Consumer Price Indices – Measuring Across Households

Presented by: Yoel Finkel[1], Central Bureau of Statistics, Israel

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1. Introduction

One way to think of the CPI is as a measure of the changing cost of buying a very large shopping basket containing all of the purchases of a typical household. There is, of course, no such thing as a typical household. As a result, while the CPI may or may not provide a good measure of the average rate of inflation, it would be remarkable if it were a good measure of inflation for everybody. The variation in inflation rates, if it is significant, is a matter of interest and importance because of the vital role of the CPI in, for example, indexation of benefits and tax allowances, pensions and wages, and most of the mortgages and loans.

Failure to adjust correctly the changes in the cost of living across households would not only distort the distribution of income and consequently aggravate economic inequality, but also have serious fiscal implication for government budgets (Lieu, Chang and Chang, 2004).

As an on-going effort to construct group-specific price indexes as a remedy to the overall average CPI, a number of studies have been devoted in recent years to addressing this index number problem empirically. The empirical results are somewhat mixed, but still support the general preposition that there are variations in the inflation experience across household groups[2].

The aim of this paper is to investigate empirically and analyze the differences in the inflation rates experienced by different households in Israel, to see how close the average rate of inflation is to the experience of inflation for the great majority of households, and to evaluate the extent of dispersion in inflation rates across households.

The time period encompassed by the analysis is January, 1999-December, 2005.

The price data are the monthly CPI indices of goods at the elementary aggregate level (fourth level) of commodity disaggregation. Elementary aggregate is a group of relatively homogenous goods and services, which serve as strata for sampling purposes. Israeli aggregation structure (pyramid) consists of more than 400 elementary aggregates[3]. Expenditure shares data are from the Household Expenditure Survey (HES). The HES is the primary source of data used in the compilation of the CPI weights. It is an annual random cross-sectional survey of more than 6,000 households (net) a year. In order to calculate the price-corresponding demand from the household data, approximately 780 categories of commodities were used; demand heterogeneity below this level of aggregation was ignored. Several expenditure categories were not included in all years, because they did not have separate price indices in those years. In the tables below we aggregate these expenditure categories, for the convenience of presentation, into 38 commodities (which correspond to the class (second) level of the Israeli CPI aggregation structure).

2. Methodology

2.1. Household-Specific Inflation Rates

The CPI inflation measures the percentage change in the price of the base period goods basket between periods *t-1* and *t*. Let $p_{j,t}$ be the price index for item stratum *j* at time *t*, and let *t=b* denote the base period. Furthermore, let $w_{j,b}$ be the aggregate expenditure share of goods category *j* in the base period. Using this notation, CPI inflation is measured as

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[2] Comprehensive discussion of the studies in this field can be found, for example, in Lieu et al. (2004).

[3] The exact number of elementary aggregates changes every two years (2001,2003 and 2005), as additional aggregates are joined and others are omitted from the pyramid.

$$\pi_t^{CPI} = \frac{\sum\limits_{j=1}^{m} w_{j,b} \dfrac{p_{j,t}}{p_{j,b}}}{\sum\limits_{j=1}^{m} w_{j,b} \dfrac{p_{j,t-1}}{p_{j,b}}} - 1$$

Our approach to calculating household specific inflation rates will differ from the approach chosen for the overall CPI in three important ways.

1. In general, the CBS updates the base period once in two years. One difference between our household specific inflation rates and the CPI inflation rate is that we do not update expenditure weights. In this study, we rely on the expenditure weights derived from HES that was held in the year 2002, and assume that they represent the expenditure patterns of the households during the whole period from 1999 to 2005. The total number of households that participated in HES 2002 is 6,227.

2. The CPI inflation rates are applied to monthly price indices that are not seasonally adjusted, so that there are large seasonal fluctuations in month-to-month inflation rates. There are many ways to get rid off the seasonality in the calculated inflation rates. The approach that we choose in this paper is to consider annual inflation rates. That is, we do not compare current prices with those a month earlier, but rather twelve months earlier. Annual inflation rate for a specific year refers to the ratio between the price index in December of the year and the price index in December of a previous year. It should be noted, however, that in 1999 the inflation rate presented compares the prices in December with those in January 1999, since we lack the prices for December 1998.

3. In principle, we would like to measure household specific expenditure weights as well as household specific price changes. For each household, which we will index by *i*, we observe its specific expenditure shares, $w_{i,j,2002}$, for each of the *m* goods categories. However, we are not able to observe the specific prices that households pay for the item strata. Therefore, we must assume that all households face the same price increases, $\pi_{j,t}$, for each item stratum. That is each household faces the same price increase as all other households *for any particular good category* at each point of time.

Given that in our data all households face the same prices, the differences in inflation rates across different households are generated by differences in their commodity demand (and the quality of approximation to their true indices will depend upon the heterogeneity in their substitution responses (Crawford and Smith, 2002)).

Having applied the assumptions above, we arrive at the definition of a household inflation rate, for household *i* in month *t*. That is,

$$\widetilde{\pi}_{i,t} = \sum_{j=1}^{m} w_{j,2002} \left(\frac{p_{j,t}}{p_{j,t-12}} - 1 \right) = \sum_{j=1}^{m} w_{j,2002} \pi_{j,t}$$

In sum, the household inflation rate that we measure represents the change in the price, over the past year, of the goods basket that a household bought in the year 2002. We assumed that the increases in the prices of the various goods categories that the household faces are equal to the national average.

2.2. Aggregate Inflation

So far we have presented the individual, household-specific inflation measure. We now consider how to aggregate these household measures together into group indices. The CPI as well as other calculations presented in this paper can all be interpreted as summary statistics of the distribution of household specific inflation rates.

To construct an aggregate price index for a population requires that some method of aggregation be used to "average" the effects of price changes on all households in the population. It is intended that this aggregate index be representative of the "average" or "representative" household. There are two broad approaches to calculating average inflation rates: democratic and plutocratic. The plutocratic approach weights households according to their share of total expenditure, which means that richer households receive more weight. In the official CPI, the aggregation method used corresponds to a plutocratic index. Democratic indices weight households equally and give straightforward means. This type of aggregation is equally valid, in terms of economic theory. In practice, the plutocratic approach is much more practicable, but it may provide a different measure of price change than the democratic index (Kokoski, 2003).

An aggregate index for a population is a weighted average of the price index values for all households in the population. If there are H households in the population, the aggregate index will look like below:

$$L_H = \sum_{h=1}^{H} w_h \sum_n S_n^h P_n,$$

where: S_n^h is the share of household h's total expenditures devoted to good n, and P_n is the market price relative for good n, and w_h represents the weight given to the individual index for household h in computing average.

The choice of the weighting scheme used to derive the aggregate price index depends upon the assumptions adopted about the social welfare function for the society whose index it is to represent (Pollak, 1981).

If we decide to accord equal weight to each household in its representation in the aggregate index, then $w_h=1/H$ for all households h and the aggregated price index follows the democratic formula (a case of "one household-one vote"). In the plutocratic case ("one dollar, one vote"), we decide to weight each household in accordance to its total household expenditure. Then the weights are determined by equation below:

$$w_h = {E_h} \Big/ {\sum_h E_h},$$

where: E_h is the total expenditure of household h.

The advantage of the plutocratic formula is that the expenditure shares for each good by all households are treated as if they were those of one aggregate "super-household" (Diewert, 1983). This means that the index can be constructed from information just on the prices and aggregated mean expenditure shares of all households. To produce a democratic index, one must first construct the price indices for each individual household, and then average them to produce an aggregate index. This is far less practicable.

The difference between the plutocratic and the democratic mean is often referred to as plutocratic bias. The size of this bias depends on the relationship between households' inflation rates and their total expenditure. The plutocratic mean gives more weight to the inflation rate experienced by richer households, so if richer households experience a higher inflation rate than poorer households, the plutocratic mean will be larger than

the democratic mean. Similarly, the plutocratic mean will be smaller than the democratic mean whenever richer households tend to experience a lower inflation rate than poorer households. If there is very little relationship between households' inflation rates and their total expenditures (i.e. the covariance between them is small), the magnitude of the bias will be small because when richer households do not systematically experience different inflation rates from poorer households, the extra weight that they receive in the aggregation will not matter (Crawford and Smith, 2002).

3. The Distribution of Inflation Rates

In order to get some overview of the degree of variation in inflation rates across households at a point of time, consider Figure 3.1. This shows estimates of the densities of the distribution of inflation rates by year from 1999 to 2005, along with the frequencies, means, standard deviations and the interquartile range for each year (shown in Table 3.1 below).

The distribution in each year is quite 'peaky', indicating relatively small differences across households. Still, the figure indicates that there is some degree of variation around the average rate of inflation.

Figure 3.1. Densities of the Distribution of Inflation Rates, January, 1999-December, 2005
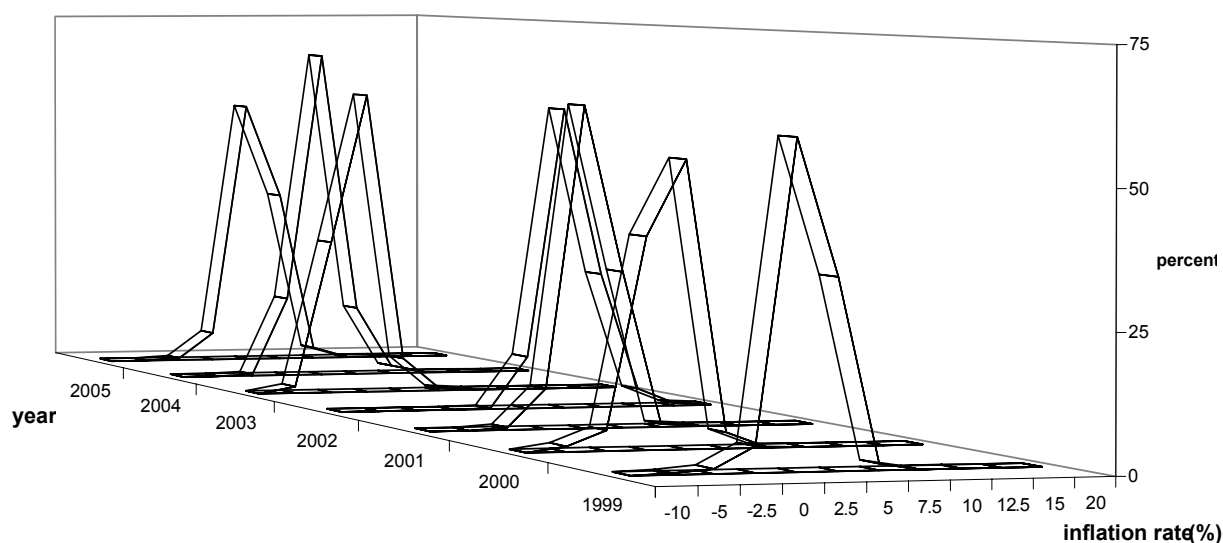
	-10	-5	-2.5	0	2.5	5	7.5	10	12.5	15	20
1999	0.0	0.3	0.9	4.7	58.7	34.1	1.2	0.0	0.1	0.0	0.0
2000	0.0	1.0	3.8	39.0	53.0	3.0	0.2	0.0	0.0	0.0	0.0
2001	0.0	0.0	0.5	7.7	61.4	29.7	0.6	0.1	0.0	0.0	0.0
2002	0.0	0.0	0.0	0.0	0.2	10.2	59.1	26.4	3.5	0.5	0.1
2003	0.0	1.3	30.7	60.7	6.7	0.5	0.1	0.0	0.0	0.0	0.0
2004	0.0	0.0	0.3	16.2	67.7	14.0	1.6	0.1	0.1	0.0	0.0
2005	0.0	0.0	0.4	5.8	55.5	35.9	2.2	0.1	0.1	0.0	0.0

Table 3.1.Mean and Standard Deviation of Household-Specific Inflation Rates, by Years

Year	Mean	Std. Deviation	Interquartile range
1999	2.03 (.001)	1.43	1.34
2000	.054 (.001)	1.51	1.67
2001	1.81 (.001)	1.40	1.77
2002	6.87 (0.001)	1.67	1.89
2003	-1.91 (.001)	1.41	1.61
2004	1.24 (.001)	1.46	1.63
2005	2.13 (.001)	1.49	1.63

* Mean standard errors appear in parentheses.

