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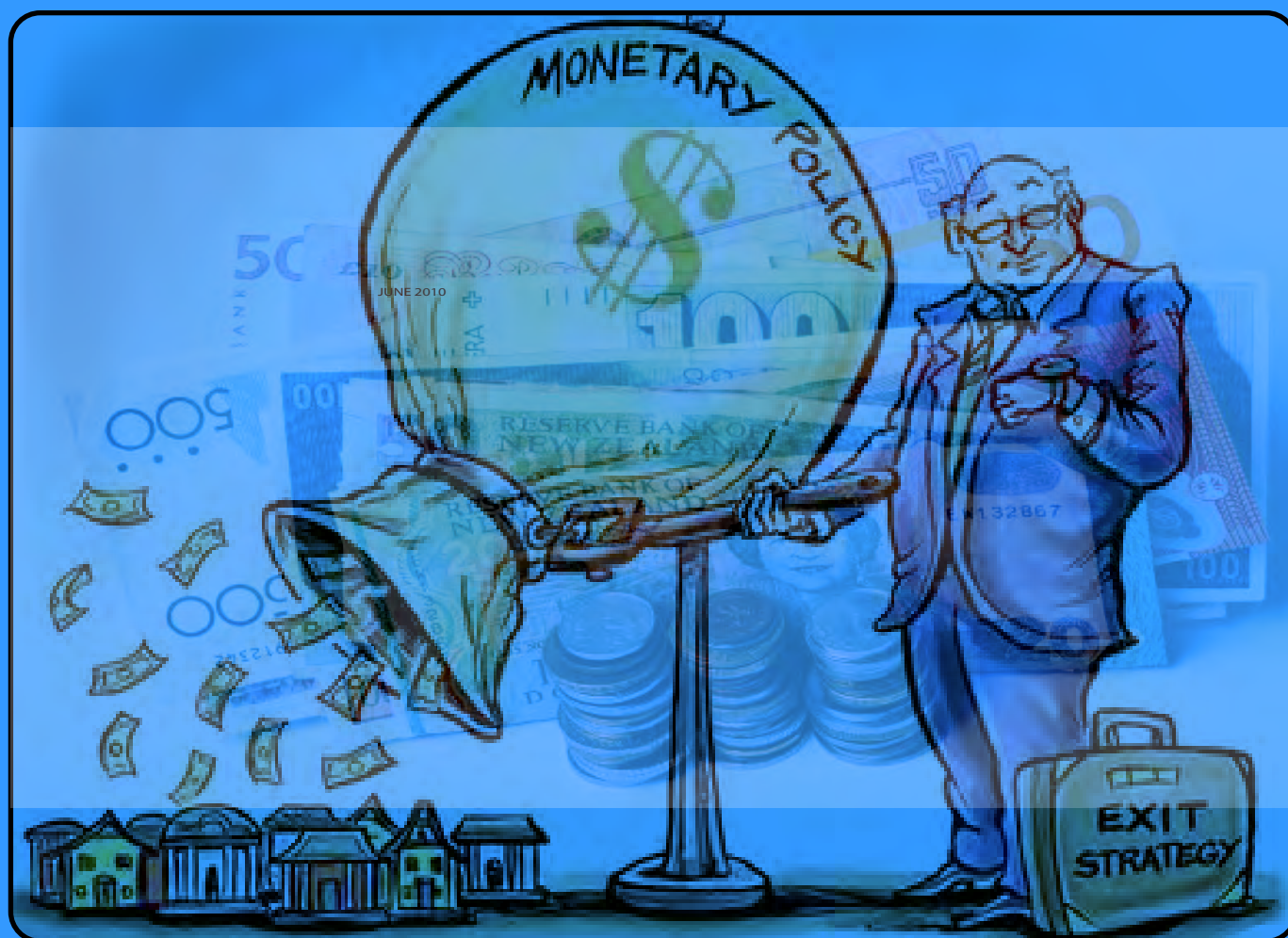
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## INFLATION DIFFERENTIALS AMONG UGANDAN HOUSEHOLDS:

1997 - 2007



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**ECONOMIC POLICY RESEARCH CENTRE**

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# 1 Introduction

Since the structural adjustment days of the 1990s, targeting inflation to single digit rates has remained a predominant feature of Uganda's macroeconomic strategy towards creating and sustaining an enabling environment for poverty-reducing growth. One of the most commonly advanced arguments for this inflation targeting strategy is the minimization of the erosion of the purchasing power of the poor. Implicit in this argument is the concern that inflation hurts the poor the most. However, since different consumers purchase different bundles of goods and services depending on personal and location-specific socioeconomic characteristics, when inflation rises beyond the targeted range, it is not obvious which income group experiences a relatively higher rate of inflation. Even when group-specific inflation rates are known, the subpopulation with a higher relative rate of inflation may not necessary be the one that bears the brunt of a surge in inflation.

Other than due to differences in consumption bundles, consumption expenditure structures may vary across individuals or groups of individuals as a result of several factors including differences in the shares of own production in one's consumption bundle, spatial price differences, and the possibility of individualized pricing. The resulting differences in consumption expenditure structure, in turn, yield different subgroup-specific inflation rates.

The quest to appropriately estimate inflation differentials across subpopulations is what motivates this study. The study follows the work of Bhorat and Oosthuizen (2005), which analyzes relative inflation experiences of South African households for the period 1997 to 2002. The specific objective of our study, therefore, is to estimate inflation rates for different subgroups of households, with emphasis on identification of the main items that drive inflation among poor households. To analyze subgroup-specific inflation levels and drivers, we use an appropriately constructed consumer price index (CPI). In so

doing, we seek to shed light on the general claim that it is the poor who ordinarily face higher levels of inflation.

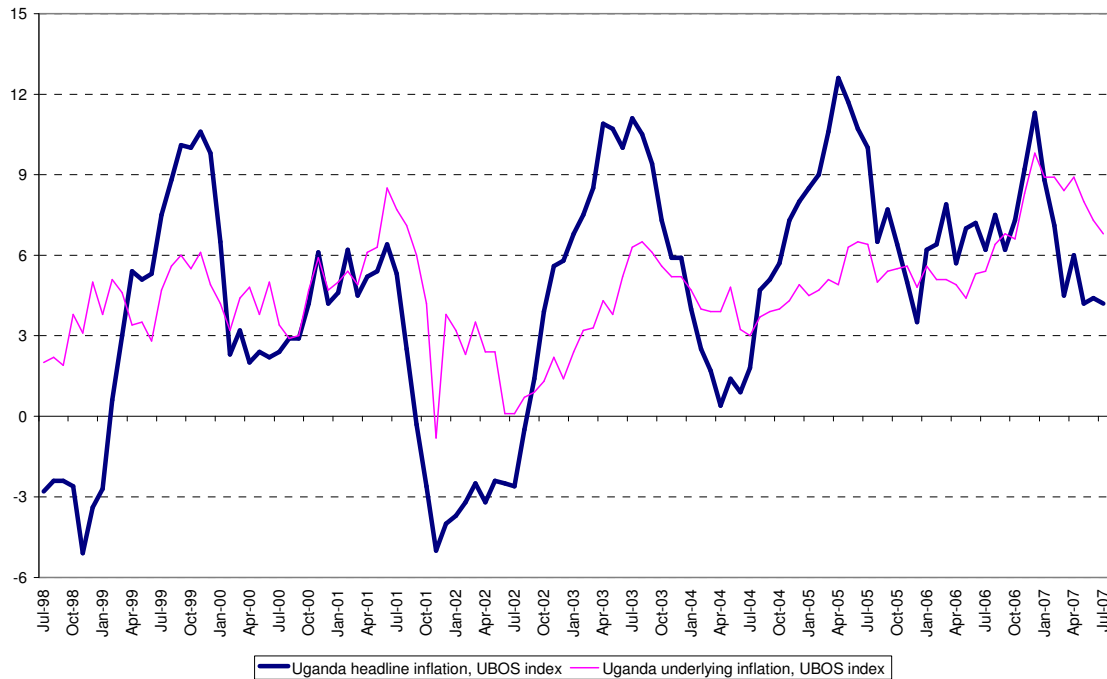
In the rest of the paper, we briefly review Uganda's inflation trend and highlight the key elements in the inflation policy of the country in section 2, describe the data used in section 3, present a methodological approach in section 4, discuss a series of analytical results in section 5 to section 9, and provide concluding and policy remarks in section 10.

## **2 Inflation policy and trend in Uganda**

Rising from economic contraction of the 1970s and early 1980s, by the mid 1990s Uganda had stabilized its macroeconomic environment, with annual inflation rate reduced to single digits from about 150% in 1985/86. Because of the country's resolve to ground its economic recovery and transformation on sound macroeconomic policy, it attracted massive overseas development assistance. The main potential source of inflation was, therefore, no longer gross economic mismanagement but expansionary fiscal strategies that aimed to absorb increasing foreign aid inflows. In this situation, the Bank of Uganda strategically transacted treasury bills, government bonds and foreign exchange, and adjusted rediscount rate and reserve requirement on deposits for purposes of macroeconomic management. All this reflected a monetary policy that aimed to ensure that liquidity conditions, foreign exchange market operations, and overall macroeconomic environment supported the level of general price stability that is necessary for sustainable economic growth.

Uganda's tight monetary policy stance has helped prevent slippage into large double-digit rates of inflation. During the period of our analytical focus (July 1998 to July 2007), the national average year-on-year headline inflation rate was 4.6%. This average, however, masks the volatile fluctuation from -5.1% in November 1998 to 12.6% in April 2005 that is presented in Figure 1.

**Figure 1: National trend of annual rate of inflation, July 1998 to July 2007**



Starting at -2.8% in July 1998, annual headline inflation rose to a peak of 10.6% in November 1999 before plummeting to 2.3% in February 2000. This fluctuation pattern continued in the subsequent years with similar wavelengths, but the volatility reduced slightly over time. In general, the fluctuations were largely attributed to seasonal changes in the prices of food items, especially staple foods (Bank of Uganda, 2000). With underlying inflation fluctuating much less than the overall composite rate, Figure 1 indicates that the trend in headline inflation has, therefore, been driven by changes in the food price index. Other than the sharp drop that occurred between June and November 2001, the relatively stable trend of the underlying inflation rate indicates that the monetary authorities have been relatively successful with the policy of containing annual underlying inflation to about 5%.



### **3 Data description and issues**

The household expenditure data used to derive weights for the Uganda CPI items are periodically collected by the Uganda Bureau of Statistics (UBOS) using nationally and regionally representative sample surveys. Price data are collected from the country's six CPI centers (Kampala, Jinja, Mbale, Masaka, Mbarara and Gulu), all of which are urban, implying that the official inflation statistics for the country do not necessarily reflect the inflation experiences of the rural consumers.

The household expenditure data analyzed in this paper were collected by UBOS during March to November, 1997. The expenditure data, however, have several limitations that UBOS addresses in fairly prudent ways. First, certain expenditures that were reported in aggregate form, such as transport fare, were decomposed using relevant information from other data sources. Second, some line-item expenditures that appeared to be over-reported or under-reported were adjusted using trends from previous surveys. Third, time lapse between the 1997 survey and the CPI base period of 1997/98 was adjusted for using relative proportions of the effective weights between the two dates. Fourth, expenditures on items not specified in the CPI were distributed to items or item groups/categories with similar price trends and end use.

