THE INTRODUCTION OF THE EURO AND THE DIVERGENCE BETWEEN OFFICIALLY MEASURED AND PERCEIVED INFLATION: THE CASE OF ITALY

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Abstract

Following the introduction of euro banknotes and coins many euro-area residents perceived a much sharper increase in the price level than the moderate rise registered by the national institutes of statistics. In the case of Italy, the paper shows that the apparent contradiction between the public's perceptions and officially measured inflation may stem from the fact that the former often refer to phenomena not captured by the inflation rate calculated for the average basket of goods and services for the whole population. The rise in perceived inflation can be largely explained by the stronger influence that large, upward, and frequently observed price movements exert on consumers' perceptions, together with the actual behaviour of prices in the period following the cash changeover, which saw many price changes, with larger increases for the more frequently purchased products and exceptional rises for some items. The reciprocal influence between inflation perceptions and the media's unusually extensive coverage of price developments on the occasion of the cash changeover also appears to have been important. Lastly, the perception of a substantial loss of purchasing power, especially on the part of the least-well-off households, can be traced to economic phenomena that do not bear directly on official inflation but which it is hard for households to consider separately, such as increases in the price of housing, not included in the official index, and the evolution of incomes.

Contents

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1. Introduction

From the beginning of 2002, coinciding with the introduction of euro banknotes and coins (cash changeover; henceforth "changeover" for short), the populations of most euro-area countries perceived a much larger rise in the price level than that registered by official statistics. The gap between "perceived" inflation and officially measured inflation reached unprecedented width before narrowing or closing in some countries in the subsequent months; in Italy it remained particularly large and persistent and only began to diminish in the first half of 2004. The perceived surge in prices was popularly associated with the introduction of the euro, even though the official estimates of the national statistical institutes and central banks indicated that the impact of the changeover on consumer prices had generally been modest.[1]

In the lively debate that ensued among experts, consumer organizations and members of the public under the spotlight of the media, the credibility of the official data on prices was sharply called into question. On the basis of their everyday experience, households estimated much higher inflation rates than the official figures. In the case of Italy there was even a strong belief that the prices of goods and services had been converted into euros at a rate of 1,000 lire to the euro,[2] which would have implied a price hike of around 100 per cent for these products. Adding to the uncertainty about prices was the publication by private research centres of alternative estimates of inflation that were much higher than those produced by the Italian National Institute of Statistics (Istat) and tended to validate and indeed reinforce individuals' impressions.

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[1] The issue received abundant attention in the international press in 2002. To cite just three articles among many, see "Euro launch blamed for price rises", "Eurozone consumers feel cheated" and "Consumer anger over 'inflationary' euro" in the *Financial Times* of 23 January, 1 March and 1 June, respectively.

[2] Rather than at the official rate of 1,936.27 lire per euro.

The gap between perceived inflation and officially measured inflation is an important phenomenon in several respects: it impairs firms' and consumers' ability to judge individual prices and thus reduces the allocative efficiency of the price system; by influencing expectations about the future trend of prices, it can distort decisions on prices and wages; the credibility of monetary policy can suffer if the quality of the price indices on which it is based is called into question; and, in the case of the euro area, the public's acceptance of the common currency and its institutional framework can be eroded.

Against the background of a debate in which knowledge of the variables in question has often been limited and consumers are ranged against the statistical institutes, this paper begins by defining the subject of inquiry and then seeks to understand whether the observations derived from personal experience are truly irreconcilable with the official statistics. To this end, we systematically review the different arguments put forward to explain the marked worsening of inflation perceptions, starting out from the hypothesis that it was the product of a combination of factors. With reference to Italy, we explore the possibility that an important role was played by the interaction between the way in which individual perceptions are formed (for example, the greater weight attributed to price increases with respect to decreases) and actual price developments during and after the changeover (for example, the higher increases recorded for frequently purchased products). We also investigate the phenomenon's collective dimension by considering the role that may have been played by the media.

The paper is organized as follows. Section 2 describes the indicator commonly used to measure inflation perceptions. Section 3 describes the methods and procedures of price collection used by Istat in calculating the official index, examines whether there are grounds for doubting their correctness and highlights some factors that might be of some importance for explaining the difference with respect to perceptions. On the hypothesis that this gap derives from a multiplicity of causes, Section 4 analyzes and assesses the other possible explanations, including interaction between the psychological mechanisms governing individuals' perception of prices and the developments of prices and other economic variables during and after the changeover. Section 5 provides an overview of the correlations between inflation perceptions and the factors identified. Section 6 summarizes and concludes.

2. Inflation perceptions

Public discussion of the perception of a much sharper increase in prices than that measured by official statistics has generally been based on anecdotal evidence, on personal impressions that very often refer to specific products or classes of goods and services. However, a survey is available that offers information on the perceptions of a representative sample of the entire population and whose questions refer to inflation as a whole. It is part of the monthly consumer surveys conducted in all the countries of the European Union with harmonized criteria. In Italy the survey is carried out by the Institute for Economic Research and Analysis (Isae) on a representative sample of around 2,000 persons, while for the euro area as a whole the respondents number around 20,000. The European Commission aggregates the results of the national surveys and publishes the monthly indicators for the whole European Union and for the euro area.[3]

In the field of prices, the respondents are asked to state their views regarding price developments over the last twelve months and the next twelve months. Specifically, with regard to the past trend of prices, Italian consumers are asked: "How do you thing prices in Italy have developed in the last 12 months?". The possible responses are: "risen a lot" (N1), "risen moderately" (N2), "risen slightly" (N3), "stayed about the same" (N4), "fallen" (N5), and "don't know". A similar question and the same possible answers are proposed in the other EU countries. A composite measure of the opinions expressed by respondents is obtained as the balance between the weighted frequencies of the different possible responses. The extreme responses ("risen a lot", "fallen") are assigned a weight double that of the intermediate responses, while the central response ("stayed about the same") is not counted. The balance statistic (S) is therefore obtained as: $S = N1 + 0.5\ N2 - 0.5\ N4 - N5$, where N_i denotes the relative frequency of the i-th response category.

[3] The data are reported for all the EU countries in the European Commission's monthly press communiqué, "Business and consumer survey results". The data for Italy are discussed in the Isae's monthly press releases on consumer confidence.

Figure 1 traces the inflation rate calculated by the statistical institutes and the balance of perceptions calculated as just described for Italy and for the euro area. It is important to stress that the indicator of perceived inflation is purely qualitative — the respondents are not asked to make a numerical estimate — and can be translated into a quantitative measure only with further assumptions (see below); in interpreting the figure, we can therefore compare the behaviour of the two curves but not their level. It is also necessary to keep in mind the distinction between measures of perceived inflation, such as the one we are now examining, and unofficial, alternative estimates of inflation, which are based on data actually observed and not on individual impressions (see Section 3).

Figure 1 shows that both in Italy and in the euro area the behaviour of inflation measured by the statistical institutes and that of consumers' perceptions were closely correlated between 1991 and 2001, although the latter were more variable especially in Italy. Subsequently, in contrast with broadly stable official inflation, there was an exceptional deterioration in perceptions.[4] In Italy, between the end of 2001 and the beginning of 2003 the percentage of consumers who thought prices had "risen a lot" increased from 10 to 49 per cent; also counting those who felt prices had "risen moderately", the percentage jumped from 48 to 89 per cent.

Figure 2 shows that inflation perceptions increased in 2002 in all the euro-area countries, except Finland.[5] However, in most countries there was a reversal of trend in the course of 2003; the turnaround was clear-cut in some countries (particularly Germany, where by the end of that year the balance was already lower than it had been before the changeover[6]) and less marked in others, where perceptions stabilized at relatively high levels. In Italy and Greece, the deterioration was exceptionally intense and persistent; in Italy the balance remained close to its peak values throughout 2003 and only began to decline in the first half of 2004.

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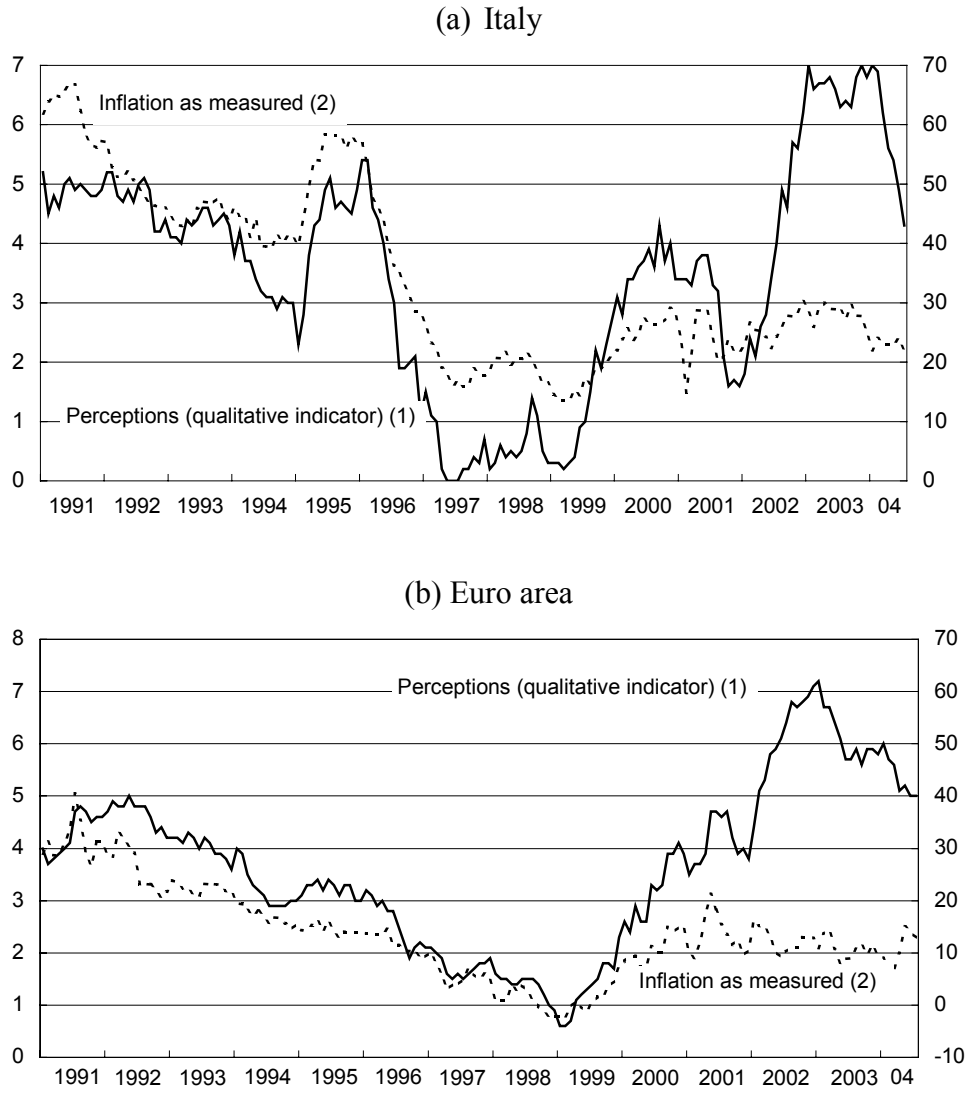
[4] See European Central Bank (2002a, 2002b, 2003b) for a description of the phenomenon for the euro area as a whole.

[5] The curve for Luxembourg is not reported as the figure on inflation perceptions in Luxembourg in December 2001 is not available.

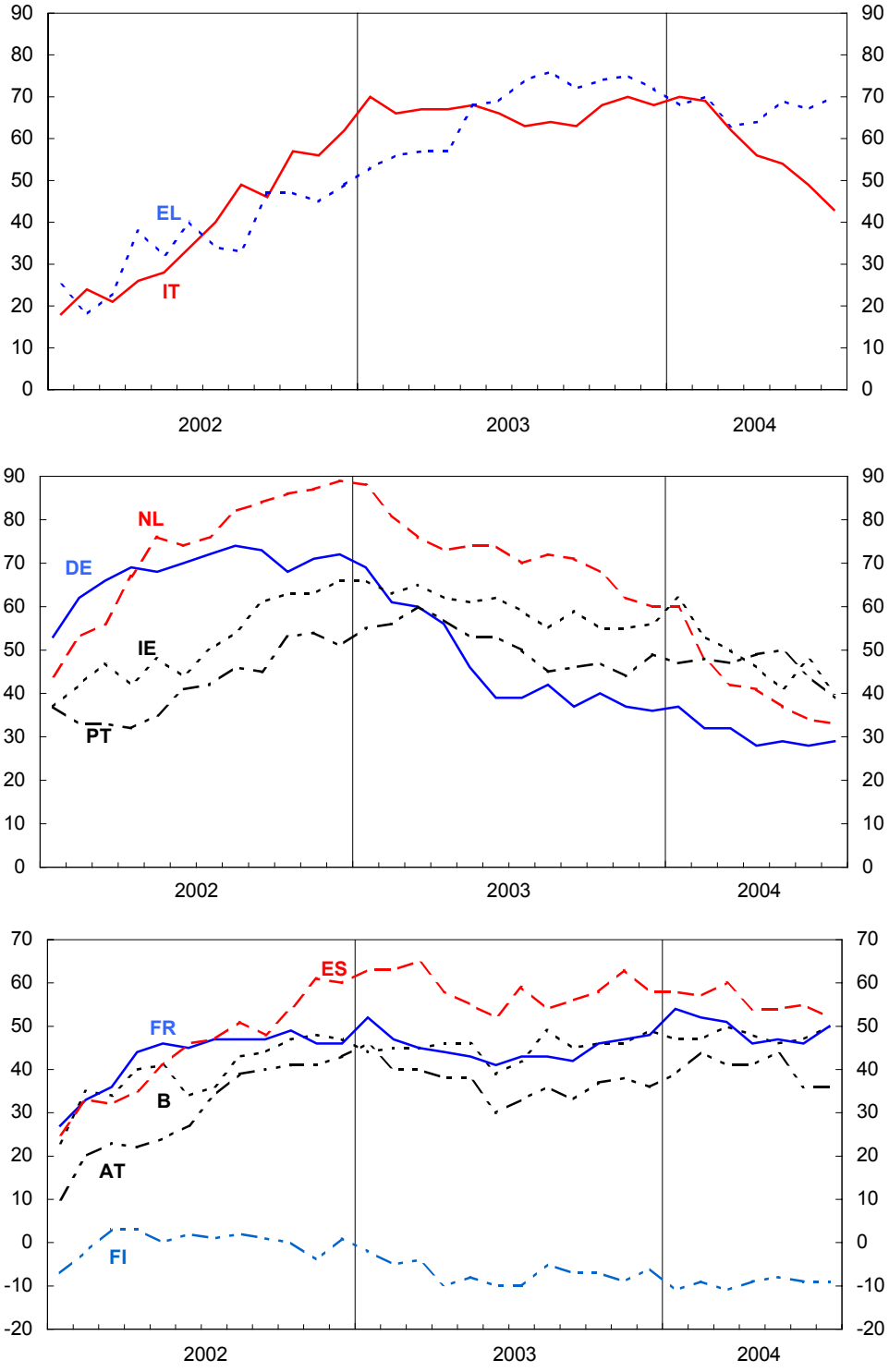
[6] For an analysis of the evolution of prices and perceptions in Germany, see Deutsche Bundesbank (2004).

