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ECONOMIC TRANSITION AND SUBJECTIVE POVERTY IN URBAN CHINA

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Market-oriented economic reforms have substantially changed the Chinese economy. A policy of "allowing some to get rich earlier" clearly has benefited some regions of the country more than others. The purpose of this paper is to investigate changes in regional urban poverty during this period of policy transition. Our approach is based on survey responses to minimum needs (i.e., the "subjective method"). For the richest (Coast) and poorest regions (North West) we find unambiguous declines in poverty between 1988 and 1995 for the registered population. For the Central and South West regions we find that changes in poverty over time are sensitive to both the poverty line selected and the poverty index employed.

1. Introduction

Market-oriented economic reforms have substantially changed the Chinese economy. Before the reforms, China was a centrally planned economy in which the labor was bureaucratically allocated and wages were administratively regulated. The egalitarian wage system eliminated or minimized wage differences across regions, occupations and genders. A watershed event was Deng Xiaoping's famous 1992 southeastern tour in which he articulated a policy of "allowing some to get rich earlier" on the premise that "advanced and richer region could help less advanced and poorer region and both get rich together later." This led to a clear policy of benefiting the growth of some regions of the country more than others. The purpose of this paper is to investigate changes in urban poverty during this period of policy transition.

The impact of Chinese market reforms on poverty and inequality has not escaped the attention of researchers. Kanbur and Zhang (1999) study inland-coastal inequality in China and find that regional inequality has increased many

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fold. Chang (2002) finds that the main reason for growing inequality in China is the widening rural–urban income gap. Furthermore, Jones *et al.* (2003) survey and contribute to the growing literature on the impact of preferential treatment given to some cities on growth and inequality. Khan *et al.* (1999) argue, " . . . economic reform in China has not succeeded in reducing urban poverty" (p. 298). Gustafsson and Li (2001) investigate regional inequality and "cannot rule out the possibility that living standards in the west have deteriorated at the lower end of the income distribution and call for further study" (p. 65).

Khan and Riskin (2001) investigate regional poverty in China and find that the "rising trend in urban poverty is nearly universal among the 10 provinces for which we have estimates" (p. 76). Gustafsson and Zhong (2000) find that poverty is "very much a rural problem" (p. 1005), finding urban poverty rates of less than 1 percent. Fang *et al.* (2002) indicate that the trend in urban poverty is sensitive to the time period chosen. Using $1.50 per day (PPP adjusted) as a the poverty line they find that "poverty incidence declined dramatically from 13.74 percent in 1992 to 8.41 percent in 1996, then increased to 9.21 percent in 1997 and 8.86 percent in 1998" (p. 441). Additionally, they find that the western region has the highest concentration of urban poverty, and the income gap between this region and rest of China has been widening over time.

Our comparison of the trends in Chinese regional poverty occurs during a period of important economic transition. The survey data collected in 1988 is during a period of stalled reforms while the 1995 survey occurred when the pace of economic reform was greatly accelerated. Regional changes during this period are quite pronounced. For example, Knight *et al.* (2001) report that while income rose in all regions between 1988 and 1995, these averages diverged substantially. They argue that this is in striking contrast to the period 1978 to 1988 where there was a strong trend toward the convergence of regional incomes. How the poor fared in China's various regions during this period of regional divergence is the subject of our paper.

The contribution of our paper is that we provide a comprehensive picture of poverty in urban China and its major regions using the subjective poverty method. We examine three alternative poverty lines, estimate a set of subjective equivalence scales from survey responses in our data, employ the distribution-sensitive Sen poverty index and investigate changes in its components (headcounts, income gaps and Gini among the poor), and adjust for regional cost of living using market basket data. Unlike many other papers on poverty in developing countries we use formal inference tests to uncover any trends in poverty. We find that each of these factors plays an important role in the conclusions we draw about changes in Chinese regional poverty during a period of economic transition.

This paper proceeds as follows. Section 2 lays out our poverty measurement approach. Our approach is eclectic in that we borrow from both the objective poverty and subjective poverty literatures. Section 3 describes the Chinese Household Income (CHIP) data used in this study. Section 4 estimates subjective equivalence scales and examines the effect of alternative equivalence scales on overall urban Chinese poverty in 1988 and 1995. Section 5 uses the poverty measurement techniques developed in earlier sections to study the changes in regional poverty between 1988 and 1995. Section 6 concludes the paper.

2. Measuring Poverty

In any study of poverty several fundamental questions must be answered: (1) How to measure economic resources available? (2) How to adjust for household size (i.e. economies of scale)? (3) Where to set the poverty line? and (4) What is the appropriate poverty index and how can we construct its standard error? A fifth question, how to adjust for rising consumer prices and regional cost of living, must also be addressed in a study of poverty. The first question is usually answered by the data available (i.e. income vs. consumption). We create household income by summing up the individual incomes of all family members.

How to account for families of different size is the equivalence scale question. Very little attention has been given to the sensitivity of Chinese poverty results to the equivalence scale used. For example, both Khan and Riskin (2001) and Fang *et al.* (2002) ignore economies of scale within households, using per capita income as their recipient unit. There are exceptions to this trend. Gustafsson and Zhong (2000) use an expert based equivalence scale. Meng *et al.* (2005) use household size in determining provincial poverty lines but do not explicitly provide a set of equivalence scales.

