

Appendix A4

Considerations in the Derivation of Price Levels in Years Other than 1990

Absolute basket costs for years other than 1990 are obtained by applying the corresponding official (and, in the rural case, also the re-weighted, i.e., adjusted) CPI to the base year (1990) price level.

Changes in CPI composition over time

Official CPIs, in order to properly reflect expenditure patterns, would ideally be constructed based on product or product category weights updated annually. I.e., ideally, base-year expenditure shares—or the mean of base-year shares and second-year shares, or second-year shares—are applied to the second-year values of the price indices of the corresponding products or product categories.¹ Summing up across products or product categories yields the price index for the second year. New weights based on the living expenditure pattern in the second year (or the mean of the second- and third-year values, or third-year values) would then be used in the calculation of the CPI of the third year, etc. But international practice is to use the same base-year weights for a lengthy period of time, such as ten years, with adjustments for substitution and quality change on a product-specific basis. (See, for example, International Labour Office (1987).)

The U.S. Bureau of Labor Statistics (BLS) changed the expenditure weights in the calculation of the CPI in the context of major revisions to the index (1940, 1953, 1964, 1978, 1987, 1998), approximately once every decade, with the weights obtained as an average of expenditure surveys covering three years (with expenditure survey data from about 5000 households), and implemented with a lag of 3.5 years (due to data collection and processing). The maximum duration of use for one set of weights appears to have been 13 years, from the mid-1980s through the late 1990s (Angus Deaton, 1998; Katharine Abraham, 2003). The current weights are of 1999-2000 (from an expenditure survey of 7500 households), applied starting with January 2002 CPI data. The Bureau of Labor Statistics has decided to in the future update the CPI expenditure weights every two years, beginning with the January 2002 release of data, in order to make the CPI reflect, as much as possible, the inflation currently experienced by consumers. (<http://www.bls.gov/cpi/cpiupdt.htm>)

In the case of China, in the compilation of the nationwide CPIs (rural, urban, total) the same weights are likely to have been in use in 1986 through 1993, and then in 1994 through 2000. The rural CPI was first compiled for 1985, and the classification of subindices in use then (for each of the three CPIs: rural, urban, and total CPI) continued through 1993; in the years 1994 through 2000 a separate classification was in use, which was then changed again in 2001. It is also possible that the weights changed more frequently than the period length identified by changes in the CPI classification.

¹ The combination of expenditure shares of two years usually takes the form of the Fisher index (combining the Laspeyres and Paasche indices) or of the Törnqvist index.

The number of categories within the CPI is larger than the number of observations (years), and thus regression analysis cannot identify whether the price subindices for the various categories are combined into the CPI using constant weights over time.

Reducing the number of urban CPI subindices for the period 1994-2000 by combining three of them using 1994 urban expenditure weights, a regression of the annual urban CPI on its subindices yields coefficients clearly different from unity. (The expenditure classification differs from the CPI classification in that the last of the eight CPI category exclusively covers all services, while the last of the eight expenditure categories is a category “others,” and services are included in the other seven expenditure categories which otherwise carry the same or a similar label as the corresponding seven CPI categories.) The non-unity coefficients in the regression even occur when the three urban CPI subindices for foods, clothing, and articles for daily use are combined; the weights from the three corresponding expenditure categories should not include many services. This increases the likelihood that the expenditure weights in the calculation of the urban CPI changed during the period 1994-2000.

In both periods, 1986-93 and 1994-2000, nationwide aggregate (total) CPI is the arithmetic mean of the nationwide rural CPI and nationwide urban CPI. The weights in the two periods are almost identical (with the differences perhaps only due to rounding in the published annual CPIs), in the early period 0.4264 for the rural CPI and 0.5729 for the urban CPI and in the recent period 0.4271 and 0.5699. (The t-values are in the 20s through 80s.) If the rural-urban weights in the aggregate CPI are constant at least within each of the two periods, then the weights of different product category price indices within the rural or urban CPI (or the aggregate CPI) may also be constant—the NBS could be revising all weights at the same point of time.

