WP-2017-011

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August 2017

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JEL Code: E01, E3, E310, E52

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Abstract

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The Plutocratic Bias in the Indian CPI

1. Introduction

Index numbers as a measure of the percentage change in prices of a relevant basket of commodities have been in official use for at least a century and a half (see Chance (1966) for a fascinating history of the topic). As a matter of fact, variants of the Laspeyres and Paasche indices (originally suggested in the 1870s) continue to be in use at most national statistical offices for a variety of different purposes. The most frequently used official index in several countries is the consumer price index (CPI), which purports to measure the changes in the COLI (cost of living), as measured by a basket of goods of a stipulated group over a specified time period. The CPI (cost of living index) is usually a Laspeyres index or its close variants such as the Lowe and Young indexes (see ILO (2004)). Ever since Konus (1939), it has been known that the Laspeyres index (as a measure of COLI) suffers from an upward "substitution bias" due to the fact that the fixed market basket ignores the substitution consumers make in their purchases in response to relative price changes. The Boskin Commission (see Boskin et al (1996)), one of the most thorough reviews of the US CPI notes several other sources of dissatisfaction with the Laspeyres-Lowe-Young (LLY) types of CPI indexes such as the *quality change bias, outlet substitution bias, new products bias* etc. Additionally these indexes are not *superlative* (see Diewert (1976)) in the sense that they do not reflect exactly the changes in COLI over a specific period.[2]

[2] See Afriat and Milana (2006) for a detailed treatment of *exact/ superlative* index numbers. Mathematically speaking a *superlative* index number can be viewed as a second-order approximation to a *homothetic* utility function (see Armknecht and Silver (2012) p. 4 footnote)

However, one notable drawback of the LLY type of indexes that has attracted relatively little attention is the so-called *plutocratic* bias in such indexes. This bias arises since by their very construction, the LLY- based CPI gives greater weightage to the more affluent consumption groups, so that the associated CPI and inflation measures overwhelmingly reflect the COLI (and changes in COLI) of the upper deciles of the population (rather than the lower). This bias seems to have been first brought to the profession's notice by Prais (1959) and Nicholson (1975). The issues were considerably elaborated by Fry and Pashardes (1985), Pollak (1998), Deaton (1998) etc.. Empirical estimates for the plutocratic gap have been obtained for various countries most notably for Spain (Ley (2005), Izquierdo et al (2003)), U.S. (Deaton (1998), Kokoski (2000) etc.), U.K. (Deaton and Muellbauer (1980), Fry and Pashardes (1985) etc.), Hungary (Newbery (1995)) etc. [3] The plutocratic bias assumes additional significance in the wake of the recent widespread adoption of *inflation targeting regimes* by several central banks all over the world. In such a situation monetary policy may exhibit an anti-poor bias under some circumstances. Such a bias may also arise in countries where wages, salaries or social benefits are indexed via the CPI.

We plan to work out the plutocratic gap for the new Indian CPI with base year 2012 for the four years 2012, 2013, 2014 and 2015. In our opinion this issue assumes special significance in the Indian case, where the incidence of poverty is very high, income and consumption inequalities are significant and consumption patterns differ widely across income groups and geographical regions. In such a context the question "Whose inflation?" is particularly poignant, especially since salaries in the organized sector are largely indexed (though those in the unorganized sector are not) and further since the Reserve Bank of India is in the process of completing a rapid switchover to a regime of inflation targeting (see Urjit Patel Committee Report (RBI (2014)).

[3] See Ley (2005), p. 639 for an exhaustive list.

The plan of this paper is as follows. The next section (Section 2) introduces the concept of the plutocratic gap and focuses on its salient features. Section 3 sets forth the relevant empirical context for the Indian case. Section 4 presents calculations for the plutocratic gap in the case of the new Indian CPI. The gaps are calculated both with and without adjustments for household size and for rural and urban households separately. Section 5 goes further and decomposes the plutocratic bias commodity-wise. Section 6 compiles plutocratic biases for three Indian states viz. Maharashtra, Andhra Pradesh and Bihar to illustrate the regional dimension of the bias. Using the concept of expenditure elasticity in Section 7, we classify the goods constituting the Indian CPI into four groups viz. (i) Necessities (ii) Housing (iii) Luxuries and (iv) Others, and present separate inflation indices for each group for three successive years. In Section 8 we develop separate index numbers for the bottom 30%, middle 60% and top 10% of the population. Such a development enables us to see the class-wise differential impact of inflation. Additionally we study the relative contributions of each commodity under these groups to the overall inflation. The concluding section (Section 9), apart from offering a summary of our main results also indicates the implications of the plutocratic bias for monetary policy and indexation of official transfer payments.

2. Plutocratic Bias : Definition and Computation

A. The Laspeyres Index & the Plutocratic CPI: As mentioned earlier most official CPI statistics are based on the Laspeyres index (or its variants the Young and Lowe indexes). The Laspeyres index is a measure of the change in COLI between a "base period" b and the current period t. Let the number of commodities in the basket be n, and let the base period prices and quantities be denoted by $p_i^{(b)}$, $q_i^{(b)}$ respectively, while $p_i^{(t)}, q_i^{(t)}$ denote the corresponding current period quantities (i=1, 2, …, n). Then the Laspeyres price index may be denoted by

$$CPI = \sum_{i=1}^{n} \frac{p_i^{(t)} q_i^{(b)}}{p_i^{(b)} q_i^{(b)}} = \sum_{i=1}^{n} s_i \left(\frac{p_i^{(t)}}{p_i^{(b)}} \right) \quad (1)$$

Where $s_i = \frac{p_i^{(b)} q_i^{(b)}}{\sum_{j=1}^{n} p_j^{(b)} q_j^{(b)}}$ is simply the share of good i in the total expenditure in the base period b.

The quantities s_i , i=1,…, n are based on a household expenditure survey conducted in an earlier year (which we call as the "base" period), which precedes the "reference" year (the year corresponding to the first use of the index). The reference year may or may not coincide with the base year. If the two periods coincide we have the Laspeyres-Young index, if they do not and the base year weights are updated to the reference year, we have the Laspeyres-Lowe index. Note that even if the base and reference periods differ but the base year weights are not updated to the reference year, we still have a Laspeyres-Young index (see Akem and Opryshko (2014)). In the Indian case, the index used is the Laspeyres-Young index, so that the distinction between the base and reference year is irrelevant. In our further discussion we will simply refer to our index as a Laspeyres index and use the term "base" year in consonance with Indian official usage.

To see how the "plutocratic bias" (formally defined below) arises, let X denote total expenditure in the economy composed of H households (h=1, 2…, H). Let X_i denote the aggregate (economy-wide) expenditure on good i (i=1,2,…, n) and let x_i^h denote the expenditure of the h-th household on good i, while x^h denotes the total expenditure of the h-th household. Further if by $s_i^h = \frac{x_i^h}{x^h}$ we denote the share of household *h* expenditure on good i in its total expenditure, and by $s_i = \frac{X_i}{X}$ the corresponding aggregate economy share, it easy to see that

$$s_i = \frac{X_i}{X} = \frac{\sum_{h=1}^{H} x_i^h}{x^h} \left(\frac{x^h}{X} \right) = \sum_{h=1}^{H} s_i^h e^h \quad (2)$$

where e^h is the share of the h-th household's expenditure in the total national expenditure. Thus the national shares s_i defined by the Laspeyres index (1) is a weighted average of the constituent household shares s_i^h with the weights e^h being the representation of the h-th household's expenditure in the total national expenditure (see e.g. Izquierdo et al (2003)). Since the richer households would naturally claim a larger share of the aggregate expenditure, the typical indices used for computing the official CPI in most countries suffer from an inherent pro-rich or plutocratic bias. To highlight this point, we add a superscript P to the national shares computed as in (2) and denote it by $s_i^{(P)}$. Thus

$$s_i^{(P)} = s_i = \sum_{h=1}^{H} s_i^h e^h \tag{3}$$

This is called as the plutocratic share and the corresponding price index $CPI^{(P)}$ is referred to as the plutocratic index of CPI.

