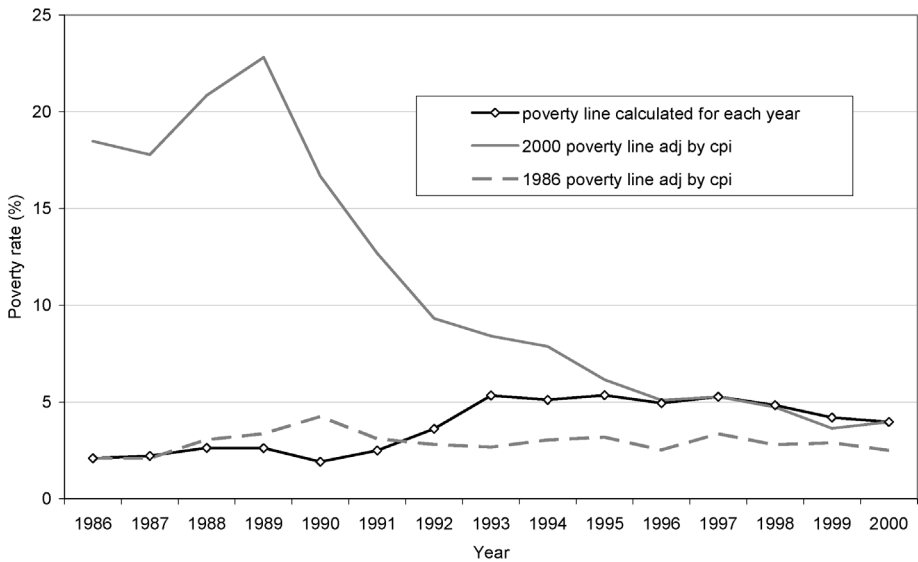
¹⁶ Using 2150 calories per person per day as a minimal energy intake, World Bank (1992) reports an urban poverty incidence of far less than 1 percent up to 1990. Using one US dollar per person per day as the benchmark, Chen and Wang (2001) calculate a lower than 1 percent poverty rate for the whole of the 1990s. Using data for two provinces and a fixed 454 yuan in 1990 prices as the poverty line, Yao (2000) suggests that from 1986 to 1993, the poverty head count index in the two provinces never exceeded 1 percent.

¹⁷ Based on household income and using 2100 calories per person per day plus a non-food component, their poverty head count indices are 8.8 and 8.0 percent for 1988 and 1995, respectively. These numbers are considerably higher than our estimates based on household income and the upper bound poverty line, which are 3.1 and 5.1 percent, respectively, for 1988 and 1995. In addition, their poverty measure does not indicate the significant increase in the poverty rate in the early 1990s. Perhaps, this is because their poverty line measure is calculated from aggregated data, which cannot properly account for price differences at different income levels, for different regions, and different commodities. Using a poverty line equal to 80 percent of the value of their estimated poverty line, their calculation of the poverty rate is 2.7 and 4.1 percent for the two years, respectively, which is close to our measures both in terms of level and trend.

¹⁸ Wong (1995, 1997) and Gustafsson et al. (2004) present other approaches to measuring poverty in China.



(a) Poverty rate measured in terms of income using 1986 upper poverty line and deflated by different price indices: 1986–2000



(b) Poverty rate measured in terms of income using upper poverty line at different base year and deflated by CPI: 1986–2000

Fig. 5. Comparison of poverty rates.

large increase in poverty in the early 1990s. The poverty rate calculated from the combined price index, however, almost mimics our poverty rate changes in the 1990s. Panel (b) indicates, using the CPI to adjust different base year poverty lines, i.e., 1986 and 2000, results in considerably different poverty rates at each point in time and significantly different changes in poverty rates

over time due to the change in the bundle of goods consumed by poor households in 1986 and 2000 and the change in the income distribution over time.¹⁹

Although the poverty head count index varies with the nature of the poverty line calculations, especially during periods of rapid changes in prices, income, and economic structure, the best choice is not clear. First, no correct poverty measure is prescribed by theory. Second, and more importantly, the methodology chosen should be influenced by the nature of the data available and the evolution of the economy during the data period. Our method enables poor households to respond to changes in relative prices and to important changes in the way in which some goods and services, particularly medical, housing, and educational services, are allocated and priced. In addition, we avoid the difficulties that arise from applying inappropriate fixed-weight price indices, such as the CPI, to adjust poverty lines across provinces and through time.

