Spatial Price Differences in China: Estimates and Implications

Prices differ across space: from province to province, from rural (or urban) areas in one province to rural (or urban) areas in another province, and from rural to urban areas within one province. Systematic differences in prices across a range of goods and services in different localities imply regional differences in the costs of living. If high-income provinces also have high costs of living, and low-income provinces have low costs of living, the use of nominal income measures in explaining such economic outcomes as inequality can lead to misinterpretations. Income should be adjusted for costs of living. We are interested in the sign and magnitude of the adjustments needed, their changes over time, and their impact on economic outcomes in China. In this article, we construct a set of (rural, urban, total) provincial-level spatial price deflators for the years 1984-2002 that can be used to obtain provincial-level income measures adjusted for purchasing power. We provide illustrations of the significant effect of ignoring spatial price differences in the analysis of China's economy.

Loren Brandt and Carsten A. Holz

Loren Brandt
Department of Economics
University of Toronto
150 St. George Street
Toronto, Ontario
M5S 3G7 CANADA
Tel.: (416) 978-4442
Fax: (416) 978-6713
Email: brandt@chass.utoronto.ca

Carsten A. Holz
Social Science Division
Hong Kong University of Science & Technology
Clear Water Bay
Kowloon
Hong Kong
Tel./Fax: +852 2719-8557
E-mail: socholz@ust.hk

8 September 2004

Spatial Price Differences in China: Estimates and Implications

Introduction

Price indices are standard statistical data that are constructed by statistical authorities across all countries. The key price index often is the Consumer Price Index (CPI). In the U.S., for example, the CPI serves as an economic indicator used in formulating fiscal and monetary policy, as a deflator of other economic series (for example, retail sales, or hourly and weekly earnings), and as a means of adjusting dollar values (for example, when social security benefits are indexed using the CPI).[1] But while the calculation and use of price indices are widespread, absolute price comparisons across localities are usually not possible. Thus, in the U.S., the Bureau of Labor Statistics compiles a nationwide urban CPI based on about 80,000 prices recorded in 87 urban areas by aggregating individual commodity or area indices.[2] The commodities are specific to the local outlets; no data are collected on the price of one specific commodity in different areas of the U.S. A comparison of the absolute price level in one locality with that in another locality, thus, is not possible for the U.S.

China's National Bureau of Statistics (NBS), like the Bureau of Labor Statistics in the U.S., publishes a number of official price indices, including national and provincial CPIs, as well as separate CPIs for rural and urban areas at both the national and the provincial level. These price indices allow a comparison of the changes in the level of consumer prices over time across different localities, but do not permit a comparison of absolute price levels between different localities at a given point in time. Like the Bureau of Labor Statistics, the NBS does not publish data on the individual prices and quantities underlying the provincial price indices it constructs.

The ability to compare the absolute price level across localities at a point in time can be important, however. The prices that consumers pay, even for identical products, are not necessarily uniform across space, and can reflect a host of factors such as transportation costs or barriers to trade. In some localities, prices may be, on average, systematically higher. This implies that comparisons of the relative purchasing power of incomes across localities may be biased. For example, at the country level, Irving Kravis and Robert Lipsey (1988) provide a theoretical argument for a positive correlation between the price level and income, in that prices of non-tradeable goods are higher, relative to prices of tradeables, in rich countries

---

[1]   For more details see BLS (2000).
[2]   See http://www.bls.gov/cpi/cpifact2.htm, titled "How BLS Measures Changes in Consumer Prices." The Bureau of Labor Statistics does not compile a rural CPI.

than in poor countries.[3] Their empirical analysis across countries confirms their argument. In the context of China, this implies that the absolute price level can be expected to be higher in provinces in which nominal incomes are higher, e.g., Guangdong, than in low-income provinces, e.g., Gansu, because non-tradeables, such as housing and services, are likely to be more expensive in Guangdong than in Gansu. Simply comparing nominal income in the high-income to that in the low-income province, thus, would exaggerate the difference in the standard of living between the two provinces.[4]

Adjustments in income measures to take into account the local price level are immediately relevant for economic analysis such as inequality studies, wage comparisons, or assessments of poverty. A large body of literature attempts to measure inequality in China. These inequality studies measure inequality using a variety of income or consumption measures.[5] But, given the absence of official price level data, they are unable to adjust their income or consumption measures to take into account systematic differences in price levels across localities.[6] If these differences were taken into account, inequality in China may well turn out to be significantly lower than these studies claim.

---

[3] A non-tradeable is a good that is both produced and consumed locally, and cannot be traded across localities. Examples include housing and services.

[4] The *Statistical Yearbook 1996*, p. 280, makes the lack of adjustment to income data for price differences very explicit. The table with time series and provincial data on per capita consumption (which, in this case, happen to be based on National Income Account data on consumption) comes with a note stating that "the ratio [of consumption of non-agricultural to agricultural residents] does not eliminate the effect of price differentials between urban and rural areas on consumption expenditure."

[5] Three types of (per capita) income measures dominate in the literature, with occasionally small variation of an individual income measure (and some authors not providing an exact definition of their income measures). The first, most widely used income measure is household survey income as compiled by the NBS for rural and urban areas separately (see, for example, Paul B. Trescott (1985), Irma Adelmann and David Sunding (1987), John Knight and Lina Song (1991), Stephen Howes (1993), Björn Gustafsson and Shi Li (1998), or Dennis Yang (1999)). In the rural case, household income includes the value of self-produced-self-consumed goods and services, with, alternatively, rural data also available for monetary income only. Literature using rural monetary income only, or a close approximation, includes Hsiung Bingyuang and Louis Putterman (1989), and Meng Xin and Harry X. Wu (1998). The Chinese Academy of Social Sciences in a survey for 1988 and 1995 augmented the NBS definition of household income by including, among others, the rental value of housing and, in urban areas, furthermore, the in-kind income omitted by the NBS in its data. Literature using this income measure, or a close approximation, includes Azizur Khan et al. (1992), Azizur Khan, Keith Griffin, and Zhao Renwei (1993), John Bishop, John Formby, and Zheng Buhong (1996), Azizur Kahn and Carl Riskin (1998), and Azizur Khan, Keith Griffin, and Carl Riskin (1999).

This augmented definition approaches the household consumption measure in the National Income Accounts, a second income measure which is also directly used in some inequality studies, with data provided by the NBS (see, for example, Zhang Xiaobo and Ravi Kanbur (2001)). The third income measure is GDP or, in early years when GDP data were not yet available, gross output value or net material product data (see, for example, John Knight and Lina Song (1990), Scott Rozelle (1994), Thomas Lyons (1998), Shangjin Wei and Wu Yi (2001), Ravi Kanbur and Zhang Xiaobo (2002)).

[6] One exception is Chen Shaohua and Martin Ravallion (1996). They construct provincial poverty lines for four southeast provinces using province-specific unit values (or implicit prices) from the rural household survey to price a common reference consumption bundle.

For a few years around 1990, the NBS published price data on specific products (defined uniformly across the country) in all provinces. At the time, Chin a was still only emerging from the planned economy, with the range of product variation in consumer goods reasonably small—and many industrial consumer goods still subject to a central distribution system—making this endeavor feasible. We use these data to construct province-specific price levels that are comparable across localities (for rural areas in each province, urban areas, and the province in total). While we use 1990 as base-year, the absolute price levels for other years can be derived based on the calculated 1990 base-year basket values combined with the CPIs of all other years. We provide year 2000 comparison data throughout the paper, and report spatial (price) deflators by province for the period between 1984 and 2002 in an appendix.[7] These price levels can serve as adjustment factors to nominal income measures in studies that involve comparisons across provinces.

Our price level is designed to match household survey income as compiled by the NBS, the primary measure of income used in studies on inequality in China. Since other income measures vary little from this basic household survey income measure, the spatial deflators provided here are likely to improve inequality calculations or income comparisons independent of the measure of income on which they are based.

This article depends on elaborate and at times highly complex data work. We provide further explanations and supplementary data in more than a dozen appendices. All appendices, including the one with provincial-level spatial deflators for the period from 1984 through 2002, can be found at http://ihome.ust.hk/~socholz/SpatialDeflators.html. The existence of relevant appendices is pointed out throughout this article, without repeating the website information every time.

Methodology

To compare the aggregate price levels across provinces, we proceed in three steps. First, we define a living expenditure basket as a list of products (goods and services) and their quantities purchased in the base-year, 1990. Second, this basket is priced in each province for the base-year. This results in the base-year price level in each province. Third, for time-series comparisons, the provincial prices of this basket in other years are obtained using the provincial CPIs.

---

[7]   We report the spatial deflators in the form of province- and year-specific basket values. A comparison of basket values across provinces in any one year reveals the price differences across provinces in that year.

Defining the basket

The 1990 basket comes in three variations: a (nationwide average, per capita) rural basket, to be priced in each province using rural prices; an urban basket, to be priced in each province using urban prices; and a "joint" (weighted rural-urban) basket which reflects the living expenditure patterns of the whole population, rural and urban, to be priced, separately, in the rural areas of each province, in the urban areas of each province, and province-wide (one joint basket, three types of pricing regimes).

One of the primary purposes of the use of a spatial deflator is to examine the impact of price differentials between provinces on the comparative purchasing power of provincial incomes. Thus, the provincial price levels we calculate, and the basket on which they are based, should match the income measures used in the literature. Since a number of alternative income measures are used in the literature, in principle, a slightly different basket (and thus, spatial deflator) could be constructed for each income measure. In this paper, we limit ourselves to the most widely used income measure, namely, household income as compiled by the NBS through household surveys, separately, for rural and urban areas, and construct the basket using the corresponding household survey living expenditure data. The living expenditure data determine the relative weight (importance) of different products, or product categories, in the basket. At the nationwide level, by design, the value of the basket equals the corresponding nationwide average per capita living expenditures.

A "basket" is a list of products with product quantities and adjustment factors. The quantity data on products and the corresponding nationwide average price data are combined to reconstruct the value of each product category in per capita living expenditures as much as possible. While households consume hundreds of different products, we do not have a complete list of quantities and prices for all individual items. As a result, we are not able to "reconstitute" fully each of the various product categories. For each product category, we need to use an appropriate adjustment factor to bridge the last gap between the value of the product on which we have data and the average nationwide per capita living expenditure value for this product category.

For example, without expenditure data on all consumer durables, we take the, de facto, major consumer durables on which both quantity data and price data are available. The value of the purchase of these consumer durables, at nationwide prices, is then multiplied by an adjustment factor so that it is equal to the total value of this particular product category (expenditures on consumer durables) in the household survey on living expenditures. In other words, within each product category, those products on which quantities and prices are

available are over-weighted in order to make up for the absence of data on other products. This practice ensures that the different product categories in the basket are given their correct (nationwide average) relative weights, to properly reflect the relative size of household expenditures in different product categories. We explain our procedures in detail below for the rural basket.

The living expenditure data come with one complication. The NBS compiles data on household living expenditures through separate rural and urban household surveys. The rural household survey collects data separately on monetary (cash) expenditures and on total household expenditures; the implicit difference constitutes self-produced-self-consumed (or in-kind) products. The *published* NBS statistics report both, rural per capita total living expenditures and rural per capita monetary living expenditures. Our rural basket covers *total* rural household living expenditures to match the corresponding rural household survey income, which includes imputed income from self-produced-self-consumed products.

In the urban case, the urban household survey also collects data on monetary and in-kind expenditures; however, the published urban living expenditure data cover only monetary living expenditures. Similarly, the urban household survey income does not include in-kind income. Our urban basket, thus, covers monetary expenditures to match the coverage of urban household survey income.

We also construct a nationwide joint (weighted rural-urban) basket, among others, to derive a deflator for average (weighted rural-urban) per capital household income. The fact that the coverage of rural and urban income differs slightly implies that per capita income levels in rural areas are not fully comparable to those in urban areas, and that a weighted rural-urban average income is therefore likely to be biased in favor of rural areas. Since self-produced-self-consumed products are probably a much less important item in urban areas (for which the data are not available) than in rural areas, the bias should be modest. In any case, the joint living expenditure basket, based on *total rural* per capita living expenditures and *monetary urban* per capita living expenditures, reflects exactly the same bias as do the published income data and any average income constructed from them.

Pricing the baskets at the provincial level in a base-year

In a second step, we ask how much each basket costs in each province. Pricing the list of individual products with their quantities, as specified in the basket, at the *provincial* prices, applying the adjustment factors for each product category, and summing up across all product categories yields the provincial basket value. (These procedures are explained below in detail

for the rural basket.) The basket value says how much a nationwide standard basket of goods and services, purchased by the typical household, costs in this provinces. This is the price level, or the comparable costs of living, for the particular province.

