

## Examination of Consumer Price Index in India – Rural versus Urban

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### ABSTRACT

For the last 66 years Indian economy has gone through many phases. The development of both rural and urban India has taken place indeed but the debate of rural versus urban or in other words India versus Bharat is still very relevant and contemporary. The Consumer Price Index (CPI) is an important economic indicator. In this paper, the authors have examined the CPI of India from January, 2011 to April, 2014 (40 months) to identify whether both rural and urban India exhibit the same economic pattern or not. The authors have observed that the distribution of CPI is different in rural and urban India in 'recreation and amusement', 'transport and communication' and 'household requisites'. It is well known that dual economy is an important theory in economics. The findings of this paper certainly spark the question in our minds – "Are we living in a dual economy in India".

**Keywords**—Consumer Price Index, CPI, Non Parametric, Mann-Whitney U test, Rural, Urban.

### I. INTRODUCTION

There are always very close links between rural and urban areas. According to Pundir and Singh (2001), "Rural-urban linkages are both a cause and a consequence of socio-economic development." [1]. Lesetedi (2003) stated, "Urban-rural linkages can be understood as the structural social relationships maintained between individuals in the urban environment and those in rural areas" [2]. Tacoli (1998) pointed out that there are two categories of rural-urban interactions – (i) linkages across space which means flow of people, money, goods, information & waste and (ii) sectoral interactions [3]. As per Tacoli (1998) sectoral interactions include, "rural activities taking place in urban areas (such as urban agriculture) or activities often classified as urban (such as manufacturing and services) taking place in rural areas" [3].

It is evident that rural-urban link plays an important role in the growth of the national economy

especially in the field of income and employment generation and thus creating wealth for the nation. As a nation, therefore it becomes an important and crucial task for us to properly nurture and balance this linkage for the development of the overall economy of the country.

In today's date the big word is 'Inflation'. We all know when the overall price level of goods and services increases in the economy that's 'inflation'. Consumer Price Index (CPI) is one of the instruments for measuring inflation. In recent years, we have observed that the price of commodities be it essential or otherwise rose sharply across the nation affecting all of us.

In this study the authors have explored the Consumer Price Index (CPI) of India which is an important economic indicator to investigate the economic conditions of rural and urban India. We often ask a very common question – "Does both rural and urban India exhibit the same economic pattern". In this paper the authors have examined and analyzed the monthly CPI data of different commodities using statistical measures to find the answer of the above question.

### II. RELATED WORK

According to Patnaik, Shah and Verones (2011), "The CPI reflects the consumption bundle of households, and is thus more relevant than any other measure of inflation" [4].

Brandt and Holz (2006) stated, "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." [5].

In 2007 Saith noted that "Rural poverty is related directly to the consumer price index number for agricultural labourers, and inversely to agricultural production" [6].

Ravallion and Datt (2002) pointed out, “The elasticities of measured poverty to farm yields and development spending did not differ significantly across states. But the elasticities of poverty to (urban and rural) non-farm output varied appreciably, and the differences were quantitatively important to the overall rate of poverty reduction” [7].

Pons’s (2011) study tries to find out “which households are the most vulnerable to rising food prices” [8]. According to Pons (2011) “there are differential impacts on different categories of households. Rural households are more vulnerable than urban households. In addition, the poorest households of both sectors are more penalized by rising food price than the richest households. The impact depends also on the commodity which price has increased.” [8].

Kumar and Boopathy (n.d.) stated, “Consumer Price Indices (CPI) released at national level are CPI for Industrial Workers (IW), CPI for Agricultural Labourers (AL)/ Rural Labourers (RL) and CPI (Rural/Urban/Combined)” [9]. According to Kumar and Boopathy (n.d.) for data collection of CPI (Rural), “From each district, two villages were selected. However, in case of some states with higher population but lesser number of districts, additional villages have been selected.” [9]. Kumar and Boopathy (n.d.) also stated for data collection of CPI (Urban), “All cities/towns having population (2001 Population Census) of more than 9 lakh and all state/UT capitals not covered therein were selected and other towns were selected randomly.” [9].

### III. OBJECTIVES OF THE STUDY

- (i) To identify the products and items whose consumer price index (CPI) are same across sectors i.e. Rural and Urban India.
- (ii) To identify the products and items whose consumer price index (CPI) are different across sectors i.e. Rural and Urban India.

### IV. HYPOTHESIS

Null Hypothesis: The distribution of Consumer Price Index (CPI) of different products and items are same across categories of sectors i.e. Rural and Urban India.

Alternative Hypothesis: The distribution of Consumer Price Index (CPI) of different products and items are different across categories of sectors i.e. Rural and Urban India.