4. Relationships among poverty, inequality, and income

To investigate the changing level of urban poverty in a broad context, Fig. 6 plots average real per capita income and expenditure, deflated using a provincial level urban consumer price index, as well as average provincial Gini coefficients to measure the inequality of income and expenditure between 1986 and 2000.²⁰ As Fig. 6 indicates, from 1986 to 2000, per capita real income and expenditure increase quite rapidly in urban China, especially since 1989. The periods of strongest growth are 1989 to 1994 and 1998 to 2000. For the entire period, per capita real income increases

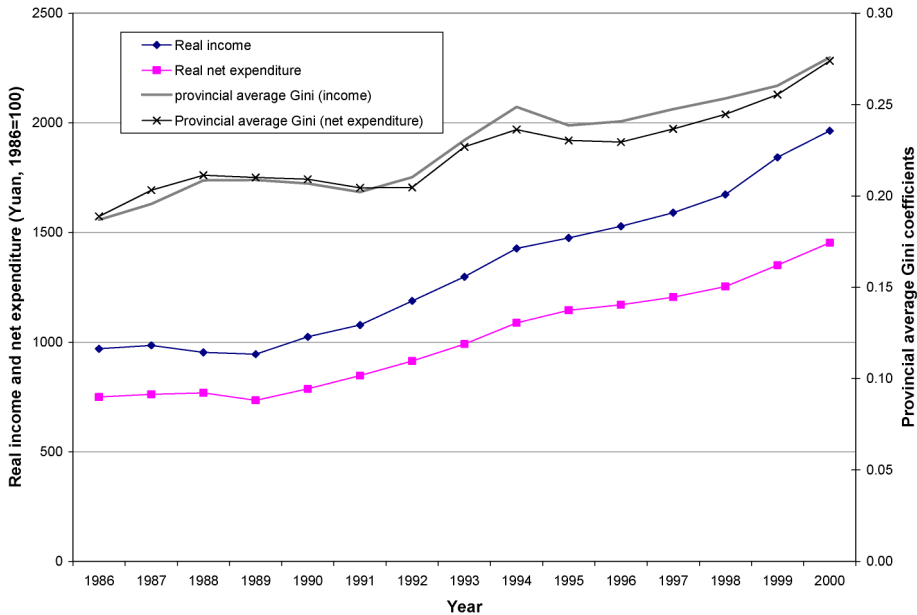


Fig. 6. Changes in income, expenditures, and Gini coefficients: 1986 to 2000.

¹⁹ Ravallion and Chen (2004) use the 2000 poverty line as the base and conclude, in contrast to us, that the poverty rate decreased significantly in urban China during the 1990s.

²⁰ The income, expenditure, and inequality measures for each province are available upon request from the corresponding author.

at an average annual rate of 5.2 percent. Moreover, the positive income–expenditure gap, evident in the poverty rates, is also evident on a per capita basis for all households and the marked difference between income and expenditure increases over time. In 1986, urban per capita household income exceeded per capita expenditure by 12 percent while this ratio increased to 20 percent in 2000, reflecting the increased savings in the 1990s. Finally, inequality calculated either in terms of per capita income or expenditure increases and the largest increases occur in the early 1990s.²¹

Although causal relationships between the changes in income and inequality associated with changes in our poverty measures are not straightforward, Datt and Ravallion (1992) and Bourguignon (2003) show that, under special circumstances, an identity relates changes in poverty head counts to changes in the poverty line, mean income, and income distribution. In this study, we do not consider causal relationships, but, rather, we investigate the empirical associations among poverty, inequality, and income growth. To examine the changes in poverty, we regress the poverty head count indices against income, an inequality measure, the changing need for savings to meet the general withdrawal of welfare services, and other factors that may affect poverty, such as the impact of the relative food price and unemployment generated from labor market reform.

The following equation is fitted to combined cross section at the provincial level and time series data:

$$\log(P_{it}) = \alpha + \beta \log(Y_{it}) + \delta \log(G_{it}) + \eta \log(S_{it}) + \theta \log(WE_{it}) + \gamma \log(X_{it}) + \mu_i + \varepsilon_{it}, \quad (5)$$

where P represents the poverty head-count index measured in terms of income or expenditure, Y is the mean income, G is the Gini coefficient measured in terms of income, S is the average saving rate, and WE is the average budget share of education, medical, and housing expenditure, which is used to measure the change in the non-food component of the poverty line. In addition, X is a vector of other control variables, including a time trend, the average proportion of household members unemployed, and the relative food price index for different provinces and over time. Finally, μ is a vector of time-invariant provincial dummy variables to capture unobservables, while ε_{it} is a random error term. The subscripts i and t index provinces and time.