Changing the weights of product category price indices in the calculation of a CPI implies a change in the composition of the living expenditure basket over time. This is desirable for the creation of a meaningful spatial deflator over time when applying CPIs to 1990 basket values. The relative constancy of the rural vs. urban weights in the aggregate CPI suggest either that consumption patterns in China have not changed drastically in the period from 1986 through 2000, or that while consumption patterns changed, the official CPI matched these patterns ever less. But even in the latter case, as long as this is true equally for all provinces, the basket costs derived here for years other than 1990 still allow a meaningful comparison of prices across provinces.

Differences in CPI composition across provinces

What is undesirable for the creation of a meaningful spatial deflator over time is differences *across provinces* in the weights of individual product category price indices in the provincial-level CPIs (rural, urban, total). The nationwide basket should ideally be priced in other years, as in 1990, at nationwide fixed weights for the different product categories; i.e., the weights for individual product category price indices in the calculation of each of the provincial-level CPIs (rural, urban, total) should be constant across provinces. But each province with its CPI, in fact, attempts to measure *local* price inflation, not the price changes in a hypothetical nationwide basket.

Each provincial statistical bureau appears to maintain a list of products on which it collects prices across all years, and does not change the coverage of products. This would be standard international practice. Standard international practice also allows for adjustments at the margin when old products disappear from the market or new products enter the market, with proper adjustment factors to guarantee the smooth inclusion in the CPI. The explanations on the CPI offered by Liu Chengxiang, Liu Ke, and Jin Zhaofeng (2000, pp. 108, 119, 127) suggest a fixed but province-specific list of products. This source mentions that each locality may add some products, depending on local circumstances, to the 325 standard goods and services (which are probably determined by the NBS for nationwide use). It is unclear, whether the addition refers only to the collection of additional data or also to the inclusion of this additional data in the local CPI.

Data on the eight product category price indices within the CPI, across provinces in 2000, show that the weights applied to the individual product category price indices in the calculation of the provincial CPI differ across provinces. But the differences are unlikely to be large. Regression analysis of the provincial year 2000 CPIs on the eight (exhaustive) product category price indices, with the 31 provinces as observations, yield eight coefficient which add up to 1.0051, very close to the expected value of unity. Two coefficients are extremely sharp with significance levels below 0.1% (foods and services), and three are significant at the 1%, 5%, and 10% levels, respectively (recreation/ entertainment, health care, and housing). These five categories accounted for at least three-quarters of total monetary living expenditures in 2000 (and for at least four-fifths of total living expenditures).² These results suggest that the use of CPIs to derive comparable provincial basket values in years other than 1990 is legitimate.³

However, the imperfect regression results also caution against over-interpreting the variation in basket values across provinces in years far removed from 1990. The larger the time difference between the year 1990 and the year for which a basket value is derived based on the 1990 basket value times the relevant CPIs, the more the differences in weights on product category price indices across provinces are likely to move the specific provincial pre- or post-1990 year's basket value away from the local value of a uniform *nationwide* basket, to the local value of a *local* basket.

² The service category in the price indices has no perfect match in the living expenditure categorization; in the case of living expenditures, services are included in the first seven categories. (The price index and living expenditure categorization have the first seven out of eight categories in common, except that the latter includes services throughout, and then has as eighth category not services but "others").

The results reported are for the case when an intercept is not included in the regression. The coefficients in the case where an intercept is included are nearly identical.

The coefficient of appliances is negative, with a (negative) 0.0713 weight. All other coefficients are plausible, but not perfectly matching the corresponding categories' shares in living expenditure; this could be due to the different treatment of services in the two categorizations, or, then, to the fact that different provinces do use different weights.

The R^2 in the case without intercept is 0.9484.