$$CPI^{(P)} = \sum_{i=1}^{n} s_i^{(P)} I_i^{(t)} \tag{4}$$

Where we have introduced the "price relative"

$$I_i^{(t)} = \left(\frac{p_i^{(t)}}{p_i^{(0)}}\right) \tag{5}$$

B. The Democratic CPI : An alternative weighting scheme, first considered by Prais (1959), attaches equal weights $(\frac{1}{H})$ to each household share s_i^h and yields a so-called democratic national share $s_i^{(D)}$ defined as

$$s_i^{(D)} = \sum_{h=1}^{H} s_i^h \left(\frac{1}{H}\right) \tag{6}$$

Corresponding to (4) we may define a democratic CPI, denoted by $CPI^{(D)}$ where

$$CPI^{(D)} = \sum_{i=1}^{n} s_i^{(D)} I_i^{(t)} \quad (7)$$

The corresponding plutocratic and domestic inflation rates are respectively

$$\Pi(P) = \left[CPI^{(P)} - 1 \right] \times 100 \quad (8)$$

$$\Pi(D) = \left[CPI^{(D)} - 1 \right] \times 100 \quad (9)$$

C. Plutocratic Bias : The plutocratic bias (in inflation) is now defined by

$$\mathcal{B}^{(P)} = \frac{\Pi(P) - \Pi(D)}{100} = CPI^{(P)} - CPI^{(D)} = \sum_{i=1}^{n} s_i^{(P)} I_i^{(t)} - \sum_{i=1}^{n} s_i^{(D)} I_i^{(t)} \quad (10)$$

A positive $\mathcal{B}^{(P)}$ indicates that the plutocratic inflation index exceeds the democratic index, so that the poor are less affected by inflation than the rich, whereas a negative bias indicates the opposite.

Ley (2005) and Izquierdo et al (2003) derive two fundamental relationships of considerable significance for practical applications, which we will also be using later in the paper. Firstly, it is shown that

$$s_i^{(P)} - s_i^{(D)} = \gamma^2 \widehat{\beta_i} \quad (11)$$

where

$$\gamma = cofficient\ of\ variation\ of\ x^h = \frac{var\left(x^h\right)}{\bar{x}} \quad (12)$$

with $\bar{x}$ denoting the average of the aggregate expenditure over households i.e.

$$\bar{x} = \left(\frac{1}{H}\right) \sum_{h=1}^{H} x^h \quad (13)$$

Further $\widehat{\beta_i}$ is the OLS coefficient from the following regression

$$s_i^h - s_i^{(D)} = \beta_i \left(\frac{x^h - \bar{x}}{\bar{x}}\right) + \epsilon_i^h; \quad h = 1,2 \ldots H \quad (14)$$

with ϵ_i^h being the error term satisfying the usual Gauss-Markov assumptions.

From this follows a second fundamental relationship viz. (see Ley (2005), p. 638)

$$\mathcal{B}^{(P)} = n\,\bar{x}\,\gamma^2 cov(\hat{\beta}_i, I_i^{(t)}) \qquad (15)$$

The above relation shows that the plutocratic bias (at time t) is the product of three terms viz.

(i) γ^2 –the square of the coefficient of variation of aggregate household expenditure

(ii) $\bar{x}$ - the average of the aggregate expenditure over households (see (13) above)

(iii) n - the number of commodities included in the compilation of the index and

(iv) $cov(\hat{\beta}_i, I_i^{(t)})$- the covariance between the regression coefficients

$\hat{\beta}_i$ and the price relatives $I_i^{(t)}$ taken over all the n goods.

A few comments are in order at this stage. Equation (15) shows that the sign of the plutocratic gap is determined by the covariance between $\hat{\beta}_i \; and \; I_i^{(t)}$. A positive covariance indicates that the goods favoured by the richer households experience a higher than average inflation, while necessities (consumed by the poorer households) experience a lower than average inflation. The plutocratic gap is also influenced by the dispersion in the consumption pattern across households as measured by the coefficient of variation. It is also important to note that the plutocratic bias is underestimated if we work with highly aggregated data (the reasons for this are elaborated in Ley (2005) p. 9, footnote 11).

D. Super-Democratic Index : The analysis so far has ignored household size in the estimation of the plutocratic bias. It is a matter of common observation that the poorer the household, the larger the number of members, and correspondingly the inequalities in per capita consumption (i.e consumption per member) are higher than the inequalities in consumption per household. This factor can be accounted for by the equivalence-scale approach of Buhmann et al (1988), originally used by them to allow for economies of scale in household consumption and later

deployed by Ley (2005) in the context of the plutocratic bias. Following Ley (2005), let $n^{(h)}$ denote the number of members in the h-th household. Now define the number of "equivalent adults" in a household of size $n^{(h)}$ via a parameter θ as

$$[m(\theta)]^{(h)} = \left[n^{(h)}\right]^{\theta},\ \theta \in [0,1] \tag{16}$$

We can then define a new set of weights

$$s_i^{(\theta)} = \sum_{h=1}^{H} s_i^h \left(\frac{1}{H\overline{[m(\theta)]}}\right)[m(\theta)]^{(h)} \tag{17}$$

$$\text{with } \overline{m(\theta)} = \left(\frac{1}{H}\right)\sum_{h=1}^{H}[m(\theta)]^{(h)}. \tag{18}$$

i.e. $\overline{m(\theta)}$ is the mean "equivalent adults" household size.

Thus the parameter θ effectively controls the weight that we are allotting to the household size, with θ = 0 corresponding to the case we have so far considered, in which household size is not accounted for. The value θ = 1 yield the other extreme in which each household share is given the full weightage of the total number of its household members. Using the weights in (17) we can define a new CPI

$$CPI^{(SD)}(\theta) = \sum_{i=1}^{n} s_i^{(\theta)} I_i^{(t)} \tag{19}$$

This is called the super-democratic index. It is easily seen that for θ = 0, the super-democratic index corresponds to the democratic index. We can also define the plutocratic bias with reference to the super-democratic index as

$$\mathcal{B}^{(P)}(\theta) = CPI^{(P)} - CPI^{(SD)}(\theta) = \sum_{i=1}^{n} s_i^{(p)} I_i^{(t)} - \sum_{i=1}^{n} s_i^{(\theta)} I_i^{(t)} \tag{20}$$

and then $\mathcal{B}^{(P)}(0)$ is nothing but the $\mathcal{B}^{(P)}$ that we defined in (10). In order to maintain uniformity of notation, we will henceforth refer to $\mathcal{B}^{(P)}$ as $\mathcal{B}^{(P)}(0)$.

While the super-democratic index can be computed over a grid of values for θ, from a practical point of view interest attaches primarily to the two extreme values viz. θ = 0 and θ = 1. The value θ = 0 corresponds to the case where the democratic index is calculated without any adjustment for household size, while θ = 1 corresponds to the case of full adjustment. Values of θ between 0 and 1 correspond to cases of partial adjustment.

3. The New Indian CPI

New Indian CPI : Let us now turn to the situation in India. Traditionally the COLI was sought to be measured in India by three separate indices viz. the CPI for industrial workers (CPI-IW), the CPI for agricultural labour (CPI-AL) and the CPI for rural labour (CPI-RL) which were released by the Ministry of Labour and Employment (Government of India). With effect from January 2015, the Central Statistical Office (CSO) has started publishing a new series of CPI Urban (CPI_U), CPI Rural (CPI_R) and CPI Combined (CPI_C). It is this group of indices which will be the subject matter of this paper, as it seems likely that they will constitute the basis for inflation measurement for policy purposes (most notably monetary policy) in lieu of the hitherto used measure of "headline inflation" the Wholesale Price index (WPI). We will term this group as the "New CPI".

These New CPI indices are based on the 68th Round of the National Sample Survey Organization (NSSO) Consumer Expenditure Survey conducted in 2011-12. The total number of households surveyed (rural and urban) is 1,01,651 (Rural = 59,683; Urban = 41,968). As per the ILO (2004) definition, the computed CPI is a Laspeyres-Young index, though the official publications of the

Indian government prefer the term “modified Laspeyres”. When there is no scope for confusion we will simply use the term Laspeyres index.