Figure 1 – Inflation measured by the statistical institutes and inflation perceptions
(twelve-month percentage change in the harmonized consumer price index; percentage balances of responses)



Sources*:* European Commission and Eurostat.
(1) Qualitative indicator obtained as the percentage balance of responses to the monthly consumer survey (right-hand scale). – (2) Twelve-month rate of increase in the harmonized index of consumer prices (left-hand scale).

Figure 2 – Inflation perceptions in the euro-area countries
(percentage balances of responses) (1)



Source: European Commission.
(1) Qualitative indicator obtained as the percentage balance of responses to the monthly consumer survey.

With specific regard to Italy, we can note that:

a) the movements in inflation perceptions in 2001-2003 were in the same direction as those in inflation as measured by Istat;

b) the difference between the development of perceptions in Italy and the trend in the euro area corresponded qualitatively to the steady widening of the differential between Italian inflation and the euro-area average.

Compared with previous episodes, however, the intensity of the variation in perceptions was exceptional in most countries, notably in Italy, and much greater than could have been expected on the basis of the relation observed in the past between inflation perceptions and measurements.

A further point is that the perception of a pronounced acceleration in prices was associated with the population's conviction that the introduction of the euro was its specific cause. Figure 3, based on the European Commission survey *The €uro, two years later*, carried out between October and November 2003, shows a clear positive relation between the change in perceptions in the different euro-area countries and the conviction that the conversion of prices into euros came about to the detriment of consumers (panel (a) of the figure). Italy was the country where this conviction was most widespread (96 per cent of respondents, against 89 per cent for the euro area as a whole). The figure also indicates that higher inflation perceptions tended to be accompanied by greater dissatisfaction with the common currency (panel (b)).[7] Italians and Greeks, who in the past had been strongly in favour of European unification, were the most dissatisfied after the Germans. In Italy, the percentage of those declaring themselves to be quite/very unhappy that the euro had become their currency rose to 44 per cent at the end of 2003, 13 percentage points more than in the

[7] The statistical significance of the relation is diminished by the outlier position of Germany, where the degree of unhappiness about the euro was the highest in the euro area notwithstanding the reduction in inflation perceptions in the course of 2003. It is likely that Germans' dissatisfaction with the euro depended more on the

survey conducted a year earlier. A comparable increase was found only in Greece (14 percentage points), while the average increase for the area was 7 points.

The opinions surveyed, which assigned a major responsibility for the perceived rise in inflation to the introduction of the euro, stand in sharp contrast with the relatively small estimates of the inflationary impact of the changeover by the central banks and statistical institutes. [8]

For Italy, for which we have disaggregated data through the end of 2002, it should also be noted that inflation perceptions differed depending on households' social and economic situation and work status (Figure 4). In particular, perceptions were higher for less well-off and less educated consumers, for housewives and for pensioners than for full-time or part-time workers. These differences, however, were already present in the preceding years and generally lessened during the post-changeover period; in addition, they concerned the level of perceptions and not their dynamics, which were very similar across categories.

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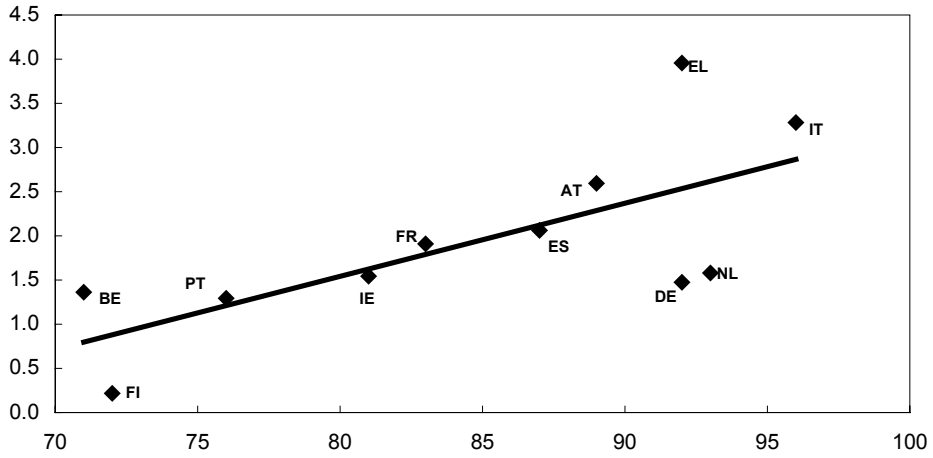
actual performance of other macroeconomic variables, notably economic growth and employment, than on the perceived trend of inflation.

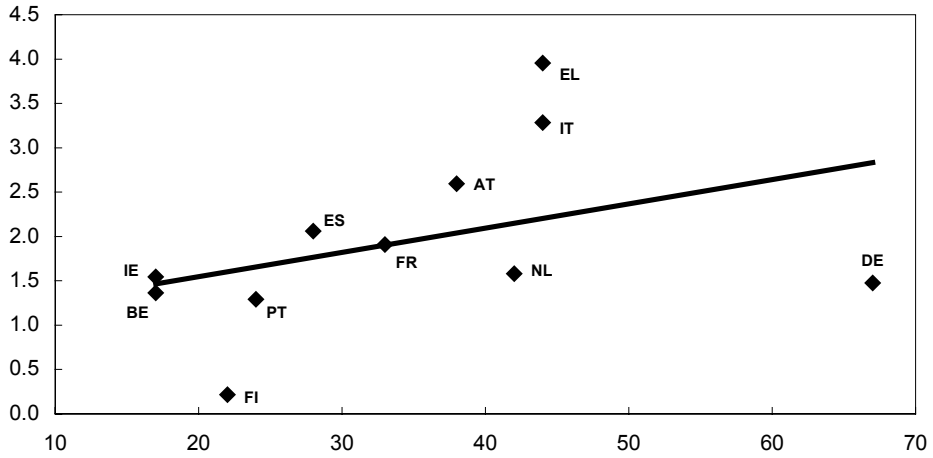
[8] See European Central Bank (2003a) and Mostacci and Sabbatini (2003), respectively, for an analysis of the impact in the euro area and in Italy.

Figure 3 – Inflation perceptions and sentiment about the euro

(a) Relation between change in inflation perceptions and the conviction that the conversion of prices into euros was to the detriment of consumers (1)



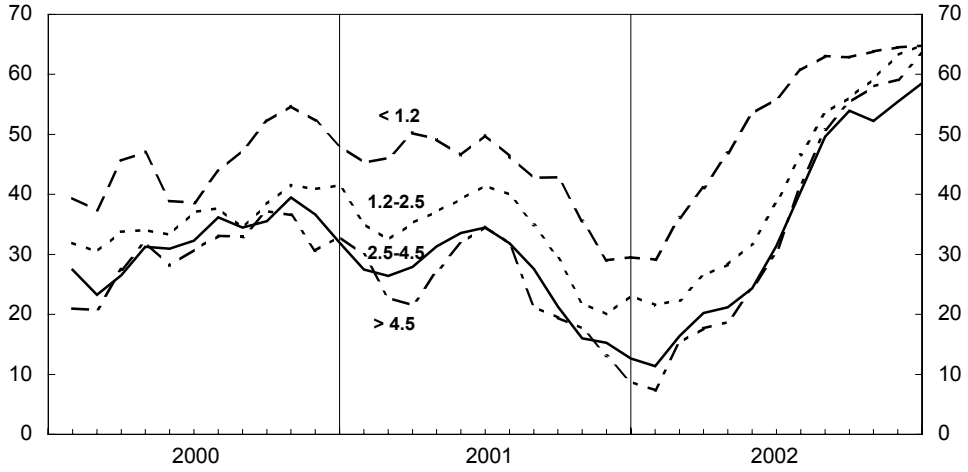
(b) Relation between change in inflation perceptions and unhappiness about the euro (2)



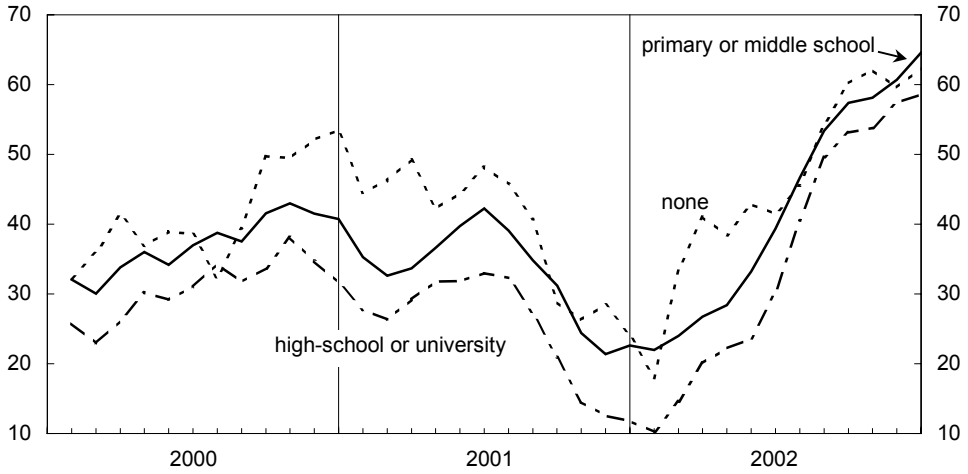
Source: European Commission (2003).
(1) The y-axis plots the change in the qualitative indicator of inflation perceptions (ratio of the average balance in 2002-03 to the figure for December 2001). The x-axis plots the percentage of those who responded "to the detriment of consumers" to the question: "Did you personally notice that in your country, when converted into euros, prices have been: rather in favour of consumers; rather to the detriment of consumers; or one way or another the rises and falls balanced out?" - (2) As in panel (a), the y-axis shows the change in inflation perceptions. The x-axis plots the percentage of those who answered "quite/very unhappy" to the question: "Are you personally: very happy, quite happy, quite unhappy, or very unhappy that the euro has become your currency?".

Figure 4 – Inflation perceptions in Italy by income bracket, educational attainment and work status of the respondents (1)

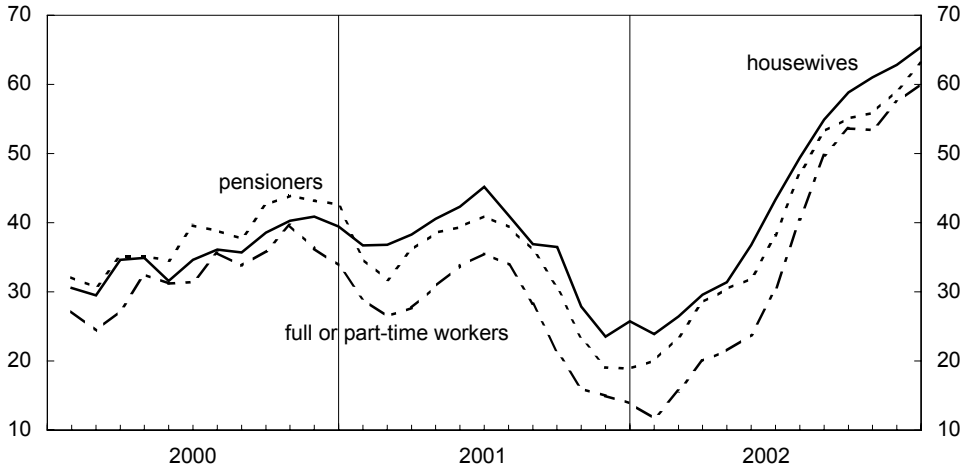
(a) Income (monthly, in thousands of euros)



(b) Educational attainment



(c) Work status



Source*:* Isae.
(1) Balances of responses, moving averages of two terms.

As mentioned earlier, no systematic, rigorous surveys are available that ask respondents to put a number on the inflation rate they perceive. However, it is possible to transform the European Commission's qualitative indicator of perceptions into a quantitative measure that can be compared with the official statistics. This can be done by a number of different methods. Below we present a calculation based on estimating the relation between officially measured inflation and the qualitative measure of inflation perceptions. In practice, official inflation (the twelve-month increase in the general consumer price index, π_t) is regressed on the balance statistics, which captures inflation perceptions referring to the twelve previous months (*balper*). The fitted value of the regression, $\pi_t^P = \hat{\alpha} + \hat{\beta}\, balper_t$, is interpreted as a quantitative measure of perceived inflation. This method is based on the assumption that in the long run perceived inflation is equal to officially measured inflation, i.e. that consumers do not make systematic errors over a sufficiently long span of time.