One complication, in the rural case, is that rural prices are not available for all products consumed in rural areas. For example, we do not have separate rural and urban prices for clothing and consumer durables, and therefore end up using use the same product prices for both rural and urban areas (the retail prices in the provincial capital cities). Insofar as the relationship between rural and urban prices for these goods differs across provinces, this may introduce some bias into the spatial deflators.[8] In the case of the rural living expenditures, three categories for which we have separate rural (in contrast to urban) prices for 1990, namely, foods (with the exception of a few individual food products), housing, and services, constitute 56.80% of rural living expenditures in that year.[9] (Details on data sources for prices and on types of prices are provided in an appendix.)

The base-year for pricing the basket is 1990. The limited availability (across years) of absolute price data narrowed the choice of base years to half a dozen years, while the availability of related statistical data and practical considerations then led to the choice of 1990. (Details on the choice of base-year are provided in an appendix.)

Pricing the basket at the provincial level in other years

With absolute price data no longer published after 1993, baskets after 1993 can no longer be priced at the provincial level, or in rural and urban areas within provinces. This problem is overcome by making use of existing official deflators for all years other than 1990. Multiplying the base-year (1990) basket value of a particular province by the relevant provincial CPI series yields the basket values for this province in all other years.

The relative weights (quantities) of different products in the official CPI are based on the household living expenditure survey data, and the CPI, thus, matches the coverage of the basket.[10] One complication is that the weights used by the NBS to construct the (rural, urban,

---

[8]   For example, if in one province the (unknown) rural price of a specific consumer durable was much below the (known) average (province-wide) price of this consumer durable in this province, but in a second province was equal to the average price, then by using provincial average prices we overestimate the rural price level in the first province, relative to the second province.

[9]   See *Rural Statistical Yearbook 1992*, p. 219, and Table 1. The percentage is net of those food products for which urban retail prices are used.

[10]   In the published, somewhat aggregated data, the first seven of eight categories of the CPI and of living expenditures cover the same types of products, but in the case of the CPI are limited to goods (i.e., excluding services); the eighth CPI category then is services, while the eighth living product category is "others." The

total) CPI from its various components is almost certainly based on the monetary living expenditures only.[11] This implies that rural self-produced-self-consumed products are underrepresented in the rural CPI. This matters when prices of self-produced-self-consumed products, mainly grain, change by a different percentage than the average price of all products that were purchased using money. In the urban case, this problem does not arise because the urban household living expenditures (and, similarly, urban household income) do not include self-produced-self-consumed products (or products received without monetary payment in exchange). We re-weight the rural CPI to take into account rural self-produced-self-consumed products in an alternative rural CPI and report both, the official and the re-weighted CPI, in the tables below. (For further details see the appendix on the adjustment of the rural CPI.)

Three provinces, Tibet, Hainan, and Chongqing (established in 1997 through its separation from Sichuan) pose problems either in pricing the basket or in applying the CPI to obtain price levels for other years. The approximations of absolute prices in the case of Tibet, Hainan, and Chongqing are extensive.[12] For the four provincial-level municipalities Beijing, Shanghai, Tianjin, and since 1997, Chongqing, no official rural CPIs are published and only municipality-wide, i.e., provincial-level CPIs are reported; the same values are also officially reported as "urban" CPIs. In the case of these four municipalities, the rural CPI used here is the official municipal/urban CPI. Overall, the reader may wish to ignore Tibet, Hainan, and Chongqing throughout, and, in addition, Beijing, Tianjin and Shanghai in the rural case.

Based on the three baskets—rural, urban, and total—we derive five price levels for all years, 1984-2002: two for rural areas in each province (one based on the rural basket and one based on the joint basket, in each case pricing the basket at rural prices), similarly, two for urban areas in each province, and one for each province in total (based on the joint basket and province-wide prices). In the following, we explain the construction of the rural living expenditure basket at some length; with the procedures similar for all baskets, discussion of the urban and joint baskets is kept much shorter.

NBS, in calculating the CPI, presumably makes use of the numerous, mainly unpublished sub- (and sub-sub-) categories of the CPI and of living expenditures.

[11] The appendix on the adjustment of the rural CPI includes evidence strongly suggesting that the official rural CPI is based on the monetary living expenditures only.

[12] Appendices on the construction of the rural and urban living expenditure baskets provide details on how missing data are approximated.

Rural living expenditure basket price level

Construction of the rural living expenditure basket price level follows the three steps outlined above: establishment of the basket, pricing of the basket across provinces (in this section at rural prices), and derivation of provincial-level basket values in other years.

The Basket

Table 1 provides a complete list of all product categories in rural household living expenditures together with the individual products for which quantity and price data are available. The table starts with total (per capita) rural household living expenditures and breaks these down into the different product categories. For each category, the table lists the total value of expenditures as well as those products for which both quantity and price data are available. For an individual product, the quantity multiplied by the price yields the value of the expenditures for this product. The sum of the values across all products in a particular category is listed in the same row in the table as the living expenditure figure for that category. The two figures should match in order for the basket to have the correct proportions across different product categories. But except in the case of implicit pricing (explained below), the two do not match because we do not have a complete list of quantities and prices for all products consumed by households in a particular category. In order for the two to match, we multiply the sum of individual product values within a category by whatever adjustment factor it takes to make the aggregate value of products in this category equal to the corresponding living expenditure figure. The adjustment factor is reported in the last column.

For example, in the product category "clothing," the average rural household nationwide in 1990 consumed 0.90 meters of cotton cloth per capita, for which it paid 3.129 yuan per meter; the value of cotton cloth purchased is 2.82 yuan per capita (0.90 times 3.129). Summing up the values of all different clothing products purchased yields per capita expenditures on clothing of 38.11 yuan. However, the official rural living expenditure data from the household surveys shows total rural per capita living expenditures on clothing to be 45.34 yuan. Thus, we adjust expenditures on our selective list of products within the clothing category by a factor of 1.1898 so that total expenditures on clothing, or 38.11 yuan times 1.1898, equals 45.34 yuan.[13]

---

[13] Adjustment factors are specific to product categories, not individual products. In the category foods, the two sub-categories staples and "all others" are treated separately, with two separate adjustment factors.

Table 1 reports not only quantities and adjustment factors but also nationwide (rural) prices, since these are needed to derive the adjustment factors in the first place. Applying the nationwide rural prices to the basket, i.e., to the set of products with quantities and product category adjustment factors, necessarily yields a basket value exactly equal to the nationwide rural total (monetary and in-kind) per capita living expenditures of 584.63 yuan. Pricing this basket at provincial-level prices—see next section—yields the provincial-level price, or value, or cost, of the nationwide uniform rural living expenditure basket.

Construction of Table 1 involved a number of choices:

* between two living expenditure classification schemes available for 1990 (the earlier one is used);
* between two values for rural living expenditures (and their product categories) depending on whether the NBS applies old or new imputation prices to self-produced-self-consumed products (the one based on new imputation prices is used);
* between two different methods for calculating the prices of staples and housing; and
* between procurement vs. retail prices of agricultural goods.

The first two choices are further explained and justified in an appendix.

Two sets of prices to value grain (staples) are the following. One is the implicit price of grain obtained by dividing per capita rural living expenditures for staples by the per capita quantity of rural consumption of grain. A second approach is to make assumptions about the relative shares of different grains in the nationwide rural per capita grain consumption quantity and to apply these shares to the procurement prices of the individual types of grains in order to obtain a composite price. An adjustment factor is derived by comparing the value of the 'nationwide composite price times nationwide rural per capita grain consumption quantity' with the nationwide rural per capita living expenditures on staples.[14] (For the two prices see Table 1. Further details on rural grain prices are provided in an appendix.)

In the case of housing, one approach is to utilize information on construction costs per square meter of rural household buildings. At the nationwide average rural construction costs per square meter, nationwide per capita rural household living expenditures on housing are equal to the costs of 0.5625 square meters of new buildings. These 0.5625 square meters are the quantity of housing to be included in the basket; priced at the nationwide rural

---

[14] At the nationwide level, the derived composite price of 0.6812 yuan/kg of staples is almost one-third larger than the implicit price. Multiplying the nationwide composite price with the quantity of staples consumed yields a consumption value of 178.53 yuan that exceeds the rural living expenditures on staples of 135.47 yuan. An adjustment factor of 0.7588 is needed to reduce 178.53 yuan to 135.47 yuan. In the calculation of the value of the provincial baskets later, this adjustment factor is applied, in each province, to the value of 'provincial composite price times nationwide uniform per capita quantity.'

construction costs, the value (price times quantity) equals the living expenditures for housing.[15] A second approach is to use the available rural quantity and price data on four types of construction materials, which yield a value equal to almost two-thirds of housing expenditures, and then to apply an adjustment factor to make up for the gap.

We proceed with the first approach of implicit prices for both grain and housing. Using composite prices yields similar variation in (total) basket values across provinces in 1990. The 1990 rural basket values across provinces with grain and housing priced at composite prices are provided in an appendix.[16]

In the case of several foods (other than grain) the question arises as to whether the agricultural procurement price or the retail price is more appropriate. Thus, in the case of meat, presumably almost all rural households throughout China produce their own meat, and the procurement price, the price they can receive when selling the meat, appears the appropriate one to price the mostly self-produced-self-consumed meat.[17] Even if some rural households were to not raise livestock, they are likely to be able to buy meat from other rural households at a price close to the procurement price.[18] For yet other foods, such as tobacco or tea, the retail price appears more appropriate than the agricultural procurement price. Tobacco and tea are only grown in a few provinces, and most farmers across the country will be purchasing the manufactured product (at retail prices).[19] The type of price used for each product is explicitly stated in Table 1.

No price or quantity data are available for services and energy, and no quantity data for consumer durables.[20] We assume that the cost of services depends solely on the cost of labor, and that the average service provider earns the rural average industrial wage (or an across provinces constant fraction thereof). Relating 1990 nationwide average rural household living

---

[15]   Pricing this quantity of 0.5625 square meters per capita in a particular province at the provincial construction costs per square meter then yields a province-specific expenditure level for housing. For further considerations in the calculation of this implicit price see the appendix on the construction of the rural living expenditure basket.

[16]   The other two pricing versions, where either staples or housing are priced at implicit prices and the other at composite prices, are not reported since they do not provide any additional information; the price levels in the four versions are highly correlated across provinces (at the 0.1% significance level for each pair of versions, in 1990 and in 2000). The two versions reported here, the one using implicit prices in the article, and the one using composite prices in an appendix, for most provinces cover the widest range of values.

[17]   The agricultural procurement price is the price for agricultural product paid by industrial and commercial enterprises, other units, and individuals when purchasing agricultural products from farmers or state-owned agricultural production units. (Liu Chengxiang, Liu Ke, Jin Zhaofeng, 2000, p. 110)

[18]   For further considerations in the choice of meat prices see the appendix on the construction of the rural living expenditure basket.

[19]   Even those farmers who harvest tobacco or tea leaves do not necessarily turn them into cigarettes and tea for their own use.

[20]   For the case of "medicine/hygiene," item 5.b. in Table 1, see the appendix on the construction of the rural living expenditure basket.

expenditures on services to average annual industrial township and village enterprise (TVE) wages per laborer shows service expenditures to be equivalent to 0.0320 labor-years in industrial TVEs. This quantity of 0.0320 labor-years can then later be priced at the province-specific average annual industrial TVE wage. In the case of energy, we assume that all energy expenses are on coal. At the national level, the nationwide average per capita rural expenses on energy in 1990 would have bought 544.5365 kg of coal, which then is the quantity to later be priced in each province.[21] In the case of consumer durables, we approximate purchases by the annual change in the stock of consumer durables between 1989 and 1990. (For further details see the appendix on rural quantities of consumer durables.)

Pricing the rural basket at the provincial level in 1990

The next step is to price the nationwide uniform basket in each province using provincial-level prices. Pricing the nationwide average per capita rural consumption quantities of the individual products given in Table 1 at *provincial* rural prices, and applying the adjustment factors listed in Table 1, yields the *provincial* price, or value, or cost, of the nationwide uniform rural living expenditure basket. The specifications in Table 1 on the particular type of nationwide price used in the construction of the basket also apply to the provincial-level prices. The result, the value (cost, price) of the nationwide uniform rural per capita living expenditure basket in each of China's provinces is reported in Table 2.

In 1990, the prices of the nationwide uniform rural basket range from a low of 509.72 yuan in Sichuan to a high of 803.57 yuan in Guangdong, which is a difference of 57.65%. What underlies the differences in the rural price levels across provinces in 1990? Table 3 reports descriptive statistics across provinces, for each product and for the major product categories. For foods, clothing, and the main consumer durables, the coefficients of variation are relatively low (0.1051, 0.1636, 0.0664, respectively). Among the foods, the coefficient of variation is lowest for basic goods such as staples, edible oil, sugar, and eggs, but higher for items such as poultry, fish, or tea leaves. Two types of cloth in the clothing category have rather high coefficients of above 0.40, but some of the variation may be due to unavoidable

---

[21]   In the case of coal, and later, for the urban basket, also gas, the published nationwide price in the derivation of the quantity—living expenditures divided by nationwide price equals the quantity to be included in the basket—is replaced by the average price across provinces. For most retail goods, the mean price across the 29 provincial capitals is within a few percentage points of the published nationwide retail price, but not so for coal and gas. In the case of coal, the nationwide retail price is 63.69% higher than the arithmetic mean across the 29 provincial capitals, with the price in none of the 29 provincial capitals higher than the nationwide price; in the case of gas, the nationwide price is 2.0476 times higher than the mean, with the price in two out of the 20 provincial capitals higher than the nationwide price (*Price Statistical Yearbook 1991*, pp. 147, 303f.).

quality differences across provinces given the broad product specification. The low variation in the prices of consumer durables implies that the prices of these goods tend to be fairly uniform across the country. These are standard industrial products, with in 1990 perhaps only minimal product differentiation across the country.