In deriving the weighting diagram for the New CPI (on the basis of the Consumer Expenditure Survey (2011-12) as mentioned above)), the data pertains to the average monthly consumption expenditure of urban/rural households and excludes items of non-consumption expenditure such as legal expenses, direct taxes etc. (though medical expenses, consumer taxes and cesses are included). Data was collected for around 225 items in the rural areas and about 250 in the urban areas. These commodities determine the consumption basket as defined in the Report of the Group of Technical Advisory Committee on Statistics of Prices and Cost of Living (2014). The criteria for the selection of consumption items, the method of distribution of these households across states, the mechanism of collating price quotations in cities, towns and villages, the treatment of seasonal items etc. are all discussed in detail in Central Statistics Organisation (2011) and Kumar and Boopathy (2013). The data is further consolidated into 6 main groups and 23 subgroups in accordance with the standard international classification system COICOP (Classification of Individual Consumption according to Purpose). The groups and sub-groups are as follows:

1. **Food & Beverages** : (i) Cereals and products (ii) Pulses and products (iii) Oils and fats (iv) Meat, fish etc (v) Milk and milk products (vi) Eggs (vii) Condiment, spices etc.(viii) Vegetables (ix) Fruits (x) Sugar and confectionery (xi) Non-alcoholic beverages (xii) Prepared meals etc

2. **Pan, tobacco, intoxicants**

3. **Fuel and Light**

4. **Housing**: Housing is an important component of the Consumer Price Index (CPI) as a substantial portion of a household income is spent on housing. Pricing of housing presents both conceptual and practical problems, since the quality of housing differs widely across as well as within cities and towns. Housing pricing comprises house rents and related charges. Repeat House Rent Surveys (covering same set of dwellings) is conducted in each of the selected towns for compilation of the housing price index and includes both rented dwellings and owner-occupied dwellings.[4] This index is not compiled for the rural sector because of two reasons: first there is negligible number of rented dwellings in the rural areas; and the Consumer Expenditure Survey (CES) also does not provide estimate of imputed rent for owner-occupied houses for this sector.

5. **Clothing & Footwear :** (i) Clothing (ii) Footwear

6. **Miscellaneous :** (i) Household goods & services (ii) Health (iii) Transport & Communication (iv) Education (v) Recreation and Amusement (vi) Personal care and effects.

4. Plutocratic Bias for India

We now proceed to calculate the plutocratic bias for the Indian case, using equation (10). The quantities $s_i^{(P)}$ are provided by the official weights attached to each of the 6 main groups and 23 sub-groups of commodities indicated in Section 3. The quantities $s_i^{(D)}$ are calculated from the detailed data manifests of the 68th Round of the National Sample Survey Organization (NSSO) Consumer Expenditure Survey (2011-12) and available on the MOSPI website

[4] The rent on owner-occupied dwellings are imputed via a *rental equivalent approach*.

(http://mail.mospi.gov.in/index.php/catalog/145). The inflation relatives $I_i^{(t)}$ for all the commodity groups and sub-groups and covering various years, are furnished by the Reserve Bank of India online database on Indian economy [5] (https://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics) This quantum of information suffices to calculate the Plutocratic Biases $\mathcal{B}^{(P)}(0)$ and $\mathcal{B}^{(P)}(1)$, with reference to the democratic and super-democratic indexes respectively[6]. In Tables 1 and 2 we present these Plutocratic bias for the four years 2012, 2013, 2014 and 2015 for which complete data is available on the required price relatives $\{I_i^{(t)}\}$. The bias is reported for all the three new CPIs – rural (CPI_R), urban (CPI_U) and combined (CPI_C).

Insert Table 1 here

Insert Table 2 here

In view of the difficulties noted above with reference to the housing price index, we thought it worthwhile to present two sets of calculations for each of our two measures (democratic and super-democratic) of plutocratic bias viz. with and without the housing sector. (For CPI_R there is only one set of calculations as the housing sector is excluded *ab initio*). Both the democratic and super-democratic plutocratic biases for the urban and combined CPI are throughout negative for the three years 2012, 2013 and 2015, implying that in India (for these three years) the goods consumed by the poorer households are experiencing a higher inflation as compared to the goods

[5] The RBI sources the data from the Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation. The CSO has revised the Base Year of the Consumer Price Index (CPI) from 2010=100 to 2012=100 with effect from the release of indices for the month of January, 2015. The earlier series with Base 2010=100 was started with effect from January 2011. This paper uses the inflation rates calculated using the base year 2012=100.
Data for All India Sub-group/Group/General/Consumer Food Price Indices and State-wise Group/General Indices for Rural, Urban and Combined are available from January 2011 onwards.

[6] As noted at the end of Section 2, $\mathcal{B}^{(P)}(0)$ *and* $\mathcal{B}^{(P)}(1)$ are obtained from (20) by substituting θ = 0 and θ=1. Further $\mathcal{B}^{(P)}(0)$ is what we have defined as $\mathcal{B}^{(P)}$ in (10).

consumed by the more affluent sections. (The year 2014 seems to be an exception). For CPI_R the bias is mainly positive but this conclusion has to be viewed with some caution as the housing sector has not been accounted for.

The conclusions which emerge robustly from Tables 1 and 2 are

(i) The inclusion of the housing sector reduces a negative plutocratic bias and increases a positive bias. This, of course implies that the inflation in housing prices experienced by the upper deciles of the population is higher than that experienced by the lower deciles, though this could simply be a reflection of the fact that the quality of dwellings varies widely across income groups and the up-market housing services consumed by the more affluent sections are less subject to regulation as compared to lower types of dwellings, where various types of rent control measures are in effect.

(ii) A priori, our expectation is that the super-democratic plutocratic bias would amplify a negative democratic bias (in absolute terms). This is because we expect poorer households to have more members so that in a situation where inflation is hurting the poor more than the rich, accounting for household size will exaggerate the relative "hurt". For the same reason, we expect a positive democratic bias to be attenuated or turned into a negative super-democratic one. This intuition is largely sustained by the results in Tables 1 and 2, for CPI_C and CPI_U (except for the year 2014). This is however not borne out so convincingly for CPI_R, where for two of the four years (2012 and 2014) the results are as per expectation whereas for the other two years the results are contrary to our priors. However, as the differences are small in magnitude, they could be accounted for by sampling variability (though, in the absence of

knowledge of the distribution of the entity $[\mathcal{B}^{(P)}(0) - \mathcal{B}^{(P)}(1)]$, we are not in a position to assert this with confidence. [7]

(iii) Another notable feature emerging from Table 1 is that the biases for the CPI_R are less (in absolute terms) than the corresponding biases in the case of CPI_U and CPI_C. As is evident from equation (15) above, the plutocratic bias depends on the four parameters $n, \bar{x}, \gamma^2, and\ cov(\hat{\beta}_i, I_i^{(t)})$ (which have been defined immediately after that equation). The term $cov(\hat{\beta}_i, I_i^{(t)})$ is negative when the goods favoured by the more affluent households experience lower than average inflation and those favoured by the poorer households experience higher than average inflation. Exactly the obverse holds for a positive covariance term. We present these parameters for the three plutocratic biases in Table 3, for the case including housing, which is taken as an illustration[8]. Table 3 shows that even though the covariance term $cov(\hat{\beta}_i, I_i^{(t)})$ for CPI_R dominates (in absolute value) the corresponding term for CPI_U and CPI_C, this effect is swamped by the fact that $\bar{x},\ and\ \gamma^2$ for CPI_R are substantially smaller than in the other two cases. Thus (with the exception of the year 2014) the difference in the inflation rates for the rural rich and poor has not only been in favour of the rural rich but this difference outweighs the difference in inflation rates of the rich and poor in the urban and overall cases. This, in the absence of other factors, should have led to a higher plutocratic bias for the rural areas. However, the average rural household expenditure $\bar{x}$ and its variability γ^2 are considerably lower than for the other two cases, and this accounts primarily for the observed lower plutocratic bias.

[7] While we have presented some basic results with respect to the super-democratic bias $\mathcal{B}^{(P)}(1)$, we do not persist with this concept further in this paper. To pursue the main thread of our argument, in our further analysis we confine our attention exclusively to the plutocratic bias $\mathcal{B}^{(P)}(0)$

[8] Corresponding decomposition for the case excluding housing are not presented here as they are very similar.