The annual average (compound) rate of inflation over the period is approximately 1.73% (standard error of 0.0005).

The interquartile range varies between 1.3 percentage points and 1.9 percentage points, On average, the difference between the first quartile of the inflation and the third quartile is over 1.6 percentage points.

It seems that inflation rates are more widely dispersed in the population, the higher the average level of inflation. Figure 3.2 shows the relationship between a measure of location (the median) and a measure of dispersion (the interquartile range). There is a positive relationship between the two (illustrated by the solid

line), which says that, on average, a 1 percentage point increase in the median rate of inflation is associated with approximately 0.03 percentage point widening of the semi-interquartile range.

<u>Figure 3.2</u>. Relationship between the Location of Inflation and its Dispersion
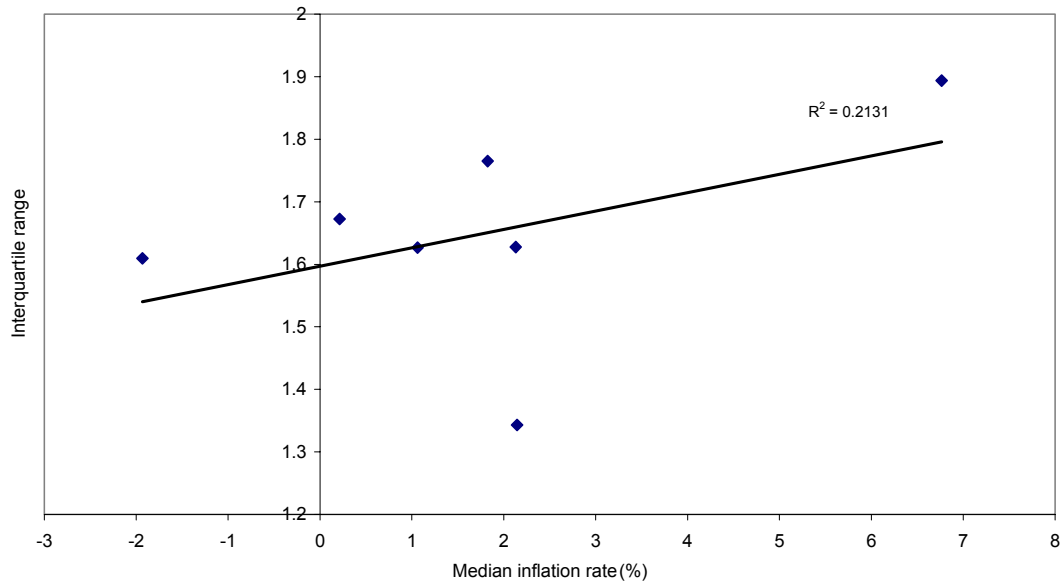
We now turn to the question of the extent to which the average rate is typical for the population of households. We take as measure the proportion of households whose inflation rates are within 1 (2 and 5) percentage points of the mean; that is, is the mean inflation rate is 5%, we ask how many households' inflation rates are between 4 (3, 0) and 6 (7, 10) percent.

The proportions are shown in Figure 3.3 by year. The average levels of the lines are rather high: over the entire period, 58% (86%, 99%) of households have inflation rates that are within 1 (2, 5) percentage points of the average. The proportion is not much variable: year-to-year changes in the proportion are seldom.

Figure 3.3. Percentage of Households within 1 (2,5) Percentage Point of the Mean Rate of Inflation
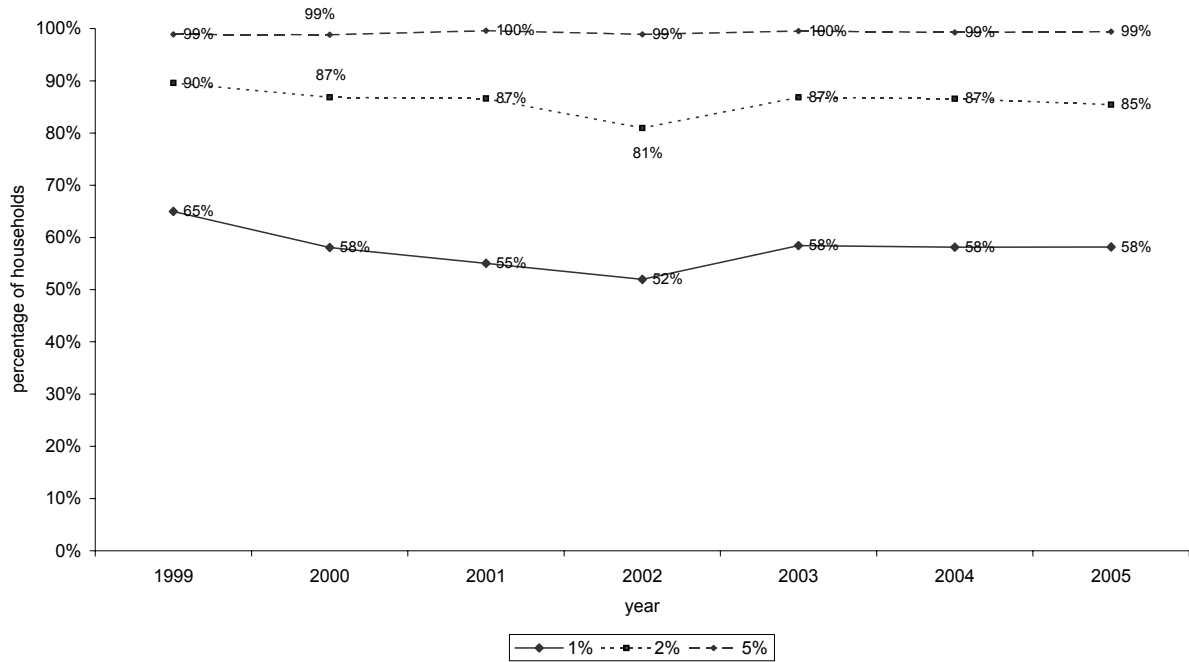
As we might expect, given the evidence that the dispersion is, in general, higher when the average level of inflation is high, Figure 3.4 shows that, on average, the percentage of households close to the mean declines as the average rate increases. The solid line in the figure indicates that a 1 percentage point increase in the mean rate of inflation is associated with a 0.7 percentage point fall in the percentage of households whose rates of inflation are close to the average.

Figure 3.4. Relationship between the Mean Rate of Inflation and the Percentage of Households within 1 Percentage Point of the Mean
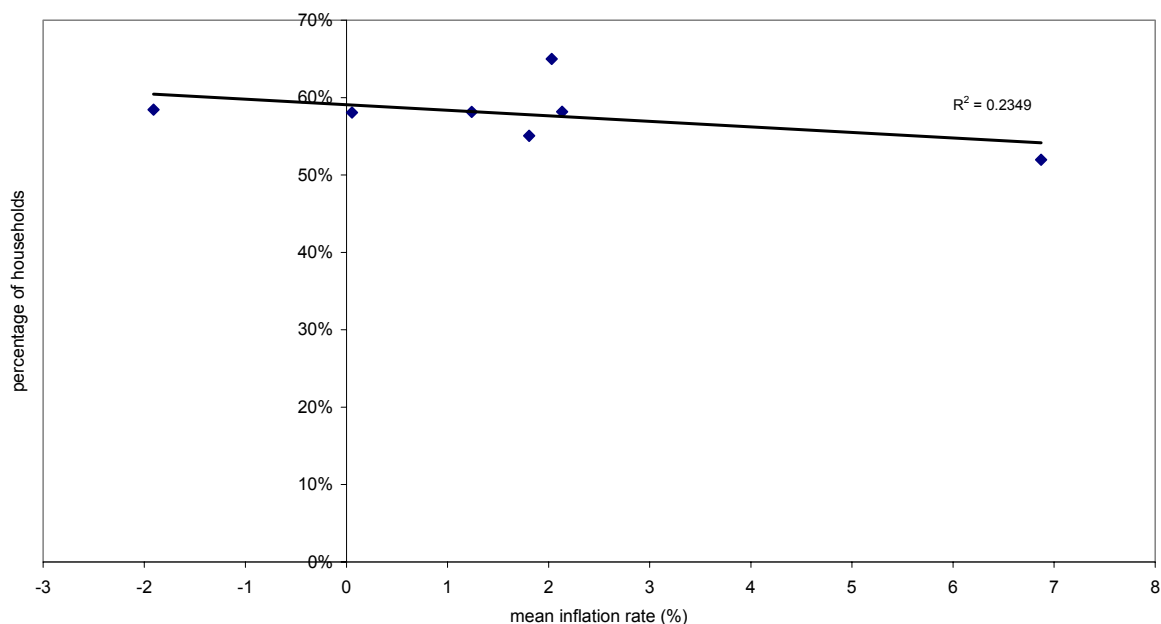
In this section we have dived below the surface of household-specific inflation distribution and considered what its main properties are and whether and how it has changed over time. The general picture that emerges from the results in this section is that inflation rates did not only vary over time, but also across households, though the variation is not very high.

It is thus important to consider what causes these variations across households and whether there are particular types of households that tend to face higher or lower than average inflation rates. In the next two sections alternative measures of aggregate inflation will be presented and the sources of cross-household heterogeneity will be considered.

4. Group Inflation Rates: Alternative Consumer Price Index Aggregations

Household-specific price indices were constructed for each household in the 2002 HES sample. These indices were then aggregated by both the plutocratic method and the democratic method as described above. There are two alternative forms of final presentation of the indices throughout this section: annual average of monthly price indices, and the annual inflation rate (in percent).

Plutocratic and democratic aggregate index values are presented in Table 4.1, below, along with the percentage difference between the plutocratic index value and its corresponding democratic index counterpart by year.

Table 4.1. Annual Average of Price Indices (Base: January 1999=100)

Year	Democratic	Plutocratic	Percentage Difference (P/D-1)*100
1999	100.57	100.63	0.06
2000	101.74	101.87	0.13
2001	103.24	103.15	-0.09
2002	109.65	109.30	-0.32
2003	110.45	110.23	-0.20
2004	109.96	109.89	-0.06
2005	110.93	110.85	-0.07

Generally, it appears that there is very little difference between the two types of indices over this study period, with the democratic index slightly higher in value (in the last five years).

Table 4.2 shows both the plutocratic and the democratic mean of annual inflation rates across all households, a 95% confidence interval around the two mean values, and the plutocratic bias.

