

# **Inflation inequality in Italy**

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Abstract

Inflation is usually assumed to affect all households with the same intensity. Since relative prices are subject to continuous changes, each household, depending on its specific pattern of consumption, is however characterised by a specific inflation rate. With the help of a rich set of microdata, this paper studies the distribution of inflation rates across Italian households during the period 1986-2004. The main findings are that rich households faced on average a slightly higher inflation rate than poor households, and that some demographic characteristics have been systematically associated with higher price increases. Also in 2002, the year of the changeover, inflation has been slightly higher for the rich. Using individual prices indexes, it is finally possible to show that, in the last few years, real living standards for many families have worsened.

## *1. Introduction*

The Italian Institute of Statistics (Istat) provides every month three indexes aimed at measuring the average inflation rate experienced by Italian households: the NIC rate, which is the most representative and widely used measure of inflation<sup>1</sup>, the index for households of manual and white collar workers<sup>2</sup>, and a third index computed according to harmonised criteria common to all EU countries. Although slightly different, these indexes have many characteristics in common, and all refer to the behaviour of a typical household, consuming an average basket of goods and services. Every single household, however, has a specific pattern of consumption, and since relative prices can vary substantially, each household is actually characterised by a specific inflation rate that may be distant from the NIC rate or other synthetic measures, which are therefore only approximate averages of the inflation rate actually experienced by millions of different consumers. The main objective of this paper is to study the distribution of inflation rates across Italian consumers over the last twenty years, so as to verify to what extent these individual rates have been different from the average NIC rate, and whether some types of households have been more severely hurt by inflation than others.

While, to my knowledge, this problem has not been previously dealt with for the Italian case, many papers have analysed the distribution of inflation rates across households of other nations. Crawford and Smith (2002), for example, study the distributional characteristics of inflation in the UK over the period 1976-2000, finding significant differences over time in the inflation rates experienced by different households. In the US, there is a long series of studies on this subject, from Michael (1979) and Hagemann (1982) to the recent paper of Hobijn and Lagakos (2003), who find large differences in the individual inflation rates during the period 1987-2001. Idson and Miller (1999) and Amble and Stewart (1994) concentrate on the evolution of inflation for specific subgroups of the population, like households with children or the elderly, concluding that their price indexes have not been significantly different from the general CPI during the 1980s. Over a longer time span, Blank and Blinder (1986) find that during the interval 1947-1982 the inflation rate for the poor has been similar to that of the whole population.

As all advanced countries, Italy experienced two price shocks during the 1970s, with inflation rates over 20%. Then inflation rapidly fell to much moderate levels, and its decline has continued until the more recent years, with levels around 2%, due not only to structural reforms of the product markets, but also to slack economic growth. The last few years have seen the opening of a gap between official measures of inflation and the levels perceived by consumers, a phenomenon common to many EU countries. It is perhaps a paradox that so many households are worried about inflation just when the main statistical institutes report for it record-low levels. This paper uses the specific price indexes for the various categories of goods and services provided by the Italian institute of statistics, and therefore the results here presented depend on the quality of these price data.

The rest of the paper is organised as follows. The second section explains the methodological choices of the analysis, in particular the definition of the household inflation rate and the description of the data on which this research is based. Section 3 presents the main results on

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<sup>1</sup> NIC is the acronym of “Nazionale Intera Collettività”, i.e. a price index for the whole community of Italian households.

<sup>2</sup> This index is called FOI, i.e. “Famiglie di Operai e Impiegati” (households of manual and white collar workers).

the distribution of individual inflation rates over time and across various household types. It also studies the connection between the distribution of individual price indexes and the evolution of the relative prices of different categories of goods or services. Section 4 is devoted to what has recently happened to inflation inequality in Italy on the occasion of the introduction of the common European currency in 2002, when, like in many other countries of the euro area, perceived inflation rose to record levels. This section analyses also the impact of individual inflation rates on the recent evolution of the real disposable incomes of Italian households. Finally, section 5 concludes.

## *2. The data and the measurement of inflation*

In order to study how inflation rates vary across different households, we need two pieces of information: a series of price data for a disaggregated set of items, and microdata on expenditure behaviour for a representative sample of Italian households. The analysis of this paper is conducted on the yearly datasets of the Household expenditure survey, carried out by the Italian National Institute of Statistics (Istat), from 1986 to 2003. This survey is done every year on a cross-sectional basis on a very large sample of households, ranging, in the sample used here, from 20,929 in 2000 to 34,759 in 1988. It represents the main source of information for the construction of the various consumer price indexes and for the study of (both relative and absolute) poverty in the distribution of consumption<sup>3</sup>. In 1997 Istat has thoroughly revised the production process of the survey, changing both the sample design, the questionnaire, and the procedures for the acquisition and validation of the data.

The sample design occurs in two stages. The first concerns the municipalities, which are divided into two groups: all the administrative centres of the provinces (107 in 2004) participate every month, while among all other municipalities about 350 are selected to participate in the survey once every 3 months. The second stage occurs at the household level: every month about 2,300 households are randomly extracted from the registry office records of the municipalities involved. Each household participate to the survey only once, and is legally obliged to respond.

The consumption data are recorder with two criteria: i) a diary where each household records all the purchases made during the last seven days; ii) a final face to face interview, concerning the social and demographic characteristics of the household and the purchases made during the last month for goods like housing, apparel, health, transport, communications and recreational goods and services. Finally, all durable goods purchased during the last three months are recorded.

The data sets of the survey publicly available from 1985 to 1996 contain only 77 categories of goods and services, while those from 1997 to 2003 have data on 279 items. To carry out a homogeneous analysis, for each year a set of 71 categories has been constructed, trying to reconcile as best as possible the different item definitions.

The second necessary piece of information for the computation of household-level prices is a set of price indexes for each category and year, which have been obtained from the series officially published by Istat<sup>4</sup>. At the end, two vectors are associated to each household: the amounts spent for the purchases of the 71 goods and services, and the corresponding vector of yearly price indexes. The fundamental assumption at the basis of this imputation is that each

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<sup>3</sup> See Brandolini (1999) for a description of this survey.

<sup>4</sup> See the Bollettino mensile di statistica published by Istat for the period 1986-1995, and <http://petra1.istat.it> for the years 1996-2004.

household faces the same unitary price for the same good. It is indeed impossible to take into account the effects that differences in the qualities and quantities of the goods and services purchased can have on the prices actually paid by each customer, because no information is available on these aspects. The same caveat applies to possible price differences in the various types of shopping places.

The yearly inflation index for a single household is computed using the Laspeyres formula, which is a weighted average of the items-specific prices, with weights given by the corresponding budget shares of the previous year:

$$(1) \quad P_t^h = \sum_{i=1}^{71} w_{i,t-1}^h \frac{P_{i,t}}{P_{i,t-1}},$$

where  $h$  is the household index,  $t$  indicates the year, and  $i$  the single item.