Insert Table 3

A useful perspective on the plutocratic bias is obtained if we pose the question as to who is the "representative consumer", whose consumption basket is reflected by the official CPI indexes? In other words, which household's consumption shares are closest to the plutocratic (official) weights s_i^P ? Muellbauer (1974) estimates that for the UK CPI, the plutocratic weights are closest to the shares of households in the 71st top percentile; while the corresponding estimate for the US CPI by Deaton (1998) is the 75th percentile. Thus the so-called "representative consumer" reflected in the official CPI is effectively an upper-income household. We perform a similar exercise for the three Indian CPIs (Urban, Rural and Combined) (with housing included) and the results are displayed in Table 4. For comparison, the percentile households corresponding to the democratic indexes are also presented alongside. As expected the representative percentiles for the official indexes are consistently high. Thus the New Indian CPI clearly reflects the consumption basket of the more affluent sections of the population. It is also seen that the democratic indexes are far more representative, being fairly close to the median households.

Insert Table 4

5. Commodity-wise Plutocratic Bias

A better understanding of the plutocratic bias $\mathcal{B}^{(P)}(0)$, may be obtained via an examination of the bias commodity wise. The commodity-wise bias is defined as follows:

$$\mathcal{B}_i^p = \left[(s_i^P - s_i^D)I_i^{(t)}\right], \quad (i = 1,2 \dots n) \tag{21}$$

While it is a straightforward matter to compute these biases for all the 23 commodity sub-groups, for conciseness of presentation we only display the biases for the 6 main groups (Table 5) and some select important commodity sub-groups (Table 6).

Tables 5 and 6 reveal some interesting details.

(i) Firstly, the major contributors to the overall bias are the items of Food & Beverages, Housing and Miscellaneous and to a lesser extent Fuel & Lighting. Of these, the biases in the case of Food & Beverages as well as Fuel & Lighting are uniformly negative for all the years and for all the three indices, whereas for the Housing and Miscellaneous sectors the bias is uniformly positive. The biases for the other sectors are relatively insignificant. This finding assumes importance since most of the items comprising the Food & Beverages and Fuel and Lighting groups are necessities, while the items comprising the Miscellaneous category (detailed in Section 3) would generally be regarded as luxuries.[9]Thus in view of the interpretation attached to the signs of the plutocratic bias, the poor are being hit where it hurts most viz. in the matter of necessities.

(ii) If we go into a sub-group wise break-up of the plutocratic bias, we find that the major contributors to the negative bias in the Food & Beverages sector are the items of (a) Cereals & Products and (b) Vegetables. On the other hand, the positive bias in the Miscellaneous sector is largely attributable to (a) Education (b) Health and (c) Transport & Communications (see Table 6). This latter feature can be understood in the context of the large-scale privatization of health and education that has been occurring in the past decade. Increasingly the more affluent sections of the population are turning to private hospitals for medical services and to private schools for education of their offspring. The poorer sections, by contrast, continue to persist with the highly subsidized government health and education sectors. Private health and education services are not only more expensive than their official counterparts, they are subject to a greater degree of price revisions. So far as transport & communications are concerned, the bias seems to matter

[9] The classification of commodities into "necessities" and "luxuries" on the basis of their demand elasticities is attempted in Section 7.

only for the urban sector, where modes of transport across economic groups vary widely. Once again there seems to be a clear distinction between the upper class and lower class users, with the former relying almost exclusively on private transport (whose prices are flexible upwards) and the latter on public transport (where rates are fixed for fairly long periods and upward revisions face stiff public resistance).

Insert Table 5

Insert Table 6

6. Regional Dimension

One of the great advantages of the New CPI is that for the first time consumer price indices have been compiled separately for the Indian states (and Union Territories). This enables us to compile plutocratic biases for the various states. Additionally, the state level CPI is now compiled separately for urban and rural areas and therefore we are able to compute the plutocratic biases for rural and urban areas separately (as well as for the combined CPI). To avoid notational confusion, we denote the various state-level measures of CPI (viz, rural, urban and combined) by adding an acronym for the state in parentheses (thus, for example CPI_R (MH) denotes the rural CPI for Maharashtra). In principle, we could calculate the plutocratic bias for each of the 29 states and 7 union territories of the Indian federation, but for illustrative purposes we present the results for three states only viz. Maharashtra (MH), Andhra Pradesh (AP) and Bihar (BH) which ranked 7^{th}, 18^{th} and 33^{rd} respectively in terms of per capita SDP (state domestic product) according to the Ministry of Statistics and Programme Implementation (MOSPI) website. The plutocratic bias at the regional level may be defined analogously to (10).

Thus, for example the plutocratic bias for rural Maharashtra may be denoted as $\boldsymbol{\mathcal{B}}^{(\boldsymbol{P})}_{\boldsymbol{R(MH)}}$ and defined by

$$\boldsymbol{\mathcal{B}}^{(\boldsymbol{P})}_{\boldsymbol{R(MH)}} = \sum_{i=1}^{n} s^{(P)}_{i,R(MH)} I^{(t)}_{i,R(MH)} - \sum_{i=1}^{n} s^{D}_{i,R(MH)} I^{(t)}_{i,R(MH)} \quad (22)$$

The quantities in (22) are state-level analogues of the corresponding quantities defined by (3), (5) and (6). Thus $s^{(P)}_{i,R(MH)}$ is the plutocratic share of commodity i in total household expenditure of rural Maharashtra, $s^{D}_{i,R(MH)}$ is the corresponding democratic share while $I^{(t)}_{i,R(MH)}$ is the "price relative" at time t for commodity i in rural Maharashtra.

Needless to say the other plutocratic biases are defined similarly. Table 7 presents our results for the three years 2013, 2014 and 2015 (since the new CPI data at the regional level for 2012 is not available officially).

The salient features to emerge from Table 7 are the following:

(i) The plutocratic biases for Maharashtra are considerably higher than those for Andhra Pradesh, the latter in turn being higher than those for Bihar. This leads to the speculation that the biases might increase with the level of development of a state, but as to why exactly this happens can only be the subject matter of a separate investigation.

(ii) The inclusion or otherwise of the housing sector makes a substantial difference to the magnitude of the plutocratic bias for all three states. The plutocratic bias for the urban housing sector[10] is uniformly positive for all years and across all the three states, but it is substantially more in the case of Maharashtra than the other two states (see Table 8 below). The positive sign of the bias, of course, means that the richer sections in the

[10] We have already mentioned (see Section 3 above) that the housing sector index is not computed for the rural sector.

urban areas experience higher housing inflation than the urban poor. A possible explanation for this has already been given above (Section 4, p.11) and is not repeated here. The positive bias for the urban housing sector in Maharashtra is much higher than that for the other two states, reflecting the strong upward pressure on reality rates for up-market residential and commercial property in the mega cities of Mumbai and Pune.

Insert Table 7

Insert table 8

7. Expenditure Elasticity and Classification of Goods

Ley (2005) and Izquierdo et al (2003) introduce the concept of the *expenditure elasticity* of a good. The expenditure elasticity of good i for the h-th household is defined by

$$\eta_i^h = \frac{\left(x_i^h - \bar{x_\iota}\right)}{\left(x^h - \bar{x}\right)} \frac{\bar{x}}{\bar{x_\iota}} \tag{23}$$

where the quantities $x_i^h, \bar{x_\iota}$ and $\bar{x}$ refer respectively to the expenditure on good i of the h-th household, the average expenditure on good i (averaged over all households) and the average aggregate expenditure over all households.

From this Izquierdo et al (2003) (p.142) derive an expression for the overall expenditure elasticity of good i as

$$\eta_i = 1 + \left(\frac{\bar{x}}{s_i^{(D)}}\right) \widehat{\beta_\iota} \tag{24}$$

Where $s_i^{(D)}$ is as defined in (6) and $\widehat{\beta_\iota}$ as defined in (14) above.

We find that the scheme adopted by Izquierdo et al (2003) for the classification of goods seems particularly suitable in the Indian context. Accordingly our 23 commodities are classified into four groups:

Group I (Necessities): All goods with expenditure elasticity considerably smaller than 1 viz. $\eta_i < 0.9$. There are 10 commodities in this group.