### V. RESEARCH METHODOLOGY

In this research we have analyzed the Consumer Price Index of different items in Rural and Urban India. We have used the monthly data from January, 2011 to April, 2014 (Total 40 months). The dataset is collected from Government of India website [10]. In this study we have selected twenty five (25) test variables and one

grouping variable. They are listed in the following tables (TABLE I & TABLE II).

TABLE I  
TEST VARIABLES

	Test Variable Name
1	Consumer Price Index of Cereal and Products
2	Consumer Price Index of Pulses and Pulse Products
3	Consumer Price Index of Oils and Fats
4	Consumer Price Index of Meat, Fish etc
5	Consumer Price Index of Milk and Milk Products
6	Consumer Price Index of Spices and Condiments
7	Consumer Price Index of Vegetables
8	Consumer Price Index of Fruits
9	Consumer Price Index of Sugar, Honey etc
10	Consumer Price Index of Non Alcoholic Beverages
11	Consumer Price Index of Prepared Meals
12	Consumer Price Index of Pan, Supari etc
13	Consumer Price Index of Food, Beverages and Tobacco
14	Consumer Price Index of Fuel and Lighting
15	Consumer Price Index of Clothing and Bedding
16	Consumer Price Index of Footwear
17	Consumer Price Index of Clothing, Bedding and Footwear
18	Consumer Price Index of Medical Care
19	Consumer Price Index of Education
20	Consumer Price Index of Recreation and Amusement
21	Consumer Price Index of Transport and Communication
22	Consumer Price Index of Personal Care Items
23	Consumer Price Index of Household Requisites
24	Consumer Price Index of Others
25	Consumer Price Index of Miscellaneous

TABLE II  
GROUPING VARIABLE

	Grouping Variable Name	Groups
1	Sector	Rural, Urban

For the purpose of data analysis we have used Mann–Whitney U test which is a non parametric method to determine whether any difference exists between two (2) independent groups. In this study the independent groups are ‘Rural’ and ‘Urban’ as shown in Table 2. We have calculated the Mann–Whitney U value, z–score and Asymptotic significance for each test variables. The significance level is .05. Using the z–score the effect size (r) is calculated using the formula [11] shown below.

Effect size,  $r = Z/\sqrt{N}$ , where N is the size of the study and Z is the z–score.

The decision rule is as follows: if  $|calculated\ z| \geq z\ tabulated$ , then the null hypothesis is rejected otherwise the null hypothesis is retained [12]. In this study we have selected  $\alpha=0.05$  for which  $|z\ tabulated|$  is 1.96 [15]. As regards the effect size is concerned, the thumb rule of Cohel suggest that an effect size of  $|.1|$  represents a small effect, an effect size of  $|.3|$  represents a medium effect and an effect size of  $|.5|$  represents a large effect size [12][13][14].

For the purpose of data analysis we have used SPSS and MS Excel.

## VI. DATA ANALYSIS & FINDINGS

The hypothesis test summary and effect size is given in the following table (TABLE III) –

TABLE III  
HYPOTHESIS TEST SUMMARY AND EFFECT SIZE

	Null Hypothesis	Z – score	Sig.	Decision	Effect Size
1	The distribution of CPI of Cereal and Products is the same across categories of sector (Rural versus Urban)	-1.703	.088	Retain the null hypothesis	-.19
2	The distribution of CPI of Pulses and Pulse Products is the same across categories of sector (Rural versus Urban)	-1.068	.285	Retain the null hypothesis	-.12
3	The distribution of CPI of Oils and Fats is the same across categories of sector (Rural versus Urban)	1.400	.161	Retain the null hypothesis	.16
4	The distribution of CPI of Meat, Fish etc is the same across categories of sector (Rural versus Urban)	.024	.981	Retain the null hypothesis	.00
5	The distribution of CPI of Milk and Milk Products is the same across categories of sector (Rural versus Urban)	-1.314	.189	Retain the null hypothesis	-.15
6	The distribution of CPI of Spices and Condiments is the same across categories of sector (Rural versus Urban)	-.943	.346	Retain the null hypothesis	-.11
7	The distribution of CPI of Vegetables is the same across categories of sector (Rural versus Urban)	-1.371	.170	Retain the null hypothesis	-.15
8	The distribution of CPI of Fruits is the same across categories of sector (Rural versus Urban)	-.760	.447	Retain the null hypothesis	-.08
9	The distribution of CPI of Sugar, Honey etc is the same across categories of sector (Rural versus Urban)	-1.299	.194	Retain the null hypothesis	-.15
10	The distribution of CPI of Non Alcoholic Beverages is the same across categories of sector (Rural versus Urban)	-.019	.985	Retain the null hypothesis	.00
11	The distribution of CPI of Prepared Meals is the same across categories of sector	.284	.777	Retain the null hypothesis	.03