In analyzing the expenditure data to construct the weights used to generate the results presented in this paper, the cell formulas underlying the Microsoft Excel adjusted expenditure databases that we obtained from UBOS were laboriously coded into several Stata Software Do files. Precisely, the above-summarized adjustments that UBOS makes to the 1997 consumption survey data were replicated using Stata for every CPI item, subgroup and group. This procedure was necessary to enable validation and comparability with the aggregate inflation statistics published by UBOS.

Certain limitations of the 1997 survey data that affect CPI weight construction are, however, not addressed by UBOS, and have also not been corrected for in our analysis. First, UBOS determines that to get reliable expenditure aggregates (for constructing weights) at the item group level a minimum of 200 sampled households from every CPI center is required. But the 1997 survey, which sampled 6,666 households, covered 240 households in Kampala and less than 200 households for each of the other CPI centers. In computing the composite CPI, UBOS takes into account household expenditure for all urban centers in the Northern region (where Gulu CPI center is situated) instead of using the sample households for Gulu only. UBOS does not, however, perform similar adjustments for the small sample sizes for the other CPI centers. Second, no adjustments are made for the fact that the 1997 survey did not cover the months of January, February and December, which potentially have huge seasonal influences on consumption expenditure levels and patterns.

Notwithstanding these drawbacks, the 1997 survey data are the official sources of the household consumption expenditures that were used to update Uganda's CPI base period from 1989 to 1997/98. Due to the complexities of the above-referred item-by-item adjustments to the consumption expenditures of households, and given that the 1997 consumption expenditure survey samples for five of the six CPI centers were not representative of the respective center's population, the analysis in this paper is confined to inflation experiences of households in the Kampala CPI center.

## 4 Methodology

Whereas consumers usually experience different rates of inflation due to differences in consumption baskets and differences in the prices faced, analysts are often unable to investigate inflation differentials based on variation in the actual prices paid by different consumers. This inability is mainly due to the nature of the surveys that statistical offices conduct for updating CPI baskets and weights. Specifically, the data collected for CPI calculation usually cover item-by-item consumption expenditure and monthly average prices of the items, not the prices paid by individual consumers. Accordingly, in our analysis, any estimated inflation differentials across subpopulations would have arisen mainly due to differences in item expenditure shares, differences that are attributable to variations in the composition of consumption baskets.

### 4.1 CPI construction

The CPI calculation that we adapt for this study is based on weights that were introduced into the Ugandan index in 2001 and, as indicated above, the weights are derived from consumption expenditure data collected in 1997. Because the reference expenditure pattern (item basket) is that of an earlier period (1997) than the subsequent period spanning 1997/98 to the present time over which prices are compared, Moulton (1996) termed this kind of CPI a modified Laspeyres index. The modified Laspeyres index takes into account the price change that occurs between the consumption expenditure survey date and CPI base period. CPIs that are constructed without taking into account this price change suffer a Laspeyres bias (Ruiz-Castillo *et al.*, 2002). The CPI is also a modification of the original Laspeyres index in the sense that it uses consumption expenditures with prices and implicit quantities (Cage *et al.*, 2002).

Following the notations of Hobijn and Lagakos (2005), let  $\pi_t^{CPI}$  represent CPI inflation in period  $t$ ,  $w_{j,b}$  the relative importance of item group  $j$  in the base period  $b$ ,  $P_{j,t}$  the price index of item group  $j$  in period  $t$ , and  $m$  the number of item groups in the CPI basket of

goods and services. Using the Laspeyres index (see appendix) yields the following expression as a measure of CPI inflation.

$$1 \quad \pi_t^{CPI} = \frac{\sum_{j=1}^m w_{j,b} \frac{P_{j,t}}{P_{j,b}}}{\sum_{j=1}^m w_{j,b} \frac{P_{j,t-1}}{P_{j,b}}} - 1$$

The CPI inflation given by equation 1 is based on a fixed-weight price index. But in the CPI construction by the Uganda Bureau of Statistics (UBOS), the method used continuously updates the base period as presented in equation 2. Essentially, in the calculation of the CPI, in every period, the base period is updated by setting  $b=t-1$  in equation 1. Hence, plugging  $b=t-1$  into equation 1 and exploiting the property  $\sum_{j=1}^m w_{j,t-1} = 1$ , we obtain a *new* measure of inflation,  $\pi_t^N$ , which is given by

$$2 \quad \pi_t^N = \sum_{j=1}^m w_{j,t-1} \frac{P_{j,t}}{P_{j,t-1}} - 1 = \sum_{j=1}^m w_{j,t-1} \left( \frac{P_{j,t}}{P_{j,t-1}} - 1 \right) = \sum_{j=1}^m w_{j,t-1} \pi_{j,t}$$

In a fixed-weight representation as in equation 1, the overall CPI inflation is a ratio of weighted averages of the percentage price changes of each of the item categories, with the price changes in the numerator being between period  $t$  and a fixed base period while in the denominator the price changes are between period  $t-1$  and the fixed base period. With chain-updating where the base period for every period  $t$  is  $t-1$  as represented in equation 2, the overall CPI inflation reduces to the sum of weighted

category-specific inflation rates, with the weights being the updated relative importance of each item category.<sup>1</sup>

The concept of *relative importance* of an item in this regard refers to the expenditure share that would prevail if quantities consumed remained constant irrespective of relative price changes. Although the implicit quantity weights remain fixed over time, as relative prices change, the relative importance of an item also changes and should be updated periodically on a chained basis. Nevertheless, because certain consumer items are very sensitive to price changes, the use of implicit quantities in the weights means that updating relative importance does not yield the required minimization of erratic behavior in the CPI owing to complex consumer responses to relative price changes. Hence Fry and Pashardes (1986) recommend a “comprehensive solution” involving forecasting models of expenditure shares as functions of past spending patterns, relative prices, income, demography, etc., after all, consumer price indexes are not single numbers but functions whose values depend on several factors<sup>2</sup> that determine base-period welfare (Pollak, 1980).

In our inflation differential analysis we do not deploy a forecasting method. Instead, we use the above-described chained-updating method where intermediate period Laspeyres indexes are literally chained. Basically, by accounting for changes in the relative importance of items we aim to incorporate substitution effect in the CPI. The difference between the indexes generated using fixed-weight versus those calculated using chained-updating depends on the size of the substitution effects of relative price changes over a given period of analysis (Aizcorbe and Jackman, 1993).

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<sup>1</sup> In updating the relative importance of each item category, the weight for the all-items category is normalized to 100.

<sup>2</sup> The price and weight factors that determine expenditure aggregate are highlighted and classified in Hurwitz (1962).

#### **4.2 *Plutocratic versus democratic indices***

In the standard computation of inflation rates by statistical offices, the CPI weights are calculated by summing, across all households, the expenditure for each item and expressing it as a proportion of total expenditure of all households on all items. Prais (1959) referred to this approach that takes an unequally weighted average of household expenditure shares as the plutocratic method. Conversely, he termed the alternative approach that attaches equal weight to each household (by averaging across households, the expenditure share of each household), the democratic method.

Whereas the standard approach of calculating CPI weights are valid for generating overall inflation, it has been established to be inappropriate for estimating the inflation rate facing the average household. The reason is that a plutocratically calculated item weight is biased towards the weight in the consumption basket of households in the upper end or lower end of the welfare distribution, with the direction of bias being determined by the income-elasticity of the item (Prais, 1959). In other words, a plutocratically derived price index is neither an average of the indexes experienced by each household nor the index of the average household (Fry and Pashardes, 1985). Accordingly, the plutocratic method is especially inappropriate in a high inequality context. Ley (2005), for example, shows that the larger the income inequality, the more different are consumption patterns across income groups, making the use of a single plutocratic CPI as the only policy deflator less appealing.

As presented in equation D in the appendix, the plutocratic weight is a weighted average of expenditure proportions, the weight being the base-period total expenditure of the household. As such, a plutocratically computed inflation rate is generally influenced by, and much more reflective of, the inflation rate facing the better-off consumers. This is because it is the better-off who normally spend more, arising from the fact that consumption items predominantly feature the property of a normal good.

Because of the inherent bias of the plutocratic approach, our analysis of inflation by population subgroup uses the democratic method where each household contributes equally to the overall weight. As expressed in equation E in the appendix, by weighting each household equally, the democratic weight is a simple average of households' expenditure shares.

## 5 Consumption expenditure pattern of Kampala households

In this section the consumption expenditure structure of Kampala households is presented to illustrate that due to the unequal distribution of welfare among the sampled households, it is inappropriate to deploy the plutocratic approach to CPI computation for purposes of investigating differentials in subpopulation-specific inflation rates. Further, we reinforce this point by providing descriptive evidence on the variability of item-category shares across welfare groups and by type of household's head.

### 5.1 Total consumption expenditure distribution

The expenditure structure presented in Table 1 shows that the distribution of welfare is quite unequal among Kampala households, with the richest 20% of the population accounting for about 50% of total household expenditure in 1997 and in 2005/06. Over time, the share of the bottom 60% of the population in total household expenditure dwindled from 30.8% in 1997 to 25.7% in 2005/06, with the magnitude of decline being gained by the upper 40% as the percentage increase in their share of total expenditure. With such unequal expenditure distribution patterns, it is expected that a price index that attaches greater importance to the contributions of richer consumers to the index would misrepresent the inflation rate facing the poorer segment of society.

**Table 1: Expenditure distribution by quintile (%), 1997 and 2005/06**

		Kampala, 1997		Kampala, 2005/06
Quintile 1		6.11		5.01
Quintile 2		10.37		8.31
Quintile 3		14.36		12.36
Quintile 4		20.03		21.51
Quintile 5		49.13		52.81

Source: Authors' calculation from the 1997 and 2005/06 national household survey data



## **5.2 Consumption expenditure shares by welfare group**

The democratic shares in Table 2 show that, on average, food constitutes the largest proportion (49%) of Kampala households' expenditure, followed at a distant second by rent, fuel and utilities category, which takes a 20% share. The third largest share of expenditure goes to the health, education and entertainment category. Each of the rest of the item categories accounts for less than 10% of total expenditure. Presenting the results by quintile, Table 4 shows that the same expenditure pattern is maintained across welfare groups. However, moving from the lowest to the highest welfare group, food share drops from 51% to 44% while that of the second largest expenditure category (rent, fuel and utilities) drops by more than half, from 25% to about 11%. This expenditure pattern confirms that the items in question are typically necessities or inferior goods. For the third largest expenditure category (health, education and entertainment) the share increases with increase in income, depicting the distinguishing attribute of a luxury item. With such variability in the expenditure structure across income groups, it is expected that the plutocratic and democratic methods would yield distinctly different weights for these major expenditure categories. The implication is that applying the plutocratic method to analyze inflation differentials across subgroups of Kampala households would yield biased results.