The overall yearly inflation rate is the simple average of these individual inflation rates:

$$(2) \quad P_t = \frac{1}{H} \sum_{h=1}^H P_t^h.$$

This measure is also usually called a “democratic” price index, since all households receive an equal weight in its computation; the alternative would be to construct a “plutocratic” price index, where each household has a weight proportional to its total expenditure, so giving more relevance to the inflation experienced by rich households. The consumer price index usually produced by statistical agencies belongs to this second category. Previous research (Izquierdo et al. 2003, Crawford and Smith 2002) suggests that the difference between the democratic and the plutocratic variants is usually very small. Since the available datasets cover the period 1985-2003, this paper analyses the distribution of household inflation rates from 1986 to 2004.

In order to compute the inflation rate actually experienced by each household, it is necessary to consider all the purchases actually done by the family. Consequently, I have not considered as an expenditure the imputed rent on home ownership, because it corresponds to the implicit value of home services, but not to an actual flow of money. Therefore, imputed rents do not belong to the set of items used for the construction of the individual price index.

On the other hand, owning the house certainly provides utility to the household, so it is important to take imputed rents into account in the computation of an indicator of the standard of living. The definition of a measure of economic well-being is important, since one of the main objectives of this paper is to verify whether inflation has been, during the last 20 years, higher for the poor or for the rich. To define such an indicator, I add to total expenditure on the 71 goods and services the value of imputed rents, and subtract expenditure on durables. Without the deduction of durables, a household would appear to be rich only because of an extraordinary expenditure in the period relevant for the interview. A proper accounting of durables would require the computation of the consumption of the services provided by their stock, but this approach is not applicable in this case due to lack of proper information<sup>5</sup>. I therefore prefer to exclude altogether the expenditure on durables, on the basis of the well-known strong intertemporal correlation between total and non durable expenditure

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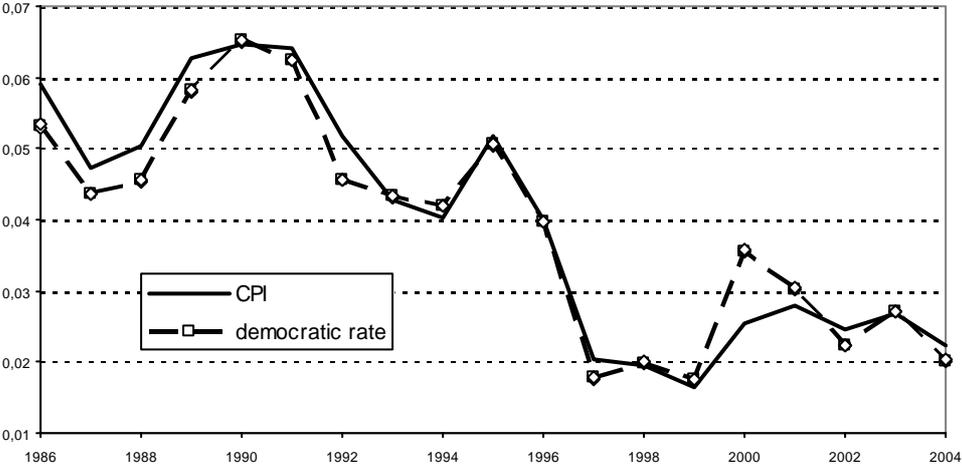
<sup>5</sup> The survey provides only some dummy variables concerning the presence of certain durable goods in the household, without any reference to their age or value.

(Kaplanoglou and Newbery, 2004). The indicator of economic wellbeing is finally obtained by dividing non durable expenditure by an equivalence scale given by the square root of the number of components. Each year, households are then divided into deciles of non durable equivalent expenditure.

*3. The distribution of household inflation rates*

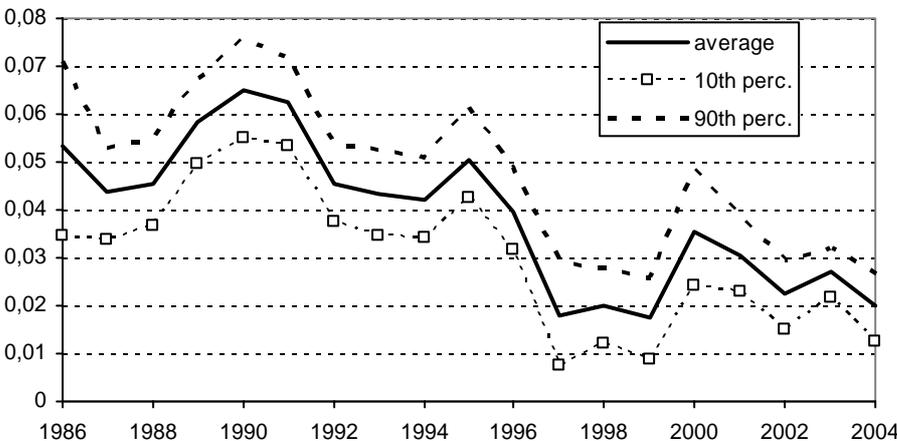
A first problem that can be addressed with the availability of individual inflation rates is to what extent the democratic price index computed on a representative sample of Italian households is different from the consumer price index produced by the National Institute of Statistics. Fig. 1 compares the annual NIC rate for the whole Italian community with the democratic average of personal inflation rates. The two indexes are quite close over the whole period, with the only exception of 2000, where the difference may, in part, be attributed also to the criteria that Istat (as all the other European statistical institutes) uses to record the changes in the price of car insurance: the conventional inflation rate for this item is the percentage difference, usually low, between the amount of insurance premia paid by all households and the refunds received. In the microdata, however, the item-specific price index is simply the overall rate of change of the value of the premium paid, which rose in 2000 by more than 10%.

*Fig. 1 – Comparison between the official consumer price index and the average of the individual inflation rates*



Thanks to the great sample size, the 95 per cent confidence interval around the mean is very narrow and close to the central value, so it is not shown in the graph. Even if the difference between the two indexes is significant for many years, they are always very close. It then seems that the CPI reflects quite closely the average inflation experienced by individual households. This average, however, may conceal significant differences in the distribution of the levels of inflation for different household. Fig. 2 shows again the democratic index, together with the individual inflation rates for the 10th and 90th percentiles of its distribution. In 2000, for example, average inflation was 3.5%, but for 10% of the sample it was less than 2.2%, and for the opposite 10% with the highest rates it was close to 5%.