	(Rural versus Urban)				
12	The distribution of CPI of Pan, Supari etc is the same across categories of sector (Rural versus Urban)	.486	.627	Retain the null hypothesis	.05
13	The distribution of CPI of Food, Beverages and Tobacco is the same across categories of sector (Rural versus Urban)	-.544	.587	Retain the null hypothesis	-.06
14	The distribution of CPI of Fuel and Lighting is the same across categories of sector (Rural versus Urban)	-1.443	.149	Retain the null hypothesis	-.16
15	The distribution of CPI of Clothing and Bedding is the same across categories of sector (Rural versus Urban)	.476	.634	Retain the null hypothesis	.05
16	The distribution of CPI of Footwear is the same across categories of sector (Rural versus Urban)	-1.612	.107	Retain the null hypothesis	-.18
17	The distribution of CPI of Clothing, Bedding and Footwear is the same across categories of sector (Rural versus Urban)	.202	.840	Retain the null hypothesis	.02
18	The distribution of CPI of Medical Care is the same across categories of sector (Rural versus Urban)	-1.107	.268	Retain the null hypothesis	-.12
19	The distribution of CPI of Education is the same across categories of sector (Rural versus Urban)	-.606	.544	Retain the null hypothesis	-.07
20	The distribution of CPI of Recreation and Amusement is the same across categories of sector (Rural versus Urban)	-4.677	.000	Reject the null hypothesis	-.52
21	The distribution of CPI of Transport and Communication is the same across categories of sector (Rural versus Urban)	-2.209	.027	Reject the null hypothesis	-.25
22	The distribution of CPI of Personal Care Items is the same across categories of sector (Rural versus Urban)	-1.896	.058	Retain the null hypothesis	-.21
23	The distribution of CPI of Household Requisites is the same across categories of sector (Rural versus Urban)	-3.219	.001	Reject the null hypothesis	-.36
24	The distribution of	.101	.920	Retain the	.01

	CPI of Others is the same across categories of sector (Rural versus Urban)			null hypothesis	
25	The distribution of CPI of Miscellaneous is the same across categories of sector (Rural versus Urban)	-1.939	.052	Retain the null hypothesis	-.22

(Asymptotic significances are displayed. The significance level is .05)

From the above table (TABLE III) we may observe that the Consumer Price Index (CPI) of ‘Cereal and products’, ‘Pulses and Pulse Products’, ‘Oils and Fats’, ‘Meat, Fish etc’, ‘Milk and Milk Products’, ‘Spices and Condiments’, ‘Vegetables’, ‘Fruits’, ‘Sugar, Honey etc’, ‘Non Alcoholic Beverages’, ‘Prepared Meals’, ‘Pan, Supari etc’, ‘Food, Beverages and Tobacco’, ‘Fuel and Lighting’, ‘Clothing and Bedding’, ‘Footwear’, ‘Clothing, Bedding and Footwear’, ‘Medical Care’, ‘Education’, ‘Personal Care’, ‘Others’ and ‘Miscellaneous’ items in Rural India did not significantly differ than in Urban India. However, the Consumer Price Index of ‘Recreation and Amusement’ in Rural India (*Median* = 114) were significantly more than Urban (*Median* = 105.85) India,  $U = 314.00$ ,  $z = -4.677$ ,  $p = .000$ ,  $r = -.52$ . The Consumer Price Index of ‘Transport and Communication’ in Rural India (*Median* = 121) were significantly more than Urban (*Median* = 116.65) India,  $U = 570.50$ ,  $z = -2.209$ ,  $p = .027$ ,  $r = -.25$ . We also observe that the Consumer Price Index of ‘Household Requisites’ in Rural India (*Median* = 127.55) were significantly more than Urban (*Median* = 119.35) India,  $U = 465.50$ ,  $z = -3.219$ ,  $p = .001$ ,  $r = -.36$ .

This represents a small to medium effect for the Consumer Price Index of Transport and Communication (Effect size = -.25), a medium effect for the Consumer Price Index of Household Requisites (Effect size = -.36) and a large effect for the Consumer Price Index of Recreation and Amusement (Effect size = -.52).

The graphical representations of the items where Consumer Price Index (CPI) were significantly different across categories of sectors (Rural versus Urban) are illustrated below:

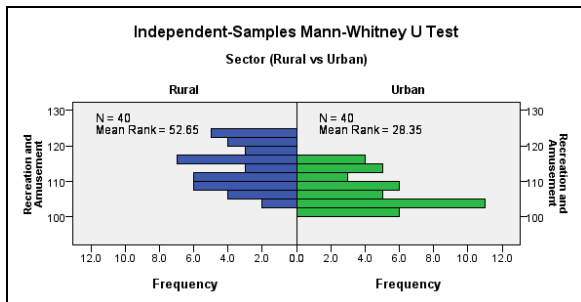


Figure 1: Mann – Whitney U test of CPI of Recreation and Amusement across categories of sector