Table 2 and Table 3<sup>3</sup> illustrate that plutocratically constructed weights are, indeed, biased in favor and reflect the expenditure pattern of the richer members of society. Breaking down the item category weights by welfare group, we observe that, for example, the overall plutocratic food category weight of 42.1% (Table 2) is approximately equal to the plutocratic food share for quintile four (Table 3). In general, for each of the item categories in the Uganda CPI market basket, the plutocratically estimated weight lies between the fourth and fifth quintiles.<sup>4</sup> By contrast, the

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<sup>3</sup> The results in Table 3 are also graphically represented in the appendix as Figure A 1.

<sup>4</sup> Basically, the plutocratic price index is neither an average of the indices experienced by each household nor the index of the average household (Fry and Pashardes, 1985).

democratically calculated weights are much more in line with the expenditure structure of the average subgroup of the population. As observed in Table 4, decomposing the democratic weights by welfare group shows that the overall democratic weights in Table 2 are plus or minus a few percentage points off the democratic weights for the middle subgroup – quintile three. This is evidence that the democratic approach avoids the strong influence of the expenditure structure of the richer households on CPI weights.

**Table 2: Expenditure shares of item categories (%)**

		Plutocratic share		Democratic share
Food		42.1		49.0
Beverages & Tobacco		8.3		3.4
Clothing & Footwear		6.2		5.1
Rent, Fuel & Utilities		15.7		19.5
Household & Personal Goods		4.9		5.4
Transport & Communication		8.7		5.7
Health, Education & Entertainment		14.2		11.9

Source: Authors' calculation from the 1997 national household survey data

**Table 3: Plutocratic expenditure shares by item category and quintile (%)**

	Quintile_1	Quintile_2	Quintile_3	Quintile_4	Quintile_5
Food	49.5	48.7	47.4	42.6	37.6
Beverages & Tobacco	2.5	4.7	6.0	7.7	11.0
Clothing & Footwear	4.7	4.4	3.9	5.3	8.1
Rent, Fuel & Utilities	24.6	22.1	20.1	18.6	9.9
Household & Personal Goods	6.9	5.8	5.3	4.9	4.2
Transport & Communication	3.7	4.9	6.0	6.9	12.0
Health, Education & Entertainment	8.1	9.3	11.3	13.8	17.1

Source: Authors' calculation from the 1997 national household survey data

**Table 4: Democratic expenditure shares by item category and quintile (%)**

	Quintile_1	Quintile_2	Quintile_3	Quintile_4	Quintile_5
Food	50.6	51.7	50.7	46.8	44.1
Beverages & Tobacco	1.2	2.2	3.0	4.0	6.1
Clothing & Footwear	4.5	4.3	4.0	5.3	7.0
Rent, Fuel & Utilities	25.0	22.2	20.2	18.8	11.2
Household & Personal Goods	7.2	5.6	5.0	4.9	4.2
Transport & Communication	3.3	4.2	5.2	6.1	9.5
Health, Education & Entertainment	7.9	9.1	11.5	13.7	17.0

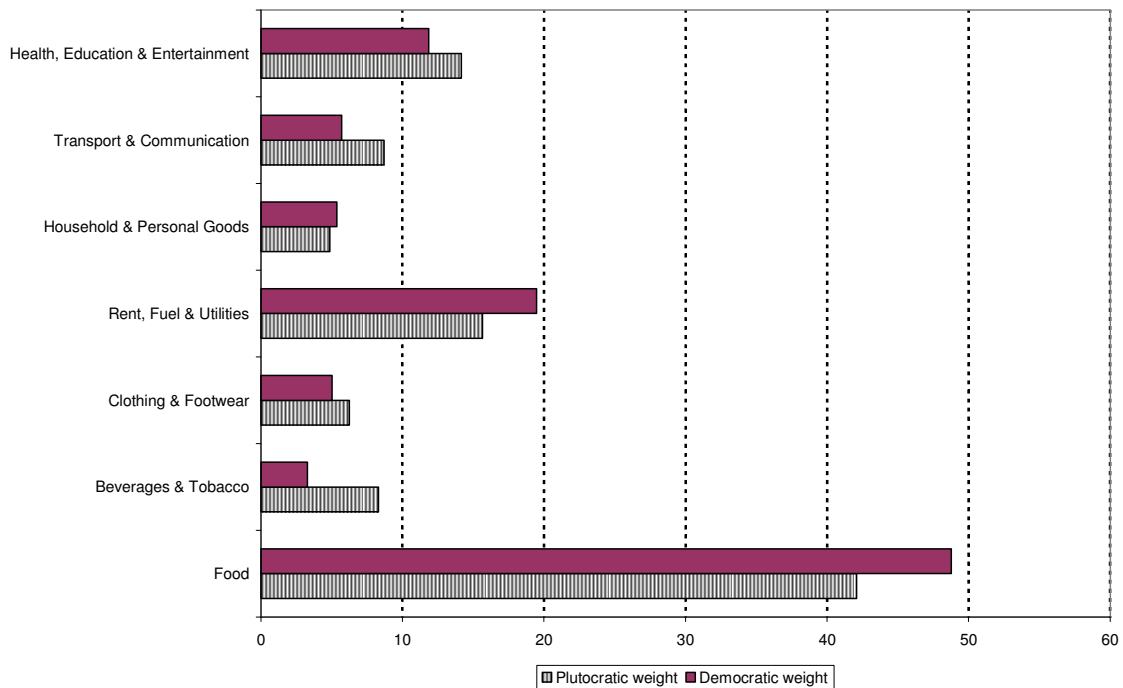
Source: Authors' calculation from the 1997 national household survey data

The bias of the plutocratic method towards the expenditure pattern of the better-off households can also be demonstrated by comparing the plutocratic and democratic weights as illustrated in Figure 2 and Figure 3. From Table 5 we observed that the three item categories (food, rent-fuel-utilities, and household-personal-goods) on which the poor spend proportionately more than the non-poor are also those whose democratic weights are higher than the corresponding plutocratic weights (Figure 2).<sup>5</sup> Conversely, the items on which the poor spend proportionately less than the non-poor have

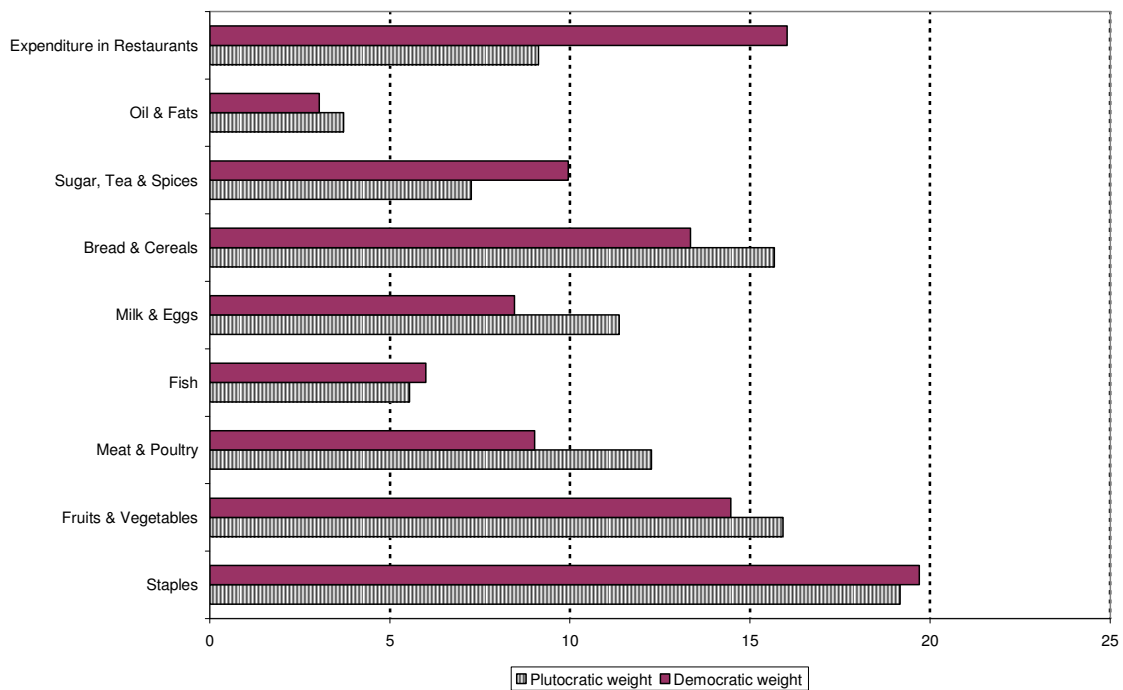
<sup>5</sup> Within the food group (Figure 3), expenditures on restaurant foods and on sugar, tea and spices are proportionately higher among the poor than among the non-poor.

democratic weights that are smaller than the plutocratic counterparts. In essence, by weighting each household equally, the democratic method corrects for the underrepresentation of the expenditure structure of the poor in the overall weight and vice versa. By comparing Table 3 and Table 4, it is evident that the correction of biases narrows the gap between the average weights in the lowest welfare group and those in the highest group.

**Figure 2: Comparison of plutocratic and democratic weights – Item groups**



**Figure 3: Comparison of plutocratic and democratic weights – Food subgroups**



In terms of gender of the head of household, the evidence in Table 5 suggests that there is basically little gender difference in expenditure pattern among Kampala households. With the exception of the health, education and entertainment category, the expenditure shares of gender-based subgroups of households differ by only about one-percentage point. This is in sharp contrast to the differential we observe between the poor and the non-poor.

**Table 5: Democratic expenditure shares by item category and type of household**

	Female-headed	Male-headed	Poor	Non-poor
Food	48.4	49.3	51.4	47.5
Beverages & Tobacco	2.7	3.7	1.8	4.4
Clothing & Footwear	4.4	5.3	4.5	5.5
Rent, Fuel & Utilities	18.7	19.9	23.6	16.8
Household & Personal Goods	4.6	5.7	6.4	4.7
Transport & Communication	5.6	5.8	3.8	7.0
Health, Education & Entertainment	15.6	10.3	8.6	14.1