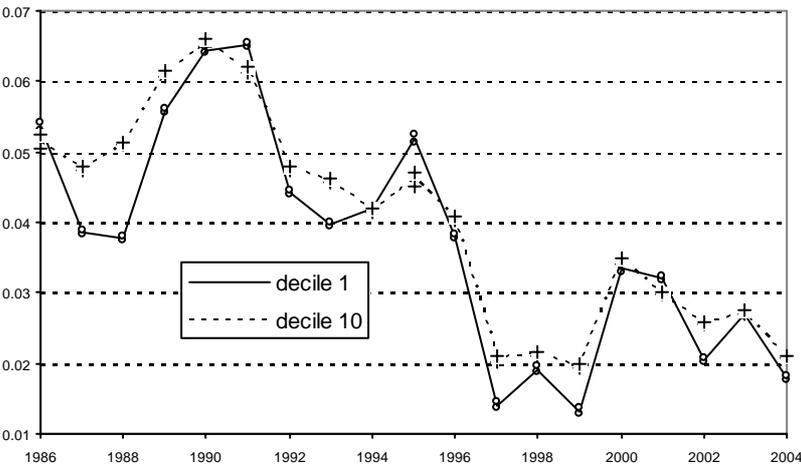
Fig. 2. Some moments of the distribution of individual inflation



The standard deviation of annual individual inflation rates is on average 0.88%, ranging from 0.47% in 2003 to 1.97% in 1995. The values found for this measure of dispersion are broadly similar to those reported for the USA by Hobijn and Lagakos (2003). Although inflation in the last few years is falling, the degree of its dispersion is on the contrary increasing, because both the Gini index and the coefficient of variation of individual price indexes are greater in the second part of the sample period<sup>6</sup>.

The main reason for the interest in the distribution of individual price indexes is the possibility that inflation may be systematically higher for certain groups of the population, in particular for the poorest households. If this were actually the case, then the economic situation of the poor could be worse than what is actually reported by traditional statistics. Fig. 3 shows the average inflation rates for the richest (dashed line) and poorest (continuous line) deciles of the distribution of equivalent non-durable expenditure, for each available year.

Fig. 3 Average inflation rates for the first ad last deciles of equivalent non-durable expenditure

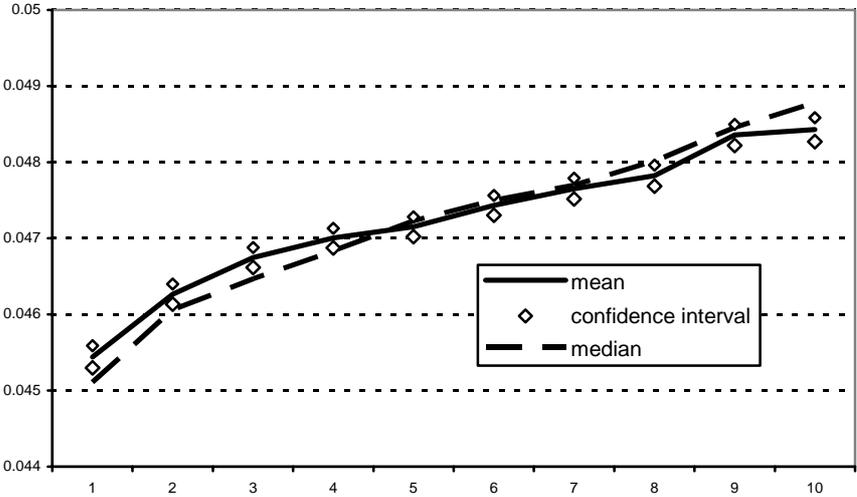


<sup>6</sup> The coefficient of variation is on average below 0.2 in the 1990s, and around 0.3 later; the Gini index oscillates around 0.1 at the beginning of the period, and is closer to 0.2 in the last few years.

The small crosses and dots in the graph represent the 95 per cent confidence intervals around the means. Only in four years the average inflation rates for the poorest and richest deciles are not significantly different. In general, there is not a definite trend, and the ranking changes often, with however a prevalence for the average inflation faced by the richest part of the distribution: the average inflation rate of the poorest decile is significantly higher than that of the richest 10% in only four years, and significantly lower in eleven years. The annual variations in the average inflation rate are a bit higher for the poor, in both directions. The inflation rate for the richest decile is in other words more stable over time, and slightly higher than that for the rest of the population. Also in 2002, the year of the introduction of the euro, inflation seems higher for the rich.

Fig. 4, showing the average inflation rate for the whole cross-sections pooled together, and for the various deciles, confirms that during the last two decades inflation has been slightly higher for the rich. The solid line represents the mean of the distribution, and the dotted line the median. The figure contains also the 95 per cent confidence interval around the mean. Over the whole period, the richest decile has experienced an inflation rate that was on average 0,3% higher than that for the first decile in each year. This difference is statistically significant. Considering a period of 19 years, we can therefore conclude that for the richest decile the cumulative inflation rate has been almost 6 percentage points higher than for the poorest 10% of the population.

*Fig 4 - Mean and median inflation rates for the deciles of the distribution of equivalent non-durable expenditure, pooling 1986-2004*



Inflation can have a distributional impact not only between the rich and the poor, but also across different socio-demographic characteristics. To study which household types have been more severely affected, we could simply study the evolution of the average inflation rates experienced by groups of households with different characteristics, for example households with children vs. households without children, pensioners vs. non pensioners, etc.. In this way, however, there is the risk that the average levels may be driven not by the characteristics actually considered, but by others that may be collinear with them (see for a concrete example Idson and Miller, 2001). The best way through which systematic differences in the level of inflation across different household types may emerge is the use of

a multivariate regression approach, where the dependent variable is the individual inflation rate, and the explanatory variables are a set of covariates available in the data set; the estimated coefficients represent therefore the net effect of each socio-demographic characteristic, given the levels of other variables.

An OLS regression of this type has been run for each available year, and the results, for a selection of years, are reported in table 1. The last two columns show also the results of a regression carried out on the pooling of all the yearly cross-sections, with the addition of a whole set of year dummies. The dependent variable is the individual inflation rate multiplied by 100. The signs of the coefficients change often over time, but some regularities do in fact emerge. The sign associated with the number of children is almost always negative, as well as that for the oldest age category of the household head. These two coefficients are consistent with the prevalence of a greater level of inflation for the richer part of the distribution. The other coefficients, however, change sign frequently over the years. This can depend on the fact that, as already observed, the ranking of the extreme deciles changes often, because inflation is driven for different sections of the population by the movements of the relative prices of different goods and services, so that individual price indexes are subject in various years to very different influences. The last two columns, with the coefficients estimated on the whole pooling of 19 cross-sections, may give a clearer picture. All coefficients now have very low standard errors. The greatest positive net effects are associated with being a tenant and with the logarithm of total expenditure. Being usually located in the poorest deciles, tenants are therefore the exception to the general finding that inflation has been higher for the rich. On the other extreme, the biggest negative impacts come from having a car, from living in the southern part of Italy and from the number of adults living in the household. The high R-square of this regression is due to the inclusion of year dummies, which are always very significant, capturing the variation of average inflation over time. The low R-squares of the single-year regressions, on the other hand, indicate that much of the variability of individual price indexes takes place within, and not between, groups. This broad picture captures only the net cumulative results of a period long nearly two decades, when the determinants of inflation, however, changed very frequently. A useful way to illustrate the shifts in the influence that different characteristics have on inflation is to plot over time the estimated coefficients for each characteristic and for each year, so that we can observe not only their level, but also their significance and the change in their net influence over the two decades under analysis.