We estimate Eq. (5) using a fixed-effects model to control for unobservable time-invariant provincial effects. The unemployment variable is available only for surveys after 1987 so that the regressions including unemployment cover the period 1988 to 2000.²² In addition, since the Gini coefficient is strongly correlated to unemployment, we also estimate a version of Eq. (5) that excludes the unemployment variable. The results are reported in 3 panels with 4 columns in each panel in Table 2. The first panel presents estimations with neither unemployment nor the Gini coefficient variables. The second panel includes unemployment but excludes the Gini coefficients, while the last panel includes the Gini coefficient and excludes unemployment. Within each panel, the first two columns use the log poverty rate measured with respect to income as the dependent variable and the third and fourth columns use the log poverty rate measured with respect to expenditure as the dependent variable. For each specification, we also estimate Eq. (5) with and without the savings rate.

²¹ Knight and Li (1999), Khan and Riskin (2001), and Riskin et al. (2001) find that the main contributing factor to the rapid increase in inequality in the early 1990s is the increase in inequality across regions rather than within each region.

²² The reported unemployment in the survey may be an under-estimate for urban China. However, apart from the official unemployment rate published in the statistical yearbooks, no other estimate exists for such a long period and across different provinces. Hence, we decided to use what was reported in the survey.

Table 2
Estimated results

	Specification 1 (without Gini and unemp.)				Specification 2 (with unemployment)				Specification 3 (with Gini)			
	Log(poverty) (income)		Log(poverty) (expenditure)		Log(poverty) (income)		Log(poverty) (expenditure)		Log(poverty) (income)		Log(poverty) (expenditure)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Constant	41.091*** (3.198)	44.105*** (3.832)	34.148*** (2.499)	43.073*** (2.899)	48.502*** (3.378)	52.860*** (3.892)	38.886*** (2.812)	47.962*** (3.130)	48.668*** (3.044)	50.631*** (3.582)	37.873*** (2.518)	46.078*** (2.869)
Log(real income)	-2.612*** (0.312)	-2.918*** (0.379)	-1.913*** (0.244)	-2.821*** (0.287)	-3.431*** (0.370)	-3.853*** (0.415)	-2.570*** (0.309)	-3.452*** (0.334)	-3.130*** (0.291)	-3.332*** (0.350)	-2.167*** (0.241)	-3.010*** (0.280)
Log(Gini)									2.838*** (0.321)	2.818*** (0.322)	1.402*** (0.266)	1.316*** (0.257)
Log(saving rate)		0.402 (0.282)		1.182*** (0.214)		0.663** (0.299)	0.130** (0.059)	1.353*** (0.239)		0.269 (0.259)		1.117*** (0.207)
Log(rate of unemp.)					0.312*** (0.070)	0.311*** (0.070)		0.134** (0.056)				
Log(food price index)	3.893*** (0.311)	3.965*** (0.314)	3.484*** (0.243)	3.702*** (0.237)	4.209*** (0.299)	4.333*** (0.302)	3.567*** (0.248)	3.832*** (0.241)	3.921*** (0.284)	3.969*** (0.287)	3.496*** (0.235)	3.701*** (0.230)
Log(rmh) ^a	1.447*** (0.350)	1.437*** (0.349)	0.914*** (0.273)	0.879*** (0.263)	1.113*** (0.391)	1.064*** (0.389)	0.700** (0.324)	0.587* (0.311)	1.117*** (0.321)	1.113*** (0.321)	0.752*** (0.266)	0.729*** (0.257)
Time trend	-0.013 (0.032)	-0.002 (0.033)	-0.005 (0.025)	0.028 (0.025)	0.037 (0.040)	0.052 (0.041)	0.044 (0.033)	0.076** (0.032)	-0.032 (0.029)	-0.024 (0.030)	-0.014 (0.024)	0.017 (0.024)
No. of observations	420	420	420	420	367	367	367	367	420	420	420	420
No. of groups	29	29	29	29	29	29	29	29	29	29	29	29
R-Squared: Within	0.41	0.41	0.46	0.50	0.47	0.47	0.47	0.51	0.51	0.51	0.50	0.53
R-Squared: Overall	0.35	0.35	0.29	0.30	0.36	0.36	0.25	0.27	0.45	0.45	0.30	0.30

^a The expression rmeh stands for the budget share of medical, education, and housing expenditure.

* Indicate the significant level at 10%.