Table 4.2. Plutocratic and Democratic Annual Inflation Rates, 1999-2005

	Democratic			Plutocratic			Plutocratic Bias
		Confidence interval (95%)			Confidence interval (95%)		(Plutocratic mean-
Year	Mean	Lower	Upper	Mean	Lower	Upper	Democratic mean)
1999	2.030	2.028	2.032	2.028	2.0281	2.0282	-0.002
2000	0.054	0.052	0.056	0.022	0.0221	0.0222	-0.032
2001	1.808	1.806	1.810	1.553	1.5527	1.5527	-0.255
2002	6.871	6.868	6.873	6.764	6.7641	6.7641	-0.106
2003	-1.908	-1.910	-1.906	-1.781	-1.7810	-1.7810	0.127
2004	1.240	1.238	1.242	1.385	1.3847	1.3847	0.145
2005	2.133	2.130	2.135	1.954	1.9536	1.9536	-0.179

Once again, the difference between the two measures of aggregate inflation seems negligible, with the democratic mean causing slightly higher value of inflation in most of the years.

Plutocratic and democratic mean inflation rates, as well as the plutocratic bias, for the sample period are presented graphically in Figures 4.1 and 4.2.

Figure 4.1. Plutocratic and Democratic Inflation Rates, 1999-2005
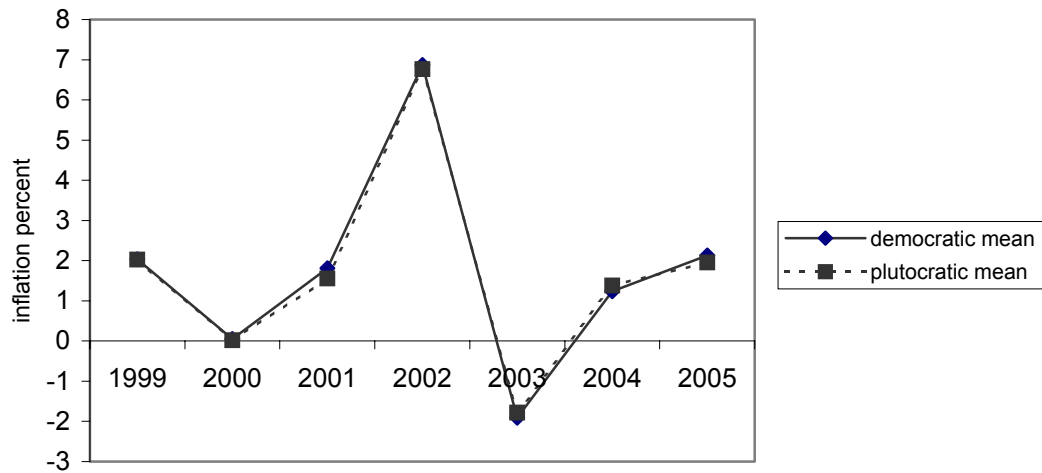
Figure 4.2. Plutocratic Bias, 1999-2005
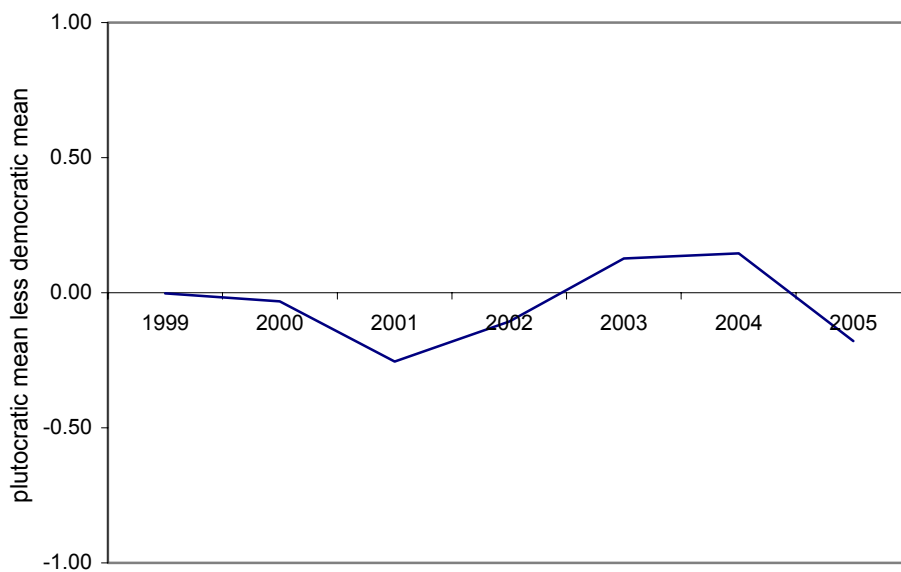
Three main observations stand out. First, the differences between the two measures of aggregate inflation are small compared to the fluctuations in these measures over time. Secondly, the results show that there is very little difference between the two types of indices over this study period, and that one index need not always exceed the other. Finally, the absolute difference between the plutocratic and the democratic means of inflation is on average 0.12 percentage points. The greatest difference between the plutocratic and democratic means occurs in 2001; still, the difference between the two is just 0.25 percentage points. There is no overall trend or divergence between the two index series.

Several alternative measures of inflation are constructed, including median inflation across households, and measures in which we use family size, the number of standard persons and the number of adults in a household as weighting variables. All these weighting schemes correspond to the democratic index, in the sense that "one vote" is given to some representative household unit. The resulting inflation rates are presented in the following table.

Table 4.3. Inflation Rates, by Aggregation Method, 1999-2005

| Year | Median | Weight variable | | |
		Persons	Standard Persons	Adults
1999	2.144	2.111	2.086	2.034
2000	0.214	0.147	0.122	0.114
2001	1.824	1.654	1.696	1.702
2002	6.764	6.685	6.742	6.792
2003	-1.933	-1.770	-1.808	-1.845
2004	1.062	1.301	1.287	1.310
2005	2.131	1.991	2.030	2.063

It can be found that the mean and median inflation rates are virtually identical over time, confirming that the cross-household distribution of inflation rates is rather symmetric.

Implying different weighting variables has a negligible impact on the calculation of mean inflation rates. In most of the years, using the family size as a weighting variable of household inflation rates causes the highest absolute deviation from the mean.

Since the plutocratic index will likely be more representative of those households with higher total expenditures, it would be of interest to examine the differences between the plutocratic and democratic aggregations by population subgroups defined by different levels of total expenditure. Therefore, we have divided the household sample into expenditure quintiles and constructed separate plutocratic and democratic indices by quintile. The lowest quintile (Q1) includes those households, which are in the lowest 20% of the 2002 HES sample, as ranked by total household expenditure. The highest quintile (Q5) is, therefore the highest 20% of households in terms of expenditure. As described in Table 4.4 below, the range and mean of total expenditures by quintile varies significantly.

Table 4.4. Mean and Range of Total Expenditures by Household Expenditure Quintile (2002 HES).

Quintile	Mean Expenditure	Range of Expenditure Amounts (NIS)
Q1	3496.3	379.7-5031.7
Q2	6265.9	5032.1-7506.8
Q3	8800.4	7508.8-10180.9
Q4	12143.3	10181.0-14448.5
Q5	20553.8	14449.4-88663.1

As Table 4.4 shows, the range of total expenditure values encompassed by each quintile varies from about 2,600 NIS (Q2 and Q3) to a high of over 74,000 NIS in Q5.

The plutocratic and democratic index values by expenditure quintile are presented in Table 4.5, where P = the plutocratic index and D = the democratic index. Table 4.6 provides the percentage difference between the plutocratic value and its democratic counterpart, based on the values in the Table 4.5.

Table 4.5. Index Values (Annual Average) by Expenditure Quintile (Base: Average January 1999=100)

Year	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
	P	D	P	D	P	D	P	D	P	D
1999	100.50	100.49	100.57	100.57	100.55	100.55	100.56	100.55	100.74	100.68
2000	101.22	101.32	101.54	101.52	101.79	101.78	102.01	102.02	102.03	102.06
2001	103.27	103.32	103.30	103.29	103.29	103.28	103.25	103.26	102.96	103.06
2002	110.54	110.45	110.16	110.18	109.58	109.58	109.22	109.25	108.75	108.80
2003	110.89	111.05	110.52	110.53	110.28	110.26	110.32	110.34	109.95	110.04
2004	109.98	110.21	109.74	109.74	109.78	109.75	110.11	110.12	109.85	109.96
2005	110.93	111.24	110.68	110.68	110.74	110.70	111.10	111.12	110.80	110.93

Table 4.6. Percentage Difference between Plutocratic and Democratic Index, by Year and Quintile.

Year	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
1999	0.006	-0.002	0.001	0.006	0.061
2000	-0.102	0.012	0.014	-0.007	-0.032
2001	-0.048	0.002	0.010	-0.015	-0.091
2002	0.081	-0.019	0.004	-0.029	-0.051
2003	-0.148	-0.008	0.017	-0.017	-0.087
2004	-0.210	-0.001	0.030	-0.013	-0.105
2005	-0.276	0.002	0.036	-0.016	-0.114

The differences between the two types of index within each quintile are generally quite small. The largest differences appear in the first and fifth quintiles, not unexpected in the latter case. In Q5 there are a very few households with very high expenditures which therefore have a larger effect of the plutocratic index, while the democratic usually index diminishes their disproportionate contribution to the index value. The democratic index for Q5 usually rises more quickly than its plutocratic counterpart (except for the year 1999), though the differences are quite small. In other quintiles there is no consistent pattern; e.g. for Q3 the plutocratic index value exceeds the democratic index value, while for Q4 the democratic index is higher.

The results of these sections suggest that the plutocratic CPI yields inflation estimates that closely follow the mean, median and several other measures of the cross-household distribution of inflation rates. However household specific inflation rates tend to vary substantially around this mean.

Since any differences observed here between indices presented in this section are statistically insignificant (because of the lack of observations), one should not draw quantitative conclusions from these results.

Empirical analysis in this paper relies upon observed information. In recent years (the study period), both overall inflation and variability of price changes relative to each other have been smaller than in the other historical periods. Thus price index values have exhibited very little change. If plutocratic and democratic indices do not differ much over the period of empirical observation, conclusions from an empirical analysis cannot be easily generalized and the sensitivity of the issue to more extreme experiences of price change has to be tested.

5. Group Inflation Rates: Sources of Heterogeneity

If households face different inflation rates, a natural question is whether we can pinpoint the source of this heterogeneity.

First of all, there must be differences in inflation rates across item strata. Since household specific inflation rates are a weighted average of the inflation rates of the item strata, if there is no difference in the cross-strata inflation rates then this weighted average does not depend on what weights are applied.

Secondly, households must have different-from-average expenditure patterns; otherwise each household's inflation rate is based on the same expenditure weights and is thus the same.

Hence, in order to get an idea what underlies the differences in inflation rates across households two things are of a particular interest: (1) we would like to know how big the variation is in expenditure shares for various strata across households; (2) we are interested in the relative price change for the different item strata over our sample period.

5.1. Variation in Expenditure Patterns

Because of the potential policy implications of group-specific cost-of-living adjustments, there have been in the past two decades a number of studies on the inflation experience of different household groups, especially of the elderly and the poor group. These two groups are often seen to be the most under-privileged in any socio-economic ladder, thus becoming the specific target of some welfare programs.

What follows is the computation of the demographic-specific expenditures for different income levels and for household heads of different ages. In addition, we track the expenditure patterns of the households along several other demographic variables; the results are presented in the Appendix.

Table 5.1.1 shows expenditure patterns in year 2002 by households with different income levels on the 38 commodities included in this study.