The prices of energy and of the non-tradeable goods housing and services vary more widely across provinces. The coefficient of variation in the case of coal is 0.2844. Implicit construction costs vary widely across provinces with a coefficient of variation of 0.3137. The coefficient of variation of 0.2798 in the aggregate composite price of construction materials together with similarly high coefficients of variation for the prices of the individual construction materials suggests that the prices of the different construction materials vary in step across provinces.[22] Construction materials are likely to be produced locally, and, thus, to reflect local costs, a fair share of which should be labor. Labor prices are also reflected in service prices, which show medium variation across provinces with a coefficient of variation of 0.2460. The finding that the prices of non-tradeables vary more widely across provinces in China than the prices of almost all other product categories parallels the findings of Irving Kravis and Robert Lipsey (1998), mentioned in the introduction, across counties.

Housing, services, and energy's small share in the basket (11.85%, 6.91%, and 4.53%) dampens their impact on the overall variation in basket values, and some variation across product categories appears to cancel out. The coefficient of variation of basket values, across provinces, was only around 0.1 in 1990 (Table 2).

In 1990, across provinces, the basket value is positively correlated with rural (nominal) net income at the 0.1% significance level; see bottom rows of Table 2 for the correlation coefficient, or Figure 1.[23] In other words, the value (or costs) of the rural basket, i.e., the price level, is highest (lowest) in the provinces with highest (lowest) rural net income. This already indicates a need for spatial deflation in cross-province income comparisons.

---

[22]   In contrast, in the case of foods and articles for daily use, the coefficient of variation for the entire category is even lower than the coefficient of variation for the prices of the individual items in all cases except sugar. This suggests that the prices of the individual products within each category do not vary systematically across provinces, with variation across individual products canceling out in the aggregate.

[23]   The significance level of the correlation coefficient is determined in an F(1,N-2) test, where N is the number of observations (provinces), and the F-value is obtained as 'correlation-coefficient-squared' times 'N-2' divided by '1 minus correlation-coefficient-squared.'

Pricing the rural basket over time

In a further step, the 1990 price level can be extended to other years using the official rural CPI. Table 2 also reports the price of the base-year rural living expenditure basket multiplied by the relative change in the official rural CPI between 1990 and 2000.

As noted earlier, the rural CPI is based on monetary expenses only, i.e., does not give enough weight to those product categories in living expenditures which contain self-produced-self-consumed products. Re-weighting the individual product category price indices within the official rural CPI according to the relative values of the corresponding categories in *total* rural living expenditures yields an adjusted rural CPI. Table 2 also reports the adjusted rural CPI and the year 2000 basket values based on the adjusted rural CPI. Basket values for other years, from 1984 through 2002, are provided in an appendix.

Given the lack of rural CPIs for Beijing, Tianjin, Shanghai, and Chongqing, and the data problems in the case of Tibet and Hainan (for details see appendices on the adjustment of the rural CPI and on the provincial-level pricing of the rural basket), in provincial analysis below these six provinces are excluded throughout.

Nationwide, rural prices in 2000 were 2.0290 times their year 1990 level according to the adjusted rural CPI, compared to 1.9025 following the official rural CPI. In other words, the adjusted rural CPI implies slightly higher inflation than the official rural CPI does. But the two rural CPI series are very highly correlated across provinces.[24] The magnitude of the price increase between 1990 and 2000 differs among provinces: the greatest increase occurred in Guizhou, where prices following the adjusted rural CPI increased by 163%; in contrast, prices rose by only 81% in Hebei. We also observe a weak negative correlation between the price increase and the basket price in the base year.[25] Nonetheless, a high (low) price level in 1990 means a high (low) price level in 2000, and the price pattern across provinces evident in 1990 persists into the year 2000.[26] Figure 2 has the graphical presentation.

The dispersion of price levels across provinces remained almost constant between 1990 and 2000; the coefficient of variation increased only slightly, from 0.0908 to 0.1019 (Table

---

[24] The significance level is 0.1%. Without Beijing, Tianjin, Shanghai, Chongqing, Hainan, and Tibet the correlation coefficient is 0.9016. For all provinces, it is 0.8608. As one would expect, the absolute difference between the adjusted rural CPI and the official rural CPI is positively correlated with the share of in-kind consumption in total rural living expenditures in 1990 (1% significance level); provinces with a high (low) share of in-kind consumption also have low (high) absolute total living expenditure levels as well as low (high) income levels (0.1% significance levels).

[25] Using the adjusted rural CPI, the negative correlation is significant at the 10% level, however, it is insignificant using the official rural CPI.

[26] The basket values in the two years are positively and significantly correlated. When the official rural CPI is used to obtain the year 2000 values, the significance level is 0.1%; with the adjusted rural CPI it is 10%.

13

2). This implies that prices are not diverging rapidly over time between the rural areas of different provinces. The spread between the provinces with the highest and lowest basket prices between 1990 and 2000 actually narrowed slightly. In 1990, Guangdong (Sichuan) had the most (least) expensive basket, with prices 57.65% higher in Guangdong. In 2000, the difference between the province with the most expensive basket (Guangdong) and the province with the least expensive basket (Henan) was only 51.91%. This suggests that the slight increase in the dispersion of the basket values is a product of the entire distribution flattening out, as opposed to a widening gap between the provinces in the two tails of the distribution.

In contrast to 1990, the year 2000 rural basket values are not correlated with year 2000 rural net income (as long as the six problematic provinces are excluded from the analysis). In other words, by the year 2000 it was no longer the case that the richest provinces also had the highest prices.[27] But, as Figure 3 shows, the absence of a correlation is in fact due to the presence of two conflicting patterns, with coastal provinces suggesting a strongly positive relationship between basket prices and rural net income in 2000, and interior provinces a slightly negative relationship.

Urban living expenditure price level

The procedures for constructing the urban living expenditure basket, pricing it across provinces, and then using the urban CPI to obtain provincial urban price levels in other years, are identical to the rural case, except for a few idiosyncrasies explained in an appendix on the construction of the urban basket.[28]

---

[27]   The correlation coefficient between 1990 and 2000 rural net income is positive and very highly significant. This implies that the random changes in prices between 1990 and 2000 (with respect to 1990 basket values) were sufficient to break the correlation between basket values and rural net income. In other words, between 1990 and 2000 price patterns across provinces, although they remained similar (with statistical significance), changed sufficiently that together with the minor changes in the income patterns the association of high basket values and high-income levels ended.

[28]   In the urban case, more quantity data are available than in the rural case. The *Urban Household Survey Yearbook 1990* contains the same quantity data as the *Statistical Yearbook*, plus additional quantity information. The *Urban Household Survey Yearbook 1990* reports quantities, values, and unit values. But because the quantities are for broad categories of products, the price data (unit values) are not very meaningful for cross-province comparisons.

One special product in the urban case is staples. One price can be obtained implicitly, as in the rural case, from the living expenditure data on staples, combined with the urban quantity of grain consumed. Second, in the urban case expenditure and quantity data are also available on six exhaustive sub-categories of staples, across provinces (which allows the calculation of unit values for sub-categories). For each of the six sub-categories a nationwide average quantity can thus be priced in each province; i.e., the implicit method is not confined to overall staples, but can be extended to six sub-categories. Both methods, pricing the average aggregate quantity of grain and pricing each of the six sub-categories individually, yield similar results across provinces. The correlation coefficient of the province-specific expenditures using the two pricing methods is significant at the

14

In Table 4 we report the urban basket, which is directly comparable to the rural basket provided in Table 1. Like in the urban case, it consists of a set of products with product quantities and product category adjustment factors.[29] We also include the nationwide prices.[30] By design, the sum, across all products, of the quantities listed in the table multiplied by the nationwide urban prices and then the relevant adjustment factor equals urban household per capita living expenditures in 1990.

Table 5 reports the values in 1990 of the nationwide uniform urban basket for each of China's provinces. Basket values for years other than 1990 are derived with the help of the urban CPI; year 2000 values are also reported in Table 5, while basket values for all years 1984-2002 are reported in an appendix. Given the lack of price data for Tibet and Hainan, and for Chongqing the lack of a basket value for 1990 as well as of pre-1997 CPIs, we exclude these provinces in the provincial analysis throughout.[31]

Between 1990 and 2000, the nationwide average cost of the urban basket increased by 115%, which is slightly higher than the increase in rural areas using either the original or adjusted CPI. Price increases in individual provinces ranged from 169% in Beijing to 96% in Henan, a range proportionally larger (relative to the mean increase) than in the rural case. These price changes across urban areas, however, are not systematically correlated with the base-year basket values; i.e., it is not the case that expensive provinces in 1990 experienced particularly high or particularly low inflation in the following years. But the pattern of basket values across provinces in 2000 remains the same as in 1990, at the 0.1% significance level (see bottom rows of Table 5 for the correlation coefficient). Provinces with relatively high price levels in 1990 were also the expensive provinces in 2000.

Over the same period, the dispersion of urban price levels across provinces rose slightly, albeit at levels below those of the rural case, with a coefficient of variation of 0.0794 in 1990 and of 0.0936 in 2000. In 1990, the price level was highest in Guangdong, which was 45.44% higher than in Anhui, the province with the lowest price level. By comparison, the largest

---

0.1% level. The results of both methods are reported in Table 4. The second method is used in the following (Table 5).

[29] The adjustment factors are relatively large for clothing and for articles for daily use. In the case of clothing, more quantity data are available but no matching prices. In the case of articles for daily use, the problem is a lack of quantity data. Insofar as the prices of clothing and articles for daily use exhibit little variation across provinces, omitting a fair share of the items in these categories is unlikely to affect the differences in price levels across provinces.

[30] As before, nationwide prices are needed to derive the adjustment factors. The specifications on the particular type of nationwide price used for each product in the basket also apply to the provincial-level prices in the pricing of the basket at the provincial level later.

[31] On the data problems of these three provinces also see the appendix on the provincial-level pricing of the urban basket.

provincial difference in the rural case was the 57.65% difference between Guangdong and Sichuan. In 2000, the maximum urban gap was the 46.70% difference between Guangdong and Henan, which is similar in magnitude to the spread between the least and most expensive provinces in 1990. Combined with the slight rise in the coefficient of variation of the basket values, this implies that within the rather narrow range of price levels, provinces between 1990 and 2000 moved towards the outer boundaries of this range, much as we observed in the rural case.

Tracing the differences in provincial urban basket values in 1990 back to individual product categories (Table 6), some findings are the same as in the rural case:[32] there is very little price variation across provinces in clothing, and least in articles for daily use, while price variation is rather large in the categories housing and energy. The latter two categories, however, account for only a small share of the total basket. In contrast to the rural case, there is less variation in the price of services, measured using average wages of industrial staff and workers, while there is more price variation in foods, especially in staples.[33] The conclusion is similar to the rural case, in that non-tradeable goods (and energy) appear to be driving price differences across provinces, and that presumably much of the price differences in non-tradeable goods are due to differences in the price of labor. In the urban case, perhaps due to state regulations, the price of labor does not differ as much across provinces as in the rural case. In the urban case, furthermore, food prices, in the aggregate, vary significantly more than in the rural case.

The 1990 urban basket values are highly correlated with urban disposable income. In other words, the most (least) expensive provinces had the highest (lowest) urban disposable income. In contrast to the rural case, where the relationship by 2000 split broadly into a positive coastal-region relationship vs. a slightly negative interior-region relationship, in the urban case the positive correlation was even stronger by 2000 (with the significance level in

---

[32] A longer table tracing the differences in provincial urban basket values in 1990 back to individual *products* and product categories, similar to Table 3 in the rural case, is provided in an appendix.

[33] The high price variation in the case of staples could be due to the fact that not all types of grains are grown in every part of China. In the rural case, the aggregate price of staples may have hidden the variation for individual grains, or rural households may predominantly consume local grains (the ones that are cheapest), while urban households may also consume some (more expensive) non-local grains. But even the (one) aggregate implicit price of staples shows more price variation across provinces in urban than in rural areas (0.2152 vs. 0.1422); a further consideration is that while farmers are likely to purchase grain and to grind it into flour themselves, urban households are likely to purchase grain in the form of flour, noodles, or steamed rice in the cafeteria; i.e., the exact product specifications differ from rural to urban households.

both years below 0.1%). (Also see Figure 4 for 2000.) Provinces with high (low) disposable income consistently face high (low) price levels. [34]

Living expenditure price levels based on a joint rural-urban basket

The joint basket consists of a set of products with nationwide average per capita consumption quantities and product category adjustment factors. To derive the category-specific adjustment factors, nationwide joint, i.e., average rural-urban prices of individual products are needed. These joint prices of individual products are multiplied with the corresponding average quantities to yield product values, and the product values then added up within each category; what is needed to bridge the gap to the living expenditures in this category constitutes the adjustment factor.