*Tab. 1 - Regression estimates of the determinants of the individual inflation rates*

Inf	1986		1990		1995		2000		2004		1986-2004	
	Coef.	t	Coef.	t	Coef.	T	Coef.	t	Coef.	t		
Ln tot. exp.	0.5673	3.02	1.9154	15.89	-2.4888	-9.6	1.7722	11.83	2.3263	26.73	0.998597	18.26
ln tot. exp squared	-0.0379	-2.65	-0.1507	-17.55	0.1548	8.73	-0.1527	-15.38	-0.1534	-26.91	-0.02965	-15.81
n. workers	0.0940	5.32	0.0376	3.44	0.0449	2.48	0.1036	9.44	0.0287	4.74	0.033699	13.58
<9 years ed.	-0.2662	-7.17	-0.1487	-6.77	-0.0019	-0.05	0.0454	2.32	0.0361	3.39	-0.09664	-19.75
13 years ed.	-0.1198	-3.24	-0.0463	-2.15	-0.0080	-0.24	0.0274	1.49	0.0422	4.5	-0.04766	-10.08
>16 years ed.	-0.0145	-0.26	0.1422	4.15	0.0054	0.11	-0.0258	-0.9	0.0239	1.59	0.033106	4.48
n. children (<18)	-0.0260	-2.11	-0.0329	-3.83	0.0010	0.06	-0.0653	-6.43	-0.0224	-4.46	-0.04752	-24.11
Small house	-0.0038	-0.16	-0.0433	-2.94	-0.0473	-1.91	-0.1154	-7.53	0.0419	5.15	0.002896	0.86
Large household	0.0104	0.32	0.1023	5.08	0.0109	0.32	0.1551	8.37	0.0395	3.86	0.013755	3
Tenant	0.5838	25.38	-0.0636	-4.24	0.3839	14.56	-0.3698	-22.56	0.2020	22.12	0.329775	96.47
With car	-0.8608	-26.17	-0.0682	-3.19	0.4411	12.19	0.9329	44.55	0.1704	15.24	-0.12412	-26.37
Male	0.1216	3.53	0.0573	2.8	0.0308	0.94	0.0827	4.59	0.0771	8.49	0.046699	10.32
North-east	0.0561	1.82	-0.0629	-3.31	-0.0692	-2.18	-0.1064	-5.75	-0.0623	-6.4	-0.01162	-2.7
Centre	0.2411	7.91	-0.1186	-6.28	-0.1421	-4.53	-0.1915	-10.24	0.0148	1.51	-0.07953	-18.7
South	0.2906	10.49	-0.3362	-19.57	-0.2469	-8.5	-0.4292	-23.95	0.0398	4.13	-0.15597	-40.12
Blue collar	-0.0261	-0.8	-0.0591	-2.89	-0.0312	-0.89	-0.0222	-1.01	0.0264	2.27	-0.02908	-6.25
Manager	-0.0533	-0.68	0.0112	0.24	-0.1355	-1.83	0.0944	2.86	-0.0118	-0.67	-0.01405	-1.35
Entrepreneur	-0.4290	-4.14	0.0424	0.68	0.0009	0.01	0.1726	3.52	-0.0099	-0.42	-0.02007	-1.55
Professional	0.0145	0.18	-0.0025	-0.05	0.0891	1.31	0.1319	3.06	0.0017	0.08	-0.02571	-2.56
Self employed	-0.1241	-3.46	-0.0050	-0.22	0.0025	0.06	0.0664	2.6	0.0086	0.63	-0.0405	-7.95
Unemployed	-0.0899	-1.1	0.0601	1.1	0.1607	2.23	0.1276	3.13	0.1045	4.53	0.040458	3.65
Houseworker	0.1667	2.89	-0.0045	-0.14	0.0266	0.48	0.0220	0.71	-0.0529	-3.35	0.021036	2.81
Other	0.0197	0.18	0.3050	3.87	0.2829	2.55	0.0447	1.34	-0.0123	-0.74	0.128745	7.76
Age <31	0.1271	2.64	0.0405	1.3	-0.1631	-2.9	0.0459	1.14	-0.0100	-0.5	0.057915	8.04
Age 30-39	0.0327	0.97	0.0534	2.48	-0.0308	-0.87	0.0628	2.83	-0.0225	-1.95	0.04695	9.72
Age 50-59	-0.0252	-0.72	0.0733	3.29	0.0307	0.82	0.0263	1.16	0.0141	1.2	-0.01165	-2.31
Age 60-69	-0.1165	-2.75	0.1071	4.16	0.0260	0.6	-0.0002	-0.01	-0.0593	-4.23	-0.00768	-1.31
Age >69	-0.2889	-6.17	0.0939	3.21	-0.1036	-2.17	-0.0314	-1.12	-0.1699	-11.22	-0.04269	-6.54
n. adults	-0.0377	-2.65	-0.0822	-8.95	-0.0344	-2.37	-0.0294	-3.28	-0.0339	-6.94	-0.08202	-39.95
Constant	3.6982	6.05	0.9099	2.17	14.6157	15.54	-1.6674	-2.96	-6.9096	-20.87	-6.26947	-2.05
n. observations	32704		33668		33928		20929		28006			559488
Adj. R <sup>2</sup>	0.053		0.042		0.018		0.215		0.116			0.5596

Fig. 5.1, for example, shows the estimated marginal effect of the dummy associated with being tenants on the individual inflation rate. The picture contains also the 95 per cent confidence interval. Consistently with the results presented in tab.1, it is clear that its impact is generally positive, although changing significantly in the various sub-periods: high price levels are associated with renting a house particularly during the 1990s, but also in the last few years the relative position of tenants seems worsening.

Fig. 5.1 Marginal effect on the individual inflation rate of the dummy variable "tenant"