There are two major approaches to the equivalence scale issue. The first, based on expert opinion, is embodied in the U.S. poverty statistics. The second one is the subjective method, based on personal assessment using survey data. The survey approach attempts to measure a minimum standard of living for alternative family structures. We use consumption data to estimate household size equivalence scales.

Gustafsson *et al.* (2002, 2004) are the first researchers to apply the subjective poverty methodology to urban China. Using a sample of 12 cities for 1999 they construct subjective poverty thresholds for each city. For China as a whole, their approach provides a poverty line estimates that are "surprisingly close to the poverty line used for producing official estimates on poverty" (2002, p. 14). Less encouraging, they find that the opinion of what constitutes "minimum needs" varies widely across cities. For example, people in Beijing can "perceive" themselves to have minimum needs that are much higher than the rest of the country and hence suffer a higher "poverty" rate than the poorest regions of the country.[1]

Yet it is difficult to deny the attraction of using survey information on income adequacy as opposed to asserting a set of basic needs without recognizing the inherent subjectivity of poverty thresholds. To overcome the shortcoming of both the subjective and objective approaches, Pradhan and Ravallion (2000) recommend a "hybrid approach" to poverty measurement in developing countries settings. Our interpretation of the hybrid method is to divide the questions of poverty thresholds and regional cost of living into two separate steps. First, we use the subjective-qualitative method directly to estimate poverty thresholds and household equivalence scales. Second, we use the market basket data to adjust these thresholds for regional differences in cost of living.

[1]Gutafsson *et al.* (2002) use the method to establish regional poverty lines yet note that "that the same budget could be used more efficiently to reduce the poverty problem (as evaluated from a national poverty line)" (p. 17). We agree. Therefore, we use the subjective method for only two purposes: first, to find a *national* poverty threshold, and second, to make adjustments for household sizes.

Given that no single poverty line will garner universal approval, we will consider alternative poverty lines to test our results for sensitivity to the poverty threshold. This approach is often referred to as poverty dominance. To find a starting place for the poverty line we employ the subjective method to establish a national poverty line and use the result to select a range of poverty lines. Employing the subjective method we estimate the one person national poverty threshold at 3,416 Yuan per year. This is close to $1 per day ($1.12) at the official exchange rate. This leads us to consider three poverty lines, 2,988 Yuan ($1.00), 3,735 Yuan ($1.25), and 4,482 Yuan ($1.50) per equivalent adult per year. It should be noted that the subjectively determined poverty lines are generally higher than poverty lines derived from alternative methods.[2] For example, in PPP adjusted terms these poverty lines correspond roughly to $4, $5, and $6 per day. However, as we also account for economies of scale in a household, these higher thresholds do not lead to extraordinarily high poverty rates.

To measure poverty, we follow Sen (1976) who argues that poverty should be measured and evaluated using an approach that combines three dimensions of poverty, the headcount of a population living below the poverty line, the income shortfalls of the poor (poverty gap), and the inequality of incomes among the poor. An acceptable measure of poverty must be distribution sensitive, which means that a redistribution of income among families below the poverty line must affect the poverty index. To see the need for a distribution-sensitive poverty measure, consider a transfer from the poorest of the poor to families just below the poverty line. This transfer always increases relative inequality among the poor (and this is reflected in distribution sensitive measures) but does not change the universally employed headcount poverty measure.

Due to the limitations of the headcount measure, Sen proposes a poverty index, called the Sen index, which equals the aggregated income gaps between each poor income and the poverty line, weighted by each individual's relative rank among the poor. The Sen index, which is denoted as S, can be written as:

$$S = H[I + (1 - I)G_P(q/q + 1)],$$

where H is the headcount poverty ratio, I is the ratio of the average income shortfall to the poverty line (hereafter referred to as poverty gap), G_p is the Gini coefficient of income inequality among the poor, and q is the number of people below the poverty threshold.

Sen's index is simultaneously sensitive to headcount poverty, the income shortfall of the poor (poverty gap), and the distribution of income among the poor. When the head count ratio and average income shortfall (poverty gap) of the poor are both constants, a rise in income inequality among the poor necessarily increases the economic deprivation among the poor. Ravallion and Chen (2004) use the squared poverty gap to capture the effect of inequality among the poor.

[2]Khan and Riskin (2001) provide three levels of poverty lines, their highest being 966 Yuan in 1,988 and 2,291 Yuan in 1995. Gustafsson and Zhong (2000) use 908 Yuan for 1988 and then scale up their poverty line to 1995 using retail price indices. Fang *et al.* (2002) suggest $1 per day (PPP adjusted) for the 1990s. Meng *et al.* (2005) estimate a median provincial poverty rate of between 1,300 and 1,850 Yuan in 1995. Ravallion and Chen (2004) use an even lower urban poverty line of 1,200 Yuan in 2002.

