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

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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

yseparately($UV_r(y)$ 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

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

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

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
NATIONAL	64%	63%	61%	60%	58%	57%	56%	54%	52%	44%

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:

EXPENDITURE SHARES	Deciles									
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
CONSUMPTION-NATIONAL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
NON-FOOD-NATIONAL	0.202	0.212	0.222	0.228	0.239	0.246	0.257	0.270	0.280	0.299
Clothing-NATIONAL	0.127	0.127	0.128	0.128	0.128	0.127	0.125	0.124	0.121	0.123
FOOD-NATIONAL	0.798	0.788	0.778	0.772	0.761	0.754	0.743	0.730	0.720	0.701
Bread&Cereals-NATIONAL	0.327	0.285	0.258	0.236	0.214	0.197	0.179	0.165	0.147	0.120
Rice-NATIONAL	0.218	0.177	0.158	0.143	0.130	0.121	0.111	0.099	0.087	0.070
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	0.778	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	1.110	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
Bread&Cereals-Urban/Rural	1.067	1.080	1.165	1.237	1.230	1.263	1.312	1.339	1.357	1.118
Rice-Urban/Rural	0.864	0.934	0.971	1.114	1.123	1.110	1.188	1.213	1.221	0.975

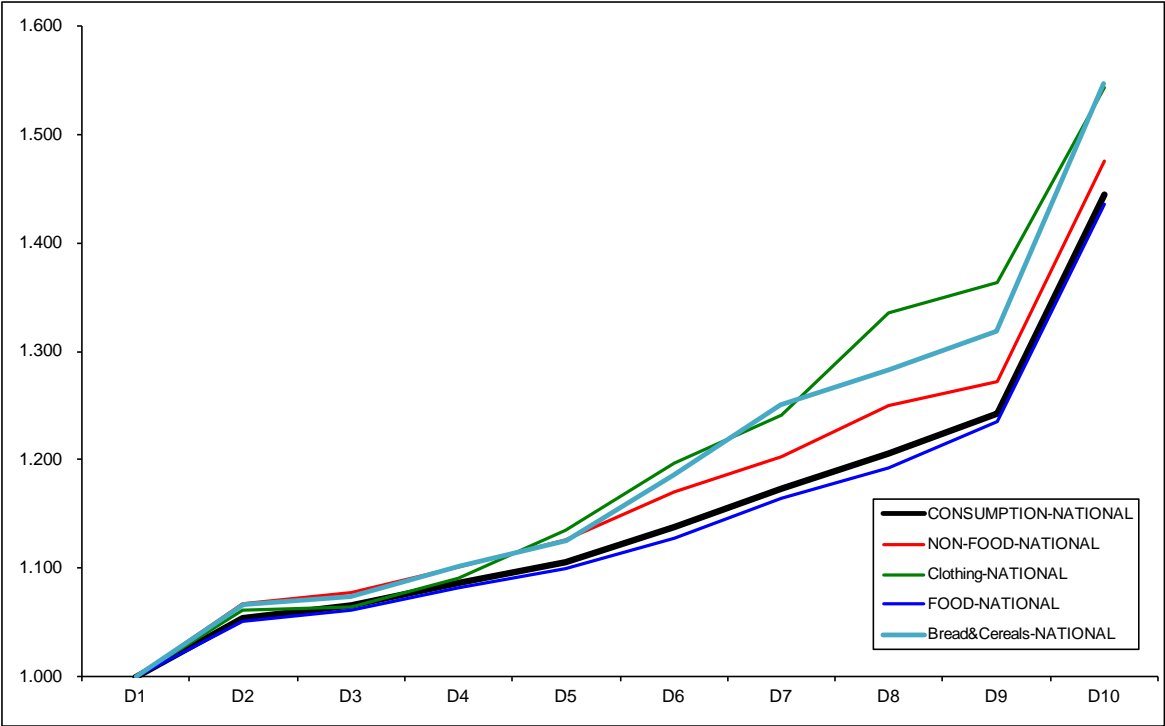
Data Validation

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.