Group II (Housing): This includes housing as a stand-alone item, because (i) as we have seen above it is a priori excluded from the CPI_R, (ii) its share in the urban household budget is quite high at around 20% (iii) in a fundamental sense it is a necessity but its expenditure elasticity is considerably above 1 and (iv) reliable and consistent data is difficult to obtain in this sector.

Group III (Others): These constitute goods whose expenditure elasticity is not substantially different from 1 viz. $0.9 < \eta_i < 1.1$. This group consists of 5 commodities.

Group IV (Luxuries): These are goods whose expenditure elasticity is significantly greater than 1 viz. $\eta_i > 1.1$. In all, 7 commodities fall into this category.

The classification of goods based on this taxonomy is displayed in Table 9 together with the relevant elasticities.

Insert Table 9 here

In Table 9 we have also presented the plutocratic and democratic weights attached to our 23 commodities. From this, the most striking fact to emerge is that the official weights at 37.5% for necessities seriously underestimate the corresponding democratic weights (45.3%). The reverse is true for the group of luxury goods.[11] This means that the true cost of inflation in necessities is seriously underestimated by the official figure.

[11] For Housing the plutocratic weights exceed to some extent, the democratic weights while for Group III the difference is insignificant.

Once such a taxonomy is available, the natural question to ask is about the behavior of inflation across the different commodity groups and specifically whether necessities experienced relatively higher inflation than the other groups. Another relevant issue is whether the plutocratic bias for Group I substantially exceeds that for the other groups, particularly Group IV. The answer to both questions is in the affirmative (except for the year 2014 which was a year of low inflation). Table 10 presents the democratic inflation rates[12] and the plutocratic biases across the four commodity groupings. Once again with the exception of the low-inflation year 2014, the inflation in necessities significantly exceeds, while that of the other commodity groups falls short of the overall official inflation rate. As the former are mostly consumed by the poorer sections, while the luxury goods are mainly figuring in the consumption baskets of the rich, inflation seems to hit the poor much harder relative to the rich. This point is strengthened even further with our analysis in the next Section where different expenditure brackets of the population are considered. But before we do so, let us also turn to the plutocratic biases in Table 10. For Group I the plutocratic biases are throughout negative and can almost approach 100 basis points (negative) in certain years. This means that not only are the prices of necessities rising faster than the price of commodities in general, but the "true" inflation in necessities is understated by any official index of necessities (computed from the official commodity weights). For Group IV (luxuries) the converse holds with the official inflation for luxuries overstating the "true" inflation. For Group III, the plutocratic bias is negative but insubstantial whereas for Group II it is marginally positive.

Insert Table 10 here

[12] The plutocratic inflation rates are easily obtained as the (algebraic) sum of the corresponding democratic inflation rates and plutocratic biases, and are not presented separately here.

8. Inflation Across Expenditure Brackets

In a pioneering initiative the Hong Kong Census and Statistics Department recently commenced compiling three distinct CPI series viz. CPI(A), CPI (B), and CPI(C) referring respectively to the lowest 50%, middle 30% and top 10% expenditure brackets of the population. The rationale for this is straightforward viz. that the expenditure patterns vary strongly with the level of affluence with lower expenditure households spending proportionately much more on items of basic necessities and the higher expenditure households spending relatively more on luxury items (see Government of Hong Kong SAR (2016)). The introduction of the plutocratic bias supplies an additional justification for computing such indices, as it is interesting to examine whether this bias varies with the level of expenditure. We attempt to compile such indices in the Indian case based on the 68th Round of the National Sample Survey Organization (NSSO) Consumer Expenditure Survey conducted in 2011-12 (discussed in Section 3 above). However, we depart from the Hong Kong system in the classification of expenditure brackets. We define three consumer expenditure brackets – Lowest 30%, Middle 60%, and Top 10% and compute the CPI_C for each of these three brackets referring to them as CPI_C(L), CPI_C(M), and CPI_C(T) respectively.[13] There is considerable inequality in the level of expenditure across the three groups. The *average monthly expenditure per household* in the Bottom 30% group is Rs. 3769.48, in the Middle 60% group it is Rs. 9602.22, while in the Top 10% it is Rs. 28132.75.

[13] While it may be tempting to refer to CPI_C(L), as a price index appropriate to those below the poverty line, we do not recommend such a procedure. As is well known consumption brackets may not be isomorphic to income brackets and besides the household survey used in the compilation of CPI_C(L) covers only about 1 lakh households which would constitute a miniscule element of the Indian population. With a population of around 72 lakhs, the Hong Kong SAR household survey for 2014-15 covers about 90% of the total population.

The difference in the expenditure levels leads us to expect fundamental differences in the expenditure patterns off the three groups.

In the computation of these indices we could use either the plutocratic or democratic weights (computed for each expenditure group separately and hence distinct from the aggregate national weights). As Table 11 indicates, the difference between the two sets of weights is marginal for the three expenditure groups, when compared to the corresponding difference at the national level. Hence in computing the CPI_C (.) separately for the three expenditure groups it does not much matter which set of weights is used. Nevertheless, considering our overall advocacy of the democratic weights, we use these in order to compute the three CPI group indices.

Table 12 presents the annual inflation for our three expenditure groups for the four years 2012 to 2015. For the sake of comparison we also present the official CPI_C, which in all probability would be the index used for government policy purposes, especially monetary policy and inflation targeting, indexation of dearness allowance, minimum wage fixation, government transfers etc.

The picture to emerge paints a highly anomalous and iniquitous situation. For three out of the 4 years that we have considered (2014 being the exception) the CPI_C (L) exceeds the CPI_C by between 0.5% to 1%. The year 2014 in which this does not happen is a lower-than-normal inflation year. Thus we may infer that the official inflation figure, seriously underestimates the true inflation confronting the poorer households and this is more likely to happen in years of high inflation. As a matter of fact we may conjecture that the extent to which the official inflation

understates the true inflation for the poorer households increases with the level of aggregate inflation.[14] For the richer households exactly the opposite holds.

Insert Table 11 here

Insert Table 12 here

We have already indicated that the expenditure pattern could differ markedly across the different expenditure groups, in particular a priori, the lower expenditure groups are expected to spend proportionately more on necessities and lower-end goods while the upper expenditure groups would tend to spend more on high-end goods. To examine this issue in detail, the classification of goods adopted in the previous Section is particularly convenient. The weightage (democratic) of the four commodity groups in the consumption budget of our three consumption expenditure brackets is presented in Table 13. These weights point to a striking contrast in the expenditure pattern across the different groups. The weightage of Group I (Necessities) for the bottom 30% expenditure group is more than twice that of the top 10% group. For Group IV (Luxuries) the weightage in the bottom 30% expenditure group is less than half of that in the top 10% group. For Group II (Housing) the weightage increases progressively as one passes from the less affluent to the more affluent groups, while for Group III (Others) the weightage in the middle 60% group exceeds that in the other two groups (though not very substantially).

The difference in the weightage patterns leads us to expect that the 4 commodity groups will play varying roles in explaining the inflation faced by the 3 expenditure groups. This is what we have tried to analyze in Table 14. So far as the lowest expenditure group is concerned, Group I (Necessities) accounts for more than 60% of the inflation experienced in years of moderate

[14] This hypothesis cannot be verified econometrically in view of the scanty number of observations available currently.

inflation but even in the low-inflation year 2014, it accounted for a substantial part viz. about 43%. For the other two expenditure groups, necessities account for a significantly smaller proportion of the total inflation. Correspondingly Group IV (Luxuries) matters much less for the Bottom 30% expenditure groups (between 12% to about 21%) while for the other two groups, luxuries explain a significant proportion of the total inflation (between 30% to 40% for the Top 10% group and between 20% to 30% for the Middle 60% group). The importance of Group II (Housing) in the total inflation increases with the expenditure level, while that of Group III (Others) is broadly similar across the three expenditure groups.

Our analysis exposes the vulnerability of the lowest expenditure group to inflation in general, as this group faces a triple jeopardy – firstly, Necessities are the dominant component of this group's inflation (see Table 14), secondly, Necessities experience relatively higher inflation as compared to the other groups (in moderate to high inflation years) (see Table 10) and thirdly, the plutocratic bias in the case of Necessities is particularly high so that the official inflation figures for this category would be seriously understating the true impact (see Table 10).