Figure 5 reports the quantification obtained for Italy by estimating the equation in the period preceding the cash changeover (alternatively, in the years 1992-2001 and 1997-2001) and utilizing the estimated coefficients to convert the balance in the two years following it. The choice of the estimation period has a strong impact on the results: at the end of 2003 the quantification of the perception was equal to 3.5 per cent on the basis of the equation estimated starting from 1997 and around 6 per cent with the estimate from 1992 on.[9] While the first figure is only a little higher than the measures published by Istat, the second approaches some of the alternative estimates formulated by research centres and consumer associations (see Section 3).[10] In view of the quantification's sensitivity to the estimation period, in the rest of this paper we prefer to use the qualitative balance of perceptions without further elaboration.

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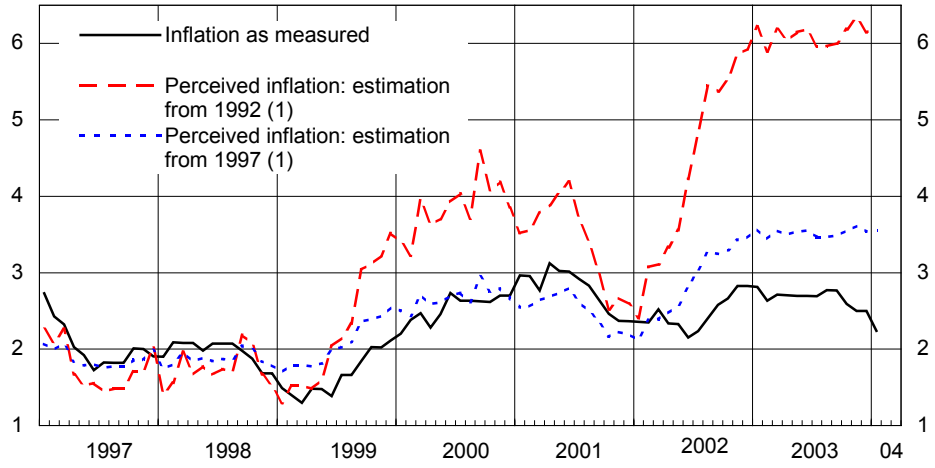
[9] The latter quantification does not differ significantly from that obtained when a dummy variable is included in the estimation from 1992 in order to capture the difference in average inflation between the first and second halves of the 1990s.

[10] Isae (2002) adopts an alternative methodological approach (latent variables) for the quantification of perceptions; the figures obtained are of an order of magnitude comparable to that of inflation as measured by Istat.

Figure 5 – Official inflation and the quantification of perceived inflation in Italy



Sources: Based on Istat and Isae data.
(1) The coefficients were estimated considering December 2001 as the last month of the estimation period and were then used for the quantification of inflation perceptions in the subsequent months.

3. The official index

In the debate on the gap between perceived and officially measured inflation, it has frequently been asserted that the official consumer price indices are calculated in an inappropriate manner and underestimate the inflation actually experienced by households. In Italy this possibility, which has been put forward by a number of consumer associations, would appear to be borne out by some estimates of inflation alternative to Istat's and much higher than it. However, in many cases the methods underlying these estimates are not well-documented, especially as regards the size and definition of the sample, the criteria used in collecting prices and the weights assigned to the single products in the calculation of inflation. The impression is that they are partial estimates in that they refer to a much more limited basket of goods and services and a much smaller sample of sales points than those monitored by the statistical institute. The estimates released by Eurispes, a private research institute, constitute an especially important case owing to the attention they received in the media. In the summer of 2002 the president of Eurispes declared that inflation in Italy was running at a rate of 8-9 per cent, more than triple that calculated by Istat. Subsequently, Eurispes (2003) estimated that food prices had risen by 29 per cent between December 2001 and December 2002, compared with Istat's estimate of 3.8 per cent. In assessing the

Eurispes' estimate one must bear in mind that it was largely derived by imputing the prices of December 2001, the reference month for the calculation of inflation, since they were not available on the basis of previous observations. Apart from the methodological issues bearing on the construction of the sample, the definition of the set of products and the construction of the indices, the fact that Eurispes derived price changes partly on the basis of the respondents' (households and retailers) retrospective evaluations makes this estimate better suited to measuring "perceived" than actual inflation, since actual data (recorded in 2002) are compared with data based partly on individuals' memory.[11]

The rest of this section describes the methods and procedures Istat uses to collect prices and calculate the official index, examines whether there are reasons to doubt their correctness, and highlights some aspects that might be relevant for explaining the difference vis-à-vis inflation perceptions.

Methods. In the course of the 1990s the methods used in the EU countries to calculate the consumer price indices were harmonized in several essential respects, such as: the definition of the index, the selection of the items to include in the basket, the classification, the formulae for aggregating the elementary data, the frequency of rebasing, and the treatment of some specific items (Eurostat, 2001).[12] This effort, still ongoing, was coordinated by Eurostat and involved the national statistical institutes, representatives of the national central banks and leading international experts on price indices. The indicator currently calculated (the so-called harmonized index of consumer prices, HICP) permit a more reliable comparison of price developments across countries but is also commonly used in the analysis of price developments within each country. The behaviour of these indicators

[11] As indicated in Eurispes (2003): "For each of the 150 products examined, the surveyors had to record the prices applied at the time of their visit to the predetermined sales point but, above all […] to reconstruct the prices of the same items in December 2001 on the basis of sure testimony. The prices in 2001 had to be derived from: printed price lists and those still stored on computers, shopping receipts of the previous year, newspaper advertisements and advertising circulars listing products and prices, *discussion groups (composed of customers and sellers) that met in front of stalls in open-air markets or within shops*" (p. 2; emphasis added). "Very often, for both shops and market stalls, *the only way to obtain information on past prices was to involve the customers present at the time and the seller in a discussion*" (p. 8; emphasis added).

[12] The treatment of changes in quality of goods and services is an especially important matter. The debate on the procedures to be followed in calculating the harmonized indices is still open, particularly as regards the use of "hedonic prices" to exclude from the observed variation in prices the component attributable to qualitative changes. Some countries are already applying these methodologies to a broad set of products on an experimental basis.

does not diverge significantly from that of the national indices (for Italy, the consumer price index for the whole population), since the statistical institutes have sought to extend the methods agreed within Eurostat to the calculation of the national indices as well. With the progress in statistical harmonization, the indices calculated by the national statistical institutes, including Istat, have improved markedly in methodological terms and the methods employed today can be said to correspond to the best practices available at international level.

It is worth taking a closer look at two aspects of these methodologies that have been the subject of some debate: (a) the reference population, and (b) substitution effects and the introduction of new products in the basket.

a) The reference population.

In all the EU countries, the products included in the consumer price index basket are selected and weighted according to the *average* consumption of resident households. As a rule, price indices are not calculated for the consumption of specific population segments (pensioners, the unemployed, high- or low-income households, etc.), a complex and costly operation requiring not only the definition of segment-specific baskets of products but also the monitoring of the prices actually paid by the households in each segment. These prices can differ depending on the segment's shopping habits in terms of both distribution channel (for example, poorer households probably make most of their purchases at large-scale distributors, where prices are lower) and type of goods (low-cost, brand-name, etc.). It would therefore be necessary to conduct an ad hoc survey in order to calculate each index for a specific population, and this would entail the recording of far more elementary price quotes than those normally used in calculating the index of consumer prices for the whole population.

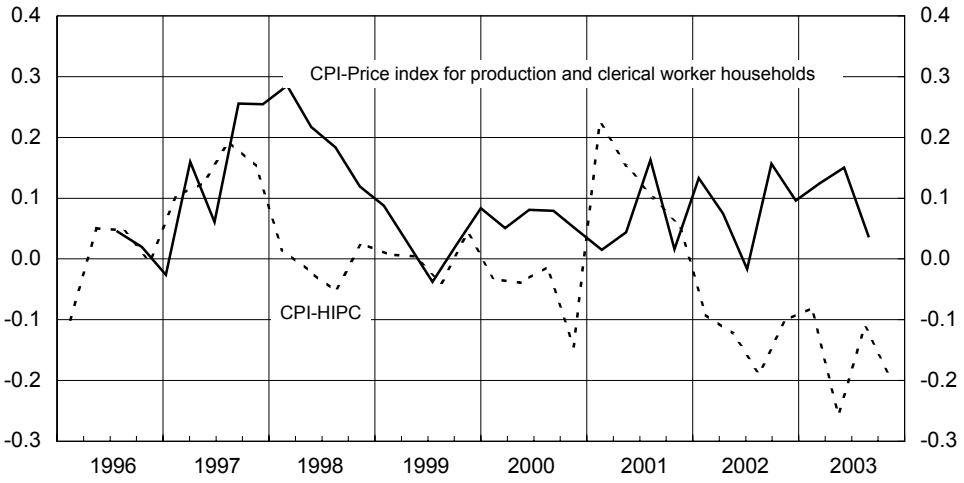
At present three consumer prices indices are calculated in Italy:

- the national index of consumer prices for the whole population (CPI);
- the harmonized index of consumer prices (HICP);

- the index of consumer prices for production and clerical worker households, once improperly known as the "cost of living".[13]

The figure on Italian harmonized inflation is published by both Istat and Eurostat, which also calculates the aggregated HICP for the euro area and for the European Union. The point is important, bearing in mind that the media have sometimes mistakenly portrayed the Eurostat figure on harmonized inflation as a "correction" of Istat's figure on CPI inflation rather than as an alternative piece of information also produced by Istat. In the period 1996-2003 the twelve-month rates of increase of the three indices did not diverge by more than 0.3 percentage points (Figure 6).

Figure 6 – Differences between the inflation rates measured by consumer price indices in Italy
(percentage points) (1)



Source: Based on Istat data.
(1) Differences calculated with respect to twelve-month percentage changes.

[13] The basic difference between the consumer price index for production and clerical worker households, on the one hand, and the CPI and HICP, on the other, is that the latter two refer to the consumption of the whole population. There are some differences between the CPI and the HICP in their treatment of social benefits (particularly health care), temporary price reductions (discounts, special offers, etc.), spending on lotteries, betting and gambling, and life insurance services. The index for production and clerical worker households is calculated using the same price observations as the CPI, although Istat recently declared that it was willing to conduct experiments for the construction of new, specific indices. According to Mostacci, Natale and Pugliese (2004), in Europe indices based on specific weighting structures are calculated in France (wage-earner households) and the United Kingdom (poor pensioners). Indices of this type used to be calculated in Germany and in Austria, where they were dropped in 2000 and at the beginning of 2003, respectively, because of their scant information value. In other EU countries, proposals to create specific indices have been rejected by special commissions.

b) Substitution effects and the introduction of new products in the basket

Price indices are constructed by aggregating the elementary items using weights that are revised periodically. In the interval between basket updates (one year for the indices calculated in Italy), the fixed nature of the weights makes it impossible to take account of the effects of the movements in relative prices on the quantities of products purchased, and particularly of the probable shift towards goods and services whose relative prices are diminishing. Since 1999 the price indices in Italy have been chained indices of the Laspeyres type, with the computation base established in December of each year. On the plausible assumption that prices and quantities demanded move in opposite directions, this leads to an overestimation of actual inflation: if as the price of the *i*-th product increases consumers tend to buy less of that product and more of substitute products whose price has not increased, the price index, in which the weights are fixed, will tend to overestimate the amount spent by consumers and hence the rise in the price level. A similar line of reasoning applies to substitution between sales points.[14]

A second effect derives from the procedure for introducing new goods and services into the basket. Since new products mean a gain in utility for consumer, they ought to be promptly included in the basket. In practice, however, this is done only gradually; immediate inclusion may be impossible due to the infrequency of index rebasing, or inadvisable (some "novelties" are likely to fail and be withdrawn from the market). For these reasons Eurostat recommends than an item be included in the index basket only if it accounts for at least 0.1 per cent of households' total consumption and spending on the item has stabilized. The combination of this lag with the behaviour that ordinarily characterizes the price of a new product — initially high and then tending to decline as a consequence, say, of improved production methods — is a source of a possible overestimation of inflation, not an underestimation; owing to the lag, the phase of initial price reduction is captured only in part, if at all.

[14] The price index is constructed on the basis of prices observed at the same sample of survey units, identified when the index is rebased. Consequently, until the survey plan is revised the index does not take account of possible changes in the type of outlet where consumer prefer to make their purchases.

The impact of the above-mentioned effects is smaller, the shorter the interval between basket updates. If these are yearly, as in Italy, the impact should be relatively small, especially in an environment of low inflation.[15]

In summary, the methods of computing the price indices in Italy and the other EU countries do not have features suggesting that they systematically generate an underestimation of inflation: if anything, the substitution effects and the impact of the introduction of new products in the basket could lead to an overestimation.[16]

Operating procedures. Given the impossibility of acquiring every month the entire universe of prices, the calculation of the index in Italy, as in other countries, is based on the survey of a sample of prices of the goods and services with the largest shares in households' consumption (1043 items in Italy). The responsibility for defining the sample and actually acquiring the data is shared by Istat and the municipal statistical offices.

The survey is carried out centrally by Istat for a little more than one fifth of the goods and services in the basket. This procedure is used for prices that vary little, if at all, from place to place (for example, tobacco products, medical products, postal services, telephone tariffs and newspapers) or require adjustments too complex to be entrusted to the local survey units (as in the case of adjustments to take account of changes in quality of such products as cars, personal computers and cell phones).

For all the other goods and services in the basket, the price survey is conducted locally in 87 provincial capitals and about 39,000 survey points.[17] The municipal statistical offices are responsible for defining the sample, based on Istat's guidelines. To ensure significant monthly comparisons between prices, the sample of products and retail outlets is held constant until the annual revision of the basket. When a new sampling plan is drawn up, the

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[15] This view is supported by a counterfactual exercise we performed on the data for 2002-03: recalculating the consumer price index by attributing the weighting structure for 2001 to those two years, the inflation rate is only marginally higher than shown by the official index calculated by Istat using variable weights.