Source: Authors' calculation from the 1997 national household survey data

## 6 Plutocratic-Gap representation of inflation differentials

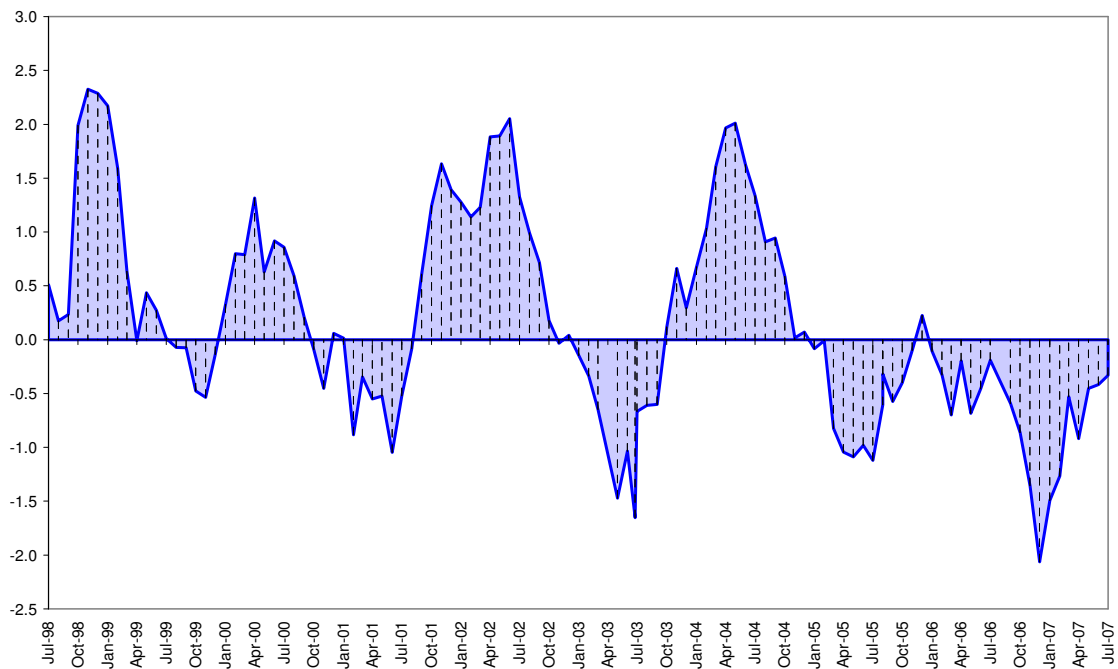
The difference between the inflation computed according to the plutocratic and the democratic price index is called the plutocratic gap. If the plutocratic- and democratic-based aggregate inflation measures are denoted by  $\pi_t^{NP}$  and  $\pi_t^{ND}$  respectively, then the plutocratic gap is expressed as  $\pi_t^{NP} - \pi_t^{ND}$ . Whether price changes in a given period hurt the poor more than the non-poor can, therefore, be read off from the gap according to the sign it takes (Izquierdo *et al.*, 2003). Essentially, the sign of the gap is determined by whether price changes in a particular period are anti-rich or anti-poor. A positive plutocratic gap for a given period means that the items that are predominantly consumed by richer households have experienced higher than average inflation rate. Conversely, a negative plutocratic gap means that necessities, which dominate the market baskets of poorer households, have experienced higher than average inflation rates.

Figure 4 presents the plutocratic gap for Kampala CPI center during July 1998 to July 2007. The plutocratic gap for the period ranges from -2.1 for the year ended December 2006 to 2.3 for the year ended December 1998. For the most parts (July 1997 to December 2004) of the period analyzed, although the plutocratic gap fluctuated in a tidal-wave pattern, for the majority of the months the gap was positive. Furthermore, whenever the gap was positive, it was much larger in order of magnitude than when it was negative. The implication is that year-on-year inflation for the sub-period spanning July 1997 to December 2004 was largely driven by higher-than-average inflation rates of items that are relatively predominant in the consumption baskets of better off households. Besides, the higher rates of inflation experienced by the better off consumers were much larger in magnitude than the rates experienced by poorer consumers in periods when the latter faced higher-than-average inflation.

From January 2005 to July 2007 the plutocratic gap was negative except for the year ended December 2005. In other words, for the last two and a half years of the period

analyzed, the items purchased relatively more by lower-income households exhibited higher-than-average rates of inflation compared to those purchased relatively more by better off households. It should, however, be noted that the size of the plutocratic gap is empirically determined by factors such as income inequality, consumption heterogeneity, and price-level dynamics, hence the gap can substantially vary spatially and inter-temporally (Izquierdo *et al.*, 2003).

**Figure 4: Plutocratic gap, year-on-year inflation, July 1998 to July 2007**



## **7 Democratically-derived group-specific inflation rates**

The discussion in section 4.2 suggests that due to the plutocratic bias, comparative analysis of group-specific inflation experiences would rather be conducted based on democratically-derived price indices. The analysis of group-specific inflation experiences in this section builds on the plutocratic-gap representation in the previous section, which shows that different income groups faced different rates of inflation.

Whereas the conclusions read off from the plutocratic gap are informative, it is important that we generate price indices for different subgroups in order to calculate and compare the actual inflation rates experienced by the different subgroups. Specifically, we present in section 7.1 and section 7.2 the inflation experiences of Kampala households by poverty status and by gender of the head of household respectively.

### ***7.1 Inflation differentials by poverty status***

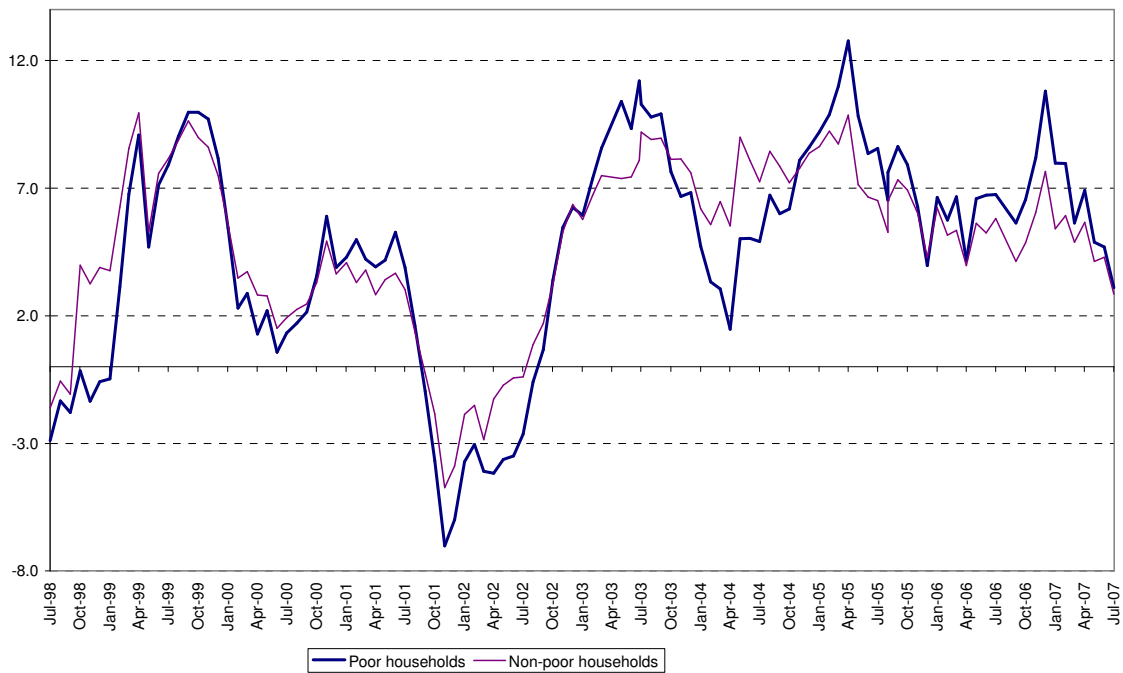
For purposes of this analysis a household is categorized as poor if its total monthly consumption expenditure falls within the first or second quintile of the sample expenditure distribution. According to Table 1, households in the bottom 40% of welfare distribution account for only about 17% of the total expenditure of all households. With such a skewed distribution of welfare and given the variations in the consumption baskets presented in Table 3, the inflation rates facing the poor versus those facing the better-off are expected to differ as long as price movements differ across items.

Figure 5 shows that during the period of analysis inflation rate certainly differed by poverty status. The period started with a -2.9% rate of inflation for the poor for the year ended July 1998, a rate lower than both the -1.6% faced by the non-poor and the -2.1% that was the overall average inflation for that year. Beyond January 1999, both the poor and non-poor faced positive year-on-year inflation except for the interval September



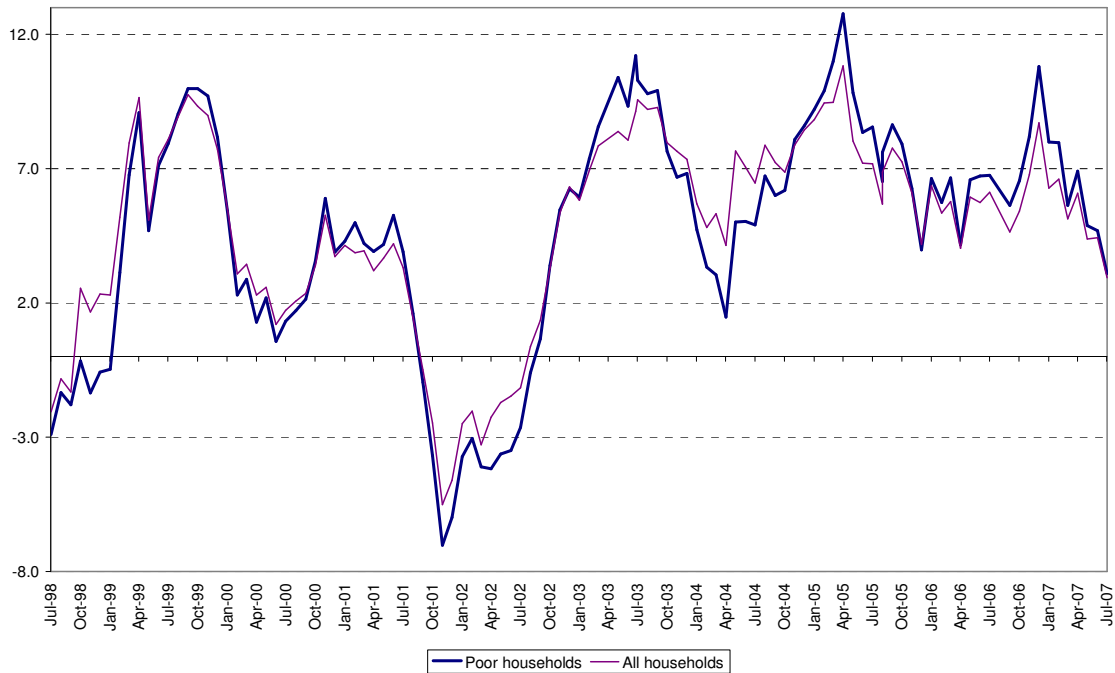
2001 to August 2002 when the rates for the respective groups plunged to -7.0 and -4.7 percent.