Table 5.1.1. Expenditure Shares by Net Income for Standard Person, 2002

	All	Lowest	Second	Third	Fourth	Fifth	Sixth	Seventh	Eights	Ninth	Highest
All Commodities	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Food (excl. fruit, vegetables)	**13.41**	**19.66**	**18.14**	**17.25**	**14.97**	**14.54**	**12.76**	**12.44**	**12.07**	**11.02**	**10.09**
Bread, cereals and pastry products	2.39	3.80	3.50	3.03	2.93	2.66	2.39	2.26	2.12	1.83	1.49
Vegetable oils and products	0.33	0.61	0.57	0.59	0.35	0.38	0.27	0.30	0.25	0.22	0.17
Meat, poultry and fish	3.39	6.06	5.95	5.31	4.02	4.04	3.06	2.92	2.89	2.17	1.69
Milk, milk products and eggs	2.48	3.71	3.41	2.97	2.90	2.67	2.51	2.31	2.26	1.95	1.82
Sugar and sugar products	0.57	0.94	0.85	0.78	0.61	0.65	0.58	0.50	0.51	0.44	0.37
Beverages	1.11	1.64	1.47	1.39	1.25	1.24	1.07	1.02	1.07	0.86	0.82
Meals away from home	1.88	1.09	1.06	1.64	1.49	1.62	1.62	1.86	1.91	2.25	2.78
Miscellaneous food products	1.26	1.81	1.32	1.53	1.42	1.28	1.25	1.28	1.06	1.31	0.95
Vegetables and fruit	**3.44**	**5.18**	**4.90**	**4.39**	**3.94**	**3.81**	**3.31**	**3.22**	**3.03**	**2.80**	**2.38**
Vegetables	1.41	2.31	2.18	1.88	1.61	1.54	1.34	1.30	1.22	1.11	0.89
Fruit, fresh	0.98	1.53	1.45	1.29	1.14	1.06	0.93	0.91	0.82	0.78	0.65
Processed vegetable products	0.62	0.83	0.74	0.68	0.64	0.70	0.60	0.61	0.58	0.55	0.49
Processed fruit products	0.44	0.51	0.53	0.54	0.54	0.50	0.44	0.40	0.41	0.36	0.35
Housing	**23.30**	**21.07**	**23.84**	**23.96**	**25.45**	**25.52**	**23.89**	**24.59**	**23.12**	**22.09**	**21.19**
Monthly rent	4.47	9.91	8.43	7.14	5.35	4.80	3.52	3.91	2.92	2.46	2.80

14

Housing consumption in kind	18.12	10.95	15.20	16.45	19.75	20.36	19.73	19.75	19.50	18.63	17.10
Other housing expenses	0.71	0.22	0.20	0.37	0.34	0.37	0.64	0.93	0.70	0.99	1.29
Dwelling and household maintenance	**9.59**	**9.50**	**9.10**	**9.35**	**9.15**	**9.61**	**9.21**	**9.25**	**9.42**	**9.70**	**10.65**
Electricity, fuel and water	3.62	5.02	4.63	4.32	4.13	4.16	3.77	3.47	3.19	3.01	2.68
Maintenance and renovation	1.20	0.98	0.85	1.22	1.00	1.10	1.16	1.06	1.19	1.33	1.59
Domestic help	1.62	0.33	0.33	0.69	0.80	1.03	1.29	1.54	1.91	2.38	3.19
Miscellaneous household articles	0.84	1.18	1.19	0.99	0.91	0.88	0.74	0.76	0.85	0.63	0.72
Municipal taxes (Arnona)	2.31	1.99	2.11	2.13	2.31	2.44	2.25	2.42	2.29	2.35	2.47
Furniture and household equipment	**4.68**	**4.23**	**4.29**	**4.65**	**4.92**	**4.20**	**4.86**	**4.27**	**4.62**	**5.33**	**4.83**
Furniture	1.75	1.40	1.08	1.81	1.56	1.37	2.17	1.53	1.88	1.99	2.01
Household electrical equipment	1.74	1.95	2.06	1.69	1.99	1.69	1.63	1.60	1.57	1.99	1.51
Non-electrical equipment	0.44	0.42	0.58	0.40	0.55	0.41	0.34	0.42	0.39	0.48	0.43
Bedding and home decorations	0.76	0.46	0.57	0.76	0.81	0.73	0.71	0.72	0.78	0.86	0.88
Clothing and footwear	**3.07**	**4.48**	**3.96**	**3.65**	**3.34**	**3.02**	**3.08**	**2.92**	**2.76**	**2.66**	**2.46**
Clothing	2.40	3.57	3.11	2.80	2.59	2.31	2.36	2.29	2.23	2.10	1.96
Footwear	0.66	0.91	0.85	0.85	0.75	0.71	0.72	0.63	0.53	0.57	0.50
Health	**4.88**	**3.98**	**4.75**	**4.63**	**5.00**	**4.31**	**4.66**	**4.82**	**5.28**	**5.23**	**5.20**
Dental treatment	1.46	1.32	1.47	1.30	1.85	1.48	1.57	1.30	1.42	1.49	1.41
Health insurance	0.99	0.62	0.66	0.76	0.92	0.91	0.97	1.05	1.16	1.13	1.14
Medical services, medicines and medical equipment	2.44	2.05	2.62	2.57	2.23	1.91	2.12	2.46	2.71	2.61	2.65
Education, culture, entertainment	**12.89**	**10.87**	**11.91**	**11.23**	**11.77**	**12.04**	**14.39**	**14.73**	**14.05**	**13.55**	**12.30**
Education services	4.71	4.45	4.61	4.61	4.81	5.33	5.78	5.68	5.07	4.00	3.58
Newspapers, books and stationery	0.92	0.97	0.62	0.77	0.84	0.91	0.96	0.81	0.89	0.99	1.14
Culture and entertainment	7.26	5.45	6.69	5.85	6.12	5.81	7.65	8.24	8.09	8.56	7.57
Transport and communication	**20.52**	**15.18**	**14.47**	**15.77**	**17.27**	**18.89**	**20.00**	**19.95**	**20.83**	**23.86**	**27.28**
Transport	16.29	10.39	9.95	10.88	12.71	13.83	15.56	15.51	16.68	20.19	24.03
Post, telephone, communication	4.23	4.79	4.52	4.89	4.56	5.07	4.44	4.44	4.15	3.67	3.25
Miscellaneous goods and services	**4.22**	**5.85**	**4.65**	**5.13**	**4.21**	**4.05**	**3.83**	**3.81**	**4.81**	**3.75**	**3.63**
Cigarettes, tobacco and accessories	0.99	2.44	1.59	1.62	1.41	1.17	0.94	0.85	0.78	0.60	0.24
Personal services and cosmetics	2.60	2.83	2.63	2.89	2.40	2.22	2.26	2.33	3.32	2.52	2.61
Jewelry and watches	0.43	0.32	0.26	0.41	0.22	0.44	0.35	0.44	0.55	0.41	0.59
Wallets, bags, suitcases etc.	0.21	0.26	0.18	0.21	0.17	0.22	0.28	0.20	0.17	0.21	0.19

It turns out that the weights for some categories deviate quite a lot from the all-household average expenditure shares in our sample. The most remarkable differences between deciles are the expenditures on food, transport and communication and owned dwelling.

Particularly, it is shown that the poorest household group spent some 24.8% of their income on food and vegetable and fruit together, whereas the wealthiest household group spent a relatively low 12.5% of their income on them (twice less than the poorest decile).

Further, we find the lower is the household income the lower is the share of it that is spent on health.

Finally, we find the income share that is spent on transportation and communication, or education, culture and entertainment is higher for the household groups with relatively higher income.

Table 5.1.2 shows expenditure patterns in year 2002 for household heads with different ages on the 38 commodities included in this study.

Table 5.1.2. Expenditure Shares by Age of the Household Head, 2002

	All Households	25 or less	26-34	35-49	50-64	65 and over
All commodities	100.00	100.00	100.00	100.00	100.00	100.00
Food (excl. fruit, vegetables)	**13.41**	**14.42**	**13.62**	**13.72**	**12.60**	**13.12**
Bread, cereals and pastry products	2.39	2.44	2.16	2.74	2.18	2.15
Vegetable oils and products	0.33	0.37	0.32	0.30	0.32	0.43
Meat, poultry and fish	3.39	3.87	2.99	3.44	3.26	3.88
Milk, milk products and eggs	2.48	2.29	2.37	2.57	2.35	2.78
Sugar and sugar products	0.57	0.58	0.54	0.63	0.51	0.56
Beverages	1.11	1.24	1.13	1.07	1.14	1.06
Meals away from home	1.88	2.35	2.81	1.70	1.63	1.01
Miscellaneous food products	1.26	1.28	1.31	1.27	1.21	1.26
Vegetables and fruit	**3.44**	**3.56**	**3.09**	**3.35**	**3.48**	**4.18**
Vegetables	1.41	1.56	1.21	1.34	1.45	1.79
Fruit, fresh	0.98	0.96	0.91	0.91	0.95	1.38
Processed vegetable products	0.62	0.63	0.56	0.66	0.63	0.53
Processed fruit products	0.44	0.41	0.41	0.44	0.44	0.48
Housing	**23.30**	**21.86**	**21.84**	**21.28**	**23.26**	**33.18**
Monthly rent	4.47	6.92	7.30	3.58	2.68	4.46
Housing consumption in kind	18.12	14.39	13.69	17.01	19.97	27.90
Other housing expenses	0.71	0.54	0.86	0.69	0.61	0.82
Dwelling and household maintenance	**9.59**	**8.38**	**9.26**	**9.60**	**9.60**	**10.91**
Electricity, fuel and water	3.62	3.60	3.42	3.65	3.61	3.91
Maintenance and renovation	1.20	1.00	1.07	1.07	1.24	1.91
Domestic help	1.62	0.94	1.74	1.73	1.36	2.06
Miscellaneous household articles	0.84	0.78	0.80	0.86	0.81	0.95
Municipal taxes (Arnona)	2.31	2.07	2.24	2.30	2.58	2.07
Furniture and household equipment	**4.68**	**4.80**	**4.73**	**4.91**	**4.72**	**3.73**
Furniture	1.75	1.72	1.88	1.86	1.90	0.85
Household electrical equipment	1.74	1.81	1.69	1.84	1.54	1.87
Non-electrical equipment	0.44	0.49	0.43	0.43	0.51	0.31
Bedding and home decorations	0.76	0.79	0.73	0.78	0.77	0.70
Clothing and footwear	**3.07**	**3.62**	**3.79**	**3.29**	**2.60**	**1.68**
Clothing	2.40	2.82	3.10	2.53	2.02	1.34
Footwear	0.66	0.80	0.70	0.76	0.59	0.35
Health	**4.88**	**3.77**	**3.81**	**4.21**	**5.26**	**8.76**
Dental treatment	1.46	1.09	1.02	1.52	1.54	2.10
Health insurance	0.99	0.74	0.76	0.84	1.19	1.56
Medical services, medicines and medical equipment	2.44	1.94	2.04	1.84	2.53	5.10
Education, culture, entertainment	**12.89**	**13.81**	**14.11**	**14.48**	**12.27**	**6.46**
Education services	4.71	5.23	5.71	5.73	4.09	0.74
Newspapers, books and stationery	0.92	0.89	0.83	1.08	0.82	0.78
Culture and entertainment	7.26	7.69	7.57	7.67	7.35	4.94
Transport and communication	**20.52**	**20.61**	**21.05**	**20.95**	**22.35**	**14.35**
Transport	16.29	15.19	16.71	16.63	17.96	11.69
Post, telephone, communication	4.23	5.42	4.34	4.32	4.39	2.67
Miscellaneous goods and services	**4.22**	**5.17**	**4.69**	**4.20**	**3.86**	**3.62**
Cigarettes, tobacco and accessories	0.99	1.70	1.21	1.04	0.75	0.48
Personal services and cosmetics	2.60	2.67	2.63	2.59	2.53	2.71
Jewelry and watches	0.43	0.54	0.58	0.33	0.46	0.30
Wallets, bags, suitcases etc.	0.21	0.26	0.27	0.24	0.12	0.13

The scrutiny of the table above, points that the elderly household group (aged 65 and over) spent relatively more, than all other age groups, on health, on housing and on household maintenance, while the youngest household groups spent relatively more than any other age groups on food, tobacco goods and communication. The 50-64 ages group spent relatively more than other age groups on transport.