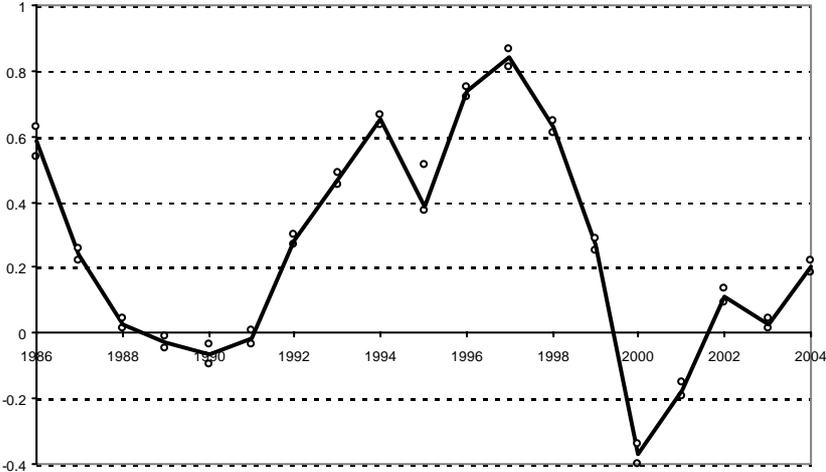
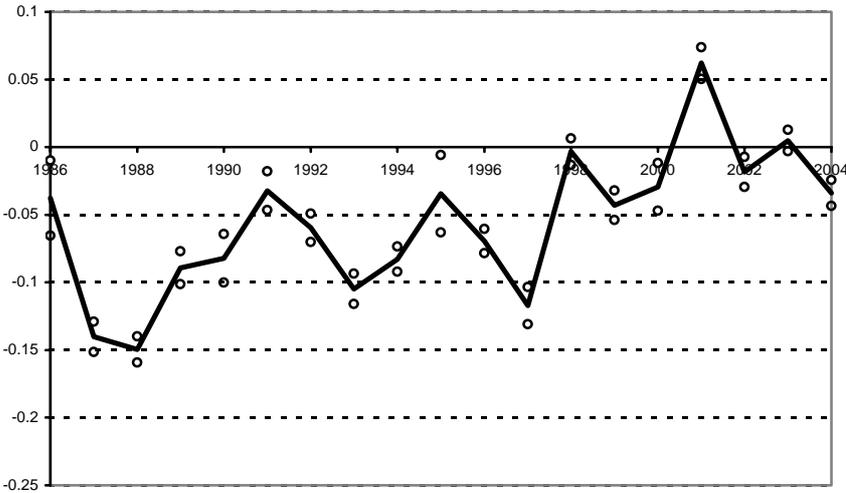


Fig. 5.2 Marginal effect on the individual inflation rate of the number of adults in the household



During the first part of the period, individual inflation was negatively correlated with the number of adults living in the family (fig. 5.2), although in the last few years this variable is generally not very significant. The same pattern is shown by the number of children (all persons aged less than 18), which had mainly a negative effect during the 1990s, but loses significance in the last few years (fig. 5.3).

Fig. 5.3 Marginal effect on the individual inflation rate of the number of children in the household

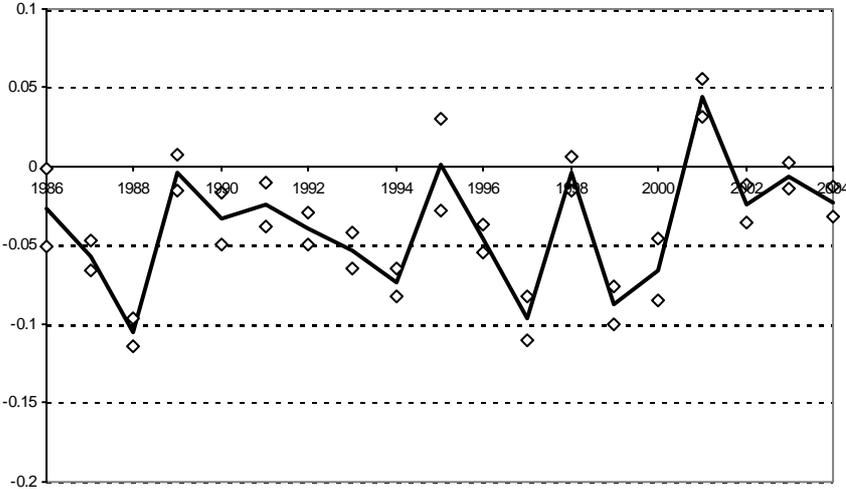
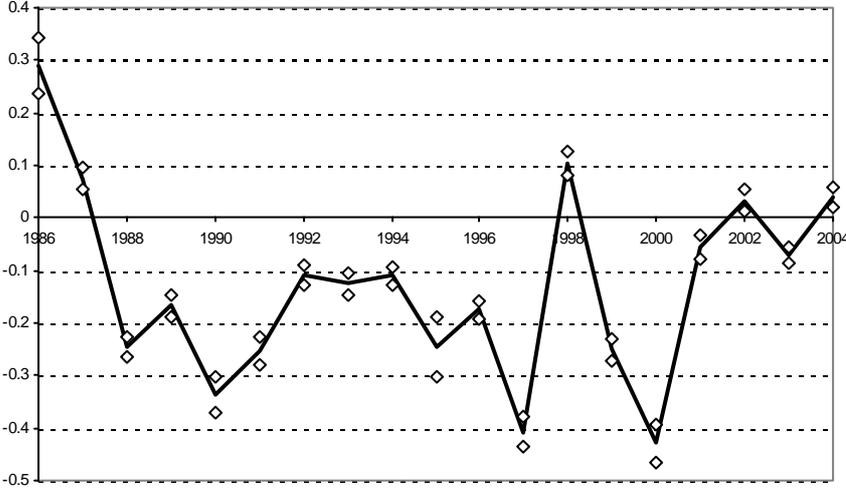


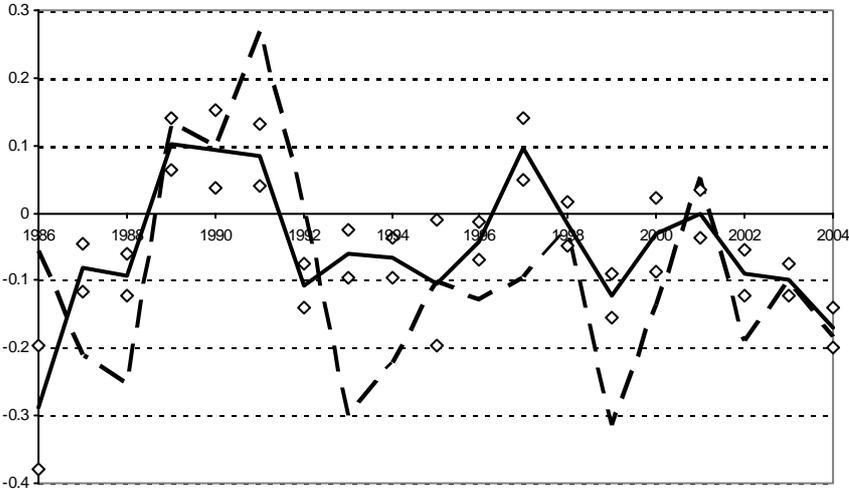
Fig. 5.4 Marginal effect on the individual inflation rate of living in the South



With the exception of the first and last parts of the period, inflation has generally been significantly lower for the southern part of Italy<sup>7</sup> (fig. 5.4). Since the South is by far the poorest area of Italy, this result confirms that during the whole period inflation has generally been lower for the poor. In the first years of the new century, however, the estimates for this marginal effect are quite close to zero.