**Figure 5: Year-on-year inflation rates by poverty status of household**



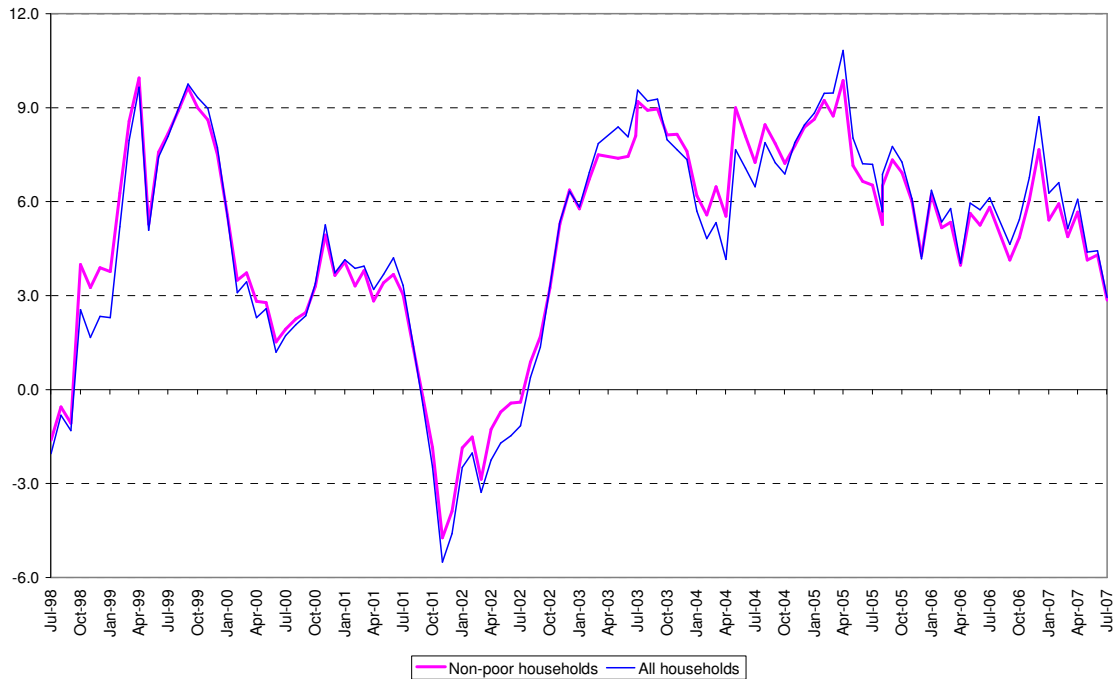
The general pattern in the trend differentials by poverty status is such that whenever inflation reached a high or a low for a given time interval, the peak or the trough was capped or enveloped by the inflation rates facing the poor. In other words, poorer households experienced greater inflation volatility between July 1997 and July 2007. Relating Figure 5 and Figure 4, we observe, for example, that the point where the plutocratic gap turned and remained negative for the rest of the period of our analysis was also the point around which the curve for the calculated inflation for the poor crossed that of the non-poor and dominated it through the end of the period.

**Figure 6: Year-on-year inflation, the poor versus all households**



Considering Figure 6 and Figure 7, we confirm the observations read off from the plutocratic gap that at the local minimum of every major downward trend, the poor experienced a lower than average level of inflation. Similarly, at the local maximum of every major upward trend, the poor were as well the bearer of the brunt of inflation spiral. Conversely, with the exception of the April 1999 and March 2004 peaks, the inflation rates experienced by the non-poor during peak periods were usually lower than the overall average.

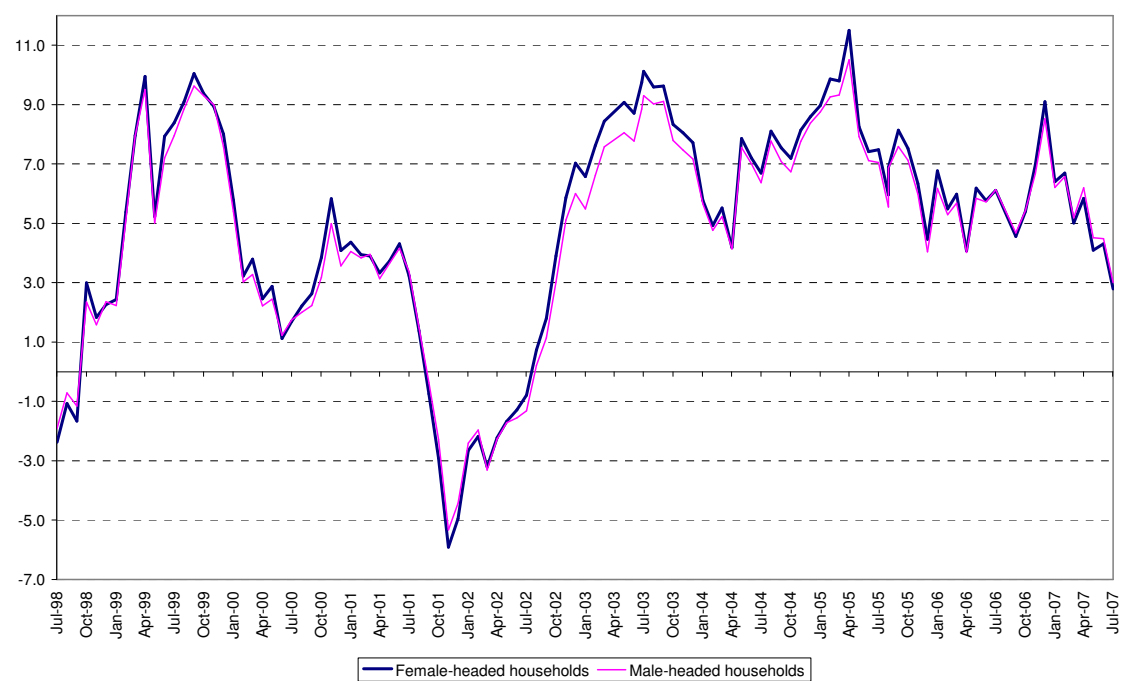
**Figure 7: Year-on-year inflation, the non-poor versus all households**



## **7.2 Inflation differentials by gender of household's head**

Unlike the sizeable differentials observed in the inflation experiences between the poor and non-poor, the trends presented in Figure 8 shows that there is virtually no difference between the inflation rates facing female-headed households compared to the rates facing male-headed households. Nevertheless, the results show that whenever and by whatever margin the two groups of households experienced different rates of inflation, it was always female-headed households who faced higher rates. The period with the largest difference in the inflation rates facing the two groups was from December 2002 to July 2003 when there was approximately a three-percentage point gap in the year-on-year rates of inflation. Essentially, there is no major gender-based inter-group variation in inflation.

Figure 8: Year-on-year inflation by gender of household's head



## **8 Contributions of item categories to inflation**

The large variations in item-category expenditure shares across welfare groups (Table 4 and Table 5) implies that an analysis of the main contributors to overall and group-wise inflation is expected to yield significant variability in the importance of different item groups to inflation. In this section we discuss this importance as measured by percentage-point contributions of item categories to overall average inflation and to subpopulation-specific inflation.

The contribution of an item category to inflation is determined by the interaction between its share in total expenditure and the change in its price index for the period over which inflation is calculated. Precisely, it is the product of the item-category inflation rate and the item-category weight, with the weight being the updated relative importance where the all-items category weight is normalized to 100. A category with a high relative importance and whose price index has changed substantially in a given period is expected to make a relatively large percentage-point contribution to overall average inflation. Identification of the item categories that drive overall inflation and group-specific inflation is thus the focus of this section.

### **8.1 *Main contributors to overall average inflation***

Reading off from Table 6, which presents the distribution of category-specific inflation and the average updated relative importance of the categories, we can deduce that certain categories were not major contributors to overall inflation. Specifically, the category clothing and footwear with a relatively small inflation standard deviation of 4.2 coupled with a relatively small average updated weight, is expected to have made little contributions to overall inflation during the entire period of analysis. Similarly, the combination of inflation standard deviation and average updated weight of beverages and tobacco and for transport and communication suggest that these item groups have made little contributions to year-on-year inflation.

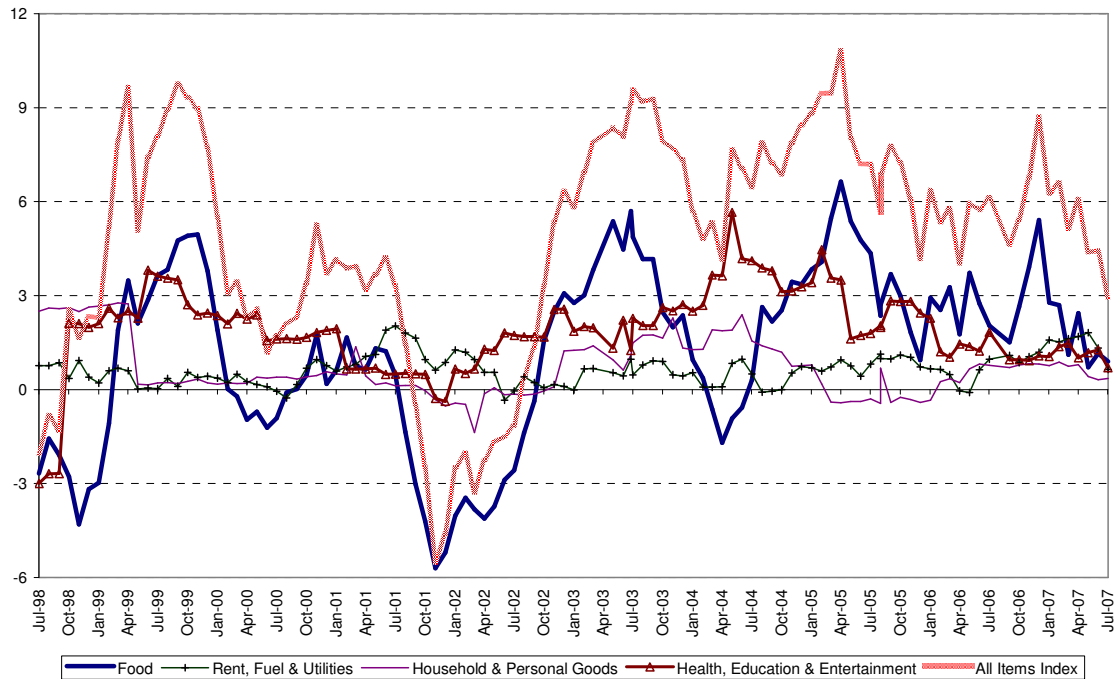
**Table 6: Identifying the main potential contributors to inflation**

	Distribution of year-on-year inflation, 1998 to 2007					Average
	Minimum		Maximum		Standard deviation	updated weight
Food	-17.4		24.2		9.4	30.2
Beverages & Tobacco	-4.4		21.4		6.1	2.4
Clothing & Footwear	-7.5		12.0		4.2	3.3
Rent, Fuel & Utilities	-2.4		15.9		3.9	13.3
Household & Personal Goods	-10.2		24.6		7.8	12.7
Transport & Communication	-10.2		15.4		4.4	4.1
Health, Education & Entertainment	-8.6		16.8		3.9	34.1
<b>All-Items Index</b>	<b>-5.5</b>		<b>10.8</b>		<b>3.6</b>	<b>100.0</b>

Source: Authors' calculation from the 1997 national household survey data and 1997 to 2007 prices

Whereas the above ballpark identification of major contributors to overall inflation is informative, it does not give the exact estimates of category-by-category contributions to year-on-year inflation. To obtain percentage-point contributions to overall inflation, we apply the approach described earlier. Essentially, multiplying the inflation rate by the updated weight of each category for every year and plotting the results, we obtain Figure 9. The figure shows that the cyclical pattern of the all-items inflation index is in consonance with the pattern of food contribution to total inflation. Nevertheless, during several sub-periods two item categories (health, education and entertainment, and household and personal goods) surpassed food in contributing to overall inflation.