** Idem., 5%.

*** Idem., 1%.

Reading across the columns of the first panel, log income is negatively and significantly associated with the log poverty rate in all cases. Within each province, higher levels of income are associated with lower levels of poverty. Regarding elasticity, income increases produce greater poverty reductions when measured in terms of income than in terms of expenditures, if the saving rate is not included. Comparing columns (1) and (3), a ten percent increase in income reduces income-measured poverty by 26.1 percent but by only 19.1 percent when poverty is measured in terms of expenditure. The weaker income effect on the expenditure poverty rate confirms our finding that, although income increased for poor households over time, not all of this increase was spent on current consumption. Moreover, the savings rate is positively and significantly related to the increase in poverty when measured in terms of expenditure. Every ten percent increase in the saving rate increases the expenditure-based poverty rate by 11.9 percent, which offsets 43 percent of the effect of an income increase on poverty reduction. These results suggest that poor households put more money aside to cope with the impact of an increase in income uncertainty on future expenditures, as Meng (2003) discusses.

In addition to these effects, increases in the relative price of food and in the proportion of expenditures on education, medical care, and housing are associated significantly with increases in poverty and the magnitudes of these effects are large.²³ Every 10 percent increase in the relative food price index increases poverty by between 34 to 40 percent, depending on the measure and the control variables. In addition, a 10 percent increase in the proportion of education, medical, and housing expenditures increases the poverty rate by between 9 and 14.5 percent. These effects capture the change in the poverty line arising from changes in food and non-food prices and they both offset the income growth effect.

Comparing the results from the full sample in the first panel with the results from the sample which excludes the 1986 and 1987 data in the middle panel, one of the most important differences is the considerably higher growth elasticity of poverty reduction in the latter. For example, in the income-poverty equation, the elasticity increased from 2.6 to 3.4 and in the expenditure-poverty equation the change is from 1.90 to 2.36 when the early two years are excluded.²⁴ The unemployment rate, measured as the average proportion of unemployed members in a household for the restricted sample, has a positive and statistically significant effect on the poverty rate measured in income. However, this relationship is not significant when the poverty rate is measured in terms of expenditure. This difference suggests that, although having more unemployed members reduces the income of poor households, it does not reduce their expenditure. Since consumption is already near subsistence level in these households, this result is expected.

The final panel in Table 2 reports the estimation results for Eq. (5) without the unemployment rate due to its high correlation with the Gini coefficient. Including the log Gini coefficient increases the growth elasticity of poverty reduction relative to the estimates in the first panel. Nonetheless, the effect of the log Gini coefficient on poverty is always positive and statistically significant at the 1 percent level. A 10 percent increase in inequality is associated with a 28.4 percent increase in poverty measured in terms of income, while a 10 percent increase in income reduces income-measured poverty by 31.3 percent. Hence, an equiproportionate increase in income and inequality are almost offsetting in their impact on poverty. However, if poverty is measured in terms of expenditure, the offsetting effect is not as dramatic.

²³ Gustafsson et al. (2004) apply a different method and find that the change in expenditure on education and health also contributes to an increase in poverty in rural China between 1988 and 1995.

²⁴ This change in the growth elasticity is not due to the additional explanatory variable. When we ran the regression using these data without the unemployment rate, the elasticities were similar.

The income growth elasticities of poverty in Table 2 are large and comparable to, if not stronger than, those found in other studies using cross-country data (Ravallion and Chen, 1997; Dollar and Kraay, 2002; Bourguignon, 2003). However, the estimated effects of the changes in inequality, the relative price of food, the proportion of expenditure spent on education, medical care, housing, and saving contribute positively to the increase in poverty and, thus, counteract to a large degree the income effect. To quantify the contributions of the changes in each of the explanatory variables, we conduct a decomposition exercise. Using the coefficients estimated from Eq. (5), we predict the log poverty rate for each year and focus on the changes from 1986 to 1990, 1990 to 1993, 1993 to 1997, and 1997 to 2000. The difference in predicted log poverty rates between the beginning and end of each of these periods is then decomposed using the change in the mean values of each variable and the estimated coefficients for the whole period.

This decomposition is written as:

$$\Delta \overline{\log(P)} = \hat{\beta} \Delta \overline{\log(Y)} + \hat{\delta} \Delta \overline{\log(G)} + \hat{\eta} \Delta \overline{\log(S)} + \hat{\theta} \Delta \overline{\log(WE)} + \hat{\gamma} \Delta \overline{\log(X)}, \quad (6)$$

where Δ indicates the difference between the beginning and end of each period, the circumflexes on the coefficients indicate that these are estimates, and the bars on the variables indicate mean values. The decomposition results are reported in Table 3. We conclude this section by highlighting the important trends.