5.2. Cross-Strata Variation in Inflation

In this subsection we will analyze the evolution of price indices for the various goods categories.

Table 5.2.1 below reports relative current-to-base-year price ratios for each of the 38 categories of commodities included in this study.

Table 5.2.1. Consumer Price Indices (Annual Average), by Commodity Group (Base: Annual Average 1998 = 100)

	1999	2000	2001	2002	2003	2004	2005
General index	105.2	106.4	107.6	113.6	114.4	114.0	115.5
Food (excl. vegetables and fruit)	**107.5**	**110.5**	**113.3**	**116.2**	**119.4**	**120.8**	**122.5**
Bread, cereals and dough products	109.8	115.5	118.4	124.0	130.1	132.6	134.5
Meat, poultry and fish	105.0	106.2	111.5	109.7	112.6	113.4	114.9
Fats and margarine	108.9	107.4	102.3	111.2	117.5	119.1	121.2
Milk and dairy products	104.3	107.4	107.9	109.4	113.5	116.1	118.7
Eggs	105.6	106.6	106.7	107.6	110.6	121.3	121.0
Sugar, marmalade and sweets	111.3	115.2	118.6	123.3	120.7	118.8	120.7
Beverages	109.4	110.7	112.1	117.2	115.9	114.6	113.6
Miscellaneous food products	108.8	109.6	111.0	116.5	118.2	116.8	115.2
Meals away from home	108.8	113.6	117.7	122.8	126.4	129.0	131.5
Vegetables and fruit	**104.6**	**105.4**	**108.2**	**112.6**	**116.0**	**108.6**	**111.6**
Vegetables	103.0	106.6	113.3	117.8	116.6	112.5	117.6
Fruits	103.3	99.0	100.1	103.5	116.8	98.5	99.5
Processed vegetable products	108.1	108.6	109.1	115.2	114.4	114.5	114.5
Processed fruit products	110.3	114.0	112.4	115.8	115.8	114.0	120.7
Housing	**102.6**	**100.4**	**104.4**	**116.3**	**110.7**	**107.7**	**106.6**
Owner occupied housing services	100.9	98.2	102.2	114.2	108.3	105.2	104.3
Rent	108.2	106.2	109.8	122.5	118.3	115.9	114.2
Other housing expenses	106.0	110.7	112.0	120.0	116.5	112.4	107.0
Household maintenance	**106.0**	**110.8**	**112.1**	**120.3**	**125.5**	**128.7**	**135.3**
Electricity, fuel and water	106.0	111.4	111.9	125.6	138.3	144.2	156.6
Maintenance and repairs	108.4	111.9	112.5	117.6	121.4	125.0	127.9
Miscellaneous household utensils	110.9	111.5	111.2	116.4	112.7	109.7	113.3
Municipal taxes	103.5	109.4	111.4	117.3	116.9	118.1	120.1
Domestic help	105.2	110.0	114.0	117.8	120.4	123.5	124.2
Furniture and household equipment	**107.4**	**104.1**	**99.0**	**100.1**	**99.9**	**96.9**	**96.4**
Furniture	107.6	104.7	103.7	105.9	107.2	106.0	103.4
Electrical equipment	107.5	101.0	89.7	91.1	91.3	86.9	86.6
Home and kitchen equipment (non-electric)	112.1	115.1	112.5	109.4	107.9	105.2	110.4
Bedding and home decorations	103.9	103.6	102.8	103.0	98.9	95.9	96.9
Clothing and footwear	**99.9**	**100.1**	**96.2**	**91.3**	**86.2**	**82.9**	**77.9**
Clothing	100.9	101.9	98.4	93.4	87.5	84.8	81.1
Footwear	96.3	91.6	86.9	82.6	80.0	74.9	66.5
Health	**109.0**	**112.7**	**117.8**	**124.6**	**127.8**	**130.6**	**133.0**
Medical services	109.3	113.9	116.7	122.2	125.9	128.9	132.3

Dental fees	111.4	115.6	118.6	122.9	126.0	129.6	131.5
Medicines and medical equipment	105.3	106.9	117.0	128.5	131.3	133.0	134.5
Education, culture and entertainment	**106.7**	**107.8**	**107.3**	**110.0**	**110.3**	**109.4**	**109.4**
Education	106.1	111.2	115.7	119.4	121.6	123.0	121.9
Culture and entertainment	107.1	105.9	102.5	104.7	104.0	101.8	102.3
Transport and communication	**103.9**	**106.9**	**106.6**	**112.9**	**117.5**	**118.8**	**120.7**
Transport	105.5	109.0	108.8	116.0	122.0	125.7	127.8
Communications services	95.7	95.9	95.1	97.3	96.8	90.0	90.6
Miscellaneous	**108.3**	**110.8**	**111.9**	**120.0**	**123.2**	**123.0**	**127.7**
Cigarettes and tobacco	108.7	112.1	116.7	140.1	153.0	154.9	166.5
Personal services and cosmetics	107.5	109.4	109.6	112.5	112.8	111.6	115.1
Jewelry and watches	111.8	113.4	114.1	126.6	130.9	133.7	138.7
Handbags, etc.	109.0	114.6	110.9	108.0	103.7	99.7	102.1

From the last column of the table we find five categories of commodities (i.e., bread, cereals and dough products; electricity, fuel and water; medicines and medical equipment; cigarettes and tobacco; jewelry and watches) whose prices have increased over the period 1999-2003 by more than 30% cumulatively. From the Table 5.1.1, we could find that the lower is the household income; the higher share of it is spent on these categories of commodities cumulatively. Particularly, it is shown that the poorest household group spent some 12.8% of their income on these five commodities altogether, whereas the wealthiest household group spent a relatively low 7.9% of their income on them.

Similarly, from the Table 5.1.2, we find that the households in the 26-34 ages group spent less than all other age groups on the five categories of commodities mentioned above. In particular, this group spent 9.4% of their income on these five categories of commodities, compared with 10.2% for the group under 25, 12% for the most elderly group, and the overall average of 9.9% for all household units.
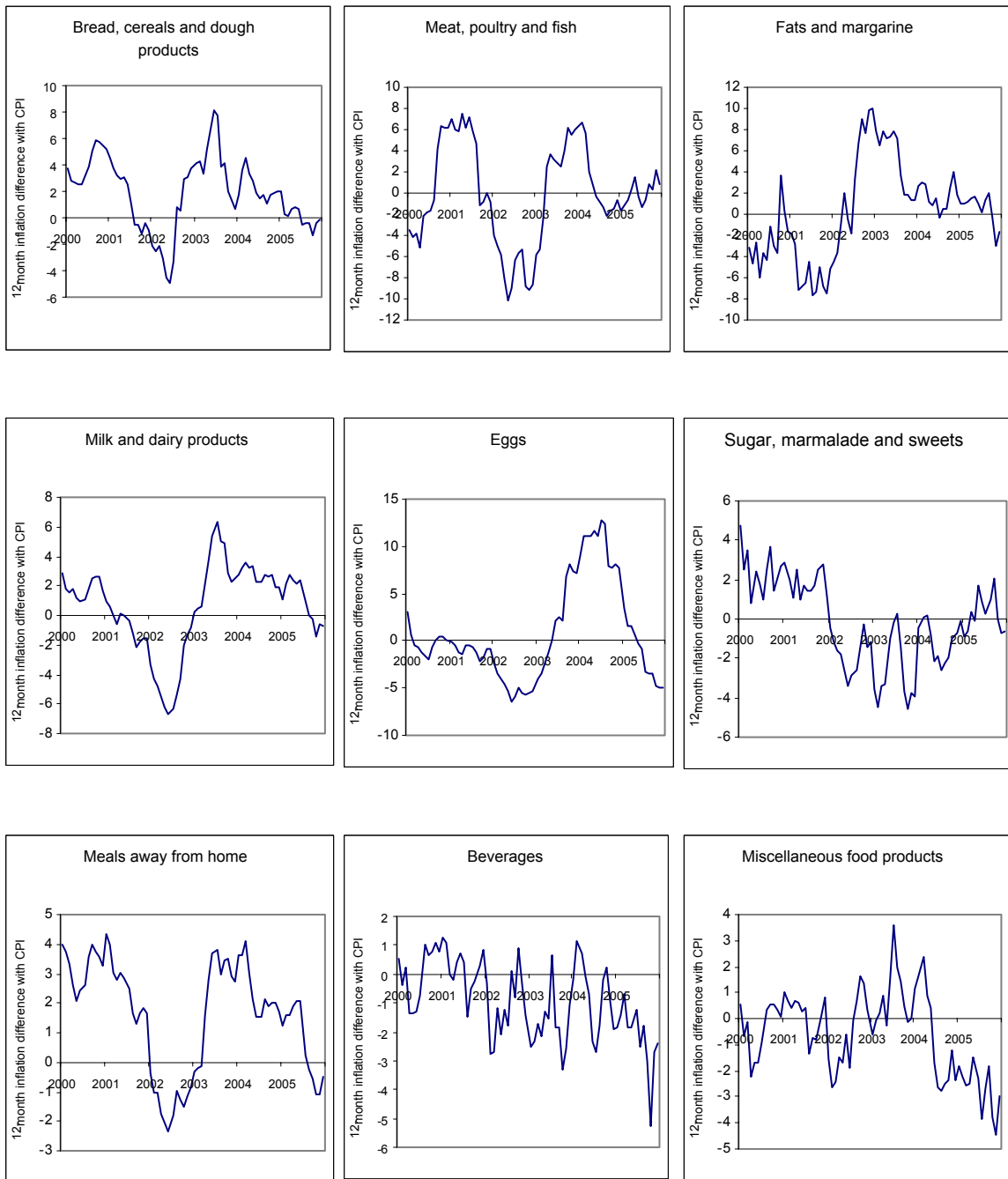
From the Table 5.1.1 we find the lower is the household income, the higher share of it is spent on food, whose prices have increased over the period much more than the general CPI (122.5 versus 115.5).
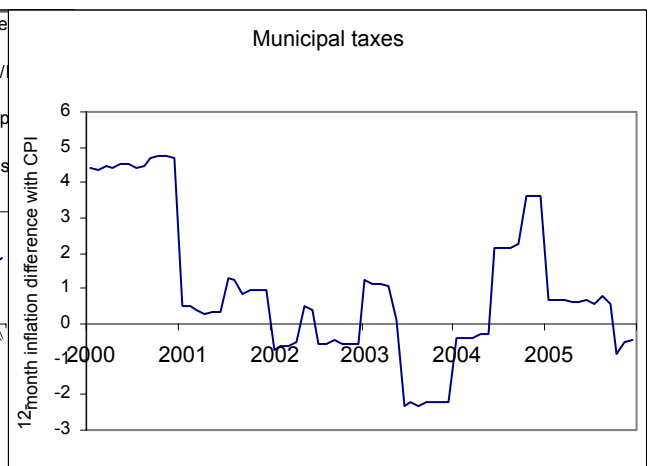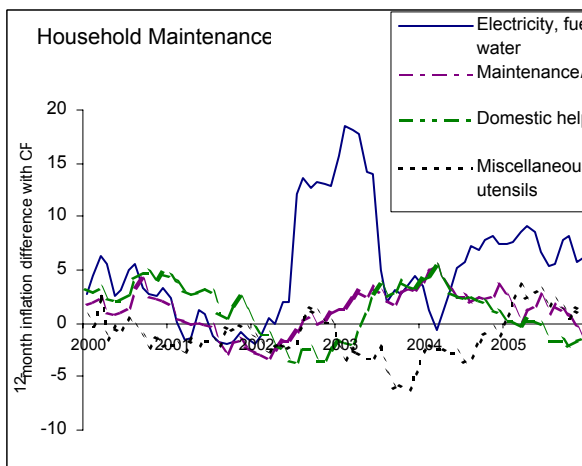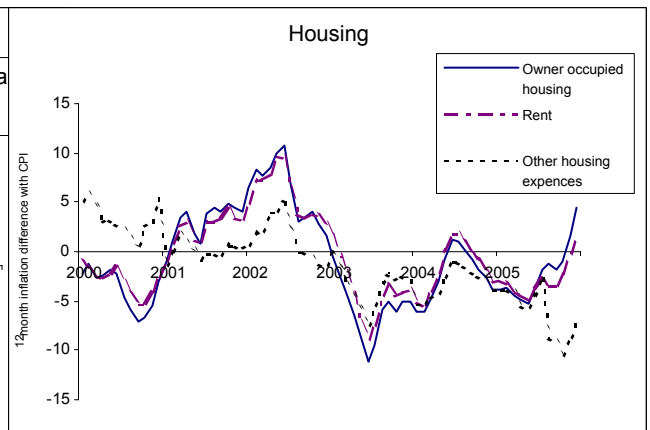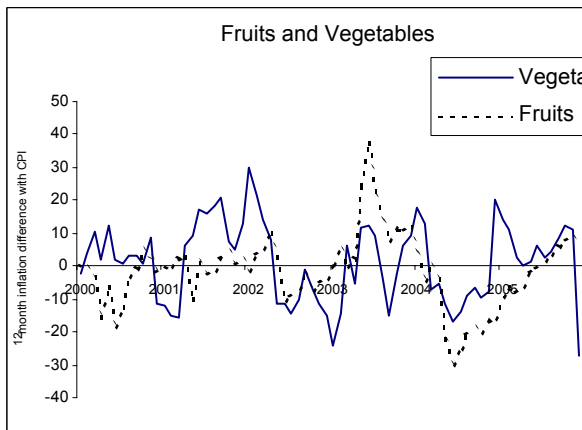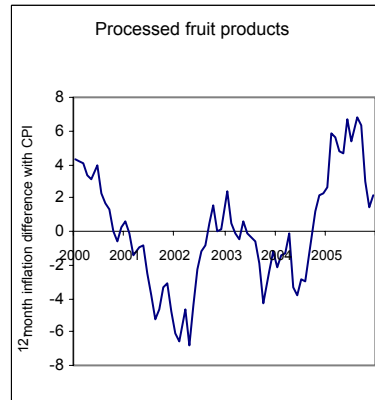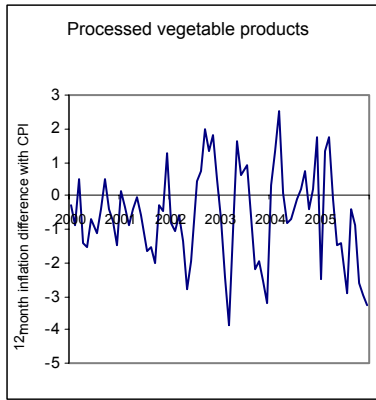Similarly, the most elderly group (65 and older) spends much higher proportion, than others on health, another group characterized by much-higher-than-average inflation over the period from 1999 to 2005 (133.0)
Since there are such big fluctuations in cross-strata price indices, it seems worthwhile scrutinizing more closely the inflation behavior over time.
Figure 5.2.1 plots the inflation rates for the 39 goods categories in deviation from overall CPI inflation. It is worth emphasizing that in each month during the period we compare 12-month inflation difference with the CPI.