Insert Table 13 here

Insert Table 14 here

9. Conclusions

Index numbers as a measure of the changes in the cost of living of a designated group of individuals have been in official use for a century and a half. Traditionally, the index number most favoured in this connection is the CPI (consumer price index) of the Laspeyre type or one of its close variants. The Boskin Commission (1996) has brought to the general notice several sources of dissatisfaction with the Laspeyre type of CPI indices viz. an *upward "substitution*

bias", the *quality change bias, outlet substitution bias, new products bias* etc., apart from the fact of their not being *superlative* (see Section 1).

However, in recent years, a relatively neglected dimension of the Laspeyres-type CPI has come to the fore. As first noted by Prais (1956), and as shown in equations (1) and (2) above, such a CPI is a weighted average of individual prices, with weights proportional to each household's share in the total expenditure. This method thus attaches greater weights to the expenditure of richer households relative to the poorer ones, and hence suffers from a pro-rich (plutocratic) bias. As a superior alternative, analysts have advocated a *democratic index,* in which the expenditure of all households receives equal weightage. Following Ley (2005), we can also define a *super-democratic index* in which the weights of household expenditures are scaled to account for the household size.The difference between the official index and the democratic (or super-democratic) index is a formal measure of the plutocratic bias. Such a bias has been investigated for a few countries most notably the U.K., U.S. and Spain.

A concern often casually reflected in the media, and shared by a number of academics is that the poor are relatively the worst-hit by inflation. The concept of the plutocratic bias affords a convenient technique to deal with this concern in a systematic fashion. This task is aided by the fact that with effect from January 2015, the Central Statistical Office (CSO) of the Government of India, has started publishing a new series of CPI Urban (CPI_U), CPI Rural (CPI_R) and CPI Combined (CPI_C), for the years beginning 2012. In addition state-level counterparts of these indices have also been made available. It is this group of indices which are the subject matter of this paper, as it seems likely that they will constitute the basis for inflation measurement for policy purposes (most notably monetary policy) in lieu of the hitherto used measure of "headline

inflation" the Wholesale Price index (WPI). We will term this group of indices as the "New CPI" indices.

Working with this rich source of data we were able to investigate several dimensions of the issue of plutocratic bias. Our major findings are:

(i) Both the democratic and super-democratic plutocratic biases for CPI_U and CPI_C (the urban and combined CPI respectively) are throughout negative for the three years 2012, 2013 and 2015, implying that in India (for these three years) the goods consumed by the poorer households are experiencing a higher inflation as compared to the goods consumed by the more affluent sections. (The low-inflation year 2014 seems to be an exception).

(ii) The biases for the CPI_R are less (in absolute terms) than the corresponding biases in the case of CPI_U and CPI_C.

(iii) After noting the presence of the plutocratic bias, the next question of interest is determining the main commodity groups contributing to this bias. We find (Table 5) that the major contributors to the overall bias for CPI_R, CPI_U and CPI_C are the items of Food & Beverages, Housing and Miscellaneous and to a lesser extent Fuel & Lighting. Of these, the biases in the case of Food & Beverages as well as Fuel & Lighting are uniformly negative for all the years and for all the three indices, whereas for the Housing and Miscellaneous sectors the bias is uniformly positive. The biases for the other sectors are relatively insignificant.

(iv) As in the new CPI system, consumer price indices have been compiled separately for the Indian states (and Union Territories), we are enabled to compile plutocratic biases

for the various states at the aggregate level as well as for the rural and urban sectors separately. We did these for three representative states viz. Maharashtra, Andhra Pradesh and Bihar. We find that the plutocratic biases (rural, urban as well as combined) for Maharashtra are substantially larger than for the other two states considered, and also exceed their national counterparts. Also the inclusion or otherwise of the housing sector has a significant impact on the magnitude of the urban plutocratic bias in the case of Maharashtra, but less so in the case of the other two states. Since the housing sector of itself (in all three states) has a positive plutocratic bias its inclusion invariably reduces the magnitude of the overall (negative) bias.

(v) Using the concept of the *expenditure elasticity* of a good (see Ley (2005) and Izquierdo et al (2003)), we classify our goods into 4 categories viz. Necessites, Luxuries, Housing and Others. We then derive inflation rates and plutocratic biases for each category over the years 2012-15. Reinforcing a common held belief in India, we find that the inflation rates for Necessities substantially dominate the rates for the other categories in years of high inflation. What makes matters worse is that the plutocratic biases for Necessities are uniformly negative and substantial in magnitude, so that not only is general inflation dominated by the Necessities component but the official figures seriously underestimate the "true" inflation in Necessities. Interestingly, Luxuries not only inflate at the lowest rate among all the four components but their plutocratic biases are throughout positive, implying that the "true" inflation is lower than the official/reported inflation in Luxuries.

(vi) For the past few years, the Hong Kong (SAR) Census and Statistics Department has compiling three distinct CPI series covering the lowest 50%, middle 30% and top

10% expenditure brackets of the population. We attempt to compile such indices in the Indian case based on the 68th Round of the National Sample Survey Organization (NSSO) discussed above in Section 3 for three consumer expenditure brackets – Lowest 30%, Middle 60%, and Top 10%. In particular, we try to examine whether the expenditure pattern of these three brackets differs across the four commodity groups (distinguished in Section 7 above) of Necessities, Luxuries, Housing and Others. We do find a striking contrast in the expenditure patterns. The weightage of Necessities for the bottom 30% expenditure group is more than twice that of the top 10% group, while for Luxuries this weightage is reversed. Reflecting this weightage, Necessities constitute the dominant component of the inflation experienced by the bottom 30% group, while in the case of the top 10% group, luxuries are the major component of inflation. Taken in conjunction with the fact that the Necessities group experiences relatively higher inflation as compared to the other groups of commodities and that its plutocratic bias is particularly high, we find that the poorest groups are far more vulnerable to inflation than the more affluent groups – a particularly disturbing feature for a country in which, according to the latest World Bank estimates, 456 million people or about 42% of the population live below the international poverty line of $1.25 per day[15].

Our analysis has at least three major implications—two for monetary policy and one for the indexation of dearness allowance of government employees.

In India in recent years, following global trends, there has been a distinct shift in monetary policy in the direction of inflation targeting. However, which is the appropriate inflation to target

[15] This poverty line has been in use since 2008. As of October 2015, the World Bank has revised the new global line to $1.90 per day.

remains a moot question. What we have called above as the CPI_C is most likely to be the official choice, yet this can differ (sometimes substantially) from the national level urban and rural inflation levels. Further, the regional CPI levels also do not correspond closely to the national levels. Hence, targeting a single inflation figure like the CPI_C is liable to introduce a tilt in monetary policy in favour of states whose inflation levels closely track their national counterparts and discriminate against states where the inflation behavior departs from the national average. As the national CPI is a weighted average of the state CPI's with weights proportional to the respective state domestic products (SDPs), targeting the national inflation level effectively means making monetary policy responsive to developments in the leading industrialized states at the expense of the underdeveloped states.

But the concept of the plutocratic bias lends an additional edge to the argument against inflation targeting. For it indicates that the official inflation figure does not really reflect the social costs of inflation, for it (official inflation) predominantly reflects the expenditure pattern of the more affluent sections of the population. As a matter of fact, when we develop inflation indices separately for the Bottom 30%, Middle 60% and Top 10% of the expenditure groups we find that in years of moderate to high inflation the actual inflation experienced by the Bottom 30% group is significantly in excess of the official inflation figure, whereas the actual inflation incidence on the Top 10% is lower than indicated by the official figure.

Thus the existing paradigm of monetary policy is strongly discriminatory on two grounds – against the less developed states and against the poorer sections of the population. The official adoption of the democratic (and super-democratic) concepts of inflation introduced above could go a long way in correcting both these biases, as this would remove the wedge between the

inflation perceived by the policymakers and the inflation actually experienced by the bulk of the country's population.

Our analysis also has significant implications for the inflation-indexation of government transfer payments. A prime example of such a transfer is the dearness allowance (DA) of government employees, which are currently indexed by the All-India CPI for Industrial Workers (AICPI_IW). This is most likely to be replaced by the new CPI_C. Once again, this will reflect the plutocratic bias discussed above. A more equitable system would be to index salaries (and pensions) of Class IV government employees with a (democratic) CPI index for the Bottom 30% (what we have termed as CPI_C (L) above). Similarly, the salaries of Class II and III employees may be indexed by CPI_C (M) and those of Class I employees by CPI_C (T).