TABLE 1

Real Income and Gini Coefficients, Urban China 1988 and 1995

	1988	1995
Family Gini	0.2286	0.2797
	(0.0024)	(0.0033)
Family income	11,544	14,233
	(58)	(103)
Per capita Gini	0.2252	0.2830
	(0.0025)	(0.0035)
Per capita income	3,397	4,728
	(17)	(35)
Equivalent Gini	0.2085	0.2682
	(0.0024)	(0.0033)
Equivalent income—China	5,924	7,683
	(27)	(53)
Coast	6,134	8,910
	(40)	(92)
Central	5,826	7,182
	(40)	(70)
Southwest	6,223	6,966
	(72)	(97)
Northwest	5,387	6,051
	(72)	(79)
Family size	3.53	3.13
Sample size	8,929	6,925
Urban CPI	1.00	2.229

Notes: Equivalent income uses subjective scales developed below. Regional incomes adjusted by cost of living as reported in Appendix Table A.1.

Formal inference procedures for Sen's index and its components are developed in Bishop *et al.* (1997). The advantage of formal inference procedures is that it allows us to identify cases in poverty levels differing only due to sampling variability. We are not aware of any paper on Chinese poverty that provides the reader with confidence intervals for their estimates.

The final measurement issue is adjusting for rising consumer prices and regional differences in cost of living. To adjust for rising consumer prices we use Khan and Riskin's (2001) overall urban cost of living inflator between 1988 and 1995 (see Table 1). We note that Meng *et al.* (2005) employ an alternative approach which closely tracks the urban grain price index. They report that the urban grain index increased by five times between 1986 and 2000 while the CPI increased by only three times. This difference is instrumental in explaining their conclusion of rising Chinese urban poverty over time.

To avoid the subjective method's problem of persons in rich regions tending to have higher perceived needs than those in poorer regions, we use objectively determined cost of living indices to adjust for regional differences in purchasing power. We obtain regional price and expenditure data from *The 1987 Survey of Income and Expenditure of Urban Households in China.* Following Bishop *et al.* (1996), we use the regional price and expenditure data for food and non-durables to calculate cost of living for 15 provinces, nine of which are in our sample for 1988. The missing provinces, Beijing and Gansu, are assumed to be the averages of

nearby provinces. We update the data to 1995 using provincial price indices provides by the China State Statistical Bureau. The Appendix provides the provincial price indices.

We divide China into four regions: the Coast region which includes Liaoning, Beijing, Jiangshu, and Guangdong Provinces; the Central region which includes Henan, Hubei, and Anhui; the South West region which includes Yunnan Province; and the North West region which includes Shanxi and Gansu.[3] Appendix Table 1 provides the provincial cost of living indices; urban China is equal to one. (We correct for provincial cost of living differences before aggregating the data into the four regions.) As expected, the rapidly developing Coastal provinces have the highest cost of living in both years while the Gansu and Shanxi (North West) and Henan (Central) provinces have the lowest cost of living.

3. Data

To study poverty during the period of economic reforms in China we use the 1988 and 1995 Chinese Household Income Project (CHIP) data. The CHIP data was collected as a part of major research program of the Chinese Academy of Social Sciences (CASS). CHIP data comes from two distinct samples of both rural and urban surveys in cooperation with the State Statistical Bureau (SSB) that collects significantly larger samples. Each survey consists of two data files: one in which the individual is the unit of analysis, and a second in which the household is the unit of analysis. We focus on the urban sample as it provides a monetary measure of minimum needs. Riskin *et al.* (2001a, 2001b), Griffin and Zhao (1993), and Pan (2003) provide detailed discussion of the CHIP data.

We note several important differences between the 1988 and 1995 data. First, the key question for our study, "according to actual conditions in your household, please estimate the monthly cost of maintaining a minimum standard of living for the whole family" is available only for 1995. This means that we must construct poverty thresholds and household size equivalence scales for 1995 and use them with the 1988 data.[4] Second, a measure of total consumption expenditures is available only for 1995 so we must use income to measure poverty across time.[5] Third, the 1988 data does not contain estimates of imputed rent (housing subsidies in-kind) or the value of owner occupied housing, so our definition of income does not include these items. Given these exceptions we believe the data is comparable

[3]The 1995 data includes Sichuan (a Southwest province). When presenting data for China as a whole we include Sichuan. However, when comparing the Southwest between 1988 and 1995 we omit Sichuan. Typically, the North West and South West are combined to form a single "West" region; however, we find these two regions are quite different in terms of poverty. Finally, an often overlooked determinant in choosing regions is the sample sizes. In order to derive variance estimates from asymptotic estimators we require sufficient sample sizes. In this study each region contains at least 600 households.

[4]We note that the U.S. equivalence scales used today are based on 1950s budget studies and the current poverty line is the 1962 poverty line adjusted for inflation. Criticisms of the U.S. procedure such as the 1995 National Research Council Report (see Citro and Michael, 1995) recommends periodic, but not annual equivalence scale updates.