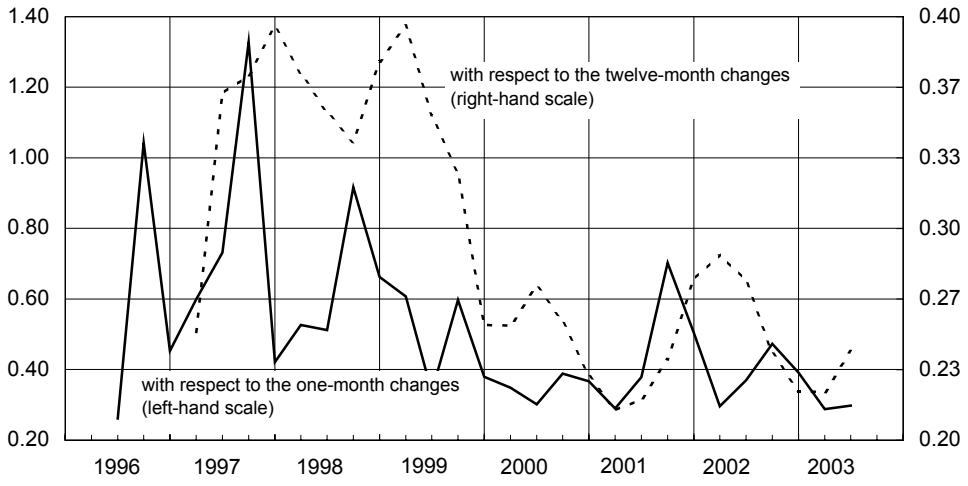
[16] In 1996 a committee established by the United States Senate under the chairmanship of Michael Boskin examined the main sources of distortion in the measurement of consumer price inflation and found that the price indices in the United States had overestimated actual inflation by an average of 1.1 percentage points per year in the period 1987-95. The causes cited included the two effects mentioned in the text, as well as changes in the quality of products.

[17] The price survey is conducted quarterly for rents and some durable goods, twice a month for unprocessed food and monthly for other goods and services.

individual surveyors are entrusted with the particularly tricky task of identifying for each type of product, at the survey points, the best-selling one among those that meet the specifications centrally established by Istat. The duties of the municipal statistical offices therefore touch on the most delicate part of the calculation of a price index, namely the acquisition of the basic data. In carrying out these tasks the offices have considerable leeway, within the general guidelines established by Istat.

We do not have direct evidence on the quality of local price survey, in particular as regards the definition of the list of actual goods and services to be surveyed and the sample of shops. We can only rely on indirect indications provided by a comparison of the price changes recorded in the different cities. The dispersion of the distribution of both the month-on-month and the twelve-month inflation rates, measured by the coefficient of variation, is limited and has diminished in the more recent years (Figure 7), signaling that the differences between cities are not large overall. The absence of extreme and systematic variations suggests that "pathological" situations should be absent.

Figure 7 – Dispersion of inflation rates among the Italian cities included in the survey
(coefficient of variation)



Source: Based on Istat data.

In public debate and in the press it has often been asserted that the Istat index does not capture the exceptional changes in the prices of some products. This argument, usually raised following the recording of particularly sharp price rises for very specific goods or services (for example, a particular vegetable sold in a certain market), neglects to consider,

on the one hand, the *average* nature of price indices and, on the other, specific methodological aspects of the treatment of some items.

The breakdown into 207 product items that Istat makes available on its Internet site every month refers in only some cases to the prices of single goods or services (for instance, potatoes). Most of the 207 items are aggregations of similar goods or services, obtained by weighting the single products in proportion to their shares in consumption. The prices of these products can register divergent movements in the short term (for example, the price of zucchini, which are included in the item "fresh vegetables", can diverge from that of the other components of the same item). As the weight of a single product within an aggregate item tends to be small, its impact on the price changes of the aggregate item and the general index is correspondingly limited. Furthermore, in the case of single products too the price index published is obtained as an average of the prices recorded in places throughout Italy. The averaging between both products and prices works to attenuate the larger changes.

In the case of the items "fresh fruit" and "fresh vegetables", each of which consists of diverse products, the comparison between individual experience and Istat's observations can also be affected by the method of calculation used in computing the price indices. The method is divided into different stages. First, the arithmetic mean of the prices of the two observations made at each sales point in the reference month is calculated for each variety considered.[18] The average monthly price of each variety is obtained by aggregating the mean prices collected at the observation points. Next, these prices are arranged in ascending order and the arithmetic mean of the first 75 per cent of the distribution is calculated; the aim of this operation is to exclude the varieties whose high prices suggest they are likely to be passed by in favour of similar ones (a plausible hypothesis, given the range of alternatives with which substitution can take place). In addition, to attenuate the impact of seasonal fluctuations, the arithmetic mean of the prices so obtained in the reference month and in the twelve preceding months is calculated (a "smoothing" operation). Lastly, the index of the composite items "fresh fruit" and "fresh vegetables" is obtained by comparing the smoothed

[18] For example, within the composite product "fresh vegetables" the prices of the different varieties of the simple product "lettuce".

monthly mean with the level calculated in the same way for the base period (December of the previous year).

In practice, this procedure lessens the impact of supply shocks to the prices of specific varieties. However, this does not tally with the everyday experience of individuals, who observe the extreme prices even if they decide not to buy the most expensive products.

Motor vehicle insurance is another much-discussed item for which the comparison between individual impressions and the official statistics is affected by a specific methodological approach. In Italy, as in the other European countries, spending on motor vehicle insurance premiums is included in the calculation of inflation net of reimbursements and therefore has a modest weight in the average basket (just over 1 per cent)[19]. The rationale for this is that the household sector as a whole pays premiums to insurance companies and receive reimbursements from them for claims. However, from the point of view of an individual consumer who has not had accidents and not received reimbursements, the incidence of this expenditure item is well above the average.

Despite the attenuation of the individual changes due to the effects described above, a careful examination of the Istat data shows that large price movements are not absent, especially when one considers the monthly peaks instead of the annual average. Table 1 shows the ten items of the 207-item breakdown that registered the largest twelve-month percentage increases in 2002 and 2003, regardless of the month in which they occurred, and the ten that registered the largest decreases. In detail, in 2002 there were very large increases for some food products (30 and 20 per cent, respectively, for potatoes and fresh vegetables) and services (between 14 and 22 per cent for air transport, insurance, bathing establishments and maritime transport). Some of these same items also registered significant decreases in other months, confirming their pronounced variability.[20] It should also be noted that the total weight in the index of the ten items with the largest increases was about half that of the ten items with the largest decreases; it follows that the net contribution of these extreme changes

[19] The weight refers to the 2003 basket. It was lower in previous surveys, as shown in Table 1.

[20] These changes were not anomalous with respect to the previous years. In every year between 1998 and 2001 the largest variations (both upward and downward) were of an order of magnitude comparable to that of the two years under review.

to overall inflation was slightly negative both in 2002 and 2003. In Section 4.1 we shall discuss the possibility that increases and decreases may be perceived asymmetrically and that the weight of the individual items in the formation of perceptions may not correspond to their actual weight in the consumption basket.

All told, the available information does not suggest that the indices calculated by Istat systematically mismeasure and underestimate inflation.[21] At the same time, the information does not allow us to rule out the possibility of weaknesses in the data collection procedures, especially with regard to the choice of the retail outlets and the sample of goods and services whose prices are to be collected, for which the municipal statistical office are responsible.[22]

[21] This conclusion is supported by the results presented by Angelini and Lippi (2004), who look at the trends in cash withdrawals at ATMs and the use of the main bank payment instruments. They find no substantial breaks between the period preceding and that following the cash changeover, contrary to what should have been observed (in the presence of flat consumption) if actual inflation had been much higher, as suggested by perceptions, than inflation as measured by the official statistics.

[22] See Buzzigoli, Di Iorio and Mariani (2002) for a detailed examination of the process used to produce Istat's price indices, particularly as regards the gathering of basic data.

Table 1 – Extreme price changes: 207-item breakdown

2002					2003				
Product item	Weight	12-month change		Annual average	**Product item**	Weight	12-month change		Annual average
	%	%	month	%change		%	%	month	%change
Upward					***Upward***				
Potatoes	0.28	30.5	Feb.	10.4	Other lodging services	0.31	32.5	Aug.	15.6
Air transport	0.67	22.1	Aug.	6.1	Postal bank services	0.15	26.7	Jan.	26.7
Fresh vegetables	1.22	19.6	Apr.	13.6	Potatoes	0.25	23.6	Nov.	2.6
Insurance services	0.31	18.7	Mar.	11.6	Inland water transport services	0.00	20.8	June	12.8
Bathing stablishments	0.17	15.9	July	6.6	Italian cigarettes	0.49	15.6	Nov.	12.1
Newspapers	0.28	14.9	July	13.0	Lubrificants	0.11	13.6	Mar.	10.6
Maritime transport services	0.14	13.8	June	8.9	Other fuels	0.28	12.6	Mar.	3.4
Fresh shellfish	0.28	12.6	Aug.	11.0	Banking services	0.64	11.9	Jan.	8.9
Fresh fruit	0.96	11.0	May	8.9	Liquid fuels	0.73	11.7	Mar.	2.9
Amusement parks	0.09	9.2	Sept.	6.0	Fresh shellfish	0.34	11.1	Jan.	5.9
Total	*4.40*				*Total*	*3.29*			
Downward					***Downward***				
Air transport	0.67	-3.9	Dec.	6.1	Other fuels	0.28	-2.0	Oct.	3.4
Potatoes	0.28	-4.4	Nov.	10.4	Audiovisual equipment	0.44	-2.3	Nov.	-1.3
Liquid fuels	0.68	-4.5	Jan.	-0.2	Amusement parks	0.09	-2.7	Sept.	0.3
Electricity	1.22	-5.2	Mar.	-1.5	Petrol	1.97	-2.8	Jan.	1.5
Other meats	0.18	-6.7	Apr.	-2.4	Ski lifts	0.09	-3.5	Dec.	2.5
Gas	1.87	-7.3	Apr.	4.8	Medica products	2.92	-6.5	Mar.	-3.8
Petrol	1.97	-7.5	Jan.	-2.7	Maritime transport services	0.13	-8.1	Sept.	-0.5
Poultry	0.65	-7.5	Mar.	-2.4	Telephones and accessories	0.90	-13.6	Dec.	-3.9
Other fuels	0.28	-9.6	Jan.	-2.7	Potatoes	0.25	-13.7	Apr.	2.6
IT equipment	0.24	-14.7	Jan.	-11.5	IT equipment	0.21	-17.0	May	-14.5
Total	*8.05*				*Total*	*7.28*			

Source: Based on Istat data (2003 basket).

4. At the origins of the gap between official and perceived inflation

In the preceding section we saw that some aspects of the set of methods used for computing the official indices may have helped to create a gap vis-à-vis inflation perceptions, particularly as regards some specific items. However, the aspects we examined are not able to explain the widespread nature and magnitude of the divergence. In this section we look at other possible explanations, to see whether they make it possible to reconcile individual inflation perceptions with the official statistics.

Section 4.1 discusses some factors attributable to *asymmetries* in the way in which individuals' inflation perceptions are formed and in the actual behaviour of prices that might

have become accentuated with or following the changeover[23]. It can be hypothesized that individuals' inflation perceptions are: (a) more sensitive to increases in the prices of more frequently purchased products; (b) more sensitive to price increases than decreases or excessively influenced by the extreme changes; (c) formed or expressed differently depending on the stratum of the population. These hypotheses on the "psychology" of inflation perceptions would imply an increase in perceptions in the presence of the following price developments: (a) larger price rises for more frequently purchased products with respect to those purchased less often; (b) a change in the distribution of price changes, with an increase in the proportion of both upward and downward changes and in the number of extreme changes; (c) a greater diversification of inflation rates specific to the consumption baskets of individuals or specific categories of persons. Moreover, these interactions may have been amplified if there was a link between individuals' expectations concerning the impact of the changeover to the euro and their ex-post perceptions[24]. Researches in experimental psychology (Traut-Mattausch *et al.*, 2004, and Kamleitner, Kirchler and Hoffman, 2004) have found that the more pessimistic had been their expectations, the more individuals tended to overestimate the changeover's inflationary effects. This relation is attributed to a mechanism called "selective output correction", the propensity to check data that confirm one's expectations less accurately than data that disprove them.

In Section 4.2 we investigate the possibility that consumers blamed inflation for losses of purchasing power arising from causes not directly attributable to inflation, such as income developments or the rise in the prices of goods not included in the official index basket. Section 4.3 considers the degree to which the media's exceptional coverage of inflation following the changeover may have amplified individual perceptions. Lastly, Section 4.4 examines whether perceptions may have reflected consumers' propensity to gauge the new prices in euros by mentally converting them into lire at approximately 2,000 lire per euro (as

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[23] Relevant examples of asymmetry in subjective evaluation can be found in Kahneman and Tversky (1979). Their analysis, though concerning a different issue (decision making under uncertainty) provided a number of interesting results for the understanding of the phenomenon considered in this paper. By the same authors, see also Tversky and Kahneman (1974) for an analysis of the heuristics employed in subjective assessments.

[24] The public's worries that marked the eve of the changeover and the first days of 2002 emerge from the accounts of daily newspapers. To cite one article among may, see *The impact of "rounding"*, in Il Sole 24 Ore of 28 December 2001.

against the official locked-in rate of 1,936.27 lire to the euro) or on the basis of an imprecise recollection of the old prices.

4.1 Asymmetries in individual perceptions and in the actual movements of prices

a) Frequency of purchases

After the cash changeover consumers had to learn and memorize a large number of prices redenominated in euros. A learning process of this scale can stretch out considerably and vary in length depending on the product; in particular, it appears plausible that the process is swifter and easier for the prices of goods and services that are purchased more frequently, in some cases as often as several times a day.[25] It can thus be hypothesized that perceptions after the changeover reflected the price movements of frequently purchased prices to a greater degree than in the past and disproportionately with respect to their weight in the basket. However, simply paying more attention to these products is not sufficient in itself to induce a higher perception of inflation than the official rate. An additional condition for this to happen is that the prices of the frequently purchased goods and services rise faster than those of the other products included in the basket.