Thus the switch-over from the current plutocratic indexes to a democratic system of indices would eliminate a long-standing anomaly in the official statistical system and put in place a more equitable policy framework. This point is applicable in a very general context, and India is not being specifically singled out for criticism, even though we have used India as the focal point of our analysis.

List of Tables to be placed in text

Table 1

Plutocratic Bias $\mathcal{B}^{(P)}(0)$ for New Indian CPI (without adjustment for household size)

CPI_R **Bias (with housing sector excluded)** $\mathcal{B}^{(P)}(0)$				
Year →	**2012**	**2013**	**2014**	**2015**
$\mathcal{B}^{(P)}(0)$	-0.2726	-0.4437	0.0813	-0.2041
Official (Plutocratic) Inflation	11.02%	10.21%	4.16%	6.32%
Actual (Democratic) Inflation	11.29%	10.65%	4.08%	6.52%
CPI_U **Bias (with housing sector excluded)** $\mathcal{B}^{(P)}(0)$				
Year →	**2012**	**2013**	**2014**	**2015**
$\mathcal{B}^{(P)}(0)$	-0.4045	-0.5287	-0.1246	-0.3504
Official (Plutocratic) Inflation	9.67%	8.63%	4.50%	4.73%
Actual (Democratic) Inflation	10.07%	9.15%	4.62%	5.08%
CPI_U **Bias (with housing sector included)** $\mathcal{B}^{(P)}(0)$				
Year →	**2012**	**2013**	**2014**	**2015**
$\mathcal{B}^{(P)}(0)\rightarrow$	-0.2788	-0.4492	-0.0519	-0.2802

Official (Plutocratic) Inflation	9.67%	8.63%	4.50%	4.73%
Actual (Democratic) Inflation	9.95%	9.08%	4.55%	5.01%
CPI_C **Bias (with housing sector excluded)** $\mathcal{B}^{(P)}(0)$				
Year →	**2012**	**2013**	**2014**	**2015**
$\boldsymbol{\mathcal{B}^{(P)}(0)}$	-0.5677	-0.7108	-0.0724	-0.4137
Official (Plutocratic) Inflation	10.45%	9.46%	4.28%	5.61%
Actual (Democratic) Inflation	11.02%	10.17%	4.35%	6.02%
CPI_C **Bias (with housing sector included)** $\mathcal{B}^{(P)}(0)$				
Year →	**2012**	**2013**	**2014**	**2015**
$\boldsymbol{\mathcal{B}^{(P)}(0)}$	-0.3308	-0.5609	-0.0646	-0.2813
Official (Plutocratic) Inflation	10.45%	9.46%	4.28%	5.61%
Actual (Democratic) Inflation	10.78%	10.02%	4.34%	5.89%

Table 2

Plutocratic Bias $\mathcal{B}^{(P)}(1)$ for New Indian CPI (with full adjustment for household size)

Year ↓	CPI_R Bias (with housing sector excluded) $\mathcal{B}^{(P)}(1)$	CPI_U Bias (with housing sector excluded) $\mathcal{B}^{(P)}(1)$	CPI_U Bias (with housing sector included) $\mathcal{B}^{(P)}(1)$	CPI_C Bias (with housing sector excluded) $\mathcal{B}^{(P)}(1)$	CPI_C Bias (with housing sector included) $\mathcal{B}^{(P)}(1)$
2012	-0.3017	-0.5115	-0.3105	-0.6914	-0.3717
2013	-0.4036	-0.6229	-0.4958	-0.7818	-0.5797
2014	0.0562	-0.1142	0.0020	-0.1021	0.0827
2015	-0.1817	-0.4113	-0.2990	-0.4488	-0.2702

Table 3

Decomposition of Plutocratic Bias (Housing Sector Included)

	CPI_C			
	2012	**2013**	**2014**	**2015**
$\mathcal{B}^{(P)}(0)$	-0.3308	-0.5609	-0.0646	-0.2813
$cov(\widehat{\beta}_i, I_i^{(t)})$	-1.77E-06	-3.01E-06	-3.47E-07	-1.51E-06
γ^2	0.835	0.835	0.835	0.835
$\overline{x(30)}$	9705.40	9705.40	9705.40	9705.40
n	23	23	23	23
	CPI_R			
$\mathcal{B}^{(P)}(0)$	-0.2726	-0.4437	0.0813	-0.2041
$cov(\widehat{\beta}_i, I_i^{(t)})$	-2.20E-06	-3.58E-06	6.56E-07	-1.65E-06
γ^2	0.6816	0.6816	0.6816	0.6816
$\overline{x(30)}$	7905.339	7905.339	7905.339	7905.339
n	23	23	23	23
	CPI_U			
$\mathcal{B}^{(P)}(0)$	-0.2788	-0.4492	-0.0519	-0.2802
$cov(\widehat{\beta}_i, I_i^{(t)})$	-1.25E-06	-2.02E-06	-2.33E-07	-1.25E-06

γ^2	0.79010	0.79010	0.79010	0.79010
$\overline{x(30)}$	12265.28	12265.28	12265.28	12265.28
n	23	23	23	23

Table 4

Representative Percentiles for the Official Indian CPI

	Official /Plutocratic Indexes $CPI^{(P)}$	**Democratic Indexes** $CPI^{(D)}$
CPI_R	72	57
CPI_U	78	52
CPI_C	75	57

Table 5

Plutocratic Bias for Main Commodity Groups

Year →		**2012**	**2013**	**2014**	**2015**
CPI_R	**1. Food & Beverages**	-0.032	-0.033	-0.010	-0.017
	2. Pan, Tobacco & Intoxicants	-0.004	-0.003	-0.003	-0.004
	3. Clothing & Footwear	0.026	0.019	0.014	0.015
	4. Fuel & Light	-0.070	-0.055	-0.030	-0.052
	5. Miscellaneous	0.185	0.141	0.085	0.112
CPI_U	**1. Food & Beverages**	-0.690	-0.75	-0.32	-0.37
	2. Pan, Tobacco & Intoxicants	-0.07	-0.06	-0.06	-0.06
	3. Clothing & Footwear	-0.02	-0.02	-0.01	-0.01
	4. Housing	0.28	0.18	0.16	0.16
	5. Fuel & Light	-0.10	-0.06	-0.03	-0.03
	6. Miscellaneous	0.37	0.30	0.16	0.14
	1. Food & Beverages	-0.435	-0.456	-0.157	-0.225

CPI_C	**2. Pan, Tobacco & Intoxicants**	-0.043	-0.034	-0.031	-0.036
	3. Clothing & Footwear	-0.006	-0.004	-0.003	-0.003
	4. Housing	0.141	0.089	0.082	0.079
	5. Fuel & Light	-0.093	-0.068	-0.034	-0.055
	6. Miscellaneous	0.273	0.217	0.119	0.136

Table 6

Plutocratic Bias for Selected Major Commodity Sub-groups

Year→		**2012**	**2013**	**2014**	**2015**
CPI_R					
Food & Beverages	**Cereals & Products**	-0.07	-0.07	0.02	0.02
	Vegetables	-0.09	-0.18	0.02	-0.02
Miscellaneous	**Health**	0.13	0.10	0.09	0.09
	Education	0.05	0.04	0.03	0.03
	Transport & Communications	0.002	0.002	0.00	0.001
CPI_U					
Food & Beverages	**Cereals & Products**	-0.32	-0.23	0.06	-0.01
	Vegetables	-0.19	-0.53	0.03	-0.07
Miscellaneous	**Health**	0.05	0.03	0.02	0.03
	Education	0.13	0.11	0.11	0.07
	Transport & Communications	0.12	0.15	-0.02	0.01
CPI_C					
Food & Beverages	**Cereals & Products**	-0.20	-0.17	-0.05	-0.03
	Vegetables	-0.17	-0.38	-0.03	-0.04
Miscellaneous	**Health**	0.09	0.06	0.05	0.06
	Education	0.09	0.07	0.07	0.05
	Transport & Communications	0.058	0.070	0.003	0.013