**Figure 9: Contributions of item categories to overall inflation, all households**



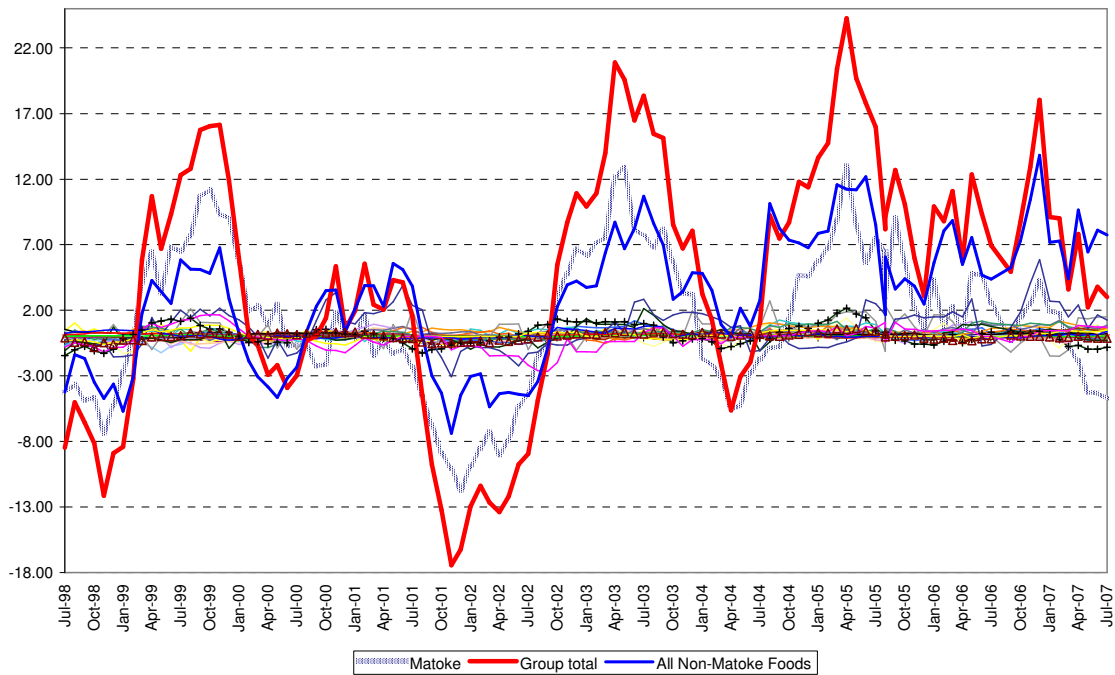
In the beginning of the period of analysis when overall year-on-year inflation was negative, the deflationary contribution of health, education and entertainment exceeded that of food. When the overall inflation turned positive at 2.5% for the year ended October 1998, it followed an upswing in the contribution of health, education and entertainment from minus 2.7 percentage points in the previous year ended September 1998 to plus 2.1 percentage points. Notwithstanding this contribution of the health, education and entertainment category, the overall year-on-year inflation for October 1998 would have been 5.3% had it not been for the minus 2.8 percentage-point contribution of the food category that weighed down (by about 53%) the total inflation for the year. During this initial period up to April 1999 the contribution of household and personal goods to inflation was positive and substantially high at around 2.6 percentage points, a level of contribution that was similar to that of health, education and entertainment.

In terms of the cyclical pattern referred to earlier, Figure 9 shows five major peaks that occurred in the year ended April 1999, September 1999, July 2003, April 2005 and

December 2006. At every peak food was the leading contributor to total inflation. Food contribution to peak inflation rose from being 3.5 percentage points of the overall 9.6% annual inflation in the year ended April 1999, to 6.6 percentage points of the total 10.8% inflation in the year ended April 2005. In proportionate terms, the contribution of food to total year-on-year inflation during the major peak periods rose continuously from 36% in April 1999 to 62% in December 2006.

The other main observation of the cyclical pattern is that whenever overall inflation reached the end of a major downward trend, such as from 9.6% in April 1999 to 1.2% in June 2000, the share of food in total inflation was also at a sub-period minimum. Basically, food is by far the leading contributor to inflation or deflation spike. To shed light on the leading items that drive food price inflation, we present in Figure 10 the contributions of food items to overall food price inflation.<sup>6</sup>

**Figure 10: Contributions of individual items to overall food inflation**



<sup>6</sup> In

Figure 10, whereas the contribution of each of the 38 food items is plotted, most of which are concentrated within a small band around the x-axis, we provide legends only for matoke, all-non-matoke, and food group total.

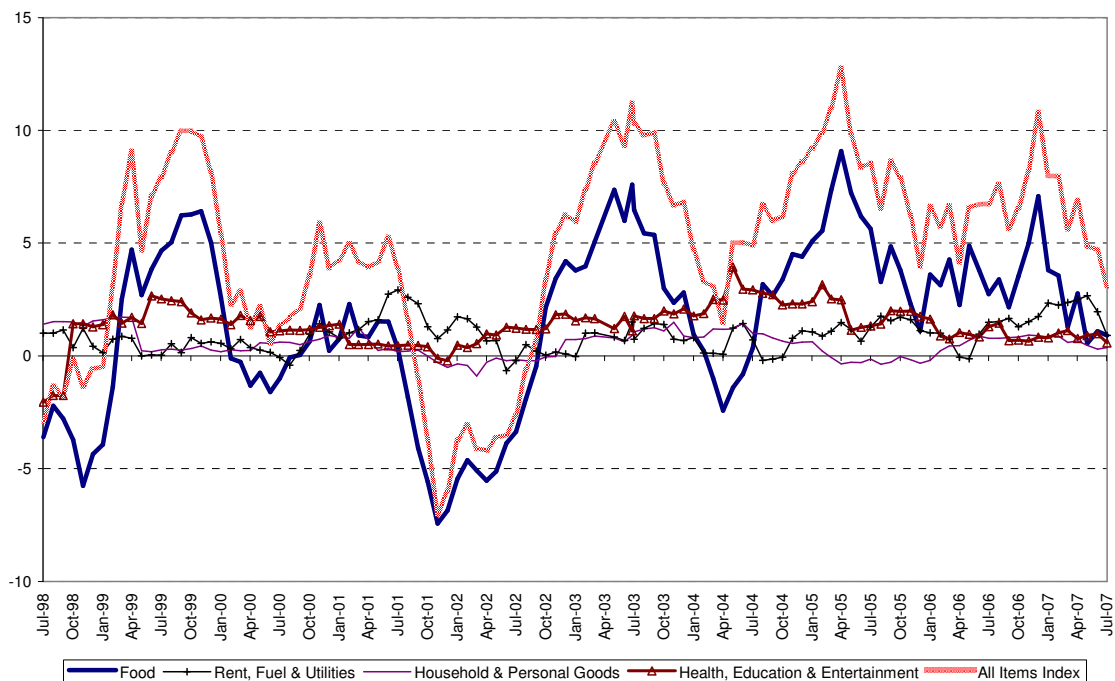


Within the all-items index matoke (green banana) commands the largest expenditure share, constituting a 7.7% weight. Being the leading staple, its large expenditure weight coupled with the huge variability in its price during the period of analysis, ensures that it is also the leading contributor to total food price inflation. At the peak of annual food price inflation in November 1999, April 2003 and April 2005, the contribution of matoke to overall food inflation was greater than the contributions of all the other food items combined. For example, matoke accounted for 54% of the 24.3-percent annual food inflation recorded in April 2005, which was the highest food price inflation for the entire period of analysis. Similarly, Figure 10 shows that the two major annual food price deflationary episodes around November 1998 and November 2001 were overwhelmingly driven by declines in matoke price.

## **8.2 Drivers of inflation among the poor**

Figure 11 presents the contribution pattern of key item categories to inflation among poor households. Just like for overall inflation among all households, among the poor, food is the leading contributor to inflation, followed by the health, education and entertainment category. Nevertheless, there is a distinct difference in the pattern of the contribution of the two categories. Whereas among all households food was the leading contributor in 61 of the 109 periods for which we calculate annual inflation, among the poor, the number of periods over which food was the leading contributor to inflation was 79. To the contrary, the health, education and entertainment category, which was the second major inflation driver in both subpopulations, led in contribution to inflation in only 21 periods among the poor compared to 38 periods when all households were included.

**Figure 11: Contributions of item categories to inflation facing poor households**



Total inflation among the poor ranged from -7% (with food contributing -7.4 percentage points) in November 2001 to 12.8% in April 2005 when food contribution was 9.1 percentage points. These are also the highest and lowest points for overall inflation for all households except that the rates at these points are larger in magnitude for the poor. As was observed for all households in the previous section, for the poor, the contribution of food to total inflation in peak times also increased continuously, from 52% in the year ended April 1999 to 71% in April 2005. These rates indicate the enormous role high food expenditure shares play in determining the incidence of food-driven price inflation among the poor. Nevertheless, as indicated above by the number of months when different item categories led in contribution to inflation, no single category uniformly dominated across time as the top driver of inflation among the poor.

The highest level of food inflation among the poor occurred in the year ended April 2005, at 26.3%, which is 2-percentage points greater than the highest food inflation for all households that also occurred in the same period. Similarly, the lowest rate of food

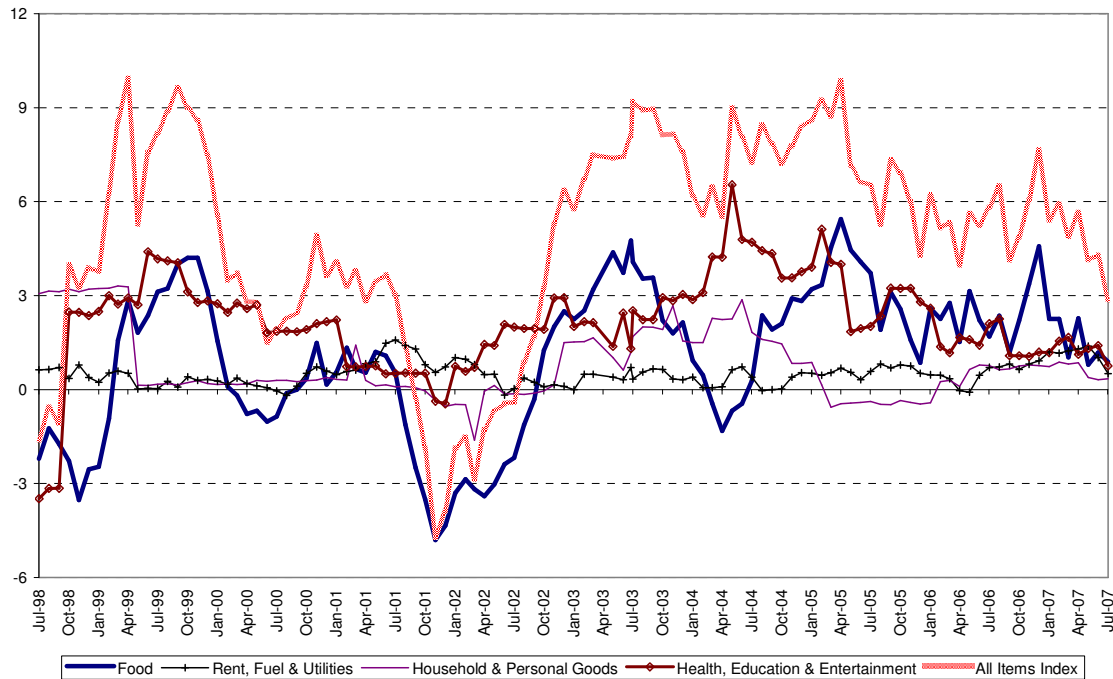
price inflation experienced by poor households was also greater in magnitude than that experienced by the overall average household. In other words, poorer households face greater fluctuation in food price inflation than the average household.