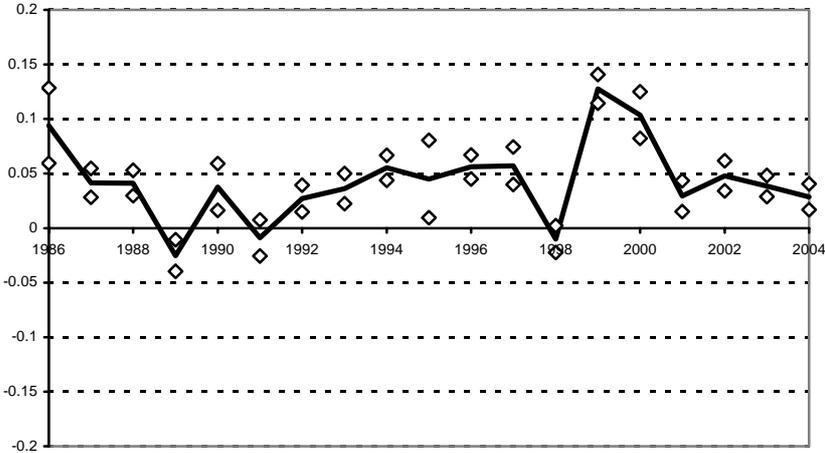
<sup>7</sup> The reference household lives in the North-western part of Italy.

Fig. 5.5 - Marginal effect (continuous line) of the variable “head older than 69” and difference between the average inflation rates for pensioners and non pensioners (dotted line)



Since 1992, pensions are no more indexed to the average increase in nominal wages, but only to the consumer price index. If pensioners experience an inflation rate significantly higher than the general CPI, then they risk a systematic fall not only in their relative well-being with respect to non pensioner households, but also in their absolute living standards. The continuous line in fig. 5.5 is the marginal effect of the presence in the household of a head older than 69 years. In most of the years the coefficient is less than or not significantly different from zero, suggesting that older households should not have experienced inflation rates higher than the rest of the population. The same graph contains another line, that supports this conclusion. The dotted line represents the difference between the inflation rate of all pensioner households (including also those headed by a person younger than 69) and the average price index for all non-pensioner households. The two lines are clearly correlated, and show that, especially from 1992 onwards, the elderly did not experience an inflation rate greater than that for other households. It therefore seems that the elderly on average did not lose over the period in terms of absolute living standards.

Fig. 5.6 Marginal effect on the individual inflation rate of the number of employed persons



Finally, fig. 5.6 shows that the more employed person are present in the household, the higher has in general been the individual inflation rate; this result confirms a greater incidence of inflation on richer household types. To sum up, it seems that the households that faced the higher inflation rates have been those of tenants, living in the North, with many employed members, and with non pensioner heads. Conversely, price increases have been lower for big households, living in the South, and for pensioners, i.e. for demographic characteristics that usually correspond to middle-low levels of wellbeing.

Going beyond the differences in average levels, which are the goods and services that drive the level of individual inflation for the various deciles of the expenditure distribution? As is well known, households with different levels of total expenditure tend to allocate their budgets in very distinct ways, as the right part of table 2 confirms, showing the average budget share of selected deciles of non-durable equivalent expenditure in the first and last available year of our data, between 13 categories of goods and services, built with an aggregation of the original 71 items. The aggregation is done to simplify and make clearer the analysis. During these 19 years, the increase in the general living standards is confirmed by the drastic fall in the food share for all households, although in 2003 still great differences persist between the extreme deciles of the distribution. The other items that have seen a decline in their overall importance in household budget shares are tobacco, beverages and clothing, while in general the budget shares of health, transport, education and housing expenditures have shown an upper trend.

The left part of table 2 reports the correlation coefficients among the differences between average inflation rates of households belonging to selected deciles and the overall average inflation, and the price indexes of these 13 categories of goods and services. These correlations have been computed on a pseudo-panel of nearly 9,000 cell averages for the whole period, on the basis of the deciles of equivalent expenditure, of 9 categories for the profession of the household head, and of 7 age classes<sup>8</sup>. The stars identify the correlation coefficients significantly different from zero at the 5% level. The average inflation rate for the poorest 10% of the population depends mainly on the evolution of the relative prices of food and transport. A lower but still significant influence comes from the prices of fuel and electricity, and housing. Luxury goods like recreation, education or other goods and services have either a negative or a null effect. For the tenth decile, as expected, the pattern is reversed, with food and fuel playing no role at all, and its average inflation driven by the price levels of luxury goods like health, recreation, education and other goods and services. In the median section of the distribution, here represented by the fifth decile, food has not a significant impact, while the most important categories are transport and fuel. On the basis of these correlations, therefore, it is possible to perform simple predictions of the effects of yearly inflation on the living standards of different sections of the distribution of well-being: while it is fairly obvious that an increase in the price of food or fuel will hurt more the poor, it is less trivial that an increase in the price of tobacco or health will hurt more the rich.

The last column of the table presents the cumulative price increase for each of the 13 categories from 1986 to 2004, where yearly price indexes have been obtained as simple averages over all sample households. Relative prices changed enormously over these 19

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<sup>8</sup> In other words, the coefficients measure the correlation between  $(p_{ht}-p_t)$  and  $p_{it}$ , where  $p_{ht}$  is the average inflation rate of the h-th cell defined on the basis of four variables (year, decile, age, occupation),  $p_t$  is the overall average inflation rate of year t, and  $p_{it}$  is the inflation level of the i-th category in year t.

years: particularly relevant are the increases in the price of tobacco, due to repeated changes in indirect taxes, education and clothing. On the other hand, prices of health, furniture, fuel, food and especially communication show relative falls. This column therefore can explain why in general the richest decile paid a greater inflation than the poorest one: some of the goods that occupy a significant share in its budget are characterised by strong increases in their relative prices, while the prices of some of the items heavily consumed by the poor, in particular food and fuel, did not increase so much<sup>9</sup>.

*Tab. 2 The determinants of individual inflation for different deciles, 1986-2004*

Decile	Correlation coefficients between the excess of the inflation rate over the overall average, and the price level of each category			Budget shares for selected deciles						Cumulative price increase 1986-2004
	1	5	10	Decile 1		Decile 5		Decile 10		
				1985	2003	1985	2003	1985	2003	
Food	0.1306*	0.0073	-0.059	0.537	0.379	0.361	0.268	0.177	0.153	+95%
Beverages	0.0694*	0.0108	-0.035	0.031	0.027	0.033	0.027	0.022	0.020	+133%
Tobacco	-0.1084*	-0.019	0.1005*	0.015	0.012	0.022	0.013	0.012	0.007	+182%
Clothing	-0.1060*	-0.039	0.1086*	0.041	0.034	0.079	0.066	0.122	0.094	+138%
Housing	0.1253*	0.1632*	-0.022	0.100	0.125	0.071	0.087	0.051	0.099	+132%
Fuel and electricity	0.2081*	0.2264*	-0.0955*	0.098	0.106	0.069	0.077	0.074	0.044	+67%
furniture	-0.0790*	-0.044	0.1571*	0.049	0.057	0.061	0.068	0.083	0.092	+85%
Health	-0.1374*	0.0164	0.2326*	0.013	0.041	0.016	0.046	0.027	0.064	+66%
Transport	0.4030*	0.2401*	-0.1348*	0.041	0.096	0.114	0.151	0.130	0.134	+123%
Communication	0.049	-0.021	-0.016	0.005	0.041	0.013	0.031	0.013	0.020	+18%
Recreation	-0.1090*	-0.031	0.1518*	0.020	0.028	0.049	0.052	0.084	0.070	+115%
Education	-0.1144*	-0.021	0.1461*	0.001	0.003	0.003	0.009	0.006	0.019	+142%
Other goods and services	0.0333	0.0431	0.3811*	0.050	0.050	0.110	0.106	0.198	0.184	+124%