Rural-urban averages (of living expenditures, quantities, prices) are population-weighted averages; the relative population shares are obtained from the population data implicit in the National Income Accounts. (Further discussion of the population data and the data themselves are provided in an appendix.)

Once the joint basket is established, it can be priced across provinces at provincial-level rural prices (as the rural basket was before), at provincial-level urban prices (as the urban basket was before), or at provincial-level joint prices (covering the whole province). Joint prices are not readily available and no one procedure to construct them is applicable to all products. Detailed explanations are relegated to an appendix, which also presents the joint basket, similar to the rural basket in Table 1 and the urban basket in Table 4.

Table 7 reports the year 1990 nationwide and provincial-level values of the joint basket in rural areas (priced at rural prices), in urban areas (priced at urban prices), and province-wide (priced at joint prices). Year 2000 data are obtained by multiplying 1990 basket values by the appropriate price index. When rural prices are used to price the joint basket, this is the rural CPI, both in official and adjusted form. When urban prices are used to price the joint basket, this is the urban CPI. When joint (i.e., provincial average) prices are used to price the joint

---

[34] The following relationships were also charted and checked visually for outliers which could strongly influence correlation coefficients: the relationship between 1990 urban basket values and 1990 urban disposable income, the relationship between 1990 urban basket values and the urban CPI (of 2000 compared to 1990), and the relationship between 1990 and 2000 urban basket values. Outliers were present in all cases, but their removal, while it might weaken the relationship, would not alter it significantly.

basket, this is the provincial CPI.[35] Table 7 also reports the year 2000 joint basket values (with two year 2000 values in the rural case, based on the official and the adjusted rural CPI).

As before, in provincial-level analysis below, provinces with problematic data are omitted; these are the three provinces Tibet, Hainan, and Chongqing when the joint basket is priced at urban or joint prices, and, in addition, Beijing, Tianjin, and Shanghai when the joint basket is priced at rural prices.

The pattern of price levels across provinces is the same when the joint basket is priced at rural prices as when the rural basket is priced at rural prices. This is also true for the urban case.[36] Most results of the rural basket, priced at rural prices, and the urban basket, priced at urban prices, carry over to the case of the joint basket priced at rural and urban prices.

Thus, the dispersion of price levels across provinces, as before, rises between 1990 and 2000, slightly in the rural and urban case (from a coefficient of variation of 0.0860 to 0.1009 or 0.1118, and from 0.1093 to 0.1256), but by 47.53% in the provincial case (from 0.0930 to 0.1372). At the same time, the relative range of basket values across provinces falls over time at all three pricing regimes.[37] The dispersion pattern and the range pattern imply that while the provinces with the lowest and highest price levels move closer to the mean price level as time progresses, the individual provinces, within this range, move outward towards the (inward-moving) boundary price levels over time. This is true for rural areas, for urban areas, and for provinces in total.

As in the case of the rural and the urban baskets, the three CPIs in the case of the joint basket are not correlated with base-year price levels in rural areas, urban areas, or province-wide, i.e., it is not the case that provinces with the highest price levels in 1990 experienced the highest price increases over the next decade. But the 1990 pattern of basket values across

---

[35] In the case of the provincial CPI, no adjustments to give proper weight to the rural self-produced-self-consumed living expenditures are made. The impact in the rural case of using an adjusted rather than the official rural CPI was relatively minor, and can only be even smaller in the joint case. It can only be smaller, because the size of the missing rural self-produced-self-consumed living expenditures in the provincial CPI is smaller than in the rural CPI (rural self-produced-self-consumed living expenditures represent one-third of total rural living expenditures, and less than that of population-weighted nationwide joint living expenditures).

[36] For simplicity, also in the following, a statement to the effect that pattern A is the same as pattern B means that the correlation coefficient between the two time series is significantly positive. In the rural and urban case here, with all correlation coefficients above 0.9, the significance level is well below 0.1%. The correlation coefficients cover 10 combinations: rural basket 1990 vs. joint basket at rural prices 1990, the same for 2000 using both rural CPIs; the previous 3 combinations without the 6 problematic provinces; urban basket 1990 vs. joint basket at urban prices 1990, the same for 2000; the previous 2 combinations without the 3 problematic provinces.

[37] When the joint basket is priced at rural prices, the highest price level in 1990 exceeds the lowest one by 56.09%, and in 2000 by 51.75% (based on the official rural CPI) or 48.05% (based on the adjusted rural CPI), i.e., the range is reduced, as in the case of the rural basket priced at rural prices before. The range is also reduced in the urban case (from 64.88% in 1990 to 51.70% in 2000), where it was constant in the case of the *urban* basket priced at urban prices, and it is finally reduced in the provincial case (from 56.29% to 48.50%).

provinces persisted into 2000 (except at rural prices using the adjusted CPI); expensive localities in 1990 remained expensive localities in 2000.[38]

Also as in the case of the rural and the urban baskets, price levels are positively correlated with same-year income throughout, at rural prices, at urban prices, and at joint prices, in 1990 and in 2000, except at rural prices in 2000 (as in the case of the rural basket before).

The joint basket also allows a direct comparison of rural and urban areas within any one province. These comparisons are taken up in the following section.

Implications of spatial price differences

What are the implications of spatial differences in the cost of living in our analysis? In order to see how important they can be, we provide two straightforward examples.

First, spatial differences in price levels matter for inequality measures. Provincial differences in per capita incomes are usually identified as an important component of overall income inequality. Yet, as we noted earlier, incomes and prices are often positively correlated, which may bias these calculations. In Table 8 we present the Gini coefficients for provincial-level mean rural and urban per capita incomes, with and without the correction to the income levels using the new spatial deflators.[39] For comparison, we also report results using the coefficient of variation, an alternative measure of income dispersion, as well as the ratio of per capita incomes in the richest to the poorest provinces. We also calculate our inequality measures for rural and urban areas using the joint basket (as opposed to the separate baskets).

In 1990, the Gini coefficient for provincial per capita rural net income was 0.134. Because rural prices tended to be higher in high-income provinces, the Gini coefficient overestimates the degree of inter-provincial inequality. Once we spatially deflate the data, the Gini coefficient falls to 0.105, a decline of almost thirty percent. In 2000, on the other hand, the Gini coefficient is 0.169 without deflating and only marginally lower at 0.163 with spatial deflating. This much smaller effect of deflating on the Gini coefficient reflects the fact that by 2000 there was no systematic correlation between per capita rural net income levels and the

---

[38] The existence of a correlation usually comes with a significance level of 0.1% or 1%; the absence of a correlation means no significance at the 10% level. For simplicity, individual significance levels are not mentioned in the text. They can be calculated from the correlation coefficients reported in Table 7. For the calculation see note 23.

[39] These Gini coefficients should not be confused with those for household per capita incomes. The Gini for provincial-level per capita incomes effectively assigns every household (individual) in the province the same per capita income. It provides an estimate of the inequality in incomes across provinces, ignoring income differences within provinces.

provincial rural price levels. The similarity in the Gini for 2000 with and without deflating also implies that the increase in inequality between 1990 and 2000 is significantly larger when incomes are spatially deflated than when they are not (55.5% versus 25.7%).

In the urban case, on the other hand, spatially deflating the income data reduces significantly both the 1990 Gini coefficient, from 0.102 to 0.076, and the 2000 Gini coefficient, from 0.144 to 0.102. In contrast with rural incomes, the growth in provincial-level inequality across provinces is actually lower when urban incomes are spatially deflated.

In Table 8, we also report inequality measures at the provincial level that use the joint basket, priced at the provincial level, to spatially deflate provincial average per capita income. Similar to the urban case, this reduces the Gini coefficient and the other measures of inequality significantly both in 1990 and in 2000.

In general then, the changes in the Gini coefficient when income is spatially deflated show that a failure to deflate spatially leads to a—at times heavily—biased estimate of the degree of inequality at a given point in time. The magnitudes of the changes in inequality that occur over time are also affected. Inequality rose more drastically across rural areas in different provinces than previously thought, but less rapidly across urban areas than previously thought.

Second, spatial differences in price levels impact on rural-urban income differences. The joint basket allows a direct comparison of incomes in rural and urban areas within each province. In 1990, the ratio of nationwide per capita urban disposable income to nationwide per capita rural net income was 2.20.[40] In other words, urban per capita income was 2.20 times larger than rural per capita income. By 2000, the ratio increased to 2.79. Yet, these calculations fail to adjust for differences in the cost of living between rural and urban areas. In 1990, the cost of the joint basket was on average 23.9% higher in urban areas than in rural areas, while by 2000 the difference had widened to 39.7%. Once adjusted for these differences in purchasing power, the gap in urban-rural incomes in 1990 falls from 2.20 to 1.78, and in 2000 from 2.79 to 1.99. These revised estimates by no means eliminate the gap, but they suggest that it is significantly smaller than the official income data indicate, and, furthermore, between 1990 and 2000 increased by 12.3% rather than 26.7%.

---

[40]   The values discussed here are nationwide values, i.e., covering all provinces. Similar comparisons are possible at the provincial level.

Conclusions

Differences in price levels across provinces matter for economic outcomes such as inequality and should be taken into account in all cross-province comparisons that involve measures of income (or gross domestic product). Thanks to absolute price data available for a limited set of products in the early 1990s, we were able to construct comparable, absolute prices of the typical household living expenditure basket for each province in China in 1990. We create a time series of absolute provincial price levels for the years 1984 through 2002 by using annual consumer price indices; the complete data are available in an appendix posted, as all other appendices, at http://ihome.ust.hk/~socholz/SpatialDeflators.html.

These spatial deflators make a significant difference to measures of inequality, more often than not reducing inequality, but also yielding differentiated results as to the relative changes in inequality over time. Given their significant impact in our straightforward applications, spatial deflators should probably become part of every inequality study. Spatial deflation is particularly urgent in a country such as China due to its large geographic area with potentially segmented markets, and due to its household registration system that hampers nationwide labor market integration and thereby convergence in the price of non-tradeables.

Our spatial deflators are not without shortcomings. It would have been ideal to price the basket at absolute prices every year, and to, in a further step, make adjustments to the basket every year or every few years, in accordance with nationwide changes in living expenditure patterns, but the absolute price data are simply not available. Our calculations have involved a range of assumptions from the choice of the price specification for particular products to the choice of population weights, implicit vs. composite pricing methods, and the handling of missing data. We have to live with a number of constraints, such as the use of the official CPI to derive price levels for other years, and official imputation prices for self-produced-self-consumed rural living expenditures in 1990.[41]

With every choice we made we have tried to check for the robustness of the method which we chose by also pursuing alternative paths whenever possible. Some of the robustness checks are mentioned in notes, others are reported in the appendices, where we also tried to document every step in our calculations and to justify every choice we made.

A next step forward is only possibly with more absolute price and quantity data across provinces for 1990 and, probably even more importantly, absolute price data across provinces in other years. These data would have to be newly released by the NBS and/ or the price

---

[41]   Detailed considerations of potential biases in our data and calculations are provided in an appendix.

bureau of the (current) State Development and Reform Commission. In all likelihood, consistent time series of prices for specific products over two decades do not exist. If they did, the data work, including the regular construction of updated baskets, would probably require a long-term commitment by a group of researchers or Chinese statistics officials. Ex ante, it is difficult to know how much of an improvement more price and quantity data might allow over our base-year basket with application of CPIs for other years. For the time being, we hope that the spatial deflators we provide help qualify research results that are based on cross-provincial comparisons in China, such as inequality studies.

References

Adelman, Irma, and David Sunding. "Economic Policy and Income Distribution in China." *Journal of Comparative Economics 11*, no. 3 (Sept. 1987): 441-61.

Bishop, John A., John P. Formby, and Zheng Buhong. "Regional Income Inequality and Welfare in China: A Dominance Analysis." *Asian Economic Journal 10*, no. 3 (Nov. 1996): 239-69.

BLS (Bureau of Labor Statistics). "Understanding the Consumer Price Index: Answers to Some Questions." Revised. U.S. Department of Labor, Bureau of Labor Statistics, 2000. Also on the web as "Frequently Asked Questions" at http://www.bls.gov./cpi/cpifaq.htm.

Chen Shaohua, and Martin Ravallion. "Data in Transition: Assessing Rural Living Standards in Southern China." *China Economic Review 7*, no. 1 (1996): 23-56.

City Yearbook 1991. *Zhonguo chengshi tongji nianjian 1991* (China City Statistical Yearbook 1991). Beijing: Zhongguo tongji chubanshe, 1991.