Table 7

Regional Plutocratic Bias (without adjustment for household size)

MAHARASHTRA(MH)				
Year ↓	$\mathcal{B}^{(P)}_{R(MH)}$ **(Bias with housing sector excluded)**	$\mathcal{B}^{(P)}_{U(MH)}$ **(Bias with housing sector included)**	$\mathcal{B}^{(P)}_{U(MH)}$ **(Bias with housing sector excluded)**	$\mathcal{B}^{(P)}_{C(MH)}$ **(Bias with housing sector excluded)**
2013	-0.593	-0.077	-0.608	-0.608
2014	-0.630	-0.076	-0.650	-0.641
2015	-0.696	-0.106	-0.699	-0.699
ANDHRA PRADESH (AP)				
Year ↓	$\mathcal{B}^{(P)}_{R(AP)}$ **(Bias with housing sector excluded)**	$\mathcal{B}^{(P)}_{U(AP)}$ **(Bias with housing sector included)**	$\mathcal{B}^{(P)}_{U(AP)}$ **(Bias with housing sector excluded)**	$\mathcal{B}^{(P)}_{C(AP)}$ **(Bias with housing sector excluded)**
2013	-0.228	-0.038	-0.224	-0.226
2014	-0.243	-0.021	-0.227	-0.237
2015	-0.272	-0.037	-0.255	-0.267
BIHAR				
Year ↓	$\mathcal{B}^{(P)}_{R(BH)}$ **(Bias with housing sector excluded)**	$\mathcal{B}^{(P)}_{U(BH)}$ **(Bias with housing sector included)**	$\mathcal{B}^{(P)}_{U(BH)}$ **(Bias with housing sector excluded)**	$\mathcal{B}^{(P)}_{C(BH)}$ **(Bias with housing sector excluded)**
2013	-0.131	-0.017	-0.133	-0.131
2014	-0.145	-0.022	-0.148	-0.146
2015	-0.151	-0.023	-0.157	-0.153

Table 8

State-wise Plutocratic Bias for (Urban) Housing Sector

Year	Maharashtra	Andhra Pradesh	Bihar
2012	0.531	0.186	0.116
2013	0.574	0.206	0.126
2014	0.593	0.218	0.134

Table 9

Classification of Goods

Commodity Classification	Commodity	Elasticity η_i	Official Weight (Plutocratic)	Democratic Weight
Group I (Necessities) $(\eta_i < 0.9)$	Spices	0.743	0.022	0.028
	Vegetables	0.772	0.056	0.070
	Pulses & Products	0.784	0.021	0.026
	Cereals and Products	0.789	0.091	0.112
	Eggs	0.834	0.004	0.005
	Oils & Fats	0.845	0.032	0.037
	Sugar & Confectionery	0.852	0.012	0.014
	Prepared Meals etc.	0.859	0.048	0.055
	Pan, Tobacco & Intoxicants	0.848	0.024	0.028
	Fuel & Light	0.788	0.065	0.078
	Total Weightage (Necessities)		**0.375**	**0.453**
Group II (Housing)	Housing	1.368	0.111	0.085
	Total Weightage (Housing)		**0.111**	**0.085**
Group III (Others) $(0.9 < \eta_i < 1.1)$	Clothing	0.931	0.052	0.055
	Non-alcoholic Beverages	0.941	0.013	0.014
	Meat & Fish	0.965	0.044	0.045

	Footwear	0.968	0.010	0.011
	Milk & Products	1.003	0.062	0.062
	Total Weightage (Others)		**0.181**	**0.187**
Group IV (Luxury Goods) $(\eta_i > 1.1)$	Household Goods & Services	1.106	0.041	0.038
	Fruits	1.106	0.029	0.027
	Personal Care & Effects	1.158	0.041	0.036
	Health	1.179	0.055	0.048
	Recreation & Amusement	1.199	0.019	0.016
	Transport & Communication	1.361	0.098	0.075
	Education	1.368	0.046	0.035
	Total Weightage (Luxuries)		**0.329**	**0.275**

Table 10

Inflation Rates (Democratic) & Plutocratic Biases for Different Commodity Groups

	Year →	**2012**	**2013**	**2014**	**2015**
	Overall Official Inflation (CPI_C) →	10.45%	9.46%	4.28%	5.61%
Group I (Necessities)	**Inflation (Democratic)**	12.28%	13.42%	3.82%	7.30%
	Plutocratic Bias	-0.918	-0.929	-0.218	-0.516
Group II (Housing)	**Inflation (Democratic)**	9.06%	5.73%	5.24%	5.06%
	Plutocratic Bias	0.237	0.150	0.137	0.132
Group III (Others)	**Inflation (Democratic)**	8.01%	7.13%	5.28%	3.90%
	Plutocratic Bias	-0.062	-0.050	-0.030	-0.031
Group IV (Luxuries)	**Inflation (Democratic)**	4.34%	3.49%	2.17%	1.87%
	Plutocratic Bias	0.823	0.688	0.362	0.383

Table 11

Plutocratic and Democratic Weights for Different Consumption Brackets

Commodities ↓	Lowest Consumption Bracket (Bottom 30%)		Middle Consumption Bracket (Middle 60%)		Top Consumption Bracket (Top 10%)		Total Population	
	Plut. weight	Dem. weight	Plut. weight	Dem. weight	Plut. weight	Dem. weight	Plut. weight	Dem. weight
Food & Beverages	0.557	0.559	0.474	0.488	0.314	0.336	0.459	0.494
Pan, Tobacco & Intoxicants	0.032	0.032	0.026	0.027	0.017	0.018	0.024	0.028
Clothing & Footwear	0.068	0.067	0.066	0.067	0.053	0.056	0.065	0.066
Housing	0.055	0.054	0.095	0.088	0.167	0.161	0.100	0.085
Fuel & Light	0.100	0.103	0.069	0.072	0.042	0.045	0.068	0.078
Miscellaneous	0.189	0.185	0.269	0.258	0.408	0.384	0.283	0.249

Table 12

Democratic Inflation Rates for Different Consumption Expenditure Brackets

	2012	2013	2014	2015
CPI_C (L) (Bottom 30%)	11.09%	10.62%	4.15%	6.05%
CPI_C (M) (Middle 60%)	10.51%	9.59%	4.45%	5.51%
CPI_C (T) (Top 10%)	9.72%	8.29%	4.44%	4.89%
CPI_C	10.45%	9.46%	4.28%	5.61%

Table 13

Weightage (Democratic) for Three Different Consumption Expenditure Brackets (across Four Commodity Groups)

	Lowest Consumption Bracket	Middle Consumption Bracket (Middle	Top Consumption Bracket (Top	Total Population

	(Bottom 30%)	60%)	10%)	
Group I (Necessities)	0.558	0.406	0.244	0.453
Group II(Housing)	0.055	0.095	0.167	0.085
Group III(Others)	0.176	0.198	0.151	0.187
Group IV(Luxuries)	0.211	0.299	0.441	0.275

Table 14

Decomposition of Inflation Rates for Different Consumption Brackets (across Commodity Groups)

Lowest Consumption Bracket (Bottom 30%)				
	2012	**2013**	**2014**	**2015**
Group I (Necessities)	63.5%	68.2%	43.5%	67.4%
Group II (Housing)	4.5%	3.0%	7.0%	4.6%
Group III (Others)	16.2%	15.6%	28.3%	15.1%
Group IV (Luxuries)	15.9%	12.9%	20.9%	12.6%
Middle Consumption Bracket (Middle 60%)				
	2012	**2013**	**2014**	**2015**
Group I (Necessities)	48.1%	53.5%	28.9%	53.3%
Group II (Housing)	8.8%	6.5%	11.7%	9.4%
Group III (Others)	19.2%	18.8%	30.5%	17.7%
Group IV (Luxuries)	23.4%	20.9%	28.1%	19.2%
Top Consumption Bracket (Top 10%)				
	2012	**2013**	**2014**	**2015**
Group I (Necessities)	31.3%	36.0%	19.6%	35.3%
Group II (Housing)	15.4%	11.5%	19.7%	17.3%
Group III (Others)	16.8%	16.4%	23.4%	16.1%
Group IV (Luxuries)	36.4%	35.1%	37.2%	31.3%

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