In order to test whether this conditions was met in the data, we classed the 207 disaggregated items published by Istat for the consumer price index (CPI) into two groups: "goods and services purchased at high frequency", i.e. at least once a month, and "goods and services purchased at medium/low frequency". To the first group we assigned food products, tobacco products, everyday household products (detergents, soaps, etc.), newspapers, some services (municipal transport and railways, postal and banking services, restaurants and

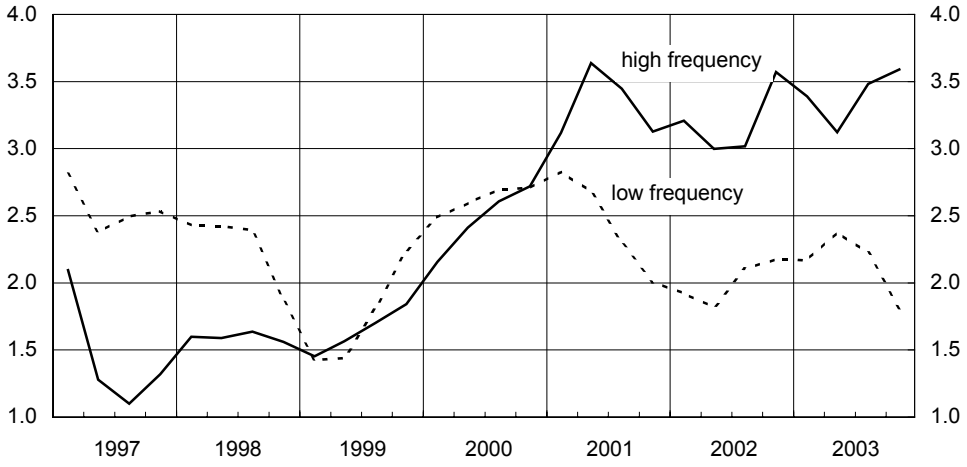
[25] Marques and Dehaene (2004) examine the psychological mechanisms through which individuals' estimates of prices are formed and the possible relation between frequency of purchase and rapidity of the learning process. An experiment presented in the work, conducted on a sample of Austrian and Portuguese citizens, seems to confirm the hypothesis of faster learning for more frequently consumed goods. On the importance of this aspect, see also Guiso (2003) and Mastrobuoni (2004).

coffee shops, recreational and cultural services) and fuels. The items included in this first group represent a total of around 40 per cent of the Istat basket.[26]

The twelve-month changes in the two sub-indices diverged markedly as early as 2001 (Figure 8) and the gap remained wide in the two subsequent years. The prices of frequently purchased products showed a sharp acceleration in the second half of 2003 and again in mid-2003, in contrast with broadly stable or decreasing inflation for the other category of products.

Figure 8 – Inflation rates for goods and services in Italy according to frequency of purchase

(quarterly data; twelve-month percentage changes of the sub-indices)



Sources: Based on Istat data.

These results suggest that the divergence between perceived and officially measured inflation can be partly explained by the concomitant gap between the inflation rate for frequently purchased goods and services, to which it is plausible that consumers attached increasing weight in formulating their opinions on average inflation, and that for less frequently purchased items.[27] Note, however, that the inflation rate for the high-frequency

[26] An alternative approach to a priori selection of the items that might best explain perceptions is to identify them with a correlation analysis. This method has been used for Italy by Isae (2002) and for France by Insee (2003) and Crédit Agricole (2004).

[27] Fabiani, Venditti and Veronese (2003) show that in 2002 the weight consumers implicitly assigned to more frequent purchases did increase sharply and was markedly higher than the component's actual weight in the Istat basket. The relationship between perceptions and price developments for specific categories of goods and services, including those purchased most frequently, has been analyzed by Banco de España (2003) and Álvarez González *et al.* (2004) with regard to Spain, by De Nederlandsche Bank (2002), Walschots (2002) and

products was less than 4 per cent, well below many consumers' personal estimates of general inflation. In this regard, it is possible that consumers' concentration on frequently purchased products was reinforced by their tendency to find confirmation of their pessimistic expectations on the inflationary effect of the changeover (Traut-Mattausch *et al.*, 2004).

b) Distribution of price changes

The official consumer price indices are calculated by weighting the individual items according to their respective shares in total household consumption. However, the individual consumer's perceptions may be more responsive to the upward movement of one price than to the downward movement of another, even if the two changes are simultaneous and of the same order of magnitude, or to an exceptionally large price change for a product whose weight in the index basket is modest than to a small price change for a product whose weight is substantial. This asymmetry of perceptions could grow in periods of heightened public debate and media coverage of inflation; typically, large upward price movements receive more attention than small or downward ones.

At a given inflation rate, perceptions formed in the ways described above are affected by the dispersion of the individual price changes. Suppose, for example, that the number of goods and services for which large upward or downward changes are recorded increased but that these changes cancel each other out. If households assign more weight to increases than to decreases and to large changes than to small ones, at a given inflation rate there would be an increase in perceived inflation.

To test the importance of these effects, we calculated the dispersion of the inflation rates of the individual goods and services included in the CPI, measured as the standard deviation of the cross-section distribution of their percentage changes with respect to the previous quarter, utilizing data at a different level of disaggregation.

First, we considered the 207 product items that compose the CPI, corresponding to the level of disaggregation of the data published on Istat's web site. An advantage of using this

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Buiten (2003) for the Netherlands, and by European Central Bank (2003b) for the euro area as a whole, as well as in the two French studies mentioned in the preceding note.

level of disaggregation is that the series names remain unchanged between one revision of the basket and the next.

Second, we considered the indices for the so-called "representative positions", which have a higher degree of disaggregation and are provided by Istat on request.[28] The list of these items changes when the basket is revised each year, as obsolete products are dropped and new ones enter. The number of items also changes from year to year. It was around 550 in the period we are looking at, and so we shall refer to this set as the "550 items".

Lastly, we used an even higher level of disaggregation, referring directly to the elementary price quotes (for example, one kilogramme of a certain brand of coffee sold in a given shop in a specific city) that are recorded each month by the municipal statistical offices for the calculation of the consumer price index. The available dataset comprises 48 goods and services whose weight corresponds to around 20 per cent of the total basket.[29] Although it is partial and not representative of the composition of the index basket, it allows us to examine price behaviour at the highest level of disaggregation and is therefore valuable in order to ascertain whether broadly stable average inflation in Italy at the beginning of 2002 coexisted with large movements in relative prices that may have been perceived asymmetrically by consumers. In fact, the calculation of the dispersion with more highly aggregated indices (e.g. the 207 items) can mask the impact of extreme movements when these offset each other within an aggregated item.

Table 2 reports the ten items that in 2002 and 2003 registered the largest twelve-month increases, regardless of the month in which they occurred, and the ten that registered the largest decreases. Its structure is the same as in Table 1 but the breakdown referred to is into 550 rather than 207 items. The greater degree of detail makes the amplitude of the changes much more evident. In 2002 they ranged between +54 and -18 per cent, compared with +31 and -15 per cent on the basis of the 207-item disaggregation. Even more clearly than Table 1, Table 2 show that exceptionally large price movements are also present in the official

[28] These can refer to both simple and composite products (e.g. fresh vegetables, medical products, the different models of cars and the diverse tariffs for telephone services or electricity). See the methodological appendix to Istat's press releases on consumer prices.

[29] The price quotes, available from 1996 onwards and recorded in 20 regional capitals, number around 750,000. For a detailed description of the dataset used here, see Veronese *et al.* (2004).

statistics and supports the hypothesis that the contrast between perceptions and official inflation may partly depend on the influence exerted on the perceptions by large price hikes in individual months for specific items, some of which have a very small weight in the basket.[30]

Table 2 – Extreme price changes: 550-item breakdown

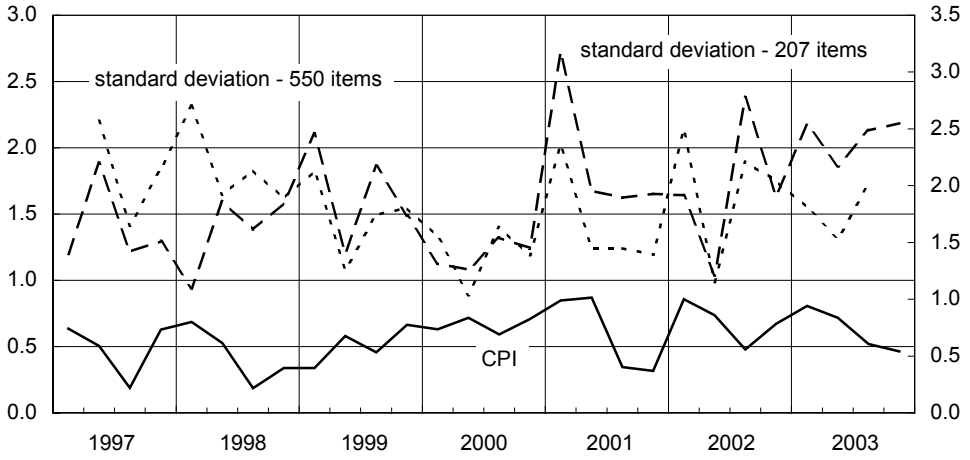
2002					2003				
Item	**Weight** (%)	12-month % change		for the year	**Item**	**Weight** (%)	12-month % change		for the year
Upward					***Upward***				
Intercontinental flights	0.21	54.0	Aug.	9.5	Campsites	0.25	39.2	Aug.	18.3
Sauce tomatoes	0.19	45.9	Nov.	28.1	Celery	0.02	27.1	Oct.	8.0
Clams	0.05	45.5	Aug.	36.7	Clams	0.07	26.7	Jan.	3.2
Potatoes	0.28	30.5	Feb.	10.4	Postal bank services	0.15	26.7	Jan.	26.7
Celery	0.05	20.0	Jan.	7.5	Lagoonal travel	0.00	24.8	June	15.1
Onions	0.14	19.8	Apr.	10.5	Sauce tomatoes	0.09	24.4	June	10.4
Motorcycle insurance	0.03	18.8	Mar.	11.8	Potatoes	0.25	23.6	Nov.	2.6
Automobile insurance	0.28	18.6	Mar.	11.6	Maritime travel	0.04	17.6	Apr.	6.3
Matches	0.03	17.6	Mar.	17.2	Grapefruit	0.00	16.9	Oct.	7.6
Maritime travel	0.04	17.3	Sept.	9.3	Mussels	0.05	16.2	Mar.	10.2
Total	*1.30*				*Total*	*0.93*			
Downward					***Downward***				
Securities custody and safekeeping	0.01	-6.7	Oct.	1.7	Campers	0.03	-5.2	Oct.	0.3
Poultry	0.63	-7.6	Mar.	-2.3	Clams	0.07	-5.8	Dec.	3.2
Car radios	0.06	-8.1	Aug.	-0.1	Medical products	2.92	-6.4	Mar.	-3.8
Cooking gas	0.06	-8.3	Apr.	-5.6	Electronic games	0.02	-7.8	Aug.	-5.7
Intercontinental flights	0.21	-8.3	Dec.	9.5	Celery	0.02	-8.7	Jan.	8.0
Diesel fuel	0.17	-8.7	Jan.	-1.6	Car ferries	0.09	-10.9	July	-3.3
Heating gas	1.54	-9.2	Apr.	-6.4	Intercontinental flights	0.19	-13.4	Aug.	-4.5
LPG	0.11	-11.3	Jan.	-4.4	Potatoes	0.25	-13.7	Apr.	2.7
Rabbit	0.10	-13.4	May	-7.1	Cellular telephones	0.86	-14.3	Dec.	-4.1
Personal computers	0.21	-18.1	Jan.	-13.7	Personal computers	0.19	-18.8	May	-16.2
Total	*3.10*				*Total*	*4.64*			

Source: Based on Istat data (2003 basket).

[30] The variability of individual prices and its possible relationship with the gap between perceptions and official measurements are also discussed for the case of Italy in Trivellato (2003) and Istat (2003). Buiten (2003) presents a similar analysis for the Netherlands, showing that following the changeover exceptionally large price increases were registered above all for goods that are frequently purchased but have a very low weight in the index basket, in contrast with significant price decreases for more expensive but rarely purchased products.

Figure 9 shows the dispersion of the quarter-on-quarter percentage changes of consumer prices on the basis of the 207- and 550-item breakdowns. The dispersion of the individual items' inflation rates was similar at both levels of disaggregation between 1999 and 2003, with the notable exception of the first quarter of 2002, when it was markedly higher for the more disaggregated series (the spike recorded a year earlier was of comparable magnitude for the two disaggregations). This appears to support the view that the changeover was accompanied by rather large movements in relative prices that are not made evident by the aggregate index.

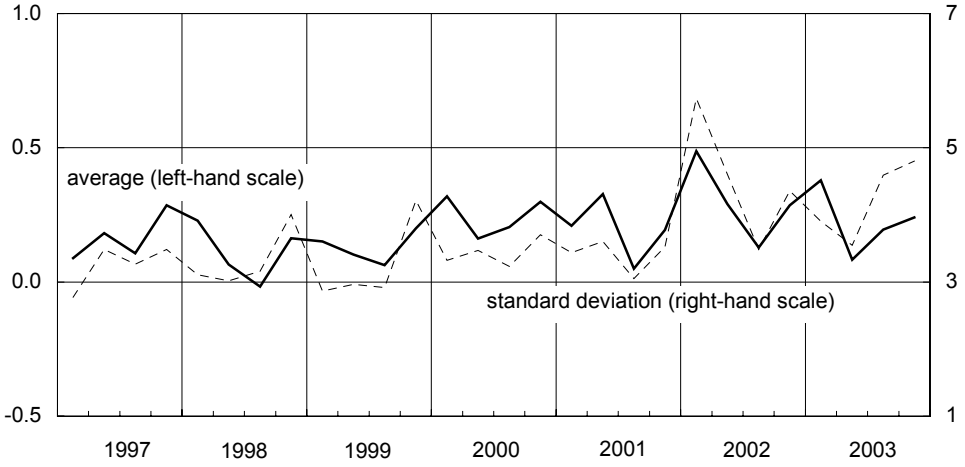
Figure 9 – Average consumer price inflation in Italy and its dispersion (1)
(percentage points)



Source: Based on Istat data.
(1) Standard deviation calculated for the cross-section distribution of the percentage changes on the previous quarter of the series with the level of disaggregation indicated.