PRICE LEVELS BASED ON UNIT VALUES										
	Deciles									
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
CONSUMPTION-NATIONAL	1.000	1.054	1.065	1.086	1.106	1.138	1.174	1.206	1.243	1.444
NON-FOOD-NATIONAL	1.000	1.067	1.078	1.101	1.127	1.170	1.203	1.249	1.272	1.475
Clothing-NATIONAL	1.000	1.061	1.064	1.091	1.135	1.197	1.241	1.335	1.364	1.543
FOOD-NATIONAL	1.000	1.050	1.062	1.081	1.099	1.128	1.165	1.193	1.235	1.435
Bread&Cereals-NATIONAL	1.000	1.067	1.074	1.102	1.125	1.185	1.250	1.283	1.318	1.547
Rice-NATIONAL	1.000	1.098	1.099	1.111	1.112	1.210	1.303	1.303	1.353	1.630
CONSUMPTION-URBAN	1.063	1.061	1.089	1.104	1.132	1.151	1.195	1.213	1.252	1.457
NON-FOOD-URBAN	1.104	1.077	1.116	1.117	1.145	1.166	1.220	1.230	1.287	1.485
Clothing-URBAN	1.076	1.068	1.100	1.097	1.123	1.159	1.249	1.276	1.367	1.565
FOOD-URBAN	1.052	1.056	1.081	1.101	1.128	1.147	1.188	1.208	1.241	1.449
Bread&Cereals-URBAN	1.069	1.078	1.091	1.127	1.187	1.192	1.267	1.290	1.328	1.545
Rice-URBAN	1.082	1.105	1.111	1.108	1.208	1.219	1.306	1.309	1.364	1.632
CONSUMPTION-RURAL	0.998	1.052	1.064	1.083	1.101	1.131	1.170	1.189	1.213	1.340
NON-FOOD-RURAL	0.995	1.073	1.069	1.094	1.118	1.161	1.194	1.234	1.250	1.380
Clothing-RURAL	0.999	1.060	1.065	1.089	1.137	1.210	1.251	1.338	1.343	1.441
FOOD-RURAL	0.999	1.045	1.062	1.080	1.096	1.123	1.163	1.175	1.201	1.327
Bread&Cereals-RURAL	0.999	1.066	1.076	1.097	1.124	1.163	1.245	1.283	1.324	1.482
Rice-RURAL	0.999	1.098	1.099	1.104	1.113	1.173	1.303	1.302	1.351	1.517



PRICE LEVELS BASED ON UNIT VALUES, BY DECILE

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):

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

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%).



URBAN-RURAL PRICE DIFFERENTIALS, BY DECILE

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 $\frac{3}{4}$ 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%).