[5]We assume that relative income needs across households are proportional to relative consumption needs. In our sample average household consumption is 86 percent of household income. This implies that a higher poverty line should be used to measure income-based poverty. We believe by allowing the poverty threshold to vary from 2,988 Yuan to 4,482 Yuan we capture this higher poverty line.

over time, especially for our purpose which is constructing regional poverty orderings.[6] We note that the data excludes the "floating population" of unregistered rural migrants. Clearly, the floating population is growing and its omission will lead to a larger underestimate of poverty in 1995 than in 1988.[7] For a detailed discussion of data comparability over time, see Riskin *et al.* (2001b).

Table 1 provides a brief look at the data used in our study. First, we note reasonable sample sizes of 8,929 households (with non-zero incomes) in 1988 and 6,925 households in 1995. Per capita income increases sharply over time from 3,397 Yuan (in 1995 Yuan) to 4,728 Yuan in 1995. However, this rise in income is accompanied by an equally sharp increase in inequality, with the per capita Gini coefficient rising from 0.2252 in 1988 to 0.2830 in 1995. We also observe increase in family and equivalent mean income and Gini coefficients. Additionally, we note a significant decline in family size from 3.53 persons in 1988 to 3.13 persons.

Table 1 also provides the regional equivalent adjusted for cost of living differences for 1988 and 1995. (Equivalent income uses the subjective scales developed below.) In 1988 we find that the Coast (6,134 Yuan) and South West (6,223 Yuan) regions have similar mean incomes, followed by the Central (5,826) and North West (5,387 Yuan) regions. However, the growth of mean equivalent income varies widely by region from 45.3 percent in the Coastal region to 11.9 percent in the South West. We observe that incomes in the Central region grew about twice as fast as those in the South West and North West. Likewise, incomes in the Coast region grew almost twice as fast as those in the Central region.

Each of these factors is expected to influence our analysis of poverty over time. First, we anticipate that rising per capita incomes should reduce poverty over time. Second, we note that while the relationship between poverty and inequality is not always straightforward, the increased inequality may be a signal of rising poverty. Finally, and less obvious is the decline in family size. A decline in family size, everything else equal, will result in a rise in poverty given any economies of scale in household consumption. Suppose we increase the poverty line, household incomes, and household sizes by 10 percent. Given the existence of economies of scale in the household, headcount poverty will fall. In China, household incomes rose, but household size fell. If household size falls fast enough and incomes rise slowly enough, poverty could actually rise. A potential solution, beyond the scope of this paper, is a simulation/decomposition exercise that isolates each of these effects.

4. The Intersection Method of Estimating Thresholds and Equivalence Scales

The intersection method for estimating subjective poverty thresholds and equivalence scales was first developed by Goedhart *et al.* (1977). Garner and Short (2003) provide a detailed description of the intersection method.

[6]Khan and Riskin (1998, table 3) estimate that housing subsidies in-kind and owner-occupied rental value are approximately 20 percent of per capita income in both 1988 and 1995. We note that we do not know the distributional impact of housing policy changes over time.

[7]We note that the subjective method results in an endogenously determined poverty threshold. Thus, while the number of poor is lower due to the omission of the floating population, the subjective poverty threshold is higher for the same reason. We assume that the first effect outweighs the second.

We estimate the threshold (Y^*) as the intersection of the relationship:

$$\ln(Y_{\min}) = a_0 + a_1 \ln(Y) + a_2 z_2 + a_3 z_3 + \ldots + a_n z_n + \varepsilon \quad (1)$$

with the line $Y_{\min} = Y$ for different values of z_n ($Y_{\min}$ is the answer to the minimum needs question). An important feature of the intersection approach is that it identifies the "true" minimum-spending threshold from those households which have spending at the minimum. As the "true" minimum is not known a priori, data are collected from a sample of the whole population. Using equation (1) the predicted threshold at the intersection, $Y_{\min} = Y$ is:

$$Y^*(z_2 \ldots z_n) = \exp\left[\frac{a_0 + a_2 z_2 + \ldots + a_n z_n}{1 - a_1}\right]. \quad (2)$$

When households have different family sizes, the responses would be expected to be different. For example, a three-person household without children would be expected to report a higher minimum spending need than a three-person household with children.

Model Specification and Regression Results

Table 2 provides descriptive statistics of variables used to estimate subjective equivalence scales. On average, a household's annual minimum spending in 1995 is 8,125 Yuan, which is about two-thirds of the average household's annual total consumption expenditure. Three-person households with children are the most common family size in our data set and one-person households are uncommon.

We propose a simple model with consumption and family indicator variables only:

$$\ln(Y_{\min}) = a_0 + a_1 \ln(Y) + a_2(D1) + a_3(D2\_60^+) + a_4(D2\_60^-) + a_5(D_3\_NK) + a_6(D4^+\_NK) + a_7(D4^+\_K). \quad (3)$$

TABLE 2

Sample Means and Standard Deviations of Variables Included in the 1995 China Annual Minimum Spending Regressions of $\ln(Y_{\min})$

Variable	N	Mean	Std Dev
Reported monthly minimum spending	6,656	677.1	455
Annual minimum spending ($Y_{\min}$)	6,656	8,124.6	5,462
Annual total consumption expenditure (Y)	6,656	12,224.9	10,462
D1 (1 person)	53	0.0080	0.0889
D2_60$^+$ (2 persons, household head ≥60)	529	0.0795	0.2705
D2_60$^-$ (2 persons, household head < 60)	623	0.0936	0.2913
D3_NK (3 persons, no children)	844	0.1268	0.3328
D3_K (3 persons with children)	2,951	0.4434	0.4968
D4$^+$_NK (4 persons or more, no children)	530	0.0796	0.2707
D4$^+$_K (4 persons or more with children)	1,126	0.1692	0.3749

Note: N represents the number of observations for each variable. Y is reported in Yuan.