Within the all-items category matoke (with the largest expenditure share) commands a higher weight (8.9%) among poor households than the weight (7.7%) it carries when all households are considered. With a huge inflation range from -50.6% in December 2001 to 87.7% in April 2005, matoke is thus the leading contributor to food price inflation among the poor. Its contribution ranged from -12.8 percentage points (-74%) of the food inflation experienced in December 2001 to 14.4 percentage points (55%) of the food inflation experienced in April 2005. In other words, matoke is the prime driver of deflationary or inflationary food price pressures, and it is so by a larger margin among the poor than among all households.

### ***8.3 Drivers of inflation among the non-poor***

Figure 12 shows the pattern of total inflation and the contributions of major item categories to year-on-year inflation among non-poor Kampala households. Overall inflation among this category of households ranged from -4.7% in November 2001 to 9.9% in April 2005, a range smaller than what it was among poor households, which was -7% to 12.8% over the same period.

**Figure 12: Contributions of item categories to inflation facing non-poor households**



In 53 of the 109 periods analyzed, the health, education and entertainment category was the leading contributor to inflation among non-poor households. This is in contrast to the food dominance that is observed when the analysis includes all households (section 8.1) or when the analysis is confined to poor households only (section 8.2). Specifically, food was the leading driver of inflation in 61 of the 109 periods when all households were analyzed and was the leading driver in 79 of the 109 periods when only poor households were considered. But in the case of non-poor households, food was the number one contributor to inflation in only 44 of the 109 periods. Although this shows that food was, indeed, an important contributor to overall inflation among the non-poor, it was, nevertheless, not the leading driver of inflation for this subpopulation.

In November 2001 when inflation was at rock-bottom, the contribution of food price inflation (-4.8 percentage points) and the level of total inflation (-4.7%) were basically the same among the non-poor. This pattern is similar to that among poor households (at -7.4 percentage points and -7.0% respectively) but the figures for the non-poor are

much smaller in absolute terms. In other words, the poor experience much larger swings in consumer price fluctuation. In terms of cyclical pattern, Figure 12 shows that overall inflation among the non-poor follows the pattern of food price inflation. However, at the April 1999 and September 1999 peaks food category and health, education and entertainment category contributed equally to the subpopulation's overall inflation. Further, from April 2004 to July 2007 the contribution of health, education and entertainment followed a similar trend to that of food. This implies that the sources of inflationary or deflationary pressure among the non-poor are not as concentrated in a few item categories as they are among the poor.

## **9 The 2007 to 2008 surge in food prices**

We confine our brief analysis of the recent price surge to the period beginning January 2007 to April 2008. On quarterly basis, food price inflation dropped into negative territory in the first quarter of 2007 in line with the normal seasonal pattern following end-of-year festive season. The decline in the food price index deepened in the second quarter of 2007 after which the trend was reversed, with quarterly inflation rate turning positive in the third and fourth quarters of 2007. Whereas food price inflation for the first quarter of 2008 was negative as expected after a festive end-of-year season, the drop into negative territory (-0.6%) was much smaller than the -2.4% registered in the same quarter in the previous year. From January to April 2008, the food price index increased by 5.6%, which was much higher than the observed increase of 3.3% during the same period in the previous year. In other words, the first quarter of 2008 experienced higher rates of inflation than the same quarter in 2007, reflecting a significant upward trend.

On annual basis, food price inflation was most stable during the period from September 2007 to April 2008. Annual food price inflation declined from 2.5% in September to -0.9% in December 2007. But after jumping to 5.6% in January 2008, annual food price inflation rose continuously, reaching 8% in April 2008. This continuous rise in annual food price inflation occurred in spite of significant consecutive negative contributions of matooke, the item that was pivotal in determining the level of food price inflation in previous years. For example, in December 2007 a -5.7 percentage-point contribution by matooke dampened food price inflation to -0.9%. Although there was a similar -5.2 percentage-point contribution by matooke in April 2008, the overall annual food price inflation, nevertheless, stood at 8%. Essentially, the -5.2 percentage-point contribution was not sufficient to offset the surge in the contribution of other food items the way it did in previous years.

These results indicate that there were consistent increases in the relative contributions of some non-matoke items to food price inflation. Specifically, millet flour, rice, maize flour, cooking butter, margarine, refined oil, fresh fish (tilapia and Nile perch), beef and goat meat were the leading drivers of the recent annual food price inflation. For example, whereas these items jointly contributed 35% of the annual food price inflation for the year-ended January 2008, for the year-ended April 2008 their joint contribution was 111%. Basically, the annual inflation rate for April 2008 would have been much higher than the 8% observed if it were not for the significant negative contributions of matoke and sugar.

On monthly basis, the April 2008 food price inflation of 6.2% was a huge jump given that the monthly rate was less than 1% for each of the previous four months. From January to April 2008 the largest increase in item CPI was 61%; that for tomato, followed by 51% for refined oil. The other items whose CPI increased by more than 20% during the first third of 2008 were salt, cooking fat, millet flour, rice, fresh tilapia, beans, cabbage and pineapple. Although these items have relatively small weights, their total contribution to food price inflation for the period January to April 2008 was 6.4 percentage points. The total percentage-point contribution of these and all other non-matoke items was 8.9 over the same period. But because of a 20.8% drop in the CPI of the heavily weighted matoke, overall food price inflation for the period was only 5.6%.

Figure A 2 in the appendix shows that the monthly food price index took a steep upward trend from March 2004 and maintained the same trajectory thereafter. Whereas from June 1997 to March 2004 the monthly food price index fluctuated around the 100 base-period index value, from March 2004 to April 2008, the index increased by 58.4%. Although Matoke (which commands the largest weight) has the most volatile monthly index, the index has not experienced a steep upward trend (Figure A 3). For example, from March 2004 to April 2008 the index actually fell by 13.8%. By contrast, during the same period, the indexes for the items that have featured strongly in the recent food price hikes more than doubled between March 2004 and April 2008 (Figure A 4). For example, the indexes for bread, rice, fresh Nile perch, fresh tilapia and beans increased by 67.3%, 81.6%, 91.1%, 137.6% and 145.5% respectively. The price increases in the later part of this period, particularly during March 2007 to April 2008, resulted in a higher rate of food inflation for the non-poor than for the poor (Figure A 5). This is a reversal of the previous pattern where the poor usually faced higher food price inflation whenever the rates were positive.



## 10 Summary and conclusions

To study inflation differentials and to identify the main drivers of inflation among household groups we used the 1997 household consumption expenditure survey data together with monthly item prices for Kampala. We adjusted the consumption expenditure data in accordance with the procedure used by the Uganda Bureau of Statistics to generate the official CPI item weights. Constructing both the plutocratic and democratic weights, we established that the plutocratic bias features strongly in the Kampala price index. Specifically, we determined that the democratic weights closely represent the expenditure structure of the average household in any given subpopulation. Hence, we used democratically derived indexes to analyze inter-group inflation differentials and to identify the main contributors to total inflation.

The inflation experience of Kampala households shows that whereas the monetary authority has successfully contained underlying inflation to about the targeted 5% per annum, seasonal food price fluctuations have resulted in a volatile headline inflation pattern.

During the period of analysis (1997 to 2007), there was a structural shift in the level of inflation faced by the poor versus that faced by the non-poor. From 1997 to 2004 annual inflation was mainly driven by higher-than-average inflation of the items that were predominant in the consumption basket of better-off households. But after 2004 annual inflation was driven by higher-than-average inflation of the items that were predominantly consumed by poorer households. In other words, neither of the subpopulations continuously faced a higher level of inflation than the other. Nevertheless, the poor faced greater inflation volatility, and whenever inflation was at a sub-period high or a sub-period low, the poor experienced a higher absolute rate of inflation than the non-poor. In contrast to the differentials by poverty status, gender-based differentials were basically insignificant. But whenever the two sets of households

experienced different rates of inflation, the rate facing female-headed households was always higher.

At all major sub-period peaks, food was always the leading contributor to total inflation. Over time, the contribution of food to peak inflation increased, for example, from 36% in April 1999 to 62% in December 2006. Nevertheless, no single item category uniformly dominated in every period as the top driver of inflation. But on the whole, food was the dominant contributor to inflation among the poor while the health, education and entertainment category dominated among the non-poor.

Among the food items, matoke, the number one staple, is the leading contributor to inflation, accounting for as high as 54% of total food price inflation in Kampala. The contribution of matoke to deflationary or inflationary food price pressures is even much higher among the poor. This is further evidence that the sources of inflation or deflation among the poor are concentrated around specific food items. Nevertheless, the 2007 to 2008 food price increases show that matoke lost some ground as the overwhelming driver of food price inflation. As a result, for the first time since 1997 the poor faced lower food inflation rates than the non-poor from March 2007 to April 2008.

On the whole, given that at peak levels about 50% of overall inflation was attributed to food, coupled with the result that food constituted about 50% of the total expenditure for the poorest 20% of the sample and only about 38% for the richest 20%, inflation hikes have in general hurt the poor disproportionately. This implies that when inflation increases towards double digits, it is the poorer households that are most likely bear the brunt of the increases. It is, therefore, arguable that Uganda's policy of targeting overall inflation to single digits is largely pro-poor, especially under the current circumstances where food commands the largest expenditure share and is the leading contributor to overall inflation.

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## **Appendix**

### **Laspeyres formula**

The Laspeyres price index in period  $t$  with base period  $b$  is given as

$$\text{A} \quad L_t = \frac{\sum_j p_{j,t} q_{j,b}}{\sum_j p_{j,b} q_{j,b}}$$

Since it is expenditure (and not quantity) that is observed along with prices during base-period household survey for CPI weight construction, the quantity of each item  $j$  purchased in the base period is recoverable as follows:

**B**  $q_{j,b} = \frac{E_{j,b}}{p_{j,b}}$  where  $E_{j,b}$  is total expenditure on item  $j$  in the base period.

Substituting equation B into A yields

**C** 
$$L_t = \frac{\sum_j p_{j,t} \frac{E_{j,b}}{p_{j,b}}}{\sum_j \frac{E_{j,b}}{p_{j,b}}} = \frac{\sum_j E_{j,b} \frac{p_{j,t}}{p_{j,b}}}{\sum_j E_{j,b}}$$

Equation C is basically a weighted average of the price ratios of each item, the weights being expenditures on the items at the base period.