This initial finding is confirmed by an examination of the dispersion of the quarter-on-quarter changes in the elementary prices of the subset of 48 goods and services (Figure 10). This dispersion shows a rapid increase in the first quarter of 2002 and a less marked one in the second half of 2003, in a context of broadly stable average inflation. Over the two years 2002-03 the standard deviation was 4.4 percentage points, compared with 3.3 points in the previous five years, while the average of the price changes (with the exception of the first half of 2002) was in line with the levels of the past.

Figure 10 – Average consumer price inflation in Italy and its dispersion : subset of 48 goods and services (1)
(percentage points)

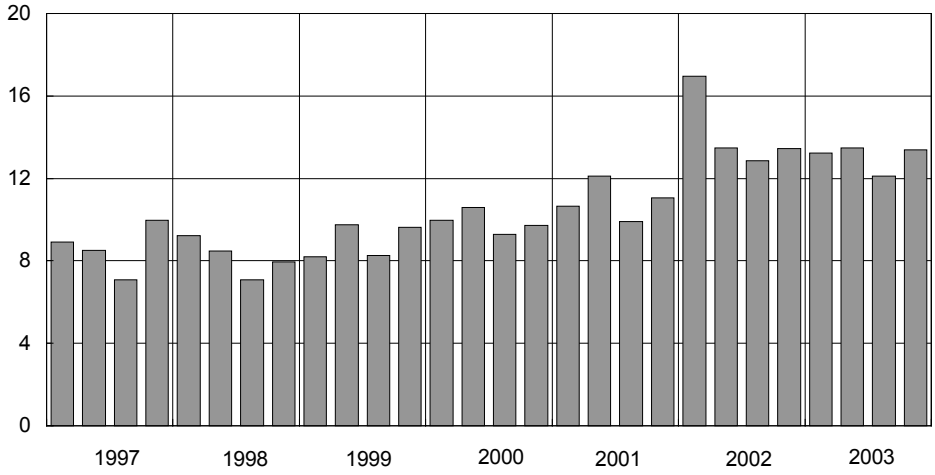


Source: Based on Istat data.
(1) Average and standard deviation calculated for the cross-section distribution of the percentage changes on the previous quarter of the elementary series of a subset of 48 goods and services included in the CPI basket.

In short, our findings validate the hypothesis that relative prices changed to an unusually large degree during the changeover period, and, in the presence of asymmetrical estimates by consumers, may have appreciably influenced inflation perceptions.

The disaggregated data on individual prices reveal other significant modifications in the distribution of price changes during and after the changeover. Figure 11 shows that in the first quarter of 2002 a much higher percentage of prices changed than in the same period of the preceding years (around 17 per cent, against an average of around 9 per cent). This contrast can also be seen in the subsequent quarters, though it is less marked: in the two years 2002-03 an average of 14 per cent of prices changed in each quarter, compared with 9 per cent in the five previous years.

Figure 11 – Share of prices that changed in each quarter in Italy: subset of 48 goods and services (1)
(percentages)

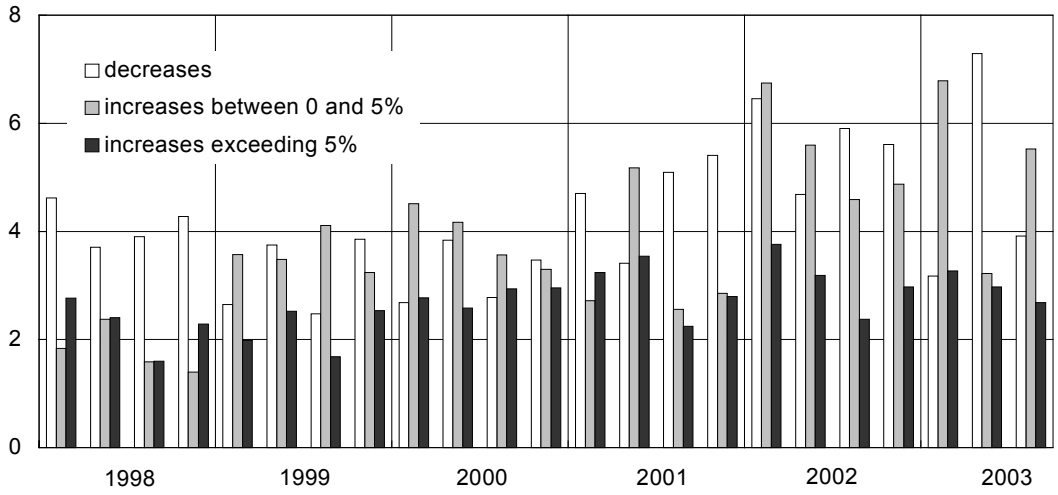


Source: Based on Istat data.
(1) The share is calculated on changes with respect to the previous quarter.

As Figure 12 indicates, the proportion of large price increases (i.e. more than 5 per cent quarter on quarter) was slightly higher in the two years 2002-03 than in the five previous years (3.1 against 2.6 per cent on average) and only somewhat more pronounced in the first quarter (3.8 and 3.3 per cent in 2002 and 2003, respectively, compared with a first-quarter average of 2.6 per cent in the five previous years). By contrast, there was a more marked rise in the share of prices that increased by less than 5 per cent or decreased.[31] These findings are consistent with the evidence presented by Gaiotti and Lippi (2004) on the Italian catering sector, showing that by comparison with previous years 2002 was distinguished by a surge in the percentage of restaurants that changed prices rather than by a peak in the size of the changes. The higher incidence of price changes registered in 2002 compared with the preceding years, in catering and other sectors, may have reflected the decision of businesses to advance the schedule of planned price changes to coincide with repricing in euros, in order to avoid incurring the same costs twice (in the case of restaurants, for example, the cost of printing menus).

[31] A similar analysis performed by Istat (2003) on the 207 items that compose the basket provided results that are qualitatively consistent with those reported here.

Figure 12 – Sign and intensity of price changes in Italy: subset of 48 goods and services (1)
(percentages)



Source: Based on Istat data.
(1) The percentages shown are calculated on changes with respect to the previous quarter.

The figures reported in Table 3 show that in the two years 2002-03 the increase in the proportion of prices raised or lowered involved products of every category. They also highlight a specific development in the service sector, where both the share of quarterly price increases ranging between 5 and 10 per cent and that of increases exceeding 10 per cent rose substantially. This latter finding is also consistent with the results of Gaiotti and Lippi (2004) on Italian restaurants, according to which in 2002 and 2003 price increases were larger in the provinces where competition was low, as well as with studies of other euro-area countries showing large price rises for some services, particularly those with a low degree of competition (see, for example, Deutsche Bundesbank, 2004) .

In summary, the disaggregated data we have examined, though incomplete, support the hypothesis that the changeover was accompanied by price developments that partly diverged from those of the past — a higher percentage of price changes and, in the service sector alone, of very large increases — that may have worked to influence households' inflation perceptions but are less visible if one only looks at the aggregated indices. These differences with respect to the past do not appear to have been intense enough to justify, by themselves, such a large surge in perceived inflation. These effects, too, may have been amplified by the relation between pre-changeover expectations and post-changeover perceptions.

Table 3 – Sign and intensity of quarterly price changes in Italy by categories of product: subset of 48 goods and services

(percentages) (1)

	1996	1997	1998	1999	2000	2001	2002	2003
				Energy products				
Negative	23.3	20.0	36.9	13.0	23.4	49.3	40.1	41.1
0	44.0	61.8	56.2	30.3	23.0	23.5	14.7	8.0
Between 0 and 5%	30.1	18.2	6.7	51.0	47.5	26.2	44.0	48.8
Between 5 and 10%	2.5	0.1	0.2	5.6	4.9	0.9	1.0	1.9
Exceeding 10%	0.1	0.0	0.0	0.1	1.1	0.2	0.1	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
				Fresh foods				
Negative	11.5	9.1	8.4	9.3	8.3	9.6	11.8	11.4
0	78.5	80.8	81.6	82.3	79.0	76.1	73.2	74.2
Between 0 and 5%	3.3	2.8	3.0	2.5	4.2	5.0	6.2	5.7
Between 5 and 10%	3.0	2.9	2.5	2.4	3.6	4.3	3.5	3.2
Exceeding 10%	3.7	4.4	4.5	3.4	4.9	5.0	5.3	5.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
				Processed foods				
Negative	4.9	4.2	3.5	3.4	2.4	2.9	4.7	3.9
0	90.1	90.4	92.2	92.7	92.9	91.0	89.2	89.9
Between 0 and 5%	1.8	2.3	2.3	2.3	2.7	3.4	4.0	3.4
Between 5 and 10%	1.7	1.7	1.2	1.0	1.3	1.7	1.3	1.8
Exceeding 10%	1.6	1.5	0.8	0.5	0.7	1.0	0.8	1.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
				Non-food and non-energy products				
Negative	1.1	1.1	1.1	1.5	1.2	1.2	2.4	1.7
0	95.4	96.2	96.4	96.0	96.0	95.5	93.0	94.4
Between 0 and 5%	1.2	1.3	1.0	1.1	1.3	1.5	2.8	2.1
Between 5 and 10%	1.4	0.9	1.0	0.9	0.9	1.2	1.0	1.0
Exceeding 10%	0.9	0.5	0.5	0.5	0.7	0.7	0.8	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
				Services				
Negative	0.4	0.8	0.7	0.4	0.5	0.5	1.5	1.0
0	97.2	96.8	97.1	97.5	97.1	97.0	92.4	95.6
Between 0 and 5%	0.6	0.7	0.8	0.6	0.6	0.7	3.2	1.5
Between 5 and 10%	0.7	0.9	0.7	0.7	0.7	0.8	1.3	1.0
Exceeding 10%	1.1	0.8	0.7	0.8	1.1	1.0	1.6	0.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
				Total				
Negative	4.0	3.7	4.1	3.2	3.2	4.7	5.7	5.2
0	89.7	91.4	91.8	91.0	90.1	89.1	85.8	86.9
Between 0 and 5%	3.0	2.3	1.8	3.6	3.9	3.3	5.5	4.8
Between 5 and 10%	1.7	1.3	1.1	1.3	1.5	1.6	1.5	1.6
Exceeding 10%	1.6	1.3	1.1	0.9	1.3	1.4	1.6	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Based on Istat data.

(1) The percentages shown are derived by calculating: (i) the quarter-on-quarter percentage changes in the elementary prices considered; (ii) for each quarter, the percentages for the different intervals; and (iii) the annual average of the percentages obtained in step 2.

c) Average basket and individual baskets

While the consumer price index refers to the average consumption of all resident households, the perceptions of an individual or category of individuals reflect the price movements of the goods and services composing a personal consumption basket.

Typically, the personal basket differs from the average basket in relation to the individual's specific social and economic situation (income, age, household status, education, etc.). For example, both essential items and non-essentials have a significant weight in the basket of wealthy households, while among less well-off households essentials are preponderant. A change in the price of an essential good (for example, a food product) will therefore have a larger impact on the personal inflation rate of a less well-off consumer, while one in the price of a good or service that only some people can often afford (for example, a stay in hotel) will have a larger impact on the basket of an affluent consumer. Given the differences in the baskets, there may be little correspondence between an individual's personal inflation rate and the average rate for the whole population. This can also translate into a systematic divergence between the average of inflation perceptions and the average official rate of inflation if the relation between the inflation an individual experiences and the inflation he or she perceives varies depending on the category to which the consumer belongs.[32]

The difference between the average basket and the individual one can be very large in the case of items of expenditure that are very important for those who incur them but that are incurred by a relatively small percentage of households and thus have a modest impact on average inflation. A very clear example is rent, which is a major expense for those who pay it but has no impact on the monthly expenditure of home-owners. In Italy, where only around 20 per cent of households live in a rented home, the weight of rent in the average basket is very low (3.1 per cent), and this makes the difference between the average basket and the personal basket of anyone who pays rent very large. The size of this difference will depend on such factors as region, neighbourhood and type of lease. According to the survey

[32] A divergence between the averages can also derive from a weighting effect. In the basket of the consumer price index the weighting system takes account of the volume of spending of the different categories

of household income and wealth conducted by the Bank of Italy for the year 2002 (Banca d'Italia, 2004), between 2000 and 2002 rents rose by a national average of 14 per cent, but the increase was much higher in large cities (25 per cent) than in small towns (9 per cent). Another important example of divergence between the average basket and individual baskets is that of spending on motor vehicle insurance, which increased by 11.7 per cent between December 2001 and December 2003 but whose weight in the index is much lower than most individuals' perceptions owing to the statistical treatment of the item (see Section 3).

A second reason for the divergence between average inflation and individually perceived inflation is that the former is measured on an annual basis, while some products are purchased by the majority of consumers less often than once a year. The weight of the price of durable goods such as cars in the CPI depends on the frequency with which they are purchased *on average* by Italian consumers. However, the item's importance relative to total expenditure will be greater than average for people who actually purchased the good in the last year while it will be nil for those who did not incur this expense in the same period.