Figure 5.2.1. Cross-Strata Deviation of Inflation from Overall CPI, 1999-2005

Processed vegetable products

Processed fruit products

Fruits and Vegetables

Housing

Household Maintenance

Municipal taxes

20

Furniture and Household equipmen

12month inflation difference with CF

10
5
0
-5
-10
-15
-20

2000 2001 2002 2003 2004 2005

Furniture
Electrical equipment
Non-electric equipmen
Bedding/Home decora

Clothing and footwear

Clothing
Footwear

12month inflation difference with CPI

4
2
0
-2
-4
-6
-8
-10
-12
-14
-16

2000 2001 2002 2003 2004 2005

Health

Medical serv
Dental fees
Medicines/Me
equipment

12month inflation difference with CPI

18
16
14
12
10
8
6
4
2
0
-2
-4

2000 2001 2002 2003 2004 2005

Education, culture and entertainmen

Education
Culture/Entertainmen

12month inflation difference with CPI

6
4
2
0
-2
-4
-6
-8

2000 2001 2002 2003 2004 2005

Transport and communcations

12month inflation difference with CPI

8
6
4
2
0
-2
-4
-6
-8
-10
-12

2000 2001 2002 2003 2004 2005

Transport
Communication services

Miscellaneous

Cigarettes and tobacco
Personal services /Cosmetics
Jewellery and watches
Handbags, etc .

12month inflation difference with CPI

25
20
15
10
5
0
-5
-10
-15

2000 2001 2002 2003 2004 2005

Of the categories presented, inflation rates seem to be substantially different from the overall CPI (at least at certain points) and are a likely source of cross-household differences in inflation rates. The most important item strata in this regard are those that are consistently higher or consistently lower than the CPI. It can be seen that medicines and medical equipment, cigarettes and tobacco, electricity, fuel and water, and meals

away from home are consistently higher; while clothing and footwear, communication services, furniture and electrical equipment, and culture and entertainment are consistently lower than the CPI. Vegetable prices are by far the most volatile.

In sum, the results of this section show that household-specific indices and inflation rates may vary substantially due to disparities in expenditure patterns across households and relative price changes of various expenditure categories. In the following section we will investigate further these differential price changes and check the persistence of these variations.

6. Group Inflation Rates: Inflation Differences and Household Characteristics

General aggregate price indices do not consider household characteristics, besides total expenditures, in their calculation. One of the benefits of calculating household-specific price indices is that it enables us to group these across households according to various characteristics that we might be interested in. Is it possible to pinpoint particular groups of households that especially and consistently face a different change in their cost of living than the representative household captured in the overall CPI? In order to answer this question we slice our sample according to various characteristics and calculate group price inflations.

In what follows in this section we will use the democratic means.

We will check seven household demographic characteristics variables: (1) income level of the household; (2) the age of the household head; (3) tenure; (4) employment status of the household head, or whether the household head is a pensioner; (5) the educational level of the household head; (6) areas of residence of the household; (7) households with kids less than 18 years old and other households.

Table 6.1 reports yearly price indices for the period of 1999-2005, grouped by different household characteristics. The main purpose of these exercises is to find out how the inflation experience of a certain group may be different from the general population.

Table 6.1. Yearly Price Indices and Average Growth Rate (Base: January 1999=100), 1999-2005, by Group and Year (1)

Group	1999	2000	2001	2002	2003	2004	2005	Average Growth Rate of Inflation, %, (1999-2005) (2)	Standard error
All	102.0	102.1	103.9	111.1	109.0	110.3	112.7	1.73	0.0005
Income decile 1	102.1	102.2	104.2	111.4	109.4	110.9	113.2	**1.79**	0.002
Income decile 10	101.8	102.1	103.4	110.8	108.8	110.6	112.8	**1.74**	0.002
Pensioners	101.8	101.5	104.2	111.5	108.9	110.0	113.2	**1.79**	0.001
Non-pensioners	102.1	102.2	103.9	111.0	109.0	110.4	112.6	1.72	0.001
Renters (3)	102.1	102.4	104.0	111.4	109.8	111.4	113.1	**1.78**	0.001
Mortgagors	102.1	102.1	103.9	110.8	108.7	109.9	112.3	1.68	0.001
No housing costs	101.9	101.8	103.9	111.0	108.6	109.8	112.7	1.73	0.001
Employed	102.1	102.2	103.8	110.9	108.9	110.4	112.5	1.71	0.001
Unoccupied	101.9	101.8	104.2	111.5	109.1	110.3	113.1	**1.78**	0.001
Children	102.2	102.4	104.0	110.9	109.0	110.4	112.5	1.71	0.001
No children	101.9	101.8	103.9	111.3	108.9	110.3	112.9	**1.75**	0.001
Age < 25	102.1	102.3	103.8	110.7	108.7	110.1	112.0	1.64	0.002
Age 26-34	102.2	102.4	103.9	111.1	109.2	110.7	112.7	1.72	0.001
Age 35-49	102.1	102.2	103.8	110.9	109.0	110.4	112.5	1.71	0.009
Age 50-64	101.9	102.0	103.8	111.1	108.8	110.3	112.8	**1.75**	0.010
Age > 65	101.8	101.5	104.2	111.6	108.9	110.0	113.2	**1.80**	0.001
Lone parents	102.1	101.9	103.8	110.8	108.6	109.6	111.9	1.62	0.003
Couples with children	102.2	102.4	104.0	110.9	109.0	110.5	112.6	1.71	0.001
Couples without children (4)	101.9	101.9	103.9	111.2	109.0	110.6	113.0	**1.77**	0.001
Single adults (below the age of 65)	102.0	102.0	103.7	111.3	109.0	110.2	112.5	1.69	0.002
10 years or less of schooling	102.0	101.9	104.2	111.4	109.1	110.5	113.2	**1.79**	0.001
12 years of schooling	102.0	102.1	103.9	110.9	108.8	110.1	112.4	1.69	0.001
More than 12 years of schooling	102.0	102.2	103.8	111.0	109.0	110.5	112.6	1.72	0.001
Urban areas	102.0	102.1	103.9	111.1	109.0	110.3	112.7	1.73	0.001
Rural areas	102.1	102.3	103.7	110.8	109.2	111.1	113.4	**1.81**	0.003

Notes:

(1) Bold type indicates groups with means that are significantly above the all-household average.

(2) These growth rates are annually compound rates.

(3) Households that rent an apartment and also pay mortgage are classified as renters.

(4) Including couples that live with another single adult (of any age).

The results show that households with certain demographic characteristics usually face higher annual price indices than other groups. These household groups are: (1) households belonging to the lowest income decile; (2) households that rent their apartment; and (3) households with the household head of age 26-34.

On the other hand, households that usually enjoy lower price indices over the period from 1999 to 2005 are: (1) households with no housing costs, and (2) lone parents.

For some group the average annual inflation growth was higher than for others, but whether the higher growth was persistent during the period from 1999 to 2005? It would be misleading to answer this question concentrating on price indices with the same base. That is because price change in a certain period will influence the price index of the following periods. Instead, we would rather look at the annual inflation rates.

Focusing on inflation rates, instead of price indices, reveals somewhat less consistent patterns of relation between household demographic characteristics and the price changes.

Figure 6.1 shows the inflation rates for the richest and the poorest 10 per cent of the population defined by net money income per standard person[4].