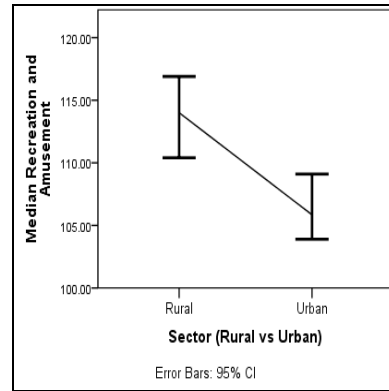


Figure 2: Median of CPI of Recreation and Amusement across categories of sector

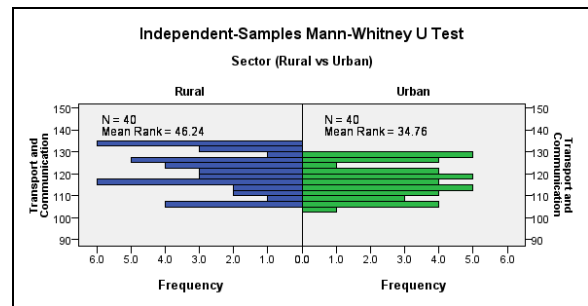


Figure 3: Mann – Whitney U test of CPI of Transport and Communication across categories of sector

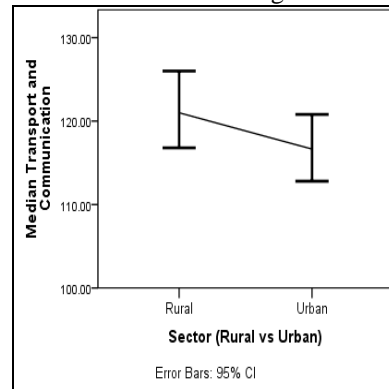


Figure 4: Median of CPI of Transport and Communication across categories of sector

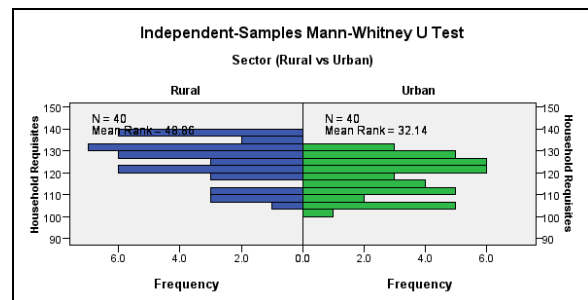


Figure 5: Mann – Whitney U test of CPI of Household Requisites across categories of sector

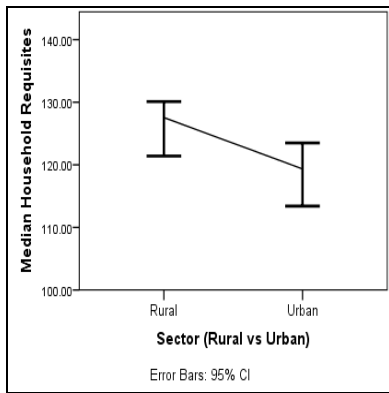


Figure 6: Median of CPI of Household Requisites across categories of sector

## VII. LIMITATIONS

In this research the authors have only explored the dataset of Consumer Price Index of different commodities in India and performed a well known non parametric test i.e. Mann–Whitney U test to identify the difference between rural and urban India. The results thus obtained no doubt give us a true insight into the story but we have not done any cause effect analysis in this study.

## VIII. CONCLUSION

To conclude with we can say, the above results clearly show us that though for most of the commodities the distribution of Consumer Price Index (CPI) remain same across categories of sector i.e. rural and urban but there exists at least three (3) distinct areas where this is not so. In this study, the authors have found that for the given dataset the distribution of CPI is different in rural and urban India in the areas like ‘recreation and amusement’, ‘transport and communication’ and ‘household requisites’. The study also reveals that in all these three (3) areas the Rural–CPI is significantly more than Urban–CPI.

These results again spark the age old debate of Rural *versus* Urban and to be very precise the more contemporary India *versus* Bharat debate. As a nation ‘We’ need to progress and when we say ‘We’ it means the entire nation – both rural and urban India but when we cross examine the economic indicator CPI of India from January, 2011 to April, 2014 (40 months) we surprisingly found that the economic pattern in urban and rural India is not same in all the fields in this given time period. In this case, we have done our research work on 40 months data and our conclusions are based on the statistical tests of these observations only. We cannot draw a holistic conclusion from here but this work certainly gives us the direction for future research with larger dataset.

It is evident that all these have a certain affect on the overall economic condition of the country and gives rise to some of the very important questions like “why this is happening” and “are we living in a dual economy in

India”. Finding answers to these important questions will certainly be our future endeavor.

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