#### 4. The last years: the euro and the evolution of real incomes

The more recent years have seen a revival of interest towards inflation just when its average levels, according to official statistics, are much lower than the typical values that characterised the recent decades. First of all, this section considers which deciles of equivalent expenditure have faced the higher inflation rates after the changeover. Table 3 presents the average inflation rates for the deciles of equivalent non durable expenditure, in the three available years after the introduction of the euro. In 2002 inflation was, as already shown in Fig. 3, higher for the richest decile by almost half a point with respect to the first decile, while

<sup>9</sup> In order to define more precisely the nature of the goods, the Appendix at the end of the paper shows the evolution of the cumulative price indexes for these 13 categories from 1986 to 2004, and the values of their expenditure elasticities.

in 2003 this difference disappears; finally, in 2004 inflation is still higher for the richer section of the distribution.

*Tab. 3 Average inflation rate for the deciles of non durable equivalent expenditure after the introduction of the euro*

Deciles of equivalent non durable expenditure	2002	2003	2004
1	0.0204	0.0269	0.0180
2	0.0206	0.0271	0.0191
3	0.0213	0.0273	0.0200
4	0.0212	0.0270	0.0201
5	0.0219	0.0271	0.0205
6	0.0222	0.0270	0.0205
7	0.0229	0.0269	0.0208
8	0.0232	0.0270	0.0208
9	0.0243	0.0270	0.0210
10	0.0257	0.0273	0.0219
Total	0.0224	0.0271	0.0202

Inflation, therefore, does not seem to have recently affected with particular intensity the poorest households. All indicators (see Boeri and Brandolini, 2005), however, report that Italian households perceive a worsening in their economic conditions and feel more insecure about the future. Many attribute the responsibility for this crisis to the introduction of the euro, arguing that the changeover coincided with an inflationary shock not reported by official statistics. The subjective evaluation of inflation measured by consumer surveys and the official inflation rate moved together until 2002, but since then the two curves drastically diverged, with that of perceived inflation rising steeply. This divergence has happened not just in Italy, but in most EU countries. This paper does not want to enter into the debate on the reliability of the official inflation rate, but takes for granted that the price indexes provided by Istat are basically reliable. There are many possible explanations for the rise of a difference between perceived and actual inflation, reviewed for example by Del Giovane and Sabbatini (2004). The analysis of the distribution of inflation rates across different households may suggest another possible reason for the distance between official and perceived inflation. In brief, many households perceived a very high inflation rate not only because many of the items whose prices rose more are typically purchased with great frequency, but also because these items also represent a very great share of the total expenditure for many, and very different, households. Tab. 4 shows, for the two years immediately following the changeover (2002 and 2003), how the prices of 13 categories of goods and services changed, and how these categories contributed to the average price changes experienced by the extreme deciles of the expenditure distribution<sup>10</sup>.

<sup>10</sup> The decomposition of total inflation into the percentage contributions from 13 categories corresponds to equation (1) in the text.

*Tab. 4 The contribution of various items to total inflation in 2002 and 2003*

	Price change for all households	Percentage contribution to average price change		
		All households	Decile 1	Decile 10
Food	6.4%	33%	<b>52%</b>	18%
Beverages	5.3%	3%	3%	2%
Tabacco	10.4%	2%	3%	1%
Clothing	4.0%	8%	4%	10%
Housing	3.5%	9%	12%	8%
Fuel and electricity	1.1%	2%	3%	1%
Furniture	4.1%	6%	5%	8%
Health	-0.7%	0%	-2%	4%
Transport	5.0%	14%	12%	11%
Communication	-3.1%	-2%	-3%	-1%
Recreation	4.5%	5%	3%	6%
Education	5.8%	1%	0%	2%
Other goods and services	6.9%	17%	7%	<b>29%</b>
Total	4.95%	100	100	100
Inflation rate		4.95%	4.75%	5.31%

For all households, for example, three categories explain almost 2/3 of total inflation during 2002 and 2003: food, transport and other goods and services. Even if the extreme deciles have experienced not very different average price changes, there are strong differences in the items that, for the various deciles, determined such overall inflation rates: the price change for the poorest decile has been determined mainly (more than half of total inflation) by the increase in the price of food items, while for the richest 10% of the population the biggest contribution comes from other goods and services, with a much smaller role played by food. Food and other goods and services are two of the categories with the greatest price increase in the first two years after the introduction of the euro, as the first column of tab. 4 indicates. Food represents for example 38% of total expenditure for the first decile, but its specific price index higher than the overall mean implies that food explains more than half of total inflation for the first decile. The same happens for the tenth decile in the case of other goods and services: the budget share of this item is 18%, but it explains nearly one third of total inflation. Both food and other goods and services comprise non durables. If the various deciles form their perception of overall inflation by observing the prices of the items that represent a greater share of their respective budgets, both the poor and the rich may conclude that prices have increased substantially.

The perception of a high level of inflation may also depend on the rate of growth of nominal incomes: if personal income grows slowly, then even small price increases may determine a significant reduction in real living standards. Unfortunately, the Istat Household budget survey does not contain reliable data on disposable incomes, so we cannot compare the evolution of individual nominal incomes and prices from the same survey. An alternative, even if far from ideal, is to try an imputation in the Istat survey of disposable income from the Bank of Italy survey of household incomes, which represents at the moment the best available source of information on the incomes of Italian households. The two most recent available

Bank of Italy surveys cover the years 2000 and 2002. With a simple regression of the logarithm of household disposable income on a set of covariates common to the Istat and Bank of Italy surveys, it is possible to impute to each Istat household a value for total disposable income both in 2000 and in 2002<sup>11</sup>. Since the Bank of Italy survey for 2004 is still not available, the projection of income to 2004 is for the moment done by simply multiplying total disposable incomes by a set of coefficients representing the average rates of increase of the incomes of the household heads. If the head is a pensioner, for example, the value of disposable income that has been imputed for 2002 is multiplied by the coefficient that the current legislation specifies for updating nominal pensions; if the head is a dependent worker, household disposable income is multiplied by the average rate of change for incomes of the same kind, and so on. At the end of this imputation procedure, in a single microdata set there are data on both the individual inflation rate and on the evolution of disposable incomes over a period of four years.

Tab. 5 shows the results of this imputation, and provides, for households defined on the basis of the profession of the head, the average increase from 2000 to 2004 in nominal disposable incomes, the average of the individual inflation rate over the period, and the share of households that faced an individual price index greater than the change in nominal income. On the whole population, about one third of all households suffered a reduction in their real disposable incomes. Among blue collar workers and pensioners more than 40% of households did suffer such a decline. For manual workers, this decline is not due to particularly high inflation rates, but above all by a very low estimated coefficient for the dummy “manual worker” in the regression for 2002. The reverse is true in the case of managers and independent workers in general. This estimation results are consistent with an increase in inequality in the last few years, in particular due to a relative worsening in the relative position of manual workers and pensioners, as evidenced also by Brandolini and Boeri (2005).