³ Choosing, as a second case, somewhat arbitrarily, the official rural CPI in 1995 (with no values for Beijing, Tianjin, Shanghai, Chongqing and Tibet), the conclusions are similar. The eight coefficients add up to 0.9927. Three coefficients are extremely sharp with significance levels below 0.1% (foods, residence, and services) and one is significant at the 10% level (appliances). Foods, housing, and appliances in 1995 accounted for two thirds of rural monetary living expenditures (and more than three quarters of total rural living expenditures). The results reported are for the case when an intercept is not included in the regression. The coefficients in the case where an intercept is included are nearly identical. The coefficient of recreation/ entertainment in both regressions is negative, suggesting a negative weight of 0.087 or 0.083. All other coefficients are plausible. The R^2 in the case without intercept is 0.9561.

A different approach to checking the consistency of CPI product category weights across provinces is to check the variation in product category shares in living expenditures across provinces, since these product category shares in living expenditures are supposed to provide the weights for the combination of product category price indices in the CPI. The smaller the variation, the closer each province's CPI matches one nationwide living expenditure basket.

Calculating the shares of individual categories in total rural living expenditures in 1990 at new imputation prices, for all individual provinces, following the early classification, the coefficient of variation across provinces (the ratio of the standard deviation to the arithmetic mean across provinces), is 0.09 for the category foods, 0.28 for clothing, 0.35 for housing, 0.32 for energy, 0.20 for articles for daily use, and 0.25 for services. (*Rural Statistical Yearbook 1992*, pp. 220-3) In the urban case, the coefficients of variation in expenditure category shares across provinces are 0.06 for foods, 0.21 for clothing, 0.13 for articles for daily use, 0.27 for cultural and recreational articles, 0.20 for books and magazines, 0.36 for medicine and medical articles, 0.65 for housing, 0.35 for energy, 0.57 for other goods, and 0.10 for services. (*Urban Household Survey Yearbook 1990*, pp. 113-7)

It appears that for the main (in terms of value) product categories of foods, articles for daily use, and services, the variation is small. Province-specific weights, thus, cannot move the local basket that is priced in the provincial CPI too far away from the nationwide uniform basket.

Alternative

One alternative to the use of CPIs would be to inflate each product included in the uniform base-year basket (or a nationwide uniform later-year basket) over the years using product-specific price indices in each province separately. This way the nationwide uniform base-year relative weights of individual products or categories could be maintained across all provinces. However, since the CPI subindices and sub-subindices do not perfectly match the living expenditure categories, and since the CPI subindex classification furthermore changed (at least) in 1994, quite a number of decisions would have to be taken on how to bridge the incongruity. The result would probably be even more ambiguous than simply applying the provincial-level CPIs.

CPI quality and CPI labeling over time

The CPI potentially has further shortcomings in that its quality, especially in earlier years, may not have been particularly good. A rural CPI was established in 1985 only, to complement the since 1951 existing urban CPI (and to jointly yield an aggregate CPI). Between 1985 and 1992, these CPIs were, as the urban one earlier, labeled "living expenditures price indices" – staff and workers vs. farmers (*shenghuo feiyong jiage zong zhishu – zhigong, nongmin*). The CPI consisted of two parts: a consumer goods price index and a services price index; the consumer goods price index, in turn, was one of two price indices within the "retail price index," the other being agricultural producer goods. Items like housing or medicine may not have been properly covered by this early CPI.

Since 1993 the CPIs are labeled rural (*nongcun*) and urban (*chengzhen*) “citizen’s consumption price indices” (*jumin xiaofei jiage fenlei zhishu*). In recent editions of the *Statistical Yearbook*, the same recent Chinese label is rendered “consumer price index” in English, and the data of the earlier indices are listed in the same column under the same heading.

Even for the more recent years, it is doubtful if all consumption is fully covered. First, in the case of the, for example, rural CPI, only monetary living expenditures are likely to be covered; in-kind consumption does not receive any weight in the CPI. One obvious effect is that many foods but also housing in the countryside are likely to receive too little weight in the rural CPI. Second, given the (minor) differences in the classifications of price indices vs. living expenditures, the weights may not always have been properly derived from the monetary living expenditure patterns; this would, however, not seem to matter so much as long as weights are relatively uniform across provinces.

References relevant for this appendix and not listed in the paper

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