TABLE 3

Regression Results (dependent variable, minimum consumption needs)

Variable	Parameter Estimate	Standard Error	t Value
Intercept	6.358	0.069	91.57
Log consumption	0.270	0.008	35.99
D1	–0.418	0.060	–6.98
D2_60$^+$	–0.101	0.020	–4.95
D2_60$^-$	–0.078	0.019	–4.09
D3_NK	0.085	0.017	5.02
D4$^+$_NK	0.215	0.020	10.51
D4$^+$_K	0.088	0.015	5.80

Adjusted $R^2 = 0.21$

Note: See Table 2 for the definition of the dummy variables—omitted group 3 persons, one child.

In this model $Y_{\min}$ is the level of necessary spending to meet the minimum standard of living for the whole family in 1995. Y is the annual household total consumption. The omitted family size dummy variable is three-person household with children, denoted as D3_K. D1 represents a one-person household, D_60$^+$ a two-person household with household head greater than or equal to 60 years old, and D2_60$^-$ a two-person household with household head less than 60 years old. D3_NK represents three-person households without children, while D4$^+$_NK represents four or more person households without children. Finally, D4$^+$_K represents four or more person households with children.[8]

The OLS regression coefficients in equation (3) are presented in Table 3. The adjusted R^2 is 0.21 and the coefficients for all variables are statistically significantly at conventional significance levels. The regression results indicate that a 10 percent increase in the annual total consumption results in 2.7 percent increase in annual household minimum spending. Variation in the family size coefficients meets our expectations. For example, we find a larger coefficient for D2_60$^-$ than for D2_60$^+$, implying that younger two-person households have higher minimum needs than older two-person households. Similarly, we find the coefficient on D3_NK (three persons, no children) is larger than D3_K (three persons, with at least one child).

Poverty Thresholds and Equivalence Scales

We use the regression results of Table 3 to construct minimum needs thresholds for seven family types. The predicted thresholds are calculated using equation (2). Panel A in Table 4 provides the thresholds. On an annual basis the results in Panel A indicate that a three-person household with a child requires 6,053 Yuan to meet its annual minimum needs. A one-person household "needs" 3,416 Yuan in

[8]Earlier versions of this paper explored more complex models. Two major findings emerged from these explorations. First, we find that the household size equivalence scales are insensitive to model specifications that included household status variables such as party membership (+), bath and kitchen facilities (+), presence of a phone (+) and regional indicators. Second, regional indicator variables are not useful in uncovering regional cost of living as individuals in higher income regions perceive themselves to have higher needs. We adjust for regional cost of living using market basket data (see Section 2).

TABLE 4
SUBJECTIVE THRESHOLDS AND EQUIVALENCE SCALES

Panel A: Predicted Thresholds						
D1	D2_60$^+$	D2_60$^-$	D3_NK	D3_K	D4$^+$_NK	D4$^+$_K
3,416	5,276	5,446	6,805	6,053	8,135	6,833
Panel B: Equivalence Scales						
D1	D2_60$^+$	D2_60$^-$	D3_NK	D3_K	D4$^+$_NK	D4$^+$_K
1.00	1.54	1.59	1.99	1.77	2.38	2.00

Note: See Table 1 for the definition of the dummy variables.

order to meet its minimum spending requirement. This is close to $1 per day ($1.12) at the official exchange rate. This leads us to consider a "neighborhood" of three poverty lines, 2,988 Yuan, 3,735 Yuan, and 4,482 Yuan per equivalent adult per year.

Panel B of Table 4 converts the thresholds into equivalence scales. We find that a two-person family composed of two adults with the age of the household's head greater than or equal to 60 years old (D2_60$^+$) would need 1.54 times as much as a single adult; a two-adult family with the head less than 60 years old "needs" slightly more (1.59). Four or more adults require 2.38 times as much as a single adult. Two adults with one child (D3_K) would "need" 1.77 times that of a single person; and two adults, two children require twice the income (2.00) of a single person. We note that the equivalence scales for families with children closely match the often used "square root rule" (see Ruggles, 1990).[9]

To help further understand the role of equivalence scales in poverty measurement, Table 5 compares these different approaches to measuring the economies of scale in a family. In particular, we compare headcount poverty in urban China using per capita income (no economies of scale in a household), "expert-based" equivalence scales (some slight economies of scale),[10] and the subjective equivalence scales developed above. In addition we compare overall urban Chinese poverty based on both regional cost of living adjusted and unadjusted incomes. The purpose of this table is to show that the choice of equivalent scale and regional cost of living adjustment can affect both the number of poor and the poverty trend.