To gauge the possible impact of the discrepancy between the individual consumption basket of a class of consumers and the average basket, we made some estimates of inflation by class of expenditure. Below we estimate specific price indices by grouping households into deciles of "equivalent expenditure", i.e. the expenditure each member would face if he or she lived alone in order to maintain the same living standard as within the household. For each group the price index differs from the CPI for two reasons (Mostacci, Natale and Pugliese, 2004):

- *the weight effect*: the index for a given group must take account of the distribution by type of consumption of the households included in the group;
- *the price effect*: the prices used in calculating the index must reflect the shopping habits of the segment of the population included in the group. These habits can differ in many respects, e.g. preferred distribution channel and types of products.[33]

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of households and the number of households in each category, while in the survey of inflation perceptions all households have the same weight.

[33] Note that Istat observes the prices of several varieties of the same product at large distributors but only the price of the "best selling" variety at traditional shops. On the occasion of the rebasing (December of each

On the basis of the available data only the first effect can be taken into account. Capturing the second effect would require a survey by the statistical institutes of the different prices paid by the consumers belonging to each group. The estimates we present are therefore rough measures of the phenomenon.

The estimates of the specific inflation rate for each decile of equivalent expenditure show that the differences were small in 2002 and virtually nil in 2003 (Table 4).[34]

Table 4 - Average inflation rate by decile of equivalent expenditure
(year-on-year percentage change in the consumer price index; annual averages) (1)

Decile of equivalent expenditure	2002	2003
First	2.1	2.5
Second	2.2	2.6
Third	2.2	2.6
Fourth	2.3	2.6
Fifth	2.3	2.6
Sixth	2.4	2.6
Seventh	2.4	2.5
Eight	2.5	2.6
Ninth	2.5	2.6
Tenth	2.6	2.4
Total	*2.5*	*2.6*

Source: Based on Istat data.
(1) Variations calculated on the basis of price indices rounded to 2 decimal places; for the annual average for 2003, this entails a slight difference with respect to the Istat figure (2.7 per cent), which is calculated on the index rounded to 1 decimal place.

In 2002 average inflation was slightly higher for the households with higher consumption than for those with lower consumption (2.6 and 2.1 per cent for the highest and lowest deciles, respectively). The disparity is explained by the rather large differences in the structure of consumption between the households belonging to the extremes of the distribution of equivalent expenditure (Table 5).

year), when the list of price quotes to be observed during the year is being prepared for each outlet, the retailer indicates the best-selling variety to the price-checker (Istat, 2005). The decision to collect only the price of the best-selling variety is dictated by the objective of considering the consumer goods purchased by the majority of the population while limiting the quantity of information to be collected every month.

[34] Baldini (2004a) and Istat (2003) obtain similar results using analogous data and methods.

Table 5 - Structure of expenditure of the Italian population by decile
(percentage weights, 2002=100)

	Goods and services not subject to price controls				Goods and services subject to price controls
	Food products	**Energy products**	**Non-food non-energy products**	**Services**	
Decile of equivalent expenditure					
First	41.8	13.5	15.1	15.2	14.4
Second	35.5	12.1	18.2	20.9	13.4
Third	31.6	11.5	21.0	24.2	11.7
Fourth	28.7	10.8	22.6	26.6	11.2
Fifth	25.6	10.0	25.2	28.7	10.5
Sixth	23.9	9.3	24.8	32.0	10.1
Seventh	21.4	8.6	27.5	32.9	9.5
Eight	19.7	7.9	27.3	35.5	9.5
Ninth	16.5	6.6	30.8	37.5	8.5
Tenth	9.9	3.8	45.4	35.1	5.8
Total	*19.2*	*7.4*	*31.9*	*32.7*	*8.8*

Source: Based on Istat data.

In 2002, the households with a lower level of expenditure were hit harder by the rise in food prices, which considerably outpaced the general index (3.6 as against 2.5 per cent; Table 6). On the other hand, they benefited from the more favourable inflation performance of two items with a high weight in their basket: energy products (-1.9 per cent) and goods and services subject to price controls (2.2 per cent). In addition, the impact of the 3.9 per cent rise in the prices of unregulated services was much smaller for the least-well-off households (around 15 per cent of their shopping basket) than for the most affluent ones (around 35 per cent).[35]

[35] As a further experiment, we divided the goods and services in the Istat basket into those whose consumption is inflexible, food products first and foremost, and those whose purchase can be more easily postponed or even avoided. However, we did not find significant differences between the price behaviour of these two categories in the two years 2002-03.

Table 6 - Consumer price inflation in Italy by component
(year-on-year percentage changes; annual averages)

	Goods and services not subject to price controls				Goods and services subject to price controls	General index
	Food products	Energy products	Non-food and non-energy products	Services		
2000	1.6	13.2	1.5	2.8	0.7	2.5
2001	4.0	-2.0	2.0	3.2	3.6	2.7
2002	3.6	-1.9	2.2	3.9	2.2	2.5
2003	3.2	2.3	1.9	3.5	2.2	2.7

Source: Based on Istat data.

These results, which, we repeat, do not take account of the price effect and are therefore approximative, contrast with the widely asserted opinion that the negative effects of the price developments of 2002 and 2003 were greater for low and middle-income households and lesser for well-off ones.[36] Furthermore, the disaggregated data on perceptions (see Section 2) suggest that the differences among the various types of households did not increase in the period following the introduction of the euro.[37]

4.2 The individual's economic situation

The perception of a larger rise in inflation than shown by the official rate and the differences in the perceptions of the various types of households could depend on an estimation based not only on experienced inflation but also on other factors that affect the

[36] An attempt to evaluate the possible direction of the effect attributable to the differing price changes of the different varieties of a single product is presented in Mostacci, Natale and Pugliese (2004). Ranking the prices of a single product in ascending order and dividing them into low prices (below the median) and high prices (above the median), they find that in 2002 the former recorded significantly larger increases than the latter. On the assumption that the low-income households purchase the less costly varieties of each product, this would imply, as a result of the combination between this effect and the weight effect, that they experienced higher inflation than wealthy households.

[37] The differentiation of perceptions could in part reflect the differing importance of more frequently purchased goods and services in the consumption basket of the least-well-off households. Carra (2004) examines the composition of the basket of Italian consumers, classifying the latter by occupational and household status and income and grouping goods and services according to the frequency with which they are purchased, in descending order (frequent, monthly, seasonally, other). This analysis shows that as income increases the relative importance of frequent purchases decreases sharply while that of seasonal purchases

individual's economic situation, for example increases in the prices of items not included in the index basket or income developments for the different segments of the population. In other words, consumers might confuse the losses of purchasing power caused by inflation with a more general impoverishment due to other factors. We shall consider two specific factors.

The first is the behaviour of house prices, which are not included in the consumer price index basket inasmuch as the purchase of a dwelling involves both investment and consumption choices and it is difficult to distinguish between the two motivations.[38] If this exclusion were not clear to consumer survey respondents (who likely do not know all the characteristics of the basket and the methodology of the Istat index), their responses would refer not so much to their inflation perceptions but to their perceptions of purchasing power, which would be gauged taking into account the potential purchase of a house. Considering that house prices rose steeply in the two years 2002-03 — by more than 28 per cent between the second half of 2001 and the second half of 2003[39] — this might have had an impact on perceptions regarding price trends in general and not just real-estate prices. Further, depending on the distribution of home ownership among the different segments of the population or the differences in the rate of increase in house prices in the areas inhabited by different social classes, house price increases could have differentiated effects on the different categories of consumers.

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increases appreciably; the differences among income groups are less pronounced in the case of monthly purchases, although these generally tend to diminish as income rises.

[38] In almost all industrial countries, including Italy, the consumer price index basket includes rent and maintenance expense on non-owner-occupied dwellings but not house prices. This approach was also adopted by Eurostat for the harmonized consumer price index. The advisability of including house prices in the basket of the harmonized index has recently been the subject of intense discussion at Community level. Those in favour of the inclusion of such item in the harmonized consumer price index argue that the current situation compromises the comparability of the national inflation rates because of the marked differences from country to country in the percentage of households that own their home. From a methodological point of view, the main objection to this inclusion is that the treatment of housing within a price index is complicated by the difficulty of distinguishing the underlying reasons for purchasing a house. More than in the case of other durable consumer goods such as cars and household appliances, the decision to purchase a house involves investment as well as consumption decisions. Obviously, the investment factor should not be considered in calculating a consumer price index. On the other hand, since ownership of a home provides the owner with a service that is actually consumed in the course of time, the consumption component deriving from the purchase of a house should be considered, on a par with the treatment of the purchase of other durable goods. For more on this subject, see Goodhart (1999) and Shiratsuka (1999).

[39] On the basis of data published by *Il Consulente Immobiliare.*

As far as income developments are concerned, the survey of Italian household income and wealth by the Banca d'Italia (2004), conducted between February and September 2003 and referring to 2002, indicates that the changes in annual disposable household income varied considerably according to the work status of the head of household (Table 7). Compared with a sample-wide increase of 6.8 per cent in nominal terms and 1.1 per cent in real terms, households headed by self-employed workers registered larger increases (respectively 10.1 and 4.4 per cent in nominal and real terms) than those headed by payroll employees (5.7 per cent in nominal terms, nil in real terms). Among the latter, the nominal incomes of households headed by blue and white-collar workers rose by only 3.9 per cent, thus declining by 1.8 per cent in real terms. Households headed by pensioners recorded a gain of 6.4 per cent (0.7 per cent in real terms).

Table 7 – Italian household income by work status of the head of household, 2000-2002
(euros, percentages)

	Annual net household income				**Annual net per capita income** (2)			
Work status of the head of household (1)			**Percentage change 2002 / 2000**				**Percentage change 2002 / 2000**	
	2000	2002	nominal	real (3)	2000	2002	nominal	real (3)
Payroll employee	28,651	30,293	5.7	0.0	9,005	9,696	7.7	2.0
of which: blue and white-collar workers	26,477	27,505	3.9	-1.8	8,306	8,798	5.9	0.2
Self-employed	36,568	40,245	10.1	4.4	11,095	12,168	9.7	4.0
Not in work	19,761	20,981	6.2	0.5	9,738	10,460	7.4	1.7
of which: pensioners	20,596	21,911	6.4	0.7	10,341	11,081	7.2	1.5
Total	26,098	27,868	6.8	1.1	9,597	10,363	8.0	2.3

Source: Banca d'Italia (2004).
(1) Member with the highest income. - (2) Annual net household income divided by the number of members. - (3) Incomes were deflated using the household consumption deflator of the national accounts, which showed an increase in prices between 2000 and 2002 of 5.7 per cent.

As shown by Boeri and Brandolini (2004), the differences in the trends in household incomes in recent years have affected the incidence of relative poverty for the different categories — the share of low-income households has diminished for self-employed workers

and increased for production and clerical workers — even though the indicators of poverty for the population as a whole have remained broadly stable.

Overall, although appreciable differences do not emerge in the inflation experienced in 2002-03 by Italian households belonging to different classes of expenditure, it seems likely that a greater perception of inflation by certain categories of individuals may reflect their actually growing poorer due to factors other than inflation.[40]

4.3 The media

Price developments and, above all, the contrast between consumers' perceptions and the official statistics received exceptionally extensive coverage in the media in the period following the changeover. This close coverage, especially when it gave greater resonance to declarations and analyses disputing the official estimates, may in turn have further fueled the perception of a generalized acceleration in prices.[41]

To obtain an indication of media coverage of the issue, we selected the articles published in two newspapers: *Il Sole 24 Ore*, Italy's leading economic and financial daily, and *La Stampa*, a newspaper with nationwide circulation. We chose these two newspapers because they were available on the same online database, allowing us to select the articles with the same search procedure. The data we collected should be evaluated bearing in mind that they only pertain to these two newspapers, one targeted to a specialist readership, the other oriented to readers likely to have above-average levels of education and income, and that they do not include radio and television.

The articles were selected on the basis of two search criteria:

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[40] On these issues, see also Baldini (2004b), Golinelli and Parigi (2005) and Saraceno (2004).

[41] Boeri (2004) underlines the exceptional media coverage of the phenomenon and suggests that it may have contributed to the gap between perceived and official inflation. He also notes that many newspapers lent credence to alternative, non-official estimates of inflation without checking their rigorousness. A study conducted by the National Public Administration School has examined the mass media's influence on measured inflation rather than the on the gap between perceptions and official measurements (for a summary, see Pennisi *et al*., 2004).

1. articles whose headline included at least one of the following three popular expressions that are proxies for inflation: "*caro-vita*", "*caro-prezzi*", "*costo della vita*";[42]
2. articles whose text included the expression "*inflazione*" or "*caro-vita*" and in which the expression "*associazioni*" or "*consumatori*" appeared in the text.

The annual data are reported in Table 8 and the monthly data in Figures 13 and 14, which also show the figures on inflation perceptions in the same period.