Gustafsson, Björn, and Shi Li. "Inequality in China at the End of the 1980s: Locational Aspects and Household Characteristics." *Asian Economic Journal 12*, no. 1 (March 1998): 35-63.

Howes, Stephen. "Income Inequality in Urban China in the 1980s: Levels, Trends and Determinants." London School of Economics, The Development Economics Research Programme, Series on Economic Transformation and Public Finance, EF No. 3 (July 1993).

Hsiung Bingyuang, and Louis Putterman. "Pre- and Post-reform Income Distribution in a Chinese Commune: The Case of Dahe Township in Hebei Province." *Journal of Comparative Economics 13*, no. 3 (Sept. 1989): 406-45.

Investment Materials. *Zhongguo guding zichan touzi tongji ziliao 1990-1990* (Statistical Materials on Fixed Asset Investment in China, 1990-1991). Beijing: Zhongguo tongji chubanshe, 1993.

Kanbur, Ravi, and Zhang Xiaobo. "Fifty Years of Regional Inequality in China: A Journey Through Central Planning, Reform and Openness." Mimeo, September 2002.

Khan, Azizur Rahman, Keith Griffin, Carl Riskin, and Zhao Renwei. "Household Income and Its Distribution in China." *The China Quarterly*, no. 132 (Dec. 1992): 1029-61.

_____, Keith Griffin, Carl Riskin, and Zhao Renwei. "Source of Income Inequality in Post-Reform China." *China Economic Review 4*, no. 1 (Spring 1993): 19-35.

_____, and Carl Riskin. "Income and Inequality in China: Composition, Distribution and Growth of Household Income, 1988 to 1995." *The China Quarterly*, no. 154 (June 1998): 221-53.

_____, Keith Griffin, and Carl Riskin. "Income Distribution in Urban China During the Period of Ecnomic Reform and Globalization." *American Economic Review 89*, no. 2 (May 1999): 296-300.

Knight, John, and Lina Song. "The Determinants of Urban Income Inequality in China." *Oxford Bulletin of Economics and Statistics 53*, no. 2 (May 1991): 123-54.

_____. "The Spatial Contribution to Income Inequality in Rural China." *Oxford Applied Economics Discussion Paper*, no. 106 (Nov. 1990).

Kravis, Irving B., and Robert E. Lipsey. "National Price Levels and the Prices of Tradeables and Nontradeables." *American Economic Review (AEA Papers and Proceedings) 78*, no. 2 (May 1988): 474-8.

Liu Chengxiang, Liu Ke, Jin Zhaofeng. *Ruhe shiyong tongji nianjian* (How to use the statistical yearbook). Beijing: Zhongguo tongji chubanshe, 2000.

Lyons, Thomas P. "Intraprovincial Disparities in China: Fujian Province, 1978-1995." *Economic Geography 74*, no. 4 (Oct. 1998): 405-32.

Meng Xin, and Harry X. Wu. "Household Income Determination and Regional Income Differential in Rural China." *Asian Economic Journal 12*, no. 1 (March 1998): 65-88.

Price Statistical Yearbook. Zhonguo wujia tongji nianjian (China Price Statistical Yearbook). Beijing: Zhongguo tongji chubanshe. Various years.

Rural Household Survey Yearbook 2003. Zhongguo nongcun zhuhu diaocha nianjian 2003 (China Rural Household Survey Yearbook 2003). Beijing: Zhongguo tongji chubanshe, 2003.

Rural Statistical Yearbook. Zhongguo nongcun tongji nianjian (China Rural Statistical Yearbook). Beijing: Zhongguo tongji chubanshe. Various years.

Rozelle, Scott. "Rural Industrialization and Increasing Inequality: Emerging Patterns in China's Reforming Economy." *Journal of Comparative Economics 19*, no. 3 (Dec. 1994): 362-91.

Statistical Yearbook. Zhongguo tongji nianjian (China Statistical Yearbook). Beijing: Zhongguo tongji chubanshe. Various years.

Trescott, Paul B. "Incentives Versus Equality: What Does China's Recent Experience Show?" *World Development 13*, no. 2 (Feb. 1985): 205-17.

TVE Yearbook. Zhongguo xiangzhen qiye nianjian (China Township [and Village] Enterprise Yearbook). Beijing: Zhongguo nongye chubanshe. Various years.

Urban Household Survey Yearbook. Zhongguo chengzhen jumin jiating shouzhi diaocha ziliao (China urban resident household income and expenditure survey material). Annual publication. Beijing: Zhongguo tongji chubanshe. Various years. Beginning with the 1996 edition the title is *Zhongguo wujia ji chengzhen jumin jiating shouzhi diaocha tongji nianjian* (China Material Price and Urban Household Expenditure Survey Statistical Yearbook).

Wei Shang-jin, and Wu Yi. "Globalization and Inequality: Evidence From Within China." NBER Working Paper Series, no. 8611, Nov. 2001.

Yang, Dennis Tao. "Urban-Biased Policies and Rising Income Inequality in China." *American Economic Review 89*, no. 2 (May 1999): 306-10.

Zhang Xiaobo, and Ravi Kanbur. "What Difference Do Polarisation Measures Make? An Application to China." *The Journal of Development Studies 37*, no. 3 (Feb. 2001): 85-98.

Table 1. Per Capita Rural Living Expenditure Basket, 1990

	Living exp. (yuan) Total	Quantity consumed	Nationwide average price (in yuan) per unit of the product	Value covered (yuan)	Adjust-ment factor
Total	584.63				
A. Consumer goods	544.23				
1. Foods	339.30	*kg*			
Staples (a. *or* b.)	135.47	262.08			
a. Implicit		262.08	implicit price 0.5169	135.47	1.0000
b. Composite		262.08	composite of 4 procurement prices 0.6812	178.53	0.7588
All others	203.83			194.79	1.0464
Vegetables		134.00	price implicit in urban living expenditure data 0.57	76.38	
Edible oil		5.17	procurement price of rapeseed oil 1.4893	7.70	
Poultry		1.26	procurement price/ kg of live poultry 6.3605	8.01	
Eggs		2.41	procurement price 4.2939	10.35	
Fish, shrimp		2.13	procurement price of silver carp 2.8732	6.12	
Sugar		1.50	retail price (*baishatang*) 2.666	4.00	
Alcohol		6.14	composite retail price: hard liquor, beer 2.2721	13.95	
Meat		11.34	procurement price of pork and beef 3.4961	39.65	
Tobacco		27.38	composite retail price of 3 grades 0.5840	15.99	
Tea leaves		0.27	composite retail price: Jasmine, black, green 20.0487	5.41	
Fruit		5.89	composite procurement price of 4 items 1.0208	6.01	
Milk		1.08	retail price 1.127	1.22	
2. Clothing	45.34	*meter*	*Retail prices*	38.11	1.1898
Cotton cloth		0.90	3.129	2.82	
Cotton (natural)		(kg) 0.31	8.659	2.68	
Chemical fiber		1.74	7.765	13.51	
Nylon		0.08	31.7504	2.54	
Silk		0.04	19.3526	0.77	
Wool products		0.07	59.726	4.18	
Shoes		(pairs) 0.67	composite retail price of 4 types of shoes 17.3164	11.60	
3. Housing (a. *or* b.)	69.30				
a. Implicit		0.5625 sqm	implicit price of 1 sqm of newly constructed househ. buildings 123.21	69.30	1.0000
b. Composite			*Retail prices*	41.98	1.6509
Cement		35.4917 kg	0.1944	6.90	
Wood planks		0.0186 cu.m	873.96	16.25	

Glass		0.0682 sqm	9.19	0.63	
Bricks		186.1901	0.0977	18.20	
4. Energy	26.46	544.5365 kg	retail price of 100 kg coal 4.8592	26.46	1.0000
5. Articles for daily use	63.83	*Items per*	*Retail prices*		
a. Consumer durables	50.6	*100 persons*		51.15	0.9892
Bicycle		2.6529	276.786	7.34	
Sewing machine		1.0730	253.047	2.72	
Clock		0.8779	43.4643	0.38	
Watch		2.6637	51.668	1.38	
Fan		2.0201	273.308	5.52	
Washing mach.		0.3183	532.965	1.70	
Refrigerator		0.0811	1697.7572	1.38	
Sofa		1.2573	349.89	4.40	
Cloth stand		1.6094	315.908	5.08	
Desk		1.2588	202.0268	2.54	
Radio		0.0131	28.852	0.00	
Black-white TV		1.6908	540.037	9.13	
Color TV		0.2777	2440.065	6.78	
Radio recorder		0.5653	496.405	2.81	
b. Medicine/ hygiene	13.23	13.23	composite retail price; by design 1.0000	13.23	1.0000
B. Services	40.40	years 0.031996	annual industrial TVE wages per laborer 1262.68	40.40	1.0000

Published data are reported with as many decimals as in the original source. Four decimals are reported for calculated prices and adjustment factors; in further calculations all decimals are used. Calculated value data are presented with two decimals.

All price data except the implicit prices of staples, vegetables, housing, and services are either nationwide retail prices or agricultural procurement prices.

All composite prices are constructed by the authors, with weights chosen by the authors.

For further details, including on specific products, see the appendix on the construction of the rural living expenditure basket.

Sources:

Living expenditures: *Statistical Yearbook 1992*, p. 310.

Quantities of major consumer goods consumed: *Statistical Yearbook 1991*, p. 303; *Rural Statistical Yearbook 1991*, p. 221; *Rural Household Survey Yearbook 2002*, pp. 15f.

Procurement prices and retail prices of individual goods: *Price Statistical Yearbook 1991*. Implicit price of rural staples: *Rural Statistical Yearbook 1992*, pp. 221, 232. Implicit vegetable price in urban expenditures: *Urban Household Survey Yearbook 1990*, p. 124. Implicit housing costs via construction costs: *Investment Materials 1990-1991*, pp. 308, 312. Industrial TVE wage per laborer: *TVE Yearbook 1991*, p. 161.

Table 2. Price Level of Rural Basket Across Provinces, 1990 and 2000, yuan

	1990 Basket value (yuan)	Ratio	Official rural CPI 2000/ 1990	2000 Basket value (yuan)	Ratio	Adjusted rural CPI 2000/ 1990	2000 Basket value (yuan)	Ratio	Reference: Rural net inc. 1990	2000
Total	584.63	1.00	1.9025	1112.24	1.00	2.0290	1186.22	1.00	686	2253
Beijing	710.88	1.22	2.6864	1909.68	1.72	2.6864	1909.69	1.61	1297	4605
Tianjin	656.72	1.12	2.2735	1493.04	1.34	2.2735	1493.03	1.26	1069	3622
Hebei	585.44	1.00	1.7051	998.23	0.90	1.8123	1060.99	0.89	622	2479
Shanxi	602.18	1.03	1.9533	1176.22	1.06	1.9337	1164.41	0.98	604	1906
Neimenggu	563.94	0.96	1.9165	1080.77	0.97	2.0348	1147.52	0.97	607	2038
Liaoning	610.66	1.04	1.7487	1067.88	0.96	1.8266	1115.42	0.94	836	2356
Jilin	627.30	1.07	1.7157	1076.25	0.97	1.8613	1167.56	0.98	804	2023
Heilongjiang	595.50	1.02	1.8316	1090.69	0.98	1.9317	1150.30	0.97	760	2148
Shanghai	730.23	1.25	2.5095	1832.52	1.65	2.5095	1832.51	1.54	1907	5596
Jiangsu	623.41	1.07	1.8729	1167.57	1.05	2.0537	1280.27	1.08	959	3595
Zhejiang	612.06	1.05	1.9614	1200.47	1.08	2.0533	1256.72	1.06	1099	4254
Anhui	536.23	0.92	2.0251	1085.91	0.98	2.3767	1274.45	1.07	539	1935
Fujian	641.31	1.10	1.8659	1196.59	1.08	1.9631	1258.97	1.06	764	3230
Jiangxi	569.70	0.97	1.8869	1074.94	0.97	2.0726	1180.76	1.00	670	2135
Shandong	577.67	0.99	1.8694	1079.89	0.97	2.0146	1163.78	0.98	680	2659
Henan	562.16	0.96	1.7569	987.63	0.89	1.9543	1098.61	0.93	527	1986
Hubei	528.44	0.90	2.0935	1106.28	0.99	2.3516	1242.66	1.05	671	2269
Hunan	569.14	0.97	2.2335	1271.19	1.14	2.5035	1424.87	1.20	664	2197
Guangdong	803.57	1.37	1.8670	1500.29	1.35	1.8655	1499.09	1.26	1043	3654
Guangxi	602.46	1.03	1.9863	1196.65	1.08	2.2109	1332.00	1.12	639	1865
Hainan	708.37	1.21	1.8699	1324.60	1.19	2.1274	1507.01	1.27	696	2182
Sichuan	509.72	0.87	2.0503	1045.08	0.94	2.2029	1122.86	0.95	558	1904
Guizhou	592.75	1.01	2.2317	1322.83	1.19	2.6301	1559.01	1.31	435	1374
Yunnan	609.39	1.04	2.2785	1388.49	1.25	2.4060	1466.19	1.24	541	1479
Tibet	673.27	1.15	1.9874	1338.07	1.20	2.0150	1356.64	1.14	650	1331
Shaanxi	592.96	1.01	2.1133	1253.08	1.13	2.5956	1539.09	1.30	531	1444
Gansu	573.76	0.98	2.0992	1204.45	1.08	2.4643	1413.90	1.19	431	1429
Qinghai	558.18	0.95	1.9617	1095.00	0.98	2.1195	1183.06	1.00	560	1490
Ningxia	564.46	0.97	1.9469	1098.96	0.99	2.2857	1290.19	1.09	578	1724
Xinjiang	546.95	0.94	2.1660	1184.69	1.07	2.3155	1266.47	1.07	683	1618
Chongqing			1.8806	958.55	0.86	1.8806	958.55	0.81		1892
Mean	607.96	1.04	2.0111	1219.56	1.10	2.1720	1313.44	1.11	747	2401
Min	509.72	0.87	1.7051	958.55	0.86	1.8123	958.55	0.81	431	1331
Max	803.57	1.37	2.6864	1909.68	1.72	2.6864	1909.69	1.61	1907	5596
SD	63.71	0.11	0.2197	217.24	0.20	0.2527	210.30	0.18	295	1024
CV	0.1048	0.1048	0.1092	0.1781	0.1781	0.1163	0.1601	0.1601	0.39	0.43
CV less 6 pr.	0.0908	0.0908	0.0810	0.1019	0.1019	0.1126	0.1109	0.1109	0.25	0.33
Correlation coefficient with rural net income of that year										
all provinces	0.6648			0.6362			0.4773			
excl. 6 prov.	0.6190			0.1351			-0.1257			
Correlation coefficient with basket value (or ratio) of										
1990			0.2084	0.7458	0.7458	-0.0705	0.6286	0.6286		
2000			0.8034			0.7410				
—excluding 6 provinces—										
1990			-0.2775	0.6481	0.6481	-0.3890	0.3603	0.3603		
2000			0.5508			0.7173				