### Construction of CPI weights

In applying the Laspeyres formula to construct the plutocratic price index, the weight  $w_{j,b}^P$  is constructed as follows:

**D** 
$$w_{j,b}^P = \frac{\sum_h x_{j,b}^h}{\sum_h \sum_j x_{j,b}^h} = \frac{\sum_h \frac{x_{j,b}^h}{X_b^h} * X_b^h}{\sum_h X_b^h} = \frac{\sum_h p_{j,b}^h * X_b^h}{\sum_h X_b^h}$$

where  $X_b^h = \sum_j x_{j,b}^h$  is the total base-period expenditure of household  $h$ , and

$p_{j,b}^h = \frac{x_{j,b}^h}{\sum_j x_{j,b}^h} = \frac{x_{j,b}^h}{X_b^h}$  is the proportion of household  $h$ 's total base-period expenditure

going to item  $j$ . This means that the plutocratic weight is a weighted average of the expenditure proportions of each household, the weight being the total base-period expenditure of the household. Thus, it is clear that the plutocratic method gives more weight to the households who have higher expenditure levels. By contrast, the democratic weight of an item is a simple average, over all households, of that item's expenditure share for each household. It is, therefore, expressed as follows:

E

$$w_{j,b}^D = \frac{1}{H} * \sum_h \left( \frac{x_{j,b}^h}{\sum_j x_{j,b}^h} \right)$$

### Calculating inflation

Using the Laspeyres price index, the inflation rate for the time period  $t-1$  to  $t$  is given by

F

$$\pi_t^{CPI} = \frac{L_t - L_{t-1}}{L_{t-1}} = \frac{\sum_j w_{j,b} \frac{p_{j,t}}{p_{j,b}}}{\sum_j w_{j,b} \frac{p_{j,t-1}}{p_{j,b}}} - 1$$

**Figure A 1: Plutocratic expenditure shares by quintile**

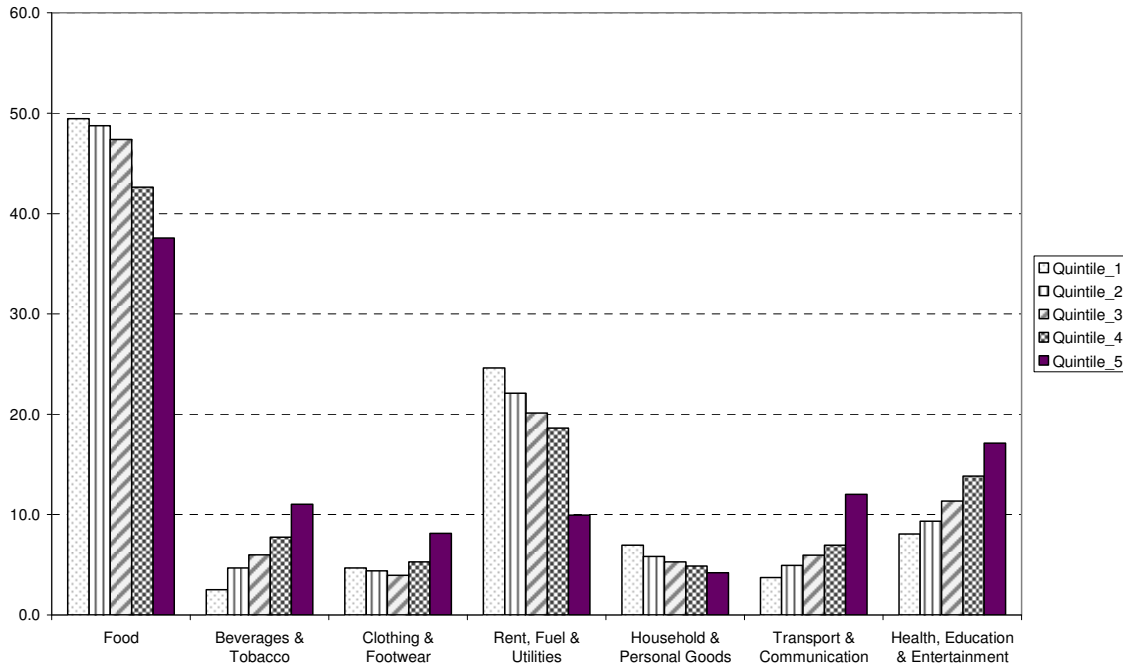


Figure A 2: Trend in the overall food price index

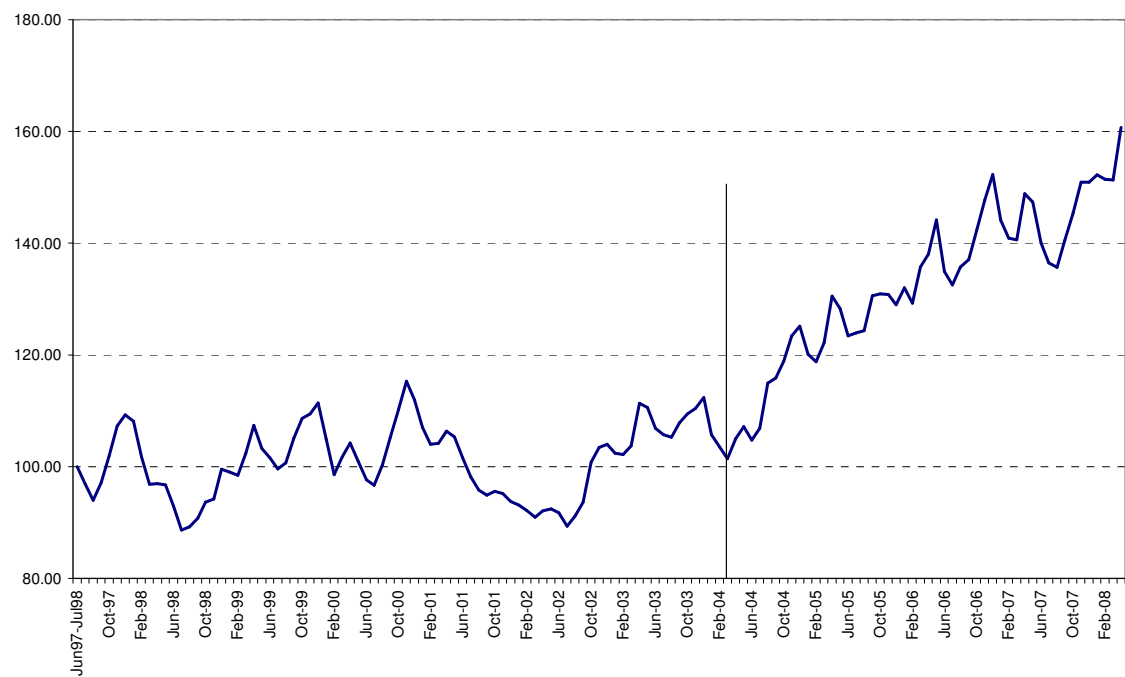
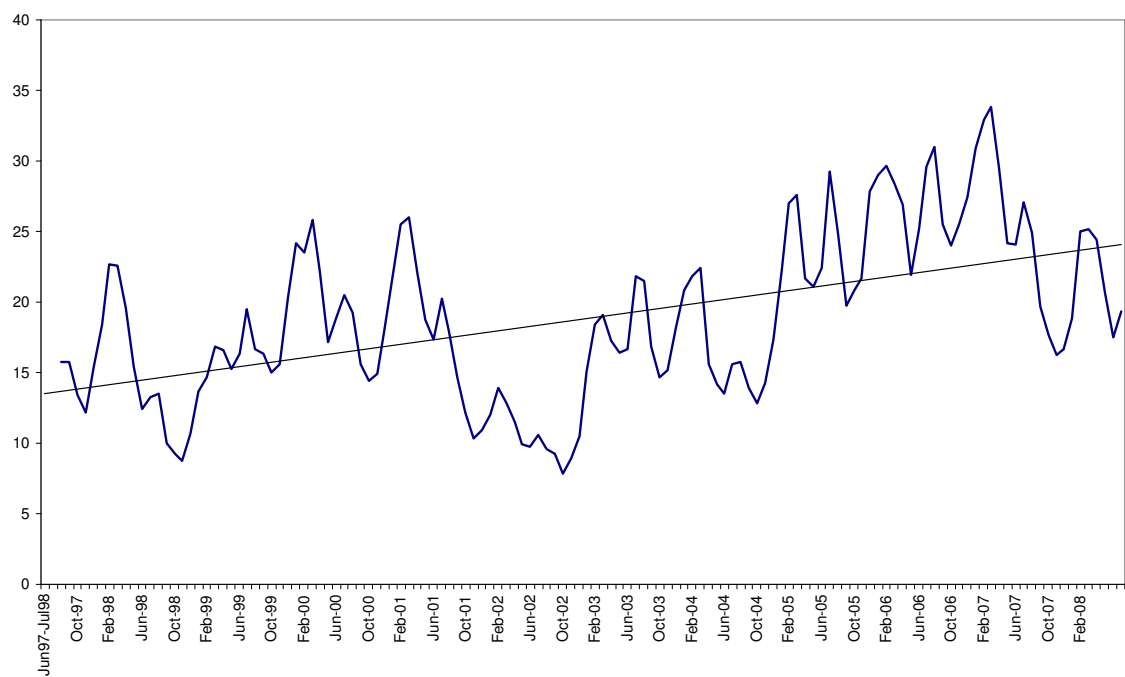
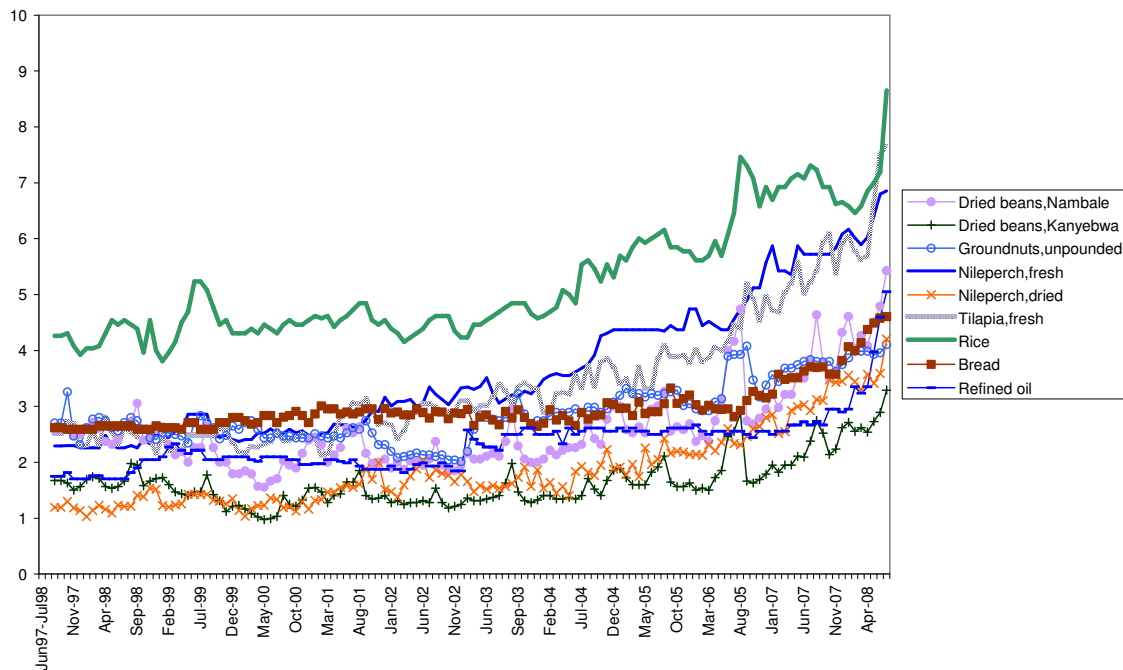


Figure A 3: Trend in matoke price index



**Figure A 4: Trends in the price indexes of other major food items**



**Figure A 5: Annual food price inflation, the poor versus non-poor**