Table 8 – Number of articles published in *Il Sole 24 Ore* and *La Stampa*

	Results of search 1: "*Caro-vita*", "*caro-prezzi*" or "*costo della vita*" in the headline			Results of search 2: "*Inflazione*" or "*caro-vita*" in the headline, "*associazioni*" or "*consumatori*" in the text		
	Il Sole 24 Ore	*La Stampa*	Total	*Sole 24 Ore*	*La Stampa*	Total
1995	25	38	63	30	15	45
1996	25	24	49	41	38	79
1997	35	14	49	32	13	45
1998	30	2	32	22	5	27
1999	19	7	26	33	19	52
2000	41	14	55	60	26	86
2001	32	18	50	65	21	86
2002	33	27	60	71	48	119
2003	35	41	76	94	52	146

For *Il Sole 24 Ore*, the annual data do not show a substantial increase in the articles selected in the period following the introduction of euro banknotes and coins; an exception is the result using the second search criteria for 2003 (94 articles, compared with 71 in 2002 and 65 in 2001). However, Figure 13 shows that in the two years 2002-03 there were some

[42] The first two of these expressions combine the word "expensive" (caro) with the terms "life" and "prices"; the third expression means "cost of living". The search engine, that accepts up to four key words, also identifies equivalent expressions ("*carovita*" for "*caro-vita*", "*costo vita*" for "*costo della vita*", etc.). We also ran the first search adding "*inflazione*" to the other key words appearing in the headlines of articles. For both of the newspapers in question, the inclusion of a more generic word used in many articles not referring to the debate on inflation in Italy (for example, articles on general economic trends in the euro area or other economic areas or on monetary policy decisions) greatly reduces the difference between the number of articles found in the two years 2002-03 and those selected with the same combination of key words for the preceding years. For the same reasons, the greater difference observed in the two years 2002-03 with respect to the past with the

appreciable peaks in that newspaper's coverage of the subject. With regard to articles whose headlines contained the three expressions that are proxies for inflation (upper panel of the figure), in the last ten years comparable numbers are only found in the first quarter of 2000 and in the spring of 2001, which were periods of rising inflation. The exceptional nature of the recent peaks is evidenced even more clearly with the search using the words "*associazioni*" and "*consumatori*" together with "*inflazione*" and "*caro-vita*" (lower panel of the figure): in 2002-03 there are five months in which at least 10 articles were selected, compared with just a single instance in the seven previous years.[43]

In the case of *La Stampa*, the pronounced increase in coverage of the subject is also very evident from the annual figures. The number of articles whose headlines contained the three expressions referring to inflation rose from 18 in 2001 to 27 in 2002 and 41 in 2003, while the articles in which the key words "*associazioni*" or "*consumatori*" appeared more than doubled between 2001 and 2002 (from 21 to 48) and rose slightly again in 2003. Figure 14 shows that the monthly peaks in the number of articles covering the subject were easily the highest of the ten years, especially those registered in the summer of 2002, when there was also an upsurge in inflation perceptions. The articles in many Italian newspapers in that period were characterized by a good dose of sensationalism, in particular when they gave ample space to criticisms of Istat's methods and to alternative estimates of inflation. Media coverage of the question was also intense between the end of 2002 and the beginning of 2003, when inflation perceptions touched a post-changeover peak, and again in the autumn of 2003, when, after an incipient decline, they rose back to the highest levels.[44]

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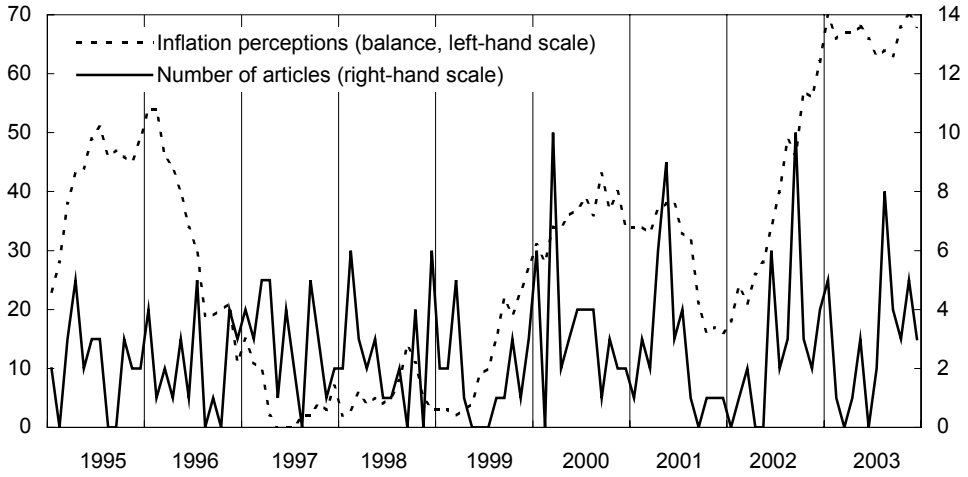
second search reflects the inclusion of the two key words "*associazioni*"and "*consumatori*", and not that of "*inflazione*".

[43] In March 2000, when the attention of the press was justified by a rise in inflation to a rate that was not particularly high in absolute terms (2.6 per cent) but that was roughly double the rate of a year earlier and the highest figure in more than three years.

[44] Conspicuous among the issues covered in these two periods were the argument between the Confederation of Italian Industry and the Confederation of Italian Commerce on the responsibility for the rise in prices and the dispute between Istat and Eurispes on the truthfulness of the official statistics. An especially interesting case is the storm over Istat's admission of measurement error in February 2002. The error was very small (the attribution of a reduction in the prices of pharmaceuticals to January 2003 instead of to February led to a 0.1 percentage point underestimation of inflation in January) and would have passed unnoticed in a less highly charged environment. On the episode, see various contributions on the website www.lavoce.info.

Figure 13 – Inflation perceptions and articles in *Il Sole 24 Ore*

(a) "*Caro-vita*", "*caro-prezzi*" or "*costo della vita*" in the headline



(b) "*Inflazione*" or "*caro-vita*" in the headline, "*associazioni*" or "*consumatori*" in the text

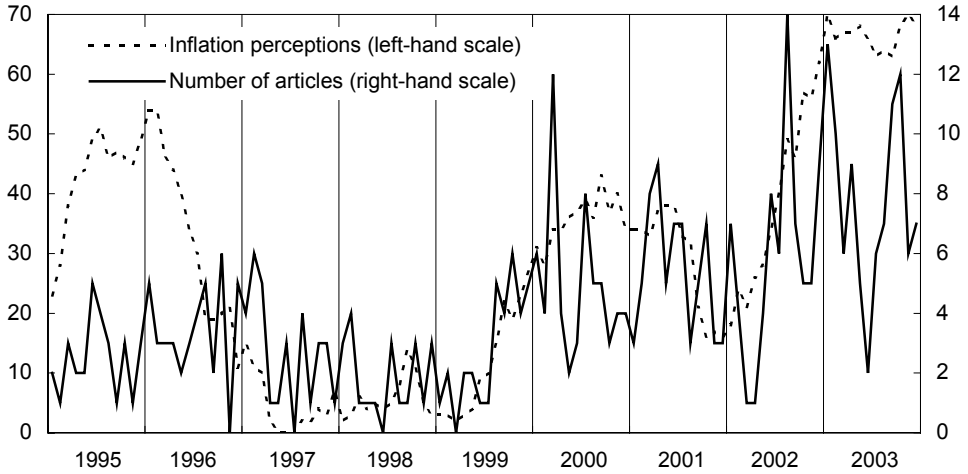
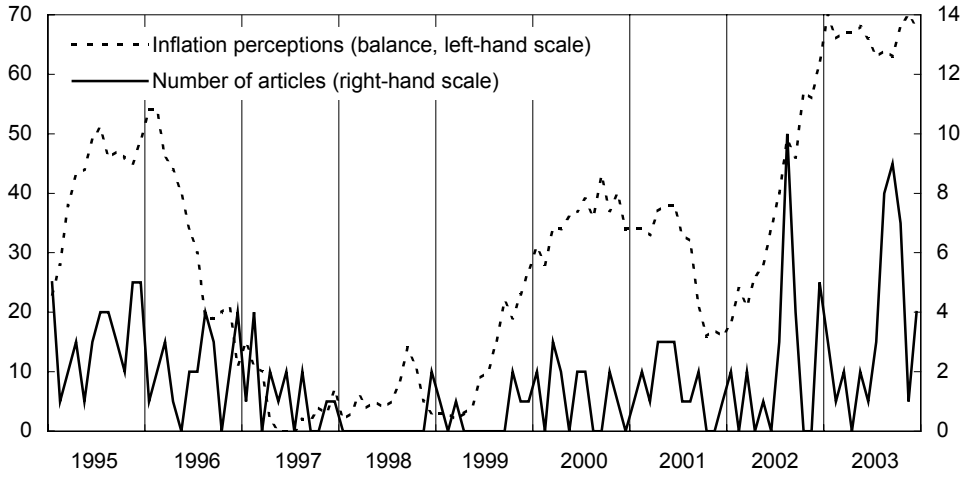
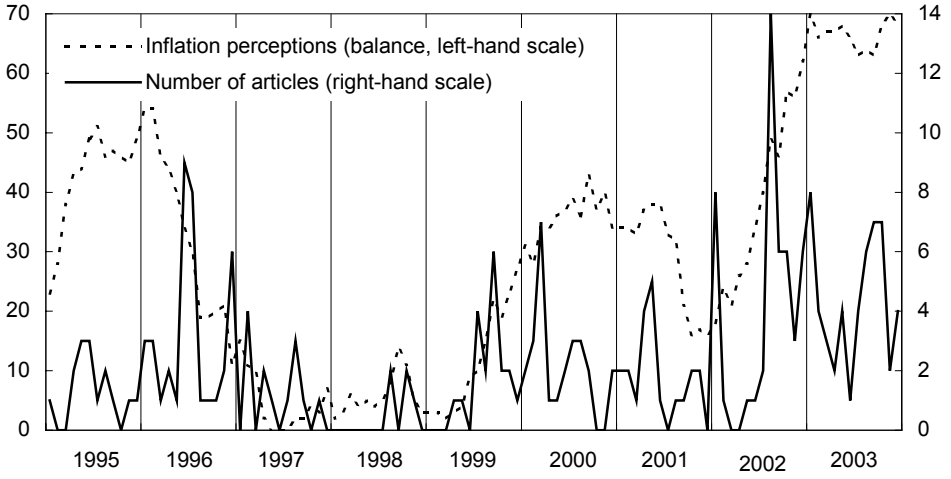


Figure 14 – Inflation perceptions and articles in *La Stampa*

(a) "*Caro-vita*", "*caro-prezzi*" or "*costo della vita*" in the headline



(b) "*Inflazione*" or "*caro-vita*" in the headline, "*associazioni*" or "*consumatori*" in the text



In the period under review, therefore, we see a coincidence between some abrupt rises in perceptions and the peaks in the number of articles containing key words with a close bearing on the debate on the cash changeover and inflation. In a medium-term perspective, a comparison between Figures 13-14 and Figure 1 shows that the previous phases of sharply deteriorating inflation perceptions (1995-96 and 1999-2000), which were phases of rising official inflation, were accompanied by an increase in media coverage but not on the scale of that seen in the most recent period, when official inflation instead remained broadly stable.

This descriptive analysis suggests that there may be a relationship between the trend of inflation perceptions and the attention the press pays to the phenomenon. However, *a priori*,

the causal link may work in both directions: a sharp deterioration in inflation perceptions is newsworthy, and extensive media coverage may in turn validate and reinforce individual perceptions. The bidirectional nature of this link is confirmed by the Granger-causality tests we performed on the data presented in this section.

4.4 Rounding and recollection of lira prices

According to Isae (2003), consumers' recourse to rounding may have influenced their inflation perceptions in 2002. Italian consumers supposedly converted prices mentally into euros with a rough yardstick of 2,000 lire to the euro instead of the correct rate of 1,936.27 lire. This would have meant an upward rounding of 3.2 per cent, which when added to official inflation would have implied a perceived inflation rate almost double the official rate in 2002. This argument received considerable play in the press when its was adopted by the president of Istat during Senate hearings in October 2003. Extending its examination to consider the approximative exchange rates that were probably used in the other euro-area countries, the Isae study indicates that the potential effect of rounding by consumers was positive by between 2 and 3 per cent in Germany and Greece and by between 1 and 2 per cent in Austria and Ireland, negative by around 1 per cent in Belgium and broadly negligible in the remaining countries. The same study also shows that in 2002 the gap between perceived and official inflation was generally higher in the countries where the potential effect of rounding was greatest.

As the Isae itself points out, this argument can help to explain the gap between perceived and official inflation in 2002, when consumers were comparing prices denominated in euros (and mentally converted into lire) with the lira prices of the previous year, but not the gap in 2003, when estimating the twelve-month change in prices involved comparing two prices expressed in euros. However, it is possible that some consumers were mislead because their memory continued to refer to the last lira prices they had observed before the introduction of the euro. In this case two types of approximation would be combined. The rough and ready mental conversion of euro prices into lira would cause a first overestimation. A second, equally important one would derive from the fact that a comparison made, say, at the at the end of 2003 would refer to a price two years' old: if the consumer did not realize that his perceptions referred to a change over 24 months and not

over 12, which is the standard lag at which the price change is computed, this effect by itself would lead to a perceived inflation rate roughly twice as high as the actual rate (since annual inflation in Italy was very similar in 2002 and 2003). The overestimation would be even greater if the last purchase to which the consumer mentally referred dated back to well before December 2001 or if he had in mind not the last lira price paid for a certain good or service but an average of the prices observed over a certain span of time, for example the two or three years preceding the cash changeover. In both cases, the consumer would attribute to the post-changeover period a change that had actually accumulated over a much longer span of time. An effect of this type can be particularly important for the prices of rarely purchased goods and services (such as durable consumer goods) and for those that underwent sharp increases over several consecutive years (such as restaurant meals).

Concerning the possible difficulties of consumers in mentally converting prices, some findings of the European Commission survey, *The €uro, two years later*, conducted at the end of 2003, are interesting. Italy was the euro-area country with the highest percentage of respondents who had experienced "a lot of difficulty" with the euro (29 per cent, against an area average of 14 per cent) and, together with Greece, the only country in which this percentage was higher than at the end of 2002 (when it had stood at 14 per cent). Italy was also the country with the highest percentage of respondents who indicated they reckoned mentally in the old national currency for everyday purchases (46 per cent, compared with an area average of 30 per cent) and the only one where this percentage exceeded that of those who said they thought in euros (33 per cent, compared with an area average of 46 per cent).

5. An overview of the correlations

Our analysis so far suggests a multiplicity of factors probably contributed to creating the exceptionally large divergence between perceptions and official measurements of inflation. In this section we present the results of a descriptive analysis of the correlations between the behaviour of perceptions and that of the factors considered, measured by means of a linear regression in which the dependent variable is the perception of inflation (balance of the responses in the Isae surveys; see Section 2) and the regressors include the factors mentioned in the preceding section for which it is possible to construct a monthly indicator. The exercise is designed to measure the correlations between perceptions and the variables

considered, not necessary to