SD: standard deviation. CV: coefficient of variation.

"Ratio" denotes the value of the basket in a particular province relative to the nationwide basket value. The nationwide basket value is based on official nationwide per capita quantity and price data, as laid out in Table 1 (quantities times adjustment factors times prices in Table 1 yield the nationwide basket value also reported here).

6 pr.: the six provinces excluded in some rows at the bottom are Tibet and Hainan (due to incomplete data—for further details see the appendix on provincial-level pricing of the rural basket), Chongqing (due to its emergence as provincial-level entity in 1997 only, and due to its largely urban character), and Beijing, Shanghai, and Tianjin (due to their largely urban character). For Beijing, Shanghai, Tianjin, and Chongqing, no rural CPIs are available; the "official rural" CPIs in the table in these four cases (with further complications in the case of Chongqing, explained in the appendix on adjustment of the rural CPI) are in fact the provincial-level (urban) CPIs.

Prices of both staples and housing are implicit prices. A similar table where the prices of staples and housing are composite prices is provided in an appendix.

For income data also see the explanations in an appendix.

For further, product- and province-specific details see the appendix on the provincial-level pricing of the rural basket.

For the choice of individual prices see Table 1.

Sources:

Base-year prices: same sources as for nationwide prices (Table 1).

Rural CPI: *Statistical Yearbook 1992*, p. 259; *1993*, p. 261; *1994*, p. 242; *1995*, p. 238; *1996*, p. 260; *Urban Household Survey Yearbook 1997*, p. 42; *Statistical Yearbook 1998*, p. 306; *1999*, p. 298; *2000*, p. 294; *2001*, p. 286.

Adjusted rural CPI: see appendix on the adjustment of the rural CPI.

Rural net income: *Statistical Yearbook 1992*, p. 308 (at new imputation prices); *2001*, p. 325.

Table 3. Driving Factors of Differences in Rural Price Levels across Provinces, 1990

	National product price	Across provinces: product (or category) price				
		Mean	Min.	Max.	SD	CV
Total						
A. Consumer goods (93.09%)						
1. Foods (58.04%)	339.30	352.23	300.76	442.76	37.02	0.1051
a. Staples (23.17%)						
(i) Implicit	135.47	143.74	119.21	219.09	23.51	0.1636
(ii) Composite	178.53	203.31	164.19	276.35	28.91	0.1422
b. All others (34.86%)	194.79	199.24	163.78	286.75	30.15	0.1513
Vegetables	0.57	0.59	0.32	0.96	0.15	0.2569
Edible oil	1.49	1.50	1.07	1.93	0.17	0.1116
Poultry	6.36	5.74	4.06	10.08	1.64	0.2855
Eggs	4.29	4.70	3.32	6.76	0.86	0.1828
Fish, shrimp	2.87	3.56	2.30	6.11	0.90	0.2540
Sugar	2.67	2.56	2.36	2.80	0.09	0.0360
Alcohol	2.27	2.22	1.32	3.69	0.51	0.2318
Meat	3.50	3.50	2.55	5.52	0.70	0.2000
Tobacco	0.63	0.59	0.41	0.94	0.10	0.1819
Tea leaves	20.05	22.53	13.00	41.79	6.26	0.2778
Fruit	1.02	1.07	0.56	1.63	0.25	0.2357
Milk	1.13	1.14	0.76	2.00	0.23	0.2007
2. Clothing (7.76%)	38.13	41.17	32.10	55.39	6.73	0.1636
Cotton cloth	3.13	3.14	2.64	3.60	0.22	0.0693
Cotton (natural)	8.66	9.75	6.00	13.00	1.62	0.1658
Chemical fiber	7.77	9.36	4.05	18.03	3.83	0.4094
Nylon	31.75	32.14	20.13	48.46	7.04	0.2189
Silk	19.35	18.60	5.81	31.43	7.75	0.4168
Wool products	59.73	58.59	46.60	70.93	5.60	0.0956
Shoes	17.32	17.34	13.95	22.38	2.14	0.1232
3. Housing (11.85%)						
(i) Construction costs	69.30	76.51	31.40	138.61	24.00	0.3137
(ii) Composite	41.98	41.37	25.43	70.67	11.58	0.2798
Cement	0.19	0.19	0.12	0.27	0.04	0.1893
Wood planks	873.96	867.49	434.28	1743.75	329.50	0.3798
Glass	9.19	9.14	6.22	12.50	1.55	0.1692
Bricks	0.10	0.10	0.04	0.17	0.04	0.3509
4. Energy (4.53%)	26.46	26.22	16.34	43.63	7.46	0.2844
Coal (100kg)	7.95	4.82	3.00	8.01	1.37	0.2844
5. Articles for daily use						
a. Consumer dur. (8.66%)	51.15	52.06	46.75	60.73	3.46	0.0664
Bicycle	276.79	277.23	218.50	327.58	31.23	0.1127
Sewing machine	253.05	247.22	183.00	281.88	26.72	0.1081
Clock	43.46	43.39	26.18	85.40	10.58	0.2437
Watch	51.67	50.54	45.00	65.00	3.39	0.0671
Fan	273.31	277.48	201.67	349.83	34.84	0.1256
Washing machine	532.97	527.21	356.00	675.00	66.36	0.1259
Refrigerator	1697.76	1714.33	1450.00	2195.00	198.94	0.1160
Sofa	349.89	348.61	220.00	475.85	59.81	0.1716
Cloth stand	315.91	332.86	206.15	548.14	78.61	0.2362
Desk	202.03	199.68	69.28	327.07	59.02	0.2956
Radio	28.85	27.36	12.10	66.00	11.96	0.4372
Black-white TV	540.04	555.34	446.00	851.39	84.18	0.1516

Color TV	2440.07	2396.45	2038.9	3679.2	277.11	0.1156
Radio recorder	496.41	593.29	409.33	833.00	121.88	0.2054
b. Medicine/ hyg. (2.26 %)	13.23	13.21	9.33	17.14	1.68	0.1270
B. Services (6.91 %)	40.40	39.35	28.08	69.81	9.68	0.2460
Industrial TVE wages	1262.68	1229.72	877.73	2181.73	302.57	0.2460

SD: standard deviation. CV: coefficient of variation.

The percentages given in parentheses after the labels of the main product categories are the shares of these product categories in total rural living expenditures. For the absolute values see Table 1.

For the units of individual products see Table 1.

When a national price for a product is lacking, the arithmetic mean across *all* provinces is used, including provinces whose values were imputed. (Chongqing data are never available, and are not imputed.)

The statistics on foods are statistics on the sum of the implicit price of staples and the aggregate price (value) of the second subcategory "all others," incorporating the small adjustment factor of "all others" of 1.0464. The statistics on the clothing category price, the composite housing price, and the aggregate price of the main consumer durables do not incorporate adjustment factors (but are simply based on the value, i.e., the sum of price times quantity, of the underlying products). The statistics on implicit staples prices, construction costs, energy, medicine/ hygiene, and services are based on the implicit prices (at the nationwide level matching the corresponding category values in the living expenditures).

Sources: See Table 1.
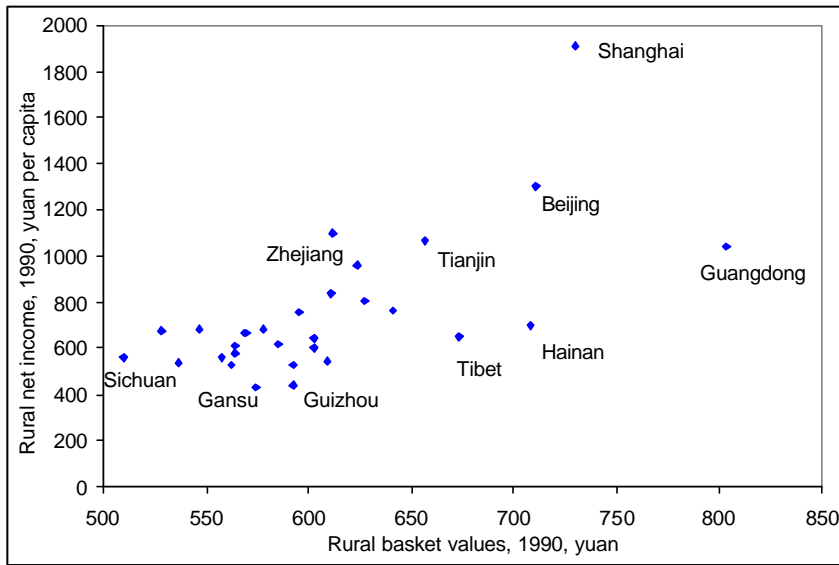
Sources: See Table 2. (Chongqing, lacking a 1990 value, is not included.)

Figure 1. Rural Living Expenditure Basket Values and Rural Net Income (1990, yuan)
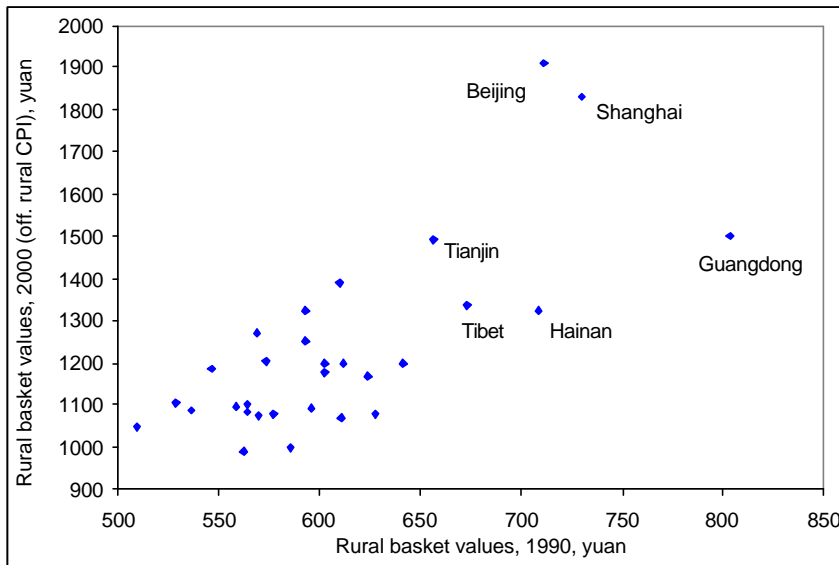
Sources: See Table 2. (Chongqing, lacking a 1990 value, is not included.)

Figure 2. Rural Living Expenditure Basket Values 1990 and 2000

Sources: See Table 2.