Figure 6.1. Inflation rates by income, 1999-2005
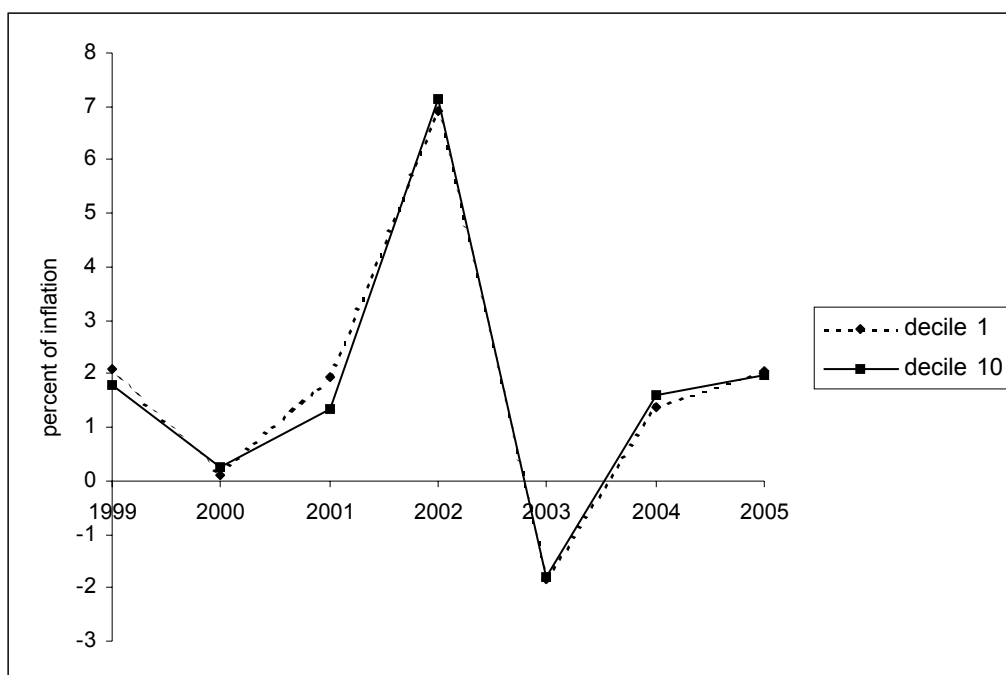
The average inflation rates for the richest and poorest income deciles are significantly different from each other[5] in most years (except 2003 and 2005), but the ranking of the two inflation rates experienced by the two groups changes frequently over the period. The average cumulative inflation rate for the poorest 10% of households was 1.79%, while the average rate for the richest 10% of households was 1.74%; the difference between the two rates is not statistically significant.

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[4] Net money income differs from net income, used to define the deciles in the Table 8, in that it does not include the imputation of housing services.
[5] Here and further α≤0.05.

Figure 6.2 shows the annual average (the geometric mean) inflation rate from January 1999 to December 2005 for all income deciles. The solid line in the figure shows the overall mean inflation rate (1.73%).

The poorest, the sixth and the richest income deciles have experienced inflation that, on average, has been more than the inflation growth for everyone, whereas the richest three and the fourth income deciles have experienced inflation that is lower than the mean rate.

Figure 6.2. Average Inflation Rates by Net Money Income for Standard Person Deciles, 1999-2005
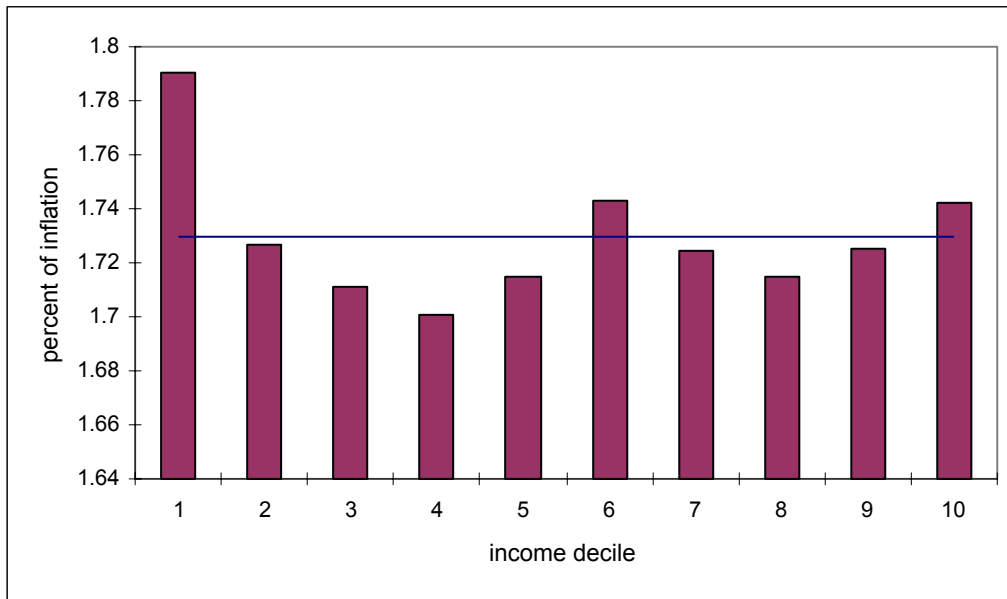

Figure 6.3 shows inflation rates for households with and without children. As for households with different incomes, the inflation rates experienced by households with and without children differ significantly (except the year 2004), but the ranking changes frequently. There is a significant difference between the average cumulative inflation rate experienced by households with and without children from 1999 to 2005.
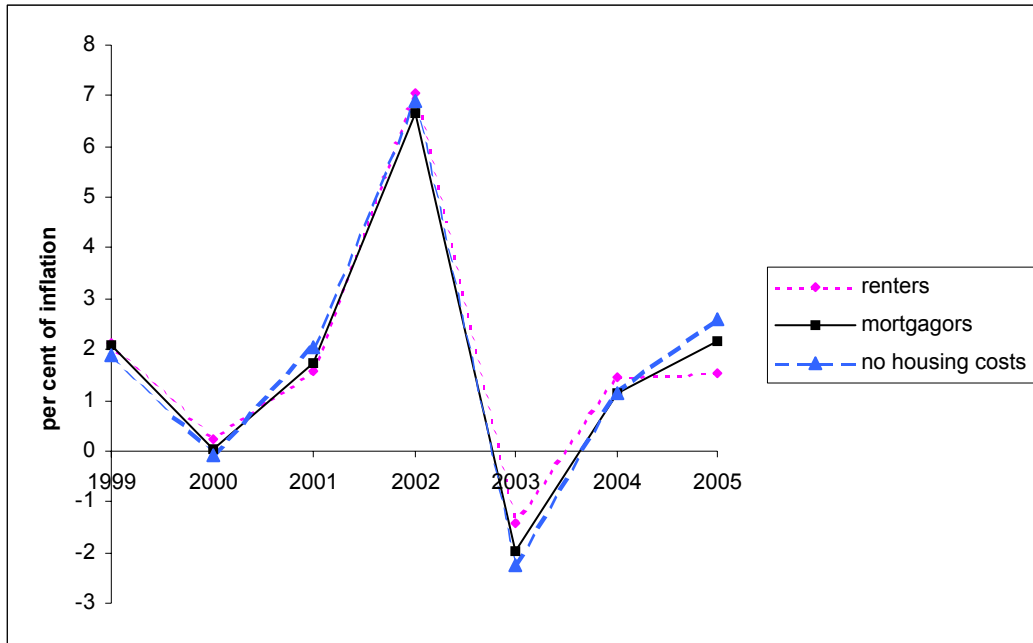
Figure 6.3. Inflation Rates for Households With and Without Children, 1999-2005
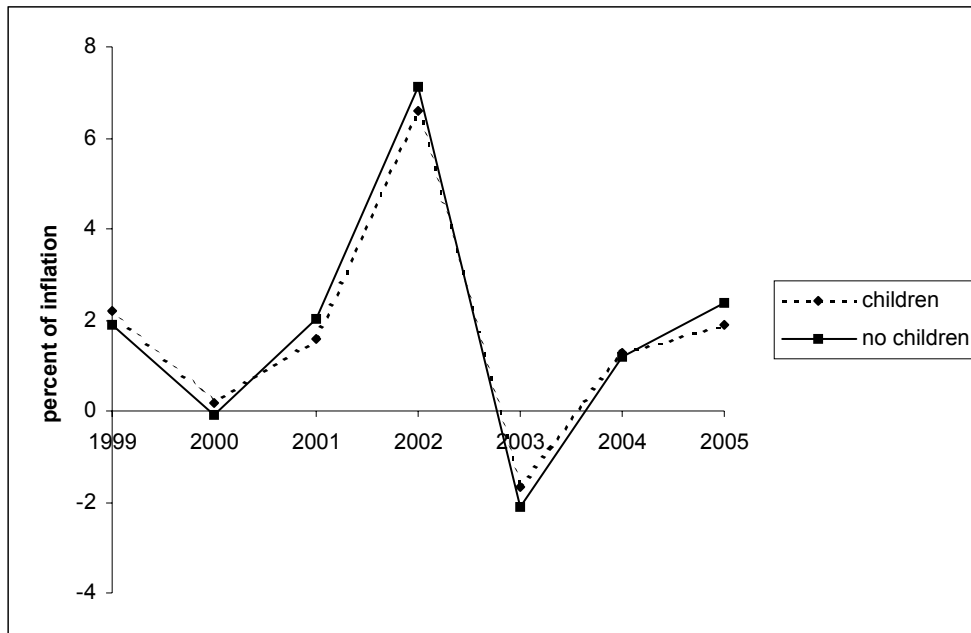
One characteristic that we might expect to generate large differences in inflation rates is tenure. Since housing makes up a large proportion of total expenditure, any price changes will have a large effect on a household's inflation rate. We grouped households according to whether they pay rent for their accommodation, whether they own it with a mortgage, or whether they do not pay any housing costs at all.[6] Figure 6.4 shows inflation rates across these three groups of households. The differences are small, but statistically significant. Similarly to the findings presented in the Table 6.1 above, the biggest difference occurs between renters and those households, which have no housing costs, while mortgagors tend to be between the two. But, despite the fact that average inflation growth was found to be higher among renters and lower among households with no housing costs, here the direction of the difference between annual inflation rates is not persistent across the years. Over the entire period, mortgagors experienced an average compound rate of inflation of 1.68%, while renters experienced an average rate of 1.78% and households that pay no housing costs experienced an average rate of 1.73%.

Figure 6.4. Inflation Rates by Tenure, 1999-2005

[6] Households that pay rent for their accommodation and also pay mortgage for some other apartment at their disposal are grouped together with renters (according to the definitions of HES).

Finally, Figure 6.5 shows the inflation rates for households grouped by whether the household head is a pensioner.[7]

Overall, pensioners have experienced slightly higher inflation than non-pensioners (an average of 1.79% compared to 1.72% for non-pensioners), although the ranking changes frequently. The differences between the inflation rates of the two groups are statistically significant in all of the years.

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[7] The definition of a pensioner in this case does not depend on whether the household head is of a pension able age, but rather on whether he or she receives an old age pension and/or survival pension.