First, the large increases in poverty occur before 1993, with a small increase in poverty from 1993 to 1997, followed by a significant drop in poverty in the last period. Second, income growth contributes to poverty reduction in all periods, although its impact is much larger in the 1990s. However, this is also a period of significant price reforms and their effect, combined with the other changes that were occurring, more than offset the positive impact of income growth on poverty in all except the post 1997 period. Third, although changes in the Gini coefficient increase poverty by similar amounts in all periods, these increases are not a major contributor to poverty increases or to the changing the path of poverty over time. Fourth, the most important contributor to the changing level of poverty in China is the impact of food price changes, with an impact on poverty increase in the first three periods and on poverty reduction in the last period. Fifth, the

Table 3
Decomposition of poverty rate changes

	1986–1990	1990–1993	1993–1997	1997–2000
<i>Expenditure</i>				
Predicted change in log poverty	0.42	0.40	0.11	–0.45
Log(real income)	–0.16	–0.71	–0.55	–0.65
Log(Gini)	0.14	0.15	0.11	0.14
Log(saving rate)	–0.01	0.02	0.02	0.08
Log(food price index)	0.28	0.61	0.30	–0.25
Log(rmeh) ^a	0.12	0.27	0.20	0.18
Time trend	0.05	0.04	0.05	0.04
<i>Income</i>				
Predicted change in log poverty	0.20	0.55	0.14	–0.51
Log(real income)	–0.31	–0.77	–0.61	–0.72
Log(Gini)	0.23	0.28	0.23	0.29
Log(saving rate)	–0.01	0.00	0.01	0.02
Log(food price index)	0.21	0.73	0.33	–0.28
Log(rmeh)	0.16	0.37	0.27	0.25
Time trend	–0.09	–0.07	–0.09	–0.07

^a The expression rmeh stands for the budget share of medical, education, and housing expenditure.

increase in the budgetary share of medical, housing, and education expenditures contributes to poverty increases throughout the period and is the major factor offsetting income growth in the last period. Sixth, the increase in the saving rate has no important impact until the period from 1997 to 2000.

5. Conclusion

After 20 or more years of spectacular income growth, average living standards in urban China have improved significantly. However, this growth has been accompanied by many other changes, including an increase in income inequality, reduced social welfare provision, an increase in urban grain prices, and increased income uncertainty. We use 15 years of urban household survey data to investigate how poverty has changed as a result of income growth and other changes. We find the following results.

First, we use the cost-of-basic-needs (CBN) method to calculate poverty lines for each province over the 15 years. This is the first consistent measure of urban poverty over such a long period and across all provinces. The application of this technique to the extensive household surveys (UIHES) yields new insights into the analysis of urban poverty over this period. Most importantly, using the CBN based poverty line we found that urban poverty increased in the early 1990s, reaching a peak in 1993, and then stabilized at a high level until declining after 1997. This pattern is generated mainly by the differential price impact of economic reforms upon the poor, who were particularly disadvantaged by large increases in grain prices relative to the CPI. The CBN method also allows us to quantify the adverse impacts of economic reforms on the supply of non-food necessities, which moved from being available at a low price, or even free, to allocation by the market at significantly increased prices.

Second, income growth has had a strong positive effect on poverty reduction over the fifteen-year period. We find that every ten percent increase in income reduced poverty by between 19 and 39 percent depending on the model specification. However, the effect of saving, the relative price of food, the need to spend more on medical services, education, and housing, and growing income inequality contributed to an increase in poverty. Over the entire period, these four effects offset the positive effect of income growth on poverty reduction.

Third, poverty head-count indices measured in terms of income and expenditure differ significantly and this difference widens considerably in the 1990s, mainly due to the increase in income uncertainty and expected future expenditure on items such as housing and education. These factors led poor households to save more of their limited income for future consumption even though the reduced expenditures caused them to fall below the poverty line. This increase in saving may also reflect the lack of credit access for the urban poor. This finding raises an important policy issue. If the authorities are interested in current living standards, expenditure-measured poverty is the appropriate target and the fact that a large proportion of individuals are choosing to live under poverty should be a concern. However, if future living standards are considered, the fact that households are trying to make provisions for their future needs by saving for their children's education, for old age security, and for unexpected medical bills is reassuring. Nonetheless, this behavior is encouraged by the lack of credit markets for the poor so that speeding up banking reform and providing financial support for education to children from poor families is urgent in China.

An important caveat, which should be born in mind when interpreting our results, is that we include only households with urban household registration. Rural migrants, who comprise a

large proportion of the urban poor, are not in our sample. Hence, our poverty head counts actually understate total urban poverty.

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