Figure 3. Rural Living Expenditure Basket Values and Rural Net Income (2000, yuan)

Table 4. Per Capita Urban Living Expenditure Basket, 1990

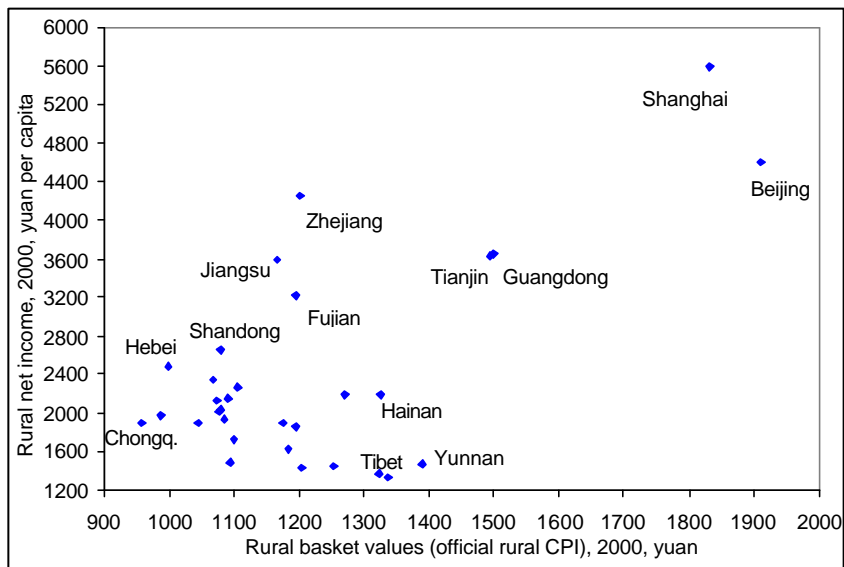|	Living exp. (yuan)	Quantity consumed	Nationwide average price (in yuan) per unit of the product	Value covered (yuan)	Adjust-ment factor
Total	1278.89				
A. Consumer goods	1150.8				
1. Foods	693.77	*kg*	*Implicit prices*		
a. Staples					
(i) implicit, aggregate	84.50	130.72	0.6464	84.50	1.0000
(ii) implicit, by type				84.50	1.0000
Coarse grain (*culiang*)	5.13	10.69	0.4799	5.13	
Wheat flour (*mianfen*)	17.05	38.56	0.4422	17.05	
Rice (*dami*)	29.20	56.72	0.5148	29.20	
Other fine grains (*xiliang*)	8.20	9.33	0.8789	8.20	
Grain purchased in work unit's cafeteria	3.45	5.75	0.6000	3.45	
Grain purchased from catering businesses	21.47	9.67	2.2203	21.47	
b. Tobacco, alcohol, and tea	76.07	*kg*	*Retail prices*	54.35	1.3995
Tobacco		(Packs) 35.12	(composite) 0.8186	28.75	
Alcohol					
Spirits (*baijiu*)		3.00	2.963	8.89	
Beer		5.10	1.322	6.74	
All other alcohol		1.15	4.489	5.16	
Tea leaves		0.24	(composite) 20.0487	4.81	
c. All others	533.2	*kg*	*Retail prices*	466.88	1.1421
Fresh vegetables		138.70	(implicit pr.) 0.57	79.06	
Dried vegetables		3.07	(implicit pr.) 3.15	9.67	
Edible oil		6.40	(implicit pr.) 3.20	20.48	
Pork		18.46	5.734	105.85	
Beef, lamb		3.28			
Beef (assume 90%)		3.078	6.801	20.93	
Lamb (assume 10%)		0.342	6.571	2.25	
Poultry		3.42	7.140	24.42	
Eggs		7.25	5.376	38.98	
Fish, shrimp (silver carp)		7.69	4.185	32.18	
Sugar		2.14	(composite) 2.6660	5.71	
Fresh melon		20.29	0.7200	14.61	
Fresh fruit		20.82	(composite) 2.9950	62.36	
Dried fruit		3.21	5.885	18.89	
Sweets		0.70	6.1431	4.30	
Cake [pastry]		3.34	5.203	17.38	
Milk		4.63	1.127	5.22	
Mixed food cans		0.30	(implicit) 5.97	1.79	
Other cans		0.75	(implicit) 3.75	2.81	
2. Clothing	170.90		*Retail prices*	75.66	2.2589
Cotton cloth		(meter) 1.33	3.129	4.16	
Cotton – chemical fiber mix		(meter) 0.44	6.297	2.77	
Chemical fiber		(meter) 1.46	7.765	11.34	
Nylon		(meter) 0.26	31.7504	8.26	
Silk		(meter) 0.41	19.3526	7.93	
Bedsheet		(item) 0.11	30.549	3.36	
Leather shoes		(pairs) 0.61	(composite) 35.8620	21.88	
Rubber shoes		(pairs) 0.25	13.0300	3.26	
Cotton shoes		(pairs) 0.49	6.545	3.21	

Plastic shoes		(pairs) 0.25	3.6998	0.92	
Other shoes (assume sports)		(pairs) 0.69	12.4230	8.57	
3.-6.	226.19			93.75	2.4128
3. Articles for daily use	129.66	*Items*			
Small items				9.61	
Soap (box of 10)		6.24	0.935	5.83	
Fragrant or medical soap		1.30	0.862	1.12	
Washing powder		(kg) 1.12	1.897	2.12	
Thermos bottle		0.03	5.6085	0.17	
Aluminum pot		0.03	12.2108	0.37	
Consumer durables		*Items, per 100*	*Retail prices*	84.13	
Bicycle		3.0971	276.786	8.57	
Sewing machine		0.1829	253.047	0.46	
Mechanical watch		2.2400	51.668	1.16	
Clock		1.5800	43.4643	0.69	
Fan		3.1029	273.308	8.48	
Washing machine		0.7229	532.965	3.85	
Refrigerator		1.3314	1697.7572	22.60	
Cloth stand		0.1771	315.908	0.56	
Desk		0.1571	202.0268	0.32	
Color TV		1.4286	2440.065	34.86	
Black and white TV		0.1686	540.037	0.91	
Radio		0.5714	28.852	0.16	
Photo camera		0.4257	353.415	1.50	
4. Cultural and recreational articles	68.25				
5. Books, newspapers, magazines	11.15				
6. Other goods	17.13				
7. Medicine and medical articles	19.65	by des. 19.65	by design 1.0000	19.65	1.0000
8. Construction materials (housing)	19.98	sqm 0.1151	173.6636		1.0000
9. Energy	20.31				2.0286
Coal		206.04	per 100 kg 4.8592	10.0119	
B. Services	128.09				
1. Gas	2.62	8.84	per kg 0.7352	6.50	0.4031
All other services	125.47	0.055074 years	2278.20	125.47	1.0000

Published data are reported with as many decimals as in the original source. Four decimals are reported for calculated prices and adjustment factors; in further calculations all decimals are used. Calculated value data are presented with two decimals.

All price data except the implicit prices of staples, vegetables (fresh and dried), edible oil, food cans, housing, and services are nationwide retail prices (or a composite thereof). The price of "all other services" is the average annual wage of staff and workers in industrial enterprises. All composite prices are constructed by the authors, with weights chosen by the authors. For further details, including on specific products, see the appendix on the construction of the urban living expenditure basket.

Sources:

Living expenditures: *Urban Household Survey Yearbook 1990*, p. 2 0, 120-3; *Statistical Yearbook 1991*, p. 281, reports the same living expenditures, but then contains slightly different values for some subcategories, with the subcategories in consumer goods almost adding up to the total, but the subcategories in services exceeding the value of services by about 10% (the item post and telecommunications carries vastly different values in the two sources).

Quantities of major consumer goods consumed: *Urban Household Survey Yearbook 2000*, pp. 25, 27, 29; *Statistical Yearbook 1991*, p. 287, carries identical data for fewer products.

Retail prices of individual goods: *Price Statistical Yearbook 1991*. Implicit prices of rural staples, vegetables (fresh and dried), edible oil, cans of food: *Urban Household Survey Yearbook 2000*, pp. 120-5, 134f. Implicit housing costs via construction costs: *Investment Materials 1990-1991*, pp. 306, 311. Industrial enterprise employee (*zhigong*) wage (obtained as total wage bill divided by employees): *City Yearbook 1991*, pp. 615-24, 635-44.

Table 5.   Price Level of Urban Basket Across Provinces, 1990 and 2000, yuan

	1990 Basket value (yuan)	Ratio	Urban CPI 2000/1990	2000 Basket value (yuan)	Ratio	Reference: Urban dispos. income 1990	2000
Total	1278.89	1.00	2.1462	2744.75	1.00	1510	6280
Beijing	1295.35	1.01	2.6864	3479.79	1.27	1901	10350
Tianjin	1188.86	0.93	2.2735	2702.84	0.98	1628	8141
Hebei	1229.92	0.96	2.1162	2602.74	0.95	1493	5661
Shanxi	1326.53	1.04	2.2896	3037.24	1.11	1291	4724
Neimenggu	1274.64	1.00	2.1824	2781.74	1.01	1149	5129
Liaoning	1317.85	1.03	2.1658	2854.22	1.04	1551	5358
Jilin	1288.10	1.01	1.9688	2536.02	0.92	1230	4810
Heilongjiang	1314.06	1.03	2.1001	2759.66	1.01	1201	4913
Shanghai	1410.59	1.10	2.5095	3539.86	1.29	2182	11718
Jiangsu	1321.36	1.03	2.2412	2961.41	1.08	1600	6800
Zhejiang	1288.19	1.01	2.3555	3034.38	1.11	1917	9279
Anhui	1217.38	0.95	2.1873	2662.82	0.97	1355	5294
Fujian	1392.01	1.09	2.1444	2985.03	1.09	1655	7432
Jiangxi	1287.38	1.01	2.1937	2824.12	1.03	1225	5104
Shandong	1238.85	0.97	2.2274	2759.41	1.01	1507	6490
Henan	1233.92	0.96	1.9593	2417.65	0.88	1268	4766
Hubei	1277.95	1.00	2.2879	2923.76	1.07	1427	5525
Hunan	1264.73	0.99	2.3110	2922.77	1.06	1439	6219
Guangdong	1770.53	1.38	2.0032	3546.80	1.29	2303	9762
Guangxi	1295.33	1.01	2.0103	2604.03	0.95	1587	5834
Hainan	1692.08	1.32	2.0342	3442.01	1.25	2303	5358
Sichuan	1220.50	0.95	2.2952	2801.27	1.02	1488	5894
Guizhou	1251.39	0.98	2.1500	2690.45	0.98	1326	5122
Yunnan	1283.72	1.00	2.1469	2756.02	1.00	1515	6325
Tibet	1236.41	0.97	2.3328	2884.27	1.05	1321	7426
Shaanxi	1267.38	0.99	2.2742	2882.31	1.05	1369	5124
Gansu	1290.72	1.01	2.0951	2704.20	0.99	1290	4916
Qinghai	1232.51	0.96	2.3165	2855.15	1.04	1321	5170
Ningxia	1276.54	1.00	2.1563	2752.56	1.00	1421	4912
Xinjiang	1244.15	0.97	2.2907	2849.96	1.04	1421	5645
Chongqing			2.1352	2605.97	0.95		6276
Mean	1307.63	1.02	2.21	2876.14	1.05	1523	6306
Min	1188.86	0.93	1.96	2417.65	0.88	1149	4724
Max	1770.53	1.38	2.69	3546.80	1.29	2303	11718
SD	122.91	0.10	0.15	278.97	0.10	305	1770
CV	0.0940	0.0940	0.0682	0.0970	0.0970	0.20	0.28
CV excl. 3 pr.	0.0794	0.0794	0.0689	0.0936	0.0936	0.18	0.29
Correlation coefficient with basket value (or ratio) of							
1990			-0.2642	0.7199	0.7199	0.7475	
2000			0.4839				0.6936
—excluding 3 provinces—							
1990			-0.1626	0.6730	0.6730	0.6540	
2000			0.6188				0.8047

SD: standard deviation. CV: coefficient of variation.

"Ratio" denotes the value of the basket in a particular province relative to the nationwide basket value. The nationwide basket value is based on official nationwide per capita quantity data, as laid out

in Table 4 (quantities times adjustment factors times prices in Table 4 yield the nationwide basket value also reported here).

3 pr.: the three provinces excluded in some rows at the bottom are Tibet and Hainan (due to incomplete or poor data) and Chongqing (due to its emergence as provincial-level entity in 1997 only).

For the choice of individual prices see Table 4. For further, product- and province-specific details see the appendix on the provincial-level pricing of the urban basket.

Sources:

Base-year prices: same sources as for nationwide prices (Table 4).

Urban CPI: *Statistical Yearbook 1992*, p. 258; *1993*, p. 260; *1994*, p. 241; *1995*, p. 238; *1996*, p. 260; *1997*, p. 271; *1998*, p. 306; *1999*, p. 298; *2000*, p. 294; *2001*, p. 286.

Urban disposable income per capita: *Urban Household Survey Yearbook 1990*, pp. 100, 106, 109 (for the construction of the urban disposable income see the appendix on income); *Statistical Yearbook 2001*, p. 311.