Table 5 shows that at a poverty line of 2,988 Yuan per year, per capita poverty fell from 48.96 percent in 1988 to 27.56 percent in 1995. Clearly, using the subjective threshold without family size adjustment leads to quite high poverty rates. Using the expert scale to adjust for family size we find that poverty declines from

[9]One important modification is necessary in order to apply the subjective equivalence scales to the 1988 data. As Table 1 points out, family size fell rapidly between 1988 and 1995. In 1995, the year for which data is available to estimate subjective scales, there are very few families with 5 or more persons. This is not the case in 1988. To address this issue, we use the marginal differences between 3 and 4 person households to estimate the equivalence factor for 5 or more persons in 1988. Thus, for 1988 we assume that D5$^+$_NK equals 2.77 and D5$^+$_K = 2.23. We note that approximately 16 percent of households are in the open-ended class in both years.

[10]Gustafsson and Li (2001) indicate that one person = 1.0, two persons = 1.88, three persons = 2.66, four persons = 3.54 and five-plus persons = 5.0. They use these scales to measure inequality in China.

TABLE 5

HEADCOUNT POVERTY FOR ALTERNATIVE EQUIVALENCE SCALES, URBAN CHINA, 1998 AND 1995

Poverty Line: 2,988 Yuan ($1/day at official exchange rate)		
	1988	1995
Per capita[1]	0.4896	0.2756
	(0.0053)	(0.0054)
Expert[1]	0.3333	0.1774
	(0.0059)	(0.0046)
Subjective[1]	0.0502	0.0409
	(0.0023)	(0.0024)
Subjective w/ cost of living adjustment	0.0441	0.0310
	(0.0023)	(0.0024)

Note: [1]Incomes are not adjusted for regional cost of living.

33.33 percent to 17.74 percent in 1995. Finally, using the subjective equivalence scales (without regional cost of living adjustment) we find only a modest decline in poverty from 5.02 percent in 1988 to 4.09 percent in 1995.

It is quite apparent that the per capita and subjective approaches paint quite different pictures of poverty reduction in China during this period of rapid economic growth. Perhaps as equally astounding as the rapid income growth is the rapid decline in household size from 3.5 persons in 1988 to 3.1 persons in 1995 (see Table 1). With fewer household members there are fewer economies of scale and hence less overall poverty reduction. As per capita poverty measures are not sensitive to the changes in household size we observe a much larger percentage reduction in poverty over time.

Furthermore, while the regional cost of living adjustments have no effect on the overall urban China mean income, this is not the case for the poverty statistics. For 1988, 5.02 percent of urban Chinese fall below a poverty line of 2,988 Yuan if we do not adjust for regional cost of living. However, adjusting for regional cost of living lowers the overall urban poverty rate to 4.4 percent. A similar reduction occurs in the 1995 headcount ratio when we adjusted for regional cost of living. We can explain this result by noting that adjusting for regional cost of living raises the incomes in the poor North West and Central regions and lowers incomes in the wealthier Coast, with the net result being an overall lower poverty rate. In sum, failing to adjust for regional cost of living in our data results in an overstatement of the poverty rate in urban China.[11]

In the next section we examine the intensity of regional poverty in China at 2,988 Yuan as well as two higher poverty lines. The use of higher poverty lines allows us to determine if the poverty trends over time are sensitive to the poverty line selected. Also, while urban poverty as a whole showed only a modest decline using the subjective poverty scales, this conclusion may not hold for all of China's regions.

[11]The urban China poverty rates unadjusted for regional cost of living are: at 3,735 Yuan: 1988, 12.2 percent; 1995, 8.9 percent; at 4,482 Yuan: 1988, 24.6 percent; 1995, 17.1 percent. If we use the subjective national threshold of 3,416 Yuan and correct for regional cost of living the 1988 poverty rate is 8.0 percent and the 1995 rate is 5.6 percent.

TABLE 6
SEN INDICES OF POVERTY AND COMPONENTS, 1988

Poverty Line	Region	Sen Index	Components		
			Headcount	Income Gap	Gini (poor)
2,988 Yuan	Coast	0.008	0.032	0.174	0.096
		(0.001)	(0.003)	(0.014)	(0.010)
	Central	0.008	0.030	0.174	0.105
		(0.001)	(0.003)	(0.018)	(0.011)
	South West	0.010	0.033	0.212	0.118
		(0.002)	(0.006)	(0.032)	(0.024)
	North West	0.033	0.103	0.223	0.119
		(0.003)	(0.008)	(0.013)	(0.003)
	China	0.013	0.044	0.198	0.111
		(0.002)	(0.002)	(0.008)	(0.006)
3,735 Yuan	Coast	0.022	0.081	0.187	0.100
		(0.006)	(0.005)	(0.009)	(0.006)
	Central	0.022	0.086	0.174	0.098
		(0.006)	(0.006)	(0.009)	(0.006)
	South West	0.024	0.081	0.199	0.117
		(0.003)	(0.009)	(0.020)	(0.014)
	North West	0.071	0.219	0.227	0.125
		(0.004)	(0.011)	(0.010)	(0.006)
	China	0.031	0.108	0.199	0.111
		(0.001)	(0.003)	(0.005)	(0.003)
4,482 Yuan	Coast	0.049	0.184	0.182	0.102
		(0.002)	(0.006)	(0.006)	(0.004)
	Central	0.052	0.206	0.175	0.095
		(0.003)	(0.008)	(0.006)	(0.004)
	South West	0.048	0.163	0.205	0.119
		(0.005)	(0.012)	(0.013)	(0.009)
	North West	0.124	0.356	0.250	0.133
		(0.006)	(0.012)	(0.008)	(0.005)
	China	0.064	0.220	0.202	0.112
		(0.002)	(0.004)	(0.004)	(0.002)