If one wants to explain why so many people feel worse off in recent years, it is therefore not necessary to suspect that the official inflation rates computed by the national statistical institute are wrong and underestimate true inflation. A simple comparison between changes in nominal incomes and the individual inflation rates shows that for a significant share of Italian household real incomes have recently fallen.

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<sup>11</sup> An OLS regression on disposable income is typically able to explain no more than 60% of its total variability. In the first regression, relative to 2000, an error normally distributed has been generated so as to reproduce the in the distribution of imputed disposable income the same mean and variance of the original distribution. In 2002, in order not to attribute purely randomly the variability of the dependent variable non explained by the covariates, only the estimated coefficients are applied, while the individual error term used is the same as that extracted for the 2000 imputation. This choice increases the correlation between the imputed incomes for the same household over time.

*Tab. 5 Comparison between changes in nominal incomes and individual inflation rates for different household types, 2000-2004*

Profession of the head	Rate of change in nominal income	Average inflation rate	% of households with a fall in real disposable income
Manual worker	10.41%	10.58%	48.06%
White collar	14.78%	10.79%	22.08%
Manager	21.47%	10.76%	5.17%
Entrepreneur	12.29%	10.55%	35.18%
Professional	14.27%	10.73%	26.03%
Self employed	18.48%	10.69%	10.82%
Unemployed	17.43%	10.67%	11.96%
Pensioner	10.48%	10.28%	43.80%
Houseworker	16.17%	10.26%	11.14%
Other	12.53%	10.46%	34.98%
<i>Total</i>	<i>13.09%</i>	<i>10.50%</i>	<i>32.70%</i>

## 5. Conclusions

The main result of this analysis is that, during the last two decades, inflation in Italy has been slightly higher for the richest half of the population, since relative prices of the goods and services typically consumed by the more well off have risen. The only important exception to this basic trend comes from households living in rented homes, that during the 1990s experienced inflation rates nearly 1% above those typically faced by other households.

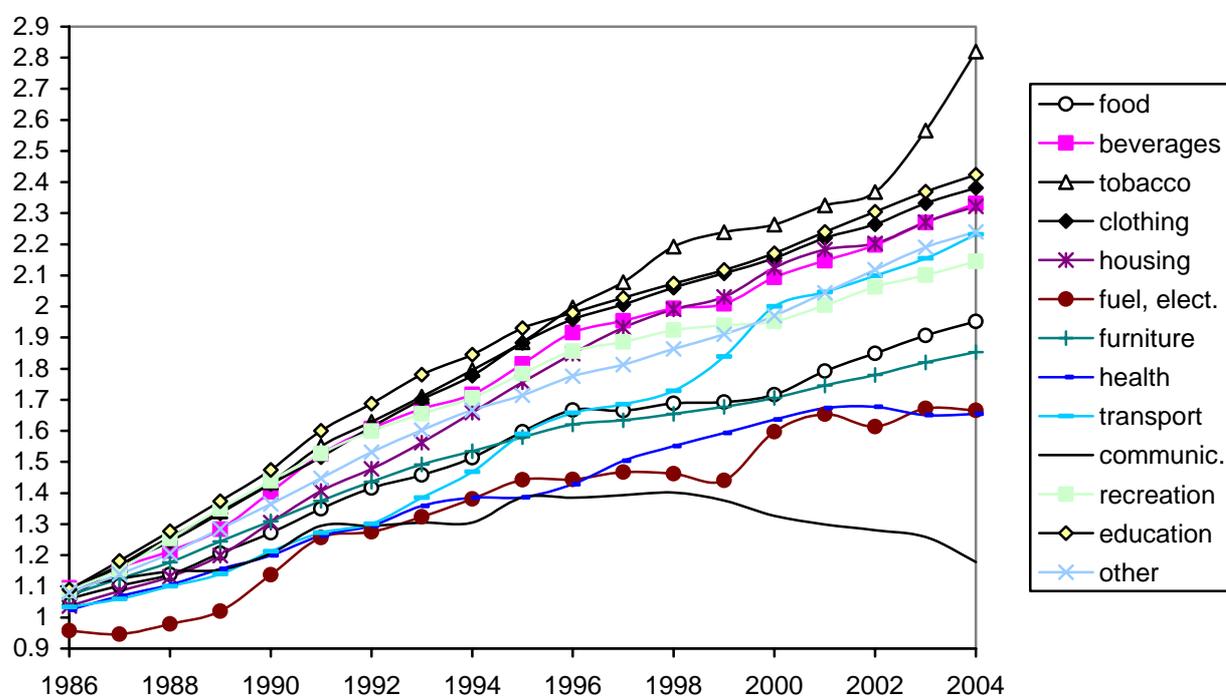
Apart from this basic trend, that depends on the general long-run improvement in the living standards, individual price changes show a marked variability both from one year to the other, because relative prices may change significantly also in the short run, and also among similar households, as the typically low R-squared in the regressions of the determinants of inflation demonstrate. Movements in the prices of food, domestic fuel, electricity and transport (i.e. gasoline) have pronounced effects on the poor, while the individual prices faced by the rich are more influenced by what happens to the prices of education and recreational goods and services. This basic pattern seems to be typical also of the last few years, including 2002, the year of the adoption of the euro. However small, the differences in individual inflation rates may help to explain why Italian households in recent years feel that their economic conditions are worsening: given the very weak increases in nominal incomes, individual inflation rates only slightly higher than the overall mean may produce real welfare losses.

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## Appendix

Cumulative price change for 13 categories of goods and services, 1986-2004 (1985=1)



Expenditure elasticities for 13 categories of goods and services computed on the 2002 Istat household budget survey

Category	Decile 1	Decile 10	Whole sample
Food	0.75	0.37	0.63
Beverages	1.05	0.49	0.83
Tabacco	1.03	0.12	0.70
Clothing	1.96	1.00	1.24
Housing	1.18	1.18	1.20
Fuel and electricity	0.56	0.24	0.47
Furniture	1.44	1.54	1.52
Health	1.72	1.15	1.38
Transport	0.71	1.35	1.08
Communication	0.54	0.44	0.50
Recreation	1.91	0.96	1.19
Education	3.65	1.46	1.65
Other goods and services	2.00	1.11	1.31

These elasticities have been computed on the basis of the expression  $\varepsilon_i = 1 + \frac{1}{w_i}(\beta_i + 2\gamma_i \ln c)$ , where  $i$  is the index of the category,  $w_i$  is the average budget share for each decile,  $\ln c$  is the average of the log of total expenditure for each decile, and the parameters come from the OLS regression  $w_i = \alpha_i + \beta_i \ln c + \gamma_i \ln(\ln c)^2 + controls + u_i$