Table 6. Driving Factors of Differences in Urban Price Levels Across Provinces, 1990

	National product price	Across provinces: indiv. item or category price				
		Mean	Min.	Max.	SD	CV
Total						
A. Consumer goods (89.98%)						
1. Foods (54.25%)	693.77	716.63	606.88	1090.22	102.83	0.1435
a. Staples (6.61%)						
(i) aggregate, implicit	0.64	0.64	0.45	1.15	0.14	0.2152
(ii) implicit, by type						
Coarse grain (*culiang*)	0.48	0.84	0.32	1.53	0.40	0.4748
Wheat flour (*mianfen*)	0.44	0.47	0.38	0.97	0.12	0.2527
Rice (*dami*)	0.51	0.59	0.30	1.09	0.26	0.4355
Other fine gr. (*xiliang*)	0.88	0.91	0.59	1.94	0.26	0.2886
Grain purchased in work unit's cafeteria	0.60	0.78	0.32	1.82	0.45	0.5809
Grain purchased from catering businesses	2.22	2.42	1.41	4.57	0.77	0.3191
b. Tobacco, alcohol, tea (5.95%)	56.53	55.12	41.58	80.22	7.65	0.1387
c. All others (41.69%)	465.93	475.24	394.32	724.00	68.90	0.1450
2. Clothing (13.36%)	75.66	78.12	62.86	96.11	8.42	0.1078
3.-6. (17.69%)						
3. Articles for daily use (10.14%)	93.75	93.61	85.66	109.39	5.73	0.0612
4. Cultural and recreat. art. (5.34%)						
5. Books, newspapers, magaz. (0.87%)						
6. Other goods (1.34%)						
7. Medicine and medical art. (1.54%)	19.65	19.63	13.86	25.46	2.49	0.1270
8. Construction materials (1.56%)	19.98	19.81	11.43	29.60	5.91	0.2981
Construction costs per sqm	173.66	172.21	99.34	257.25	51.33	0.2981
9. Energy (1.59%)	10.01	9.92	6.18	16.51	2.82	0.2844
Coal	7.95	4.82	3.00	8.01	1.37	0.2844
B. Services (10.02%)						
1. Gas (0.20%)	6.50	6.72	1.77	22.98	4.49	0.6672
Liquefied petroleum gas	0.76	0.76	0.20	2.60	0.51	0.6672
All other services (9.81%)	125.47	126.40	99.82	172.28	15.66	0.1239
Wages of ind. staff & workers	2278.20	2295.07	1812.53	3128.09	284.26	0.1239

SD: standard deviation. CV: coefficient of variation.

The full table of driving factors, including all individual products, is reported in an appendix.

For the units of individual products see Table 4.

The percentages given in parentheses after the labels of the main product categories are the shares of these product categories in total urban living expenditures. For the absolute values see Table 4.

When a national price for a product is lacking, the arithmetic mean across *all* provinces is used, including provinces whose values were imputed. (Chongqing data are never available, and are not imputed.)

The statistics for the price of foods cover the sum of the 'implicit price times quantity' of staples, and the aggregate prices (values) of the other two categories within foods, namely "tobacco, alcohol, and tea," and "all others," with the latter two categories weighted by their adjustment factor. All other category prices do not incorporate adjustment factors. The underlying prices for the categories medicine and medical articles, construction materials, energy, and "all others" within services are implicit prices (i.e., their adjustment factor would be unity).
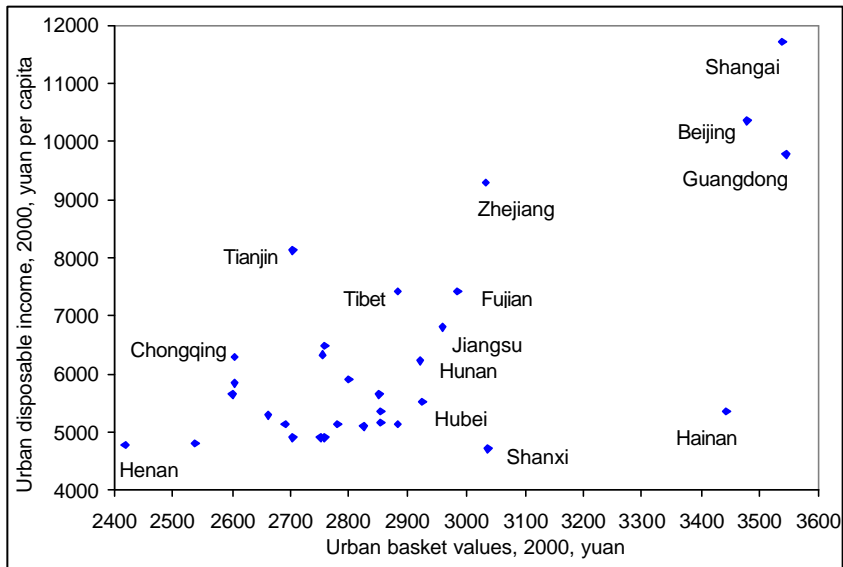
Sources: See Table 4.

Figure 4. **Urban Living Expenditure Basket Values and Urban Disposable Income (2000, yuan)**

Sources: See Table 4.

Table 7.   Joint Expenditure Basket Price Levels, 1990 and 2000, yuan

	In rural areas, at rural prices			In urban areas, at urban prices		Province-wide, at joint prices	
	1990	2000 (off. CPI)	2000 (adj. CPI)	1990	2000	1990	2000
Total	696.56	1325.19	1413.33	862.83	1851.80	729.25	1462.09
Beijing	813.50	2185.36	2185.36	954.50	2564.14	840.73	2258.51
Tianjin	758.05	1723.41	1723.40	895.25	2035.32	783.17	1780.51
Hebei	687.03	1171.44	1245.10	813.07	1720.61	717.85	1350.34
Shanxi	714.75	1396.11	1382.08	864.56	1979.51	744.84	1601.59
Neimenggu	670.77	1285.51	1364.90	821.69	1793.22	699.65	1461.87
Liaoning	716.62	1253.18	1308.97	881.71	1909.62	744.70	1517.88
Jilin	722.96	1240.37	1345.61	873.85	1720.44	751.53	1445.00
Heilongjiang	700.91	1283.76	1353.92	851.18	1787.56	730.57	1487.03
Shanghai	851.12	2135.88	2135.89	1002.15	2514.89	878.10	2203.59
Jiangsu	746.48	1398.06	1533.01	892.07	1999.30	776.10	1597.59
Zhejiang	722.43	1416.95	1483.33	866.99	2042.23	748.06	1601.19
Anhui	649.53	1315.33	1543.72	800.94	1751.92	678.84	1427.75
Fujian	767.90	1432.80	1507.48	973.32	2087.19	800.94	1588.76
Jiangxi	701.47	1323.58	1453.86	823.70	1806.95	725.79	1480.70
Shandong	689.74	1289.40	1389.56	855.50	1905.54	719.77	1469.58
Henan	678.96	1192.83	1326.86	855.15	1675.51	711.58	1324.29
Hubei	647.49	1355.50	1522.62	823.26	1883.50	675.57	1487.33
Hunan	693.48	1548.91	1736.16	813.93	1880.98	717.41	1632.44
Guangdong	952.10	1777.62	1776.18	1268.85	2541.81	1006.92	1966.63
Guangxi	719.85	1429.82	1591.54	859.97	1728.81	753.09	1513.53
Hainan	856.27	1601.17	1821.66	1211.98	2465.40	937.94	1909.49
Sichuan	609.96	1250.61	1343.68	771.05	1769.71	644.28	1386.59
Guizhou	700.84	1564.05	1843.31	818.69	1760.15	733.32	1590.75
Yunnan	721.63	1644.24	1736.24	855.08	1835.77	756.86	1677.31
Tibet	770.67	1531.64	1552.90	768.82	1793.49	781.13	1725.17
Shaanxi	707.59	1495.33	1836.63	841.38	1913.48	736.59	1625.81
Gansu	674.04	1414.98	1661.02	834.68	1748.75	714.05	1497.05
Qinghai	666.54	1307.58	1412.73	770.33	1784.49	697.93	1527.57
Ningxia	684.58	1332.82	1564.75	821.82	1772.07	717.55	1483.27
Xinjiang	652.06	1412.35	1509.85	769.54	1762.77	681.27	1530.67
Chongqing		1147.07	1147.06		1646.32		1282.11
Mean	721.64	1447.02	1559.33	875.17	1921.98	753.54	1594.58
Min	609.96	1147.07	1147.06	768.82	1646.32	644.28	1282.12
Max	952.10	2185.36	2185.36	1268.85	2564.14	1006.92	2258.51
SD	69.90	241.68	238.43	112.22	254.82	75.51	223.34
CV	0.0969	0.1670	0.1529	0.1282	0.1326	0.1002	0.1401
CV excl. 6/3/3 prov.	0.0860	0.1009	0.1118	0.1093	0.1256	0.0930	0.1372
Correlation coefficient of basket value with							
same-year income	0.6315	0.6315	0.4508	0.8374	0.7554	0.6209	0.7693
excl. 6/3/3 prov.	0.6168	0.1297	-0.1296	0.7806	0.9027	0.6833	0.8489
1990 basket value		0.7074	0.5894		0.8333		0.7867
excl. 6/3/3 prov.		0.6347	0.3508		0.8056		0.7756
corresponding CPI:							
official	0.1660	0.8106		-0.1815	0.3975	0.1091	0.7041
official, less 6/3/3	-0.2440	0.5938		-0.0504	0.5481	0.1688	0.7505
adjusted	-0.0766		0.7682				
adj., less 6/3/3	-0.3524		0.7513				

SD: standard deviation. CV: coefficient of variation.

6/3/3 prov.: 6 provinces in the rural case (Tibet, Hainan, Chongqing, Beijing, Tianjin, Shanghai), 3 provinces in the urban case (Tibet, Hainan, Chongqing), and the same 3 provinces in the province-wide case.

"Same-year income," in a row at the bottom of the table, is the income of the same year for which basket values are listed in the columns. In the last two columns of this row, basket values at joint prices are correlated with the population-weighted mean of rural net income and urban disposable income.

Also see notes to Table 2 and Table 5.

Further details on the joint basket, including its establishment and provincial-level pricing, are provided in an appendix.

Sources: See Table 1, Table 2, Table 4, and Table 5; CPI: *Statistical Yearbook 1992*, p. 257; *1993*, p. 259; *1994*, p. 240; *1995*, p. 238; *1996*, p. 260; *1997*, p. 271; *1998*, p. 306; *1999*, p. 298; *2000*, p. 294; *2001*, p. 286.

Table 8. Provincial Income Inequality

	1990		2000		% change '90 to '00	
	without deflating	with deflating	without deflating	with deflating	without deflating	with deflating
Rural income inequality (rural basket)						
Gini coefficient for prov. incomes	0.134	0.105	0.169	0.163	25.74	55.47
Ratio of richest to poorest prov.	2.55	2.45	3.10	3.41	21.57	39.18
Coefficient of variation for income	0.2490	0.2018	0.3336	0.3171	33.98	57.14
Urban income inequality (urban basket)						
Gini coefficient for prov. incomes	0.102	0.076	0.144	0.102	41.10	33.86
Ratio of richest to poorest prov.	2.00	1.72	2.48	2.13	24.00	23.84
Coefficient of variation for income	0.1837	0.1422	0.2923	0.2076	59.12	45.99
Rural income inequality (joint basket)						
Gini coefficient for prov. incomes	0.134	0.106	0.169	0.165	25.74	55.66
Ratio of richest to poorest prov.	2.55	2.45	3.10	3.42	21.57	39.59
Coefficient of variation for income	0.2490	0.2046	0.3336	0.3176	33.98	55.23
Urban income inequality (joint basket)						
Gini coefficient for prov. incomes	0.102	0.065	0.144	0.085	41.10	31.07
Ratio of richest to poorest prov.	2.00	1.58	2.48	1.95	24.00	23.42
Coefficient of variation for income	0.1837	0.1175	0.2923	0.1695	59.12	44.26
Provincial income inequality (joint basket)						
Gini coefficient for prov. incomes	0.151	0.119	0.186	0.147	23.18	24.20
Ratio of richest to poorest prov.	3.84	3.21	5.30	3.83	38.02	19.31
Coefficient of variation for income	0.3669	0.2919	0.5071	0.3433	38.21	17.61
Rural-urban income differences						
Ratio of urban to rural income	2.20	1.78	2.79	1.99	26.65	12.27

The six (three) problematic provinces in the rural (urban and joint) case are omitted. To obtain the rural spatial deflators for 2000, the official rural CPI was used.

All Gini coefficients are population-weighted. The Gini coefficients, in the case "without deflating," are calculated using the per capita rural net income (or urban disposable income, or provincial-level population-weighted income) in each province weighted by the size of the rural (urban, provincial) population. In the case "with deflating," the income measures are first spatially deflated.

The ratio of urban to rural income, for example, in 1990 with deflating, is obtained as the nationwide ratio of 'urban per capita disposable income in 1990 to urban basket value in 1990' (1510/862.83), divided by the nationwide ratio of 'rural per capita net income in 1990 to rural basket value in 1990' (686/696.56).

Sources: Table 2, Table 5, Table 7, and appendix on income and population data.