Income Effect and Urban-Rural Price Differentials from the Household Survey Perspective

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Income Effect and Urban-Rural Price Differentials from the Household Survey Perspective

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World Bank

1. Introduction

The International Comparison Program intends to generate parities which represent national average prices. In practice, however, in many cases sampling framework used to collect prices does not cover the whole country. Therefore the results of ICP get periodically criticized for various alleged biases, most frequently, for failing to account properly for urban-rural price differentials. Often the criticism stems from analyses of household expenditure surveys, in particular, of unit values generated by those surveys. In particular, attention is given to India, where the issue of the urban-rural price differentials may seriously affect poverty numbers. In this paper we will investigate if unit values can serve as proxies for prices of comparable items, and if the urban-rural price differentials can be assessed from the unit values.

2. Description of methodology

Some household surveys include questions about individual consumption items - the number of units consumed along with expenditures on them. Usually, those surveys cover a hundred or so goods and services. Survey organizers make no attempt to compare identical products; that would be impossible. Instead the unit value is estimated as expenditure divided by quantity. It is important to understand the difference between unit value in household survey and comparable price in ICP. In ICP, an emphasis is on comparing like with like. In particular, the last round of ICP made special effort to ensure cross-country comparability of the products collected. Thus, PPP for rice in ICP would be an average [index number] of price relatives for several narrowly specified types of rice. In the household survey the unit value of rice would necessarily include all varieties of rice, without quality distinction. Unfortunately, because of that the unit prices do not represent the same mixes of products for different population groups. In particular, income effect causes unit values to go up with income of the respondent, as quality of the product consumed rises with income.

As the ICP is concerned with comparing like with like, the income effect needs to be removed in order to compare prices generated by ICP and unit values generated by household surveys. In general it would be unrealistic without organizing a special price survey. However, it is still possible to compare unit values of populations at the same income level. Both urban and rural populations would experience the income effect at each level of income. Thus, it would be possible to compare unit value of rural and urban populations at each income level.
y separately \( UV_r(y) \) and \( UV_u(y) \), respectively), and then aggregate them into a national urban-rural price differential.

3. **Urban-Rural Price Differentials for India at the National Level**

The current study uses the 2005 India household expenditure survey. First, the population was grouped into deciles by income, irrespective of where they live. Then, the population of each decile was separated into its urban and rural parts. The composition of deciles is presented below:

**INDIA 2005 - POPULATION BY DECILE AND AREA**

<table>
<thead>
<tr>
<th>Decile</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>95,225,757</td>
<td>2,924,248</td>
</tr>
<tr>
<td>2</td>
<td>93,545,759</td>
<td>4,622,004</td>
</tr>
<tr>
<td>3</td>
<td>90,858,996</td>
<td>7,299,426</td>
</tr>
<tr>
<td>4</td>
<td>87,716,829</td>
<td>10,458,268</td>
</tr>
<tr>
<td>5</td>
<td>84,337,250</td>
<td>13,812,160</td>
</tr>
<tr>
<td>6</td>
<td>80,551,644</td>
<td>17,609,085</td>
</tr>
<tr>
<td>7</td>
<td>73,720,765</td>
<td>24,449,760</td>
</tr>
<tr>
<td>8</td>
<td>63,465,601</td>
<td>34,680,278</td>
</tr>
<tr>
<td>9</td>
<td>46,294,406</td>
<td>51,935,479</td>
</tr>
<tr>
<td>10</td>
<td>17,379,315</td>
<td>80,710,182</td>
</tr>
<tr>
<td>Total</td>
<td>733,096,322</td>
<td>248,500,889</td>
</tr>
</tbody>
</table>

The survey tracked 199 items, out of which 194 items had unit values estimated (see Annex 1). Those items account for 44% to 64% of total expenditures, with the shares consistently declining with income (see below).

**SHARE OF SELECTED ITEMS IN TOTAL EXPENDITURES, BY DECILE**

<table>
<thead>
<tr>
<th></th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>D8</th>
<th>D9</th>
<th>D10</th>
</tr>
</thead>
<tbody>
<tr>
<td>NATIONAL</td>
<td>64%</td>
<td>63%</td>
<td>61%</td>
<td>60%</td>
<td>58%</td>
<td>57%</td>
<td>56%</td>
<td>54%</td>
<td>52%</td>
<td>44%</td>
</tr>
</tbody>
</table>
Those items include mostly food and clothing, with food being 70% to 80%, and clothing being around 12-13%. The composition of expenditures on 199 items is provided below. As one can see, the expenditure composition of urban and rural populations that belong to the same income group is quite similar:

<table>
<thead>
<tr>
<th>EXPENDITURE SHARES</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>D8</th>
<th>D9</th>
<th>D10</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSUMPTION-NATIONAL</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>NON-FOOD-NATIONAL</td>
<td>0.202</td>
<td>0.212</td>
<td>0.222</td>
<td>0.228</td>
<td>0.239</td>
<td>0.246</td>
<td>0.257</td>
<td>0.270</td>
<td>0.280</td>
<td>0.299</td>
</tr>
<tr>
<td>Clothing-NATIONAL</td>
<td>0.127</td>
<td>0.127</td>
<td>0.128</td>
<td>0.128</td>
<td>0.128</td>
<td>0.127</td>
<td>0.125</td>
<td>0.125</td>
<td>0.124</td>
<td>0.121</td>
</tr>
<tr>
<td>FOOD-NATIONAL</td>
<td>0.798</td>
<td>0.788</td>
<td>0.778</td>
<td>0.772</td>
<td>0.761</td>
<td>0.754</td>
<td>0.743</td>
<td>0.730</td>
<td>0.720</td>
<td>0.701</td>
</tr>
<tr>
<td>Bread&amp;Cereals-NATIONAL</td>
<td>0.327</td>
<td>0.285</td>
<td>0.258</td>
<td>0.236</td>
<td>0.214</td>
<td>0.197</td>
<td>0.179</td>
<td>0.165</td>
<td>0.147</td>
<td>0.120</td>
</tr>
<tr>
<td>Rice-NATIONAL</td>
<td>0.218</td>
<td>0.177</td>
<td>0.158</td>
<td>0.143</td>
<td>0.130</td>
<td>0.121</td>
<td>0.111</td>
<td>0.099</td>
<td>0.087</td>
<td>0.070</td>
</tr>
</tbody>
</table>

| CONSUMPTION-URBAN | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  |
| NON-FOOD-URBAN     | 0.223  | 0.222  | 0.223  | 0.231  | 0.241  | 0.252  | 0.261  | 0.272  | 0.279  | 0.303  |
| Clothing-URBAN     | 0.105  | 0.102  | 0.101  | 0.103  | 0.100  | 0.104  | 0.103  | 0.105  | 0.107  | 0.120  |
| FOOD-URBAN         | 0.777  | 0.777  | 0.777  | 0.769  | 0.759  | 0.748  | 0.739  | 0.728  | 0.721  | 0.697  |
| Bread&Cereals-URBAN | 0.346  | 0.304  | 0.292  | 0.279  | 0.250  | 0.232  | 0.213  | 0.195  | 0.169  | 0.123  |
| Rice-URBAN         | 0.189  | 0.165  | 0.152  | 0.155  | 0.141  | 0.129  | 0.123  | 0.111  | 0.095  | 0.070  |

| CONSUMPTION-RURAL | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  |
| NON-FOOD-RURAL     | 0.201  | 0.211  | 0.221  | 0.227  | 0.239  | 0.244  | 0.255  | 0.267  | 0.278  | 0.276  |
| Clothing-RURAL     | 0.128  | 0.130  | 0.133  | 0.134  | 0.137  | 0.135  | 0.136  | 0.137  | 0.136  | 0.133  |
| FOOD-RURAL         | 0.799  | 0.789  | 0.779  | 0.773  | 0.761  | 0.756  | 0.745  | 0.733  | 0.722  | 0.724  |
| Bread&Cereals-RURAL | 0.324  | 0.281  | 0.251  | 0.226  | 0.203  | 0.183  | 0.163  | 0.145  | 0.124  | 0.110  |
| Rice-RURAL         | 0.219  | 0.177  | 0.157  | 0.139  | 0.125  | 0.116  | 0.104  | 0.092  | 0.078  | 0.072  |

| CONSUMPTION-Urban/Rural | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  | 1.000  |
| NON-FOOD-Urban/Rural   | 1.130  | 1.054  | 1.010  | 1.018  | 1.009  | 1.031  | 1.023  | 1.016  | 1.004  | 1.096  |
| Clothing-Urban/Rural   | 0.815  | 0.785  | 0.756  | 0.771  | 0.729  | 0.768  | 0.758  | 0.765  | 0.790  | 0.906  |
| FOOD-Urban/Rural       | 0.972  | 0.986  | 0.997  | 0.995  | 0.997  | 0.990  | 0.992  | 0.994  | 0.999  | 0.963  |
| Rice-Urban/Rural       | 0.864  | 0.934  | 0.971  | 1.114  | 1.123  | 1.110  | 1.188  | 1.213  | 1.221  | 0.975  |

Data Validation

Before the unit values could be aggregated, they needed to be validated, as there were some mistakes contained in the database. In addition, unit values with less than 10 quotes were removed.

Aggregation

PPPs were estimated using the EKS (Fisher) index. As other indexes show similar results, only EKS index will be presented. The results (see Table below) show steadily increasing unit values as income level rises.
<table>
<thead>
<tr>
<th>PRICE LEVELS BASED ON UNIT VALUES, BY DECILE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deciles</strong></td>
</tr>
<tr>
<td><strong>CONSUMPTION-NATIONAL</strong></td>
</tr>
<tr>
<td><strong>NON-FOOD-NATIONAL</strong></td>
</tr>
<tr>
<td><strong>Clothing-NATIONAL</strong></td>
</tr>
<tr>
<td><strong>FOOD-NATIONAL</strong></td>
</tr>
<tr>
<td><strong>Bread&amp;Cereals-NATIONAL</strong></td>
</tr>
<tr>
<td><strong>Rice-NATIONAL</strong></td>
</tr>
<tr>
<td><strong>CONSUMPTION-URBAN</strong></td>
</tr>
<tr>
<td><strong>NON-FOOD-URBAN</strong></td>
</tr>
<tr>
<td><strong>Clothing-URBAN</strong></td>
</tr>
<tr>
<td><strong>FOOD-URBAN</strong></td>
</tr>
<tr>
<td><strong>Bread&amp;Cereals-URBAN</strong></td>
</tr>
<tr>
<td><strong>Rice-URBAN</strong></td>
</tr>
<tr>
<td><strong>CONSUMPTION-RURAL</strong></td>
</tr>
<tr>
<td><strong>NON-FOOD-RURAL</strong></td>
</tr>
<tr>
<td><strong>Clothing-RURAL</strong></td>
</tr>
<tr>
<td><strong>FOOD-RURAL</strong></td>
</tr>
<tr>
<td><strong>Bread&amp;Cereals-RURAL</strong></td>
</tr>
<tr>
<td><strong>Rice-RURAL</strong></td>
</tr>
</tbody>
</table>
The table above shows a significant income effect across all groups of commodities, both for urban and rural populations. The data clearly show that the income effect is very substantial and reaches 40 to 60% depending on the group of items. The table above also allows us to estimate the urban-rural price differential at each income level (see below):

<table>
<thead>
<tr>
<th>URBAN-RURAL PRICE DIFFERENTIALS, BY DECILE</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>D8</th>
<th>D9</th>
<th>D10</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSUMPTION-Urban/Rural</td>
<td>1.065</td>
<td>1.009</td>
<td>1.024</td>
<td>1.019</td>
<td>1.028</td>
<td>1.017</td>
<td>1.021</td>
<td>1.020</td>
<td>1.032</td>
<td>1.087</td>
<td>1.032</td>
</tr>
<tr>
<td>NON-FOOD-Urban/Rural</td>
<td>1.109</td>
<td>1.004</td>
<td>1.044</td>
<td>1.021</td>
<td>1.024</td>
<td>1.005</td>
<td>1.022</td>
<td>0.997</td>
<td>1.030</td>
<td>1.076</td>
<td>1.033</td>
</tr>
<tr>
<td>Clothing-Urban/Rural</td>
<td>1.077</td>
<td>1.008</td>
<td>1.033</td>
<td>1.007</td>
<td>0.988</td>
<td>0.957</td>
<td>0.999</td>
<td>0.954</td>
<td>1.018</td>
<td>1.086</td>
<td>1.012</td>
</tr>
<tr>
<td>FOOD-Urban/Rural</td>
<td>1.052</td>
<td>1.010</td>
<td>1.018</td>
<td>1.019</td>
<td>1.029</td>
<td>1.021</td>
<td>1.021</td>
<td>1.028</td>
<td>1.033</td>
<td>1.092</td>
<td>1.032</td>
</tr>
<tr>
<td>Bread&amp;Cereals-Urban/Rural</td>
<td>1.070</td>
<td>1.011</td>
<td>1.014</td>
<td>1.027</td>
<td>1.056</td>
<td>1.025</td>
<td>1.018</td>
<td>1.006</td>
<td>1.003</td>
<td>1.042</td>
<td>1.027</td>
</tr>
<tr>
<td>Rice-Urban/Rural</td>
<td>1.084</td>
<td>1.006</td>
<td>1.011</td>
<td>1.004</td>
<td>1.086</td>
<td>1.040</td>
<td>1.003</td>
<td>1.005</td>
<td>1.009</td>
<td>1.076</td>
<td>1.032</td>
</tr>
</tbody>
</table>

The table above shows that the urban-rural price differentials range from minus 4.3% (Clothing for Decile 8) to plus 10.9% (NON-FOOD for Decile 1). Finally, computing the overall differentials across income groups using the Tornqvist index, we obtain 3.2% at the level of consumption. The lowest value is for clothing (1.2%), and the highest – for NON-FOOD (3.3%).
**Comparison with ICP results**

The resulting urban-rural consumption price differential (3.2%) can be compared to the ICP price data. In 2005 ICP round, India collected food and clothing data both in rural and urban locations. The overall urban-rural spread obtained in the ICP (3-4%) is quite consistent with the unit values from household surveys net of the income effect. It is worthwhile to note, that Indian urban-rural differentials are quite consistent with those in other countries in Asia, where rural prices were collected.

**4. Geographical Price Differences in India**

The same methodology can be applied at the regional level as well: thus, the national deciles can be broken down into state components in order to find out regional price differentials. Ten largest states of India with over ¾ of total population were selected for the analysis. The resulting state price averages ranged from 90% (Bihar) to 109% (Maharashtra) of the national average, which was significantly larger than the national urban-rural differences (3.2%).

<table>
<thead>
<tr>
<th>STATE</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>D8</th>
<th>D9</th>
<th>D10</th>
<th>average</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPR</td>
<td>0.97</td>
<td>0.95</td>
<td>0.98</td>
<td>0.95</td>
<td>0.94</td>
<td>0.93</td>
<td>0.94</td>
<td>1.00</td>
<td>0.99</td>
<td>0.91</td>
<td>0.96</td>
</tr>
<tr>
<td>RAJ</td>
<td>1.07</td>
<td>1.05</td>
<td>1.05</td>
<td>1.05</td>
<td>1.06</td>
<td>1.01</td>
<td>1.02</td>
<td>1.01</td>
<td>0.97</td>
<td>0.98</td>
<td>1.03</td>
</tr>
<tr>
<td>MAH</td>
<td>1.13</td>
<td>1.07</td>
<td>1.12</td>
<td>1.09</td>
<td>1.06</td>
<td>1.05</td>
<td>1.05</td>
<td>1.12</td>
<td>1.12</td>
<td>1.07</td>
<td>1.09</td>
</tr>
<tr>
<td>WBE</td>
<td>0.99</td>
<td>0.97</td>
<td>0.95</td>
<td>0.99</td>
<td>0.99</td>
<td>0.98</td>
<td>0.96</td>
<td>1.01</td>
<td>1.02</td>
<td>0.93</td>
<td>0.98</td>
</tr>
<tr>
<td>BIH</td>
<td>0.96</td>
<td>0.93</td>
<td>0.91</td>
<td>0.91</td>
<td>0.90</td>
<td>0.89</td>
<td>0.85</td>
<td>0.90</td>
<td>0.92</td>
<td>0.85</td>
<td>0.90</td>
</tr>
<tr>
<td>APR</td>
<td>1.11</td>
<td>1.05</td>
<td>1.06</td>
<td>1.02</td>
<td>1.06</td>
<td>0.99</td>
<td>0.99</td>
<td>1.01</td>
<td>0.97</td>
<td>0.90</td>
<td>1.01</td>
</tr>
<tr>
<td>MAP</td>
<td>1.03</td>
<td>0.93</td>
<td>0.96</td>
<td>0.94</td>
<td>0.95</td>
<td>0.92</td>
<td>0.95</td>
<td>0.98</td>
<td>0.97</td>
<td>0.90</td>
<td>0.95</td>
</tr>
<tr>
<td>KAR</td>
<td>1.10</td>
<td>1.02</td>
<td>1.03</td>
<td>1.03</td>
<td>0.99</td>
<td>0.98</td>
<td>0.96</td>
<td>0.97</td>
<td>0.96</td>
<td>0.92</td>
<td>1.00</td>
</tr>
<tr>
<td>TAN</td>
<td>1.17</td>
<td>1.09</td>
<td>1.13</td>
<td>1.10</td>
<td>1.05</td>
<td>1.05</td>
<td>1.05</td>
<td>1.06</td>
<td>1.04</td>
<td>0.99</td>
<td>1.07</td>
</tr>
<tr>
<td>GUJ</td>
<td>1.13</td>
<td>1.11</td>
<td>1.04</td>
<td>1.08</td>
<td>1.04</td>
<td>1.10</td>
<td>1.08</td>
<td>1.01</td>
<td>1.01</td>
<td>1.07</td>
<td></td>
</tr>
</tbody>
</table>

TABLE. STATE PRICE LEVELS BY NATIONAL DECILE, INDIA = 1.00
The results show that the overall national urban-rural price differentials (3.2%) are significantly smaller than geographical ones which range from 10% lower than the average for India to 9% higher. In connection to the ICP, the results show that it is very important to organize proper geographical coverage of the survey. They also show that a possible urban bias in ICP in 2005 for India could not be more than one percent which still would be significantly less than the standard error in estimating PPP.
ANNEX 1. List of items in Indian household survey

- rice - PDS
- rice - other sources
- chira
- khoi, lawa
- muri
- other rice products
- wheat/atta - PDS
- wheat/atta - other sources
- maida
- suji, rawa
- sewai, noodles
- bread: bakery
- other wheat products
- jowar& products
- bajra& products
- barley & products
- barley & products
- small millets & products
- ragi& products
- other cereals
- cereal substitutes: tapioca, jackfruit, etc.
- arhar, tur
- gram: split
- gram: whole
- moong
- masur
- urd
- peas
- soyabean
- khesari
- other pulses
- gram products
- besan
- other pulse products
- milk: liquid (litre)
- baby food
- milk: condensed/ powder
- curd
- ghee
- butter
- ice-cream
- other milk products
- vanaspati, margarine
- mustard oil
- groundnut oil
- coconut oil
- edible oil: others
- eggs (no.)
- fish, prawn
- goat meat/mutton
- beef/ buffalo meat
- pork
- chicken
- others: birds, crab, oyster, tortoise, etc.
- potato
- onion
- radish
- carrot
- turnip
- beet
- sweet potato
- arum
- pumpkin
- gourd
- bitter gourd
- cucumber
- parwal, patal
- jhinga, torai
- snake gourd
- papaya: green
- cauliflower
- cabbage
- brinjal
- lady's finger
- palak/other leafy vegetables
- french beans, barbati
- tomato
- peas
chillis: green
capsicum
plantain: green
jackfruit: green
lemon (no.)
garlic (gm)
ginger (gm)
other vegetables
banana (no.)
jackfruit
watermelon
pineapple (no.)
coconut (no.)
guava
singara
orange, mausami (no.)
papaya
mango
kharbooza
pears, naspati
berries
leechi
apple
grapes
other fresh fruits
coconut: copra
groundnut
dates
cashewnut
walnut
other nuts
raisin, kishmish, monacca, etc.
other dry fruits
sugar - PDS
sugar - other sources
gur
candy, misri
honey
salt
turmeric (gm)
black pepper (gm)
dry chillies (gm)
tamarind (gm)
curry powder (gm)
oilseeds (gm)
other spices (gm)
tea: cups (no.)
tea: leaf (gm)
coffee: cups (no.)
coffee: powder (gm)
ice
cold beverages: bottled/canned (litre)
fruit juice and shake (litre)
coconut: green (no.)
other beverages: cocoa, chocolate, etc.
biscuits
salted refreshments
prepared sweets
cooked meals (no.)
cake, pastry
pickles (gm)
sauce (gm)
jam, jelly (gm)
other processed food
pan: leaf
pan: finished (no.)
supari (gm)
lime (gm)
katha (gm)
other ingredients for pan (gm)
bidi (no.)
cigarettes (no.)
leaf tobacco (gm)
snuff (gm)
hookah tobacco (gm)
cheroot (no.)
zarda, kimam, surti (gm)
other tobacco products
ganja (gm)
toddy (litre)
country liquor (litre)
beer (litre)
foreign liquor or refined liquor (litre)
other intoxicants
coke
firewood and chips
electricity (std. unit)
dung cake
kerosene-PDS (litre)
kerosene - other sources (litre)
matches (box)
coal
LPG
charcoal
candle (no.)
gobar gas
dhoti (metre)
sari (metre)
cloth for shirt, pyjama, salwar, etc. (metre)
cloth for coat, trousers, overcoat, etc. (metre)
chaddar, dupatta, shawl, etc. (no.)
lungi (no.)
gamchha, towel, handkerchief (no.)
hosiery articles, stockings, under-garments, etc. (no.)
ready-made garments (no.)
headwear (no.)
knitted garments, sweater, pullover, cardigan, muffler, scarf, etc. (no.)
knitting wool, cotton yarn (gm)
clothing: others
bed sheet, bed cover (no.)
rug, blanket (no.)
pillow, quilt, mattress (no.)
cloth for upholstery, curtain, table-cloth, etc. (metre)
mosquito net (no.)
mats and matting (no.)
cotton (gm)
leather boots, shoes
leather sandals, chappals, etc.
other leather footwear
rubber/ PVC footwear
other footwear