Figure 6.5. Inflation Rates for Pensioner and Non-Pensioner Households, 1999-2005
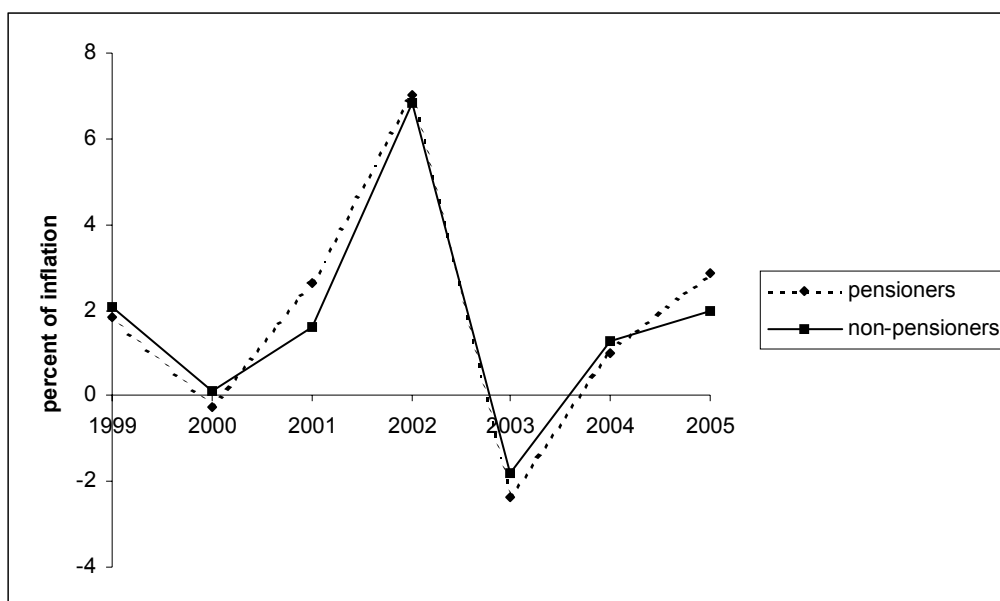
7. Summary

While the CPI may (or may not) provide a good measure of the average rate of inflation, it would be remarkable if it were a good measure of inflation for everybody.

In this study we find that:

- The headline average of inflation is not necessarily a good guide to the actual rates of inflation faced by individual households. In general, though, it is close to the experience of inflation for the majority of households. On average, over the period from 1999 to 2005, more than a half of households at a point in time faced inflation rates within 1 percentage point of the average rate.

- The analysis examines the issue of the choice between the plutocratic (one dollar-one vote) approach and the democratic (one household-one vote) approach to constructing an aggregate price index for a society. The results show that there is little difference between the democratic and plutocratic index values for the period from 1999 to 2005. There is no persistent bias in either direction in the plutocratic indices compared to the democratic indices over the period studied.

- Average inflation rates defined for different population subgroups are often significantly different from each other, although their rankings usually swap over almost every year throughout the period studied. Those households that experience high inflation in one year do not generally face high inflation in the next year. That is we do not find much household-specific persistence in inflation disparities. Over the whole period, pensioners, renters, the unemployed and childless households experienced higher-than-average cumulative inflation.

Since the period covered in this paper was a period of low inflation, it would be valuable to extend the analysis to include some hypothetical scenarios of price change.

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Appendix

Table A.1. Expenditure Shares for Households With and Without Children, 2002

	All Households	No children	Children
All commodities	100.00	100.00	100.00
Food (excl. fruit, vegetables)	**13.41**	**12.55**	**14.09**
Bread, cereals and pastry products	2.39	1.96	2.73
Vegetable oils and products	0.33	0.35	0.31
Meat, poultry and fish	3.39	3.14	3.58
Milk, milk products and eggs	2.48	2.31	2.61
Sugar and sugar products	0.57	0.48	0.64
Beverages	1.11	1.10	1.12
Meals away from home	1.88	2.15	1.67
Miscellaneous food products	1.26	1.04	1.44
Vegetables and fruit	**3.44**	**3.38**	**3.48**
Vegetables	1.41	1.39	1.42
Fruit, fresh	0.98	0.99	0.97
Processed vegetable products	0.62	0.56	0.66
Processed fruit products	0.44	0.44	0.44
Housing	**23.30**	**26.41**	**20.86**
Monthly rent	4.47	5.85	3.39
Housing consumption in kind	18.12	19.90	16.73
Other housing expenses	0.71	0.67	0.74
Dwelling and household maintenance	**9.59**	**9.44**	**9.72**
Electricity, fuel and water	3.62	3.38	3.81
Maintenance and renovation	1.20	1.36	1.08
Domestic help	1.62	1.65	1.60
Miscellaneous household articles	0.84	0.77	0.89
Municipal taxes (Arnona)	2.31	2.27	2.34
Furniture and household equipment	**4.68**	**4.24**	**5.03**
Furniture	1.75	1.54	1.91
Household electrical equipment	1.74	1.56	1.87
Non-electrical equipment	0.44	0.41	0.46
Bedding and home decorations	0.76	0.73	0.78
Clothing and footwear	**3.07**	**2.47**	**3.53**
Clothing	2.40	1.91	2.79
Footwear	0.66	0.55	0.75
Health	**4.88**	**5.92**	**4.07**
Dental treatment	1.46	1.54	1.40
Health insurance	0.99	1.18	0.83
Medical services, medicines and medical equipment	2.44	3.20	1.84
Education, culture, entertainment	**12.89**	**10.51**	**14.75**
Education services	4.71	2.39	6.53
Newspapers, books and stationery	0.92	0.80	1.01
Culture and entertainment	7.26	7.32	7.21
Transport and communication	**20.52**	**20.92**	**20.20**
Transport	16.29	16.91	15.81
Post, telephone, communication	4.23	4.01	4.40
Miscellaneous goods and services	**4.22**	**4.17**	**4.27**
Cigarettes, tobacco and accessories	0.99	0.94	1.03
Personal services and cosmetics	2.60	2.62	2.59
Jewelry and watches	0.43	0.47	0.39
Wallets, bags, suitcases etc.	0.21	0.14	0.26

Table A.2. Expenditure Shares by Household Area of Residence, 2002

	All Households	Urban	Rural
All commodities	100.00	100.00	100.00
Food (excl. fruit, vegetables)	**13.41**	**13.47**	**12.56**
Bread, cereals and pastry products	2.39	2.40	2.26
Vegetable oils and products	0.33	0.33	0.30
Meat, poultry and fish	3.39	3.43	2.73
Milk, milk products and eggs	2.48	2.50	2.18
Sugar and sugar products	0.57	0.57	0.55
Beverages	1.11	1.12	0.99
Meals away from home	1.88	1.90	1.66
Miscellaneous food products	1.26	1.22	1.89
Vegetables and fruit	**3.44**	**3.45**	**3.21**
Vegetables	1.41	1.41	1.37
Fruit, fresh	0.98	0.98	0.85
Processed vegetable products	0.62	0.62	0.53
Processed fruit products	0.44	0.44	0.46
Housing	**23.30**	**23.61**	**18.80**
Monthly rent	4.47	4.56	3.18
Housing consumption in kind	18.12	18.34	14.90
Other housing expenses	0.71	0.71	0.72
Dwelling and household maintenance	**9.59**	**9.48**	**11.25**
Electricity, fuel and water	3.62	3.60	3.88
Maintenance and renovation	1.20	1.19	1.32
Domestic help	1.62	1.58	2.27
Miscellaneous household articles	0.84	0.84	0.87
Municipal taxes (Arnona)	2.31	2.27	2.91
Furniture and household equipment	**4.68**	**4.59**	**6.09**
Furniture	1.75	1.72	2.13
Household electrical equipment	1.74	1.69	2.36
Non-electrical equipment	0.44	0.42	0.67
Bedding and home decorations	0.76	0.75	0.93
Clothing and footwear	**3.07**	**3.08**	**2.85**
Clothing	2.40	2.41	2.27
Footwear	0.66	0.67	0.59
Health	**4.88**	**4.91**	**4.38**
Dental treatment	1.46	1.47	1.33
Health insurance	0.99	0.99	0.97
Medical services, medicines and medical equipment	2.44	2.46	2.08
Education, culture, entertainment	**12.89**	**12.84**	**13.56**
Education services	4.71	4.58	6.75
Newspapers, books and stationery	0.92	0.92	0.86
Culture and entertainment	7.26	7.35	5.95
Transport and communication	**20.52**	**20.28**	**24.02**
Transport	16.29	16.04	19.95
Post, telephone, communication	4.23	4.24	4.07
Miscellaneous goods and services	**4.22**	**4.29**	**3.27**
Cigarettes, tobacco and accessories	0.99	1.03	0.46
Personal services and cosmetics	2.60	2.63	2.26
Jewelry and watches	0.43	0.43	0.39
Wallets, bags, suitcases etc.	0.21	0.21	0.16

Table A.3. Expenditure Shares by Educational Level of Household Head, 2002

	All Households	Years of schooling		
		10 or less	12	More than 12
Consumption expenditures - total	100.00	100.00	100.00	100.00
Food (excl. fruit, vegetables)	**13.41**	**16.31**	**13.80**	**12.19**
Bread, cereals and pastry products	2.39	2.89	2.61	2.10
Vegetable oils and products	0.33	0.54	0.33	0.25
Meat, poultry and fish	3.39	5.30	3.51	2.65
Milk, milk products and eggs	2.48	2.78	2.56	2.33
Sugar and sugar products	0.57	0.69	0.57	0.53
Beverages	1.11	1.40	1.17	0.98
Meals away from home	1.88	1.25	1.71	2.19
Miscellaneous food products	1.26	1.46	1.34	1.15
Vegetables and fruit	**3.44**	**4.59**	**3.58**	**2.96**
Vegetables	1.41	2.04	1.50	1.14
Fruit, fresh	0.98	1.32	0.96	0.87
Processed vegetable products	0.62	0.68	0.67	0.56
Processed fruit products	0.44	0.54	0.45	0.39
Housing	**23.30**	**26.22**	**23.56**	**22.14**
Monthly rent	4.47	3.69	3.69	5.18
Housing consumption in kind	18.12	22.25	19.29	16.03
Other housing expenses	0.71	0.27	0.58	0.93
Dwelling and household maintenance	**9.59**	**10.14**	**9.54**	**9.43**
Electricity, fuel and water	3.62	4.51	3.84	3.19
Maintenance and renovation	1.20	1.03	1.17	1.28
Domestic help	1.62	1.30	1.29	1.92
Miscellaneous household articles	0.84	1.10	0.89	0.72
Municipal taxes (Arnona)	2.31	2.21	2.35	2.32
Furniture and household equipment	**4.68**	**4.39**	**4.84**	**4.70**
Furniture	1.75	1.32	1.76	1.89
Household electrical equipment	1.74	1.84	1.99	1.56
Non-electrical equipment	0.44	0.56	0.38	0.43
Bedding and home decorations	0.76	0.67	0.70	0.82
Clothing and footwear	**3.07**	**3.23**	**3.17**	**2.95**
Clothing	2.40	2.49	2.45	2.35
Footwear	0.66	0.73	0.73	0.60
Health	**4.88**	**5.81**	**4.74**	**4.64**
Dental treatment	1.46	1.77	1.45	1.36
Health insurance	0.99	0.93	0.98	1.00
Medical services, medicines and medical equipment	2.44	3.10	2.31	2.28
Education, culture, entertainment	**12.89**	**9.56**	**12.97**	**14.00**
Education services	4.71	2.67	4.53	5.53
Newspapers, books and stationery	0.92	0.64	0.77	1.09
Culture and entertainment	7.26	6.25	7.67	7.38
Transport and communication	**20.52**	**14.83**	**19.27**	**23.19**
Transport	16.29	10.89	14.65	19.08
Post, telephone, communication	4.23	3.94	4.62	4.11
Miscellaneous goods and services	**4.22**	**4.93**	**4.53**	**3.81**
Cigarettes, tobacco and accessories	0.99	1.72	1.22	0.61
Personal services and cosmetics	2.60	2.62	2.71	2.53
Jewelry and watches	0.43	0.41	0.40	0.44
Wallets, bags, suitcases etc.	0.21	0.17	0.20	0.22