5. REGIONAL POVERTY COMPARISONS: URBAN CHINA, 1988 AND 1995

Tables 6 and 7 present the Sen index and its components for each region and urban China as a whole for 1988 and 1995. We consider three alternative poverty lines, 2,988 Yuan, 3,735 Yuan, and 4,482 Yuan for a one-person household, which form a "neighborhood" around our subjective estimate of 3,416 Yuan. Equivalent incomes for multiple person households are created by dividing their family income by the equivalence scales given in Table 4, Panel B. As noted above, the subjectively determined poverty line for a single person household lies in this range at 3,416 Yuan for 1995. Using an alternative poverty line allows us to examine the sensitivity of our finding to the choice of the poverty line. To account for sampling variability we construct standard errors as described by Bishop *et al.* (1997).

Tables 6 and 7 contain a great deal of information and we focus on the familiar headcount and Sen index. We begin by examining regional poverty in 1988 and 1995 and then examine changes in regional poverty over time.

For 1988 the regional poverty ordering is sensitive to both the poverty line and the poverty measure selected. At the lowest poverty line, 2,988 Yuan, we find the headcounts and Sen indices are similar for three regions (Sen index 0.01;

TABLE 7
SEN INDICES OF POVERTY AND COMPONENTS, 1995

Poverty Line	Region	Sen Index	Components		
			Headcount	Income Gap	Gini (poor)
2,988 Yuan	Coast	0.005	0.019	0.185	0.102
		(0.001)	(0.003)	(0.022)	(0.014)
	Central	0.008	0.026	0.188	0.106
		(0.001)	(0.004)	(0.025)	(0.022)
	South West	0.006	0.021	0.190	0.098
		(0.002)	(0.006)	(0.042)	(0.013)
	North West	0.020	0.067	0.216	0.108
		(0.003)	(0.008)	(0.018)	(0.008)
	China	0.006	0.031	0.200	0.108
		(0.001)	(0.002)	(0.010)	(0.007)
3,735 Yuan	Coast	0.013	0.044	0.200	0.105
		(0.001)	(0.004)	(0.015)	(0.009)
	Central	0.020	0.072	0.185	0.107
		(0.002)	(0.006)	(0.014)	(0.010)
	South West	0.016	0.058	0.181	0.104
		(0.003)	(0.009)	(0.026)	(0.016)
	North West	0.047	0.149	0.225	0.116
		(0.004)	(0.011)	(0.013)	(0.008)
	China	0.022	0.078	0.200	0.109
		(0.001)	(0.003)	(0.007)	(0.004)
4,482 Yuan	Coast	0.026	0.090	0.200	0.117
		(0.002)	(0.006)	(0.011)	(0.007)
	Central	0.043	0.180	0.180	0.104
		(0.006)	(0.009)	(0.009)	(0.006)
	South West	0.033	0.121	0.193	0.104
		(0.005)	(0.013)	(0.018)	(0.012)
	North West	0.087	0.263	0.235	0.126
		(0.006)	(0.014)	(0.010)	(0.006)
	China	0.045	0.152	0.205	0.114
		(0.002)	(0.005)	(0.005)	(0.003)

headcount, 0.03), with the North West registering nearly three times more poverty than the other regions (Sen index 0.033; headcount, 0.103). Raising the poverty line to 3,735 Yuan does not change the conclusion regarding similar Sen indices for the Coast, Central, and South West regions (0.022–0.024) and the higher North Western poverty (Sen index, 0.071). Moving to the highest poverty line considered, 4,482 Yuan, we find that the Coast, Central and South West have similar Sen indices (0.05) but the South West has a lower headcount (0.16). The South West's lower headcount but equivalent Sen index can be explained by its higher income gap and Gini.

Summarizing the 1988 findings, the Sen indices for the Coast, Central and South West regions are nearly identical at all poverty lines considered. Only at the highest poverty line (4,482 Yuan) does the headcount provide a complete poverty ordering for 1988; South West dominates Coast, Coast dominates Central, and Central dominates North West.

Table 7 presents the Sen index and its components for 1995. At all poverty lines the North West region is clearly poorer than any of the other regions. For the lowest poverty line we find no significant difference in headcount poverty

TABLE 8
REGIONAL POVERTY COMPARISONS ACROSS TIME

Region	Poverty Line					
	2,988 Yuan		3,735 Yuan		4,482 Yuan	
Coast	–	–	–	–	–	–
Central	0	–	0	–	–	–
South West	0	0	0	0	–	–
North West	–	–	–	–	–	–

Note: 1st entry is Sen index, 2nd entry is headcount.
0, implies no change; –, implies decline in poverty.

between the Coast, Central and South West regions; however, the Coast suffers less Sen poverty than does the Central region. At poverty lines above 2,988 Yuan the Coast enjoys both lower headcount and Sen poverty than the Central region. The point estimates for the South West region suggest that its poverty level lies between the Coast and Central regions; however, due to this region's smaller sample size (647 cases without Sichuan) many of these differences are not statistically significant.

Table 8 provides the results of inference tests on the headcount and Sen indices across time. A minus indicates a decline in poverty, while a zero indicates no significant difference over time. The first entry is the Sen index results, followed by the head count result. The Coast and North West enjoy declines in both headcount and Sen poverty at each poverty line between 1988 and 1995.

Changes in poverty over time can be sensitive to both the poverty measure and the poverty line chosen. Changes in South West poverty over time are sensitive to the poverty line—the South West region shows no significant difference in poverty level between 1988 and 1995 except at the highest poverty threshold (4,482 Yuan). Changes in the Central region poverty are sensitive to both poverty measure and poverty line—the Central region shows a decline in headcount poverty at all three poverty lines while its Sen poverty level does not change over time at the lowest two poverty lines.

In sum, the North West is unambiguously the poorest region, but its poverty level is falling over time. At a poverty line of 3,735 Yuan the North West headcount fell from 22 percent to 15 percent. In 1995 the Coast clearly has the lowest level of poverty and its headcount fell from 8.1 percent to 4.4 percent. Neither the Central region nor the South West region (which had the highest level of equivalent income in 1988) enjoyed any decline in Sen index poverty between 1988 and 1995 at poverty lines below 4,482 Yuan.

6. CONCLUSION

This paper analyzes poverty in urban China among the registered population during a period of rapid economic transition, 1988 to 1995. The contribution of our paper is that we provide a comprehensive picture of subjective poverty in urban China and its major regions. We examine three alternative

poverty lines, estimate a set of equivalence scales from survey responses in our data, employ the distribution sensitive Sen poverty index and investigate changes in its components (headcounts, income gaps and Gini among the poor), and adjust for regional cost of living using market basket data. Unlike many other papers on poverty in developing countries we use formal inference tests to uncover any trends in poverty. We find that each of these factors, and how one adjusts for rising consumer prices over time, plays an important role in the conclusions we draw about changes in regional poverty during a period of economic transition.

Our subjectively determined national poverty line is 3,416 Yuan per year per equivalent adult. To check for the sensitivity of the poverty line we use three alternatives, 2,988 Yuan, 3,735 Yuan, and 4,482 Yuan which correspond to $1.00, $1.25, and $1.50 at the official exchange rate or roughly $4, $5, and $6 in PPP adjusted terms. These higher poverty lines are offset by our finding of substantial household economies of scale; for example, a four-person household (two adults, two children) requires only twice that of a single-adult household. Using the intermediate poverty line of 3,735 Yuan and adjusting for household size and regional cost of living differences, we find poverty rates for urban China of 10.8 percent in 1988 and 7.8 percent in 1995. Certainly, economic growth contributed to this decline in poverty. However, it is apparent that declines in family size (fewer economies of scale) between 1988 and 1995 slowed the overall poverty reduction in urban China.

While regional cost of living adjustments have no effect on China's mean income they do impact the poverty statistics. We find that failing to correct for cost of living adds approximately one percentage point to the urban poverty rate in both years. We can explain this result by noting that adjusting for regional cost of living raises the incomes in the poor regions and lowers incomes in the wealthier regions, with the net result being an overall lower poverty rate.

We find important changes in regional poverty between 1988 and 1995. In 1988 we find little difference in poverty across three of the four regions, with the North West having significantly higher rates of poverty. In 1995, the Coast has the lowest poverty, followed by the South West and Central regions. At the intermediate poverty line the North West poverty rate fell from 22 percent to 15 percent, the Coastal poverty rate fell from 8.1 percent to 4.4 percent, the Central region poverty rate fell from 8.6 percent to 7.2 percent and the South West region's poverty rate declined from 8.1 percent to 5.8 percent. We note, however, that only the Coast and North West enjoyed statistically significant declines in the distribution-sensitive Sen poverty index at poverty lines below 4,482 Yuan per year.

Appendix

TABLE A1

Provincial Cost of Living Indices, 1988 and 1995

	1988	1995
Beijing	1.00	1.12
Liaoning	1.03	1.03
Jiangsu	0.97	0.99
Guangdong	1.32	1.23
Hubei	0.94	0.98
Henan	0.88	0.81
Anhui	0.96	0.97
Gansu	0.94	0.93
Shanxi	0.94	0.93
Yunnan	0.97	1.01
Sichuan	0.93	0.97

Note: Urban China equals 1.

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