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

TABLE. STATE PRICE LEVELS BY NATIONAL DECILE, INDIA = 1.00

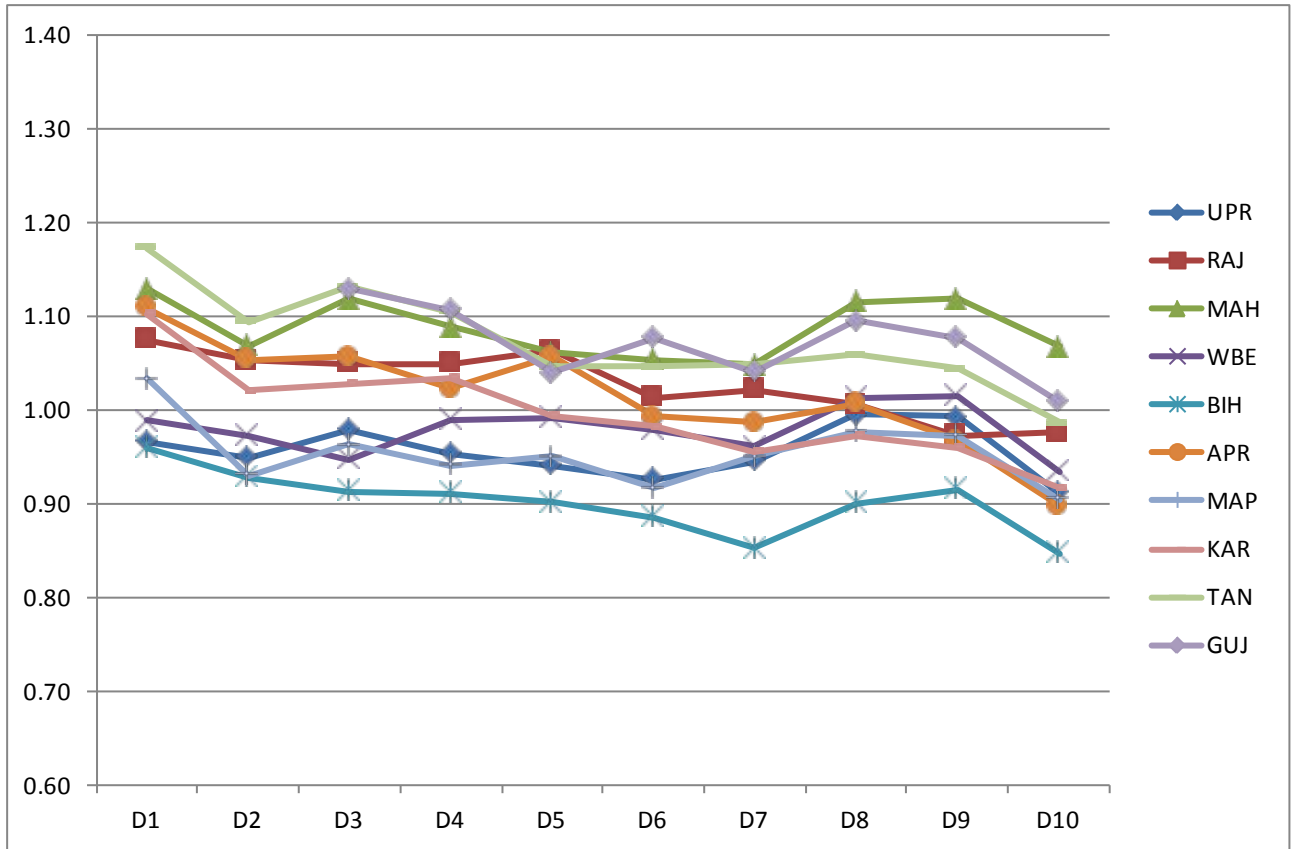


FIGURE. STATE PRICE LEVELS BY NATIONAL DECILE, INDIA = 1.00

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	butter
rice - other sources	ice-cream
chira	other milk products
khoi, lawa	vanaspati, margarine
muri	mustard oil
other rice products	groundnut oil
wheat/atta - PDS	coconut oil
wheat/atta - other sources	edible oil: others
maida	eggs (no.)
suji, rawa	fish, prawn
sewai, noodles	goat meat/mutton
bread: bakery	beef/ buffalo meat
other wheat products	pork
jowar& products	chicken
bajra& products	others: birds, crab, oyster, tortoise, etc.
maize & products	potato
barley & products	onion
small millets & products	radish
ragi& products	carrot
other cereals	turnip
cereal substitutes: tapioca, jackfruit, etc.	beet
arhar, tur	sweet potato
gram: split	arum
gram: whole	pumpkin
moong	gourd
masur	bitter gourd
urd	cucumber
peas	parwal, patal
soyabean	jhinga, torai
khesari	snake gourd
other pulses	papaya: green
gram products	cauliflower
besan	cabbage
other pulse products	brinjal
milk: liquid (litre)	lady's finger
baby food	palak/other leafy vegetables
milk: condensed/ powder	french beans, barbati
curd	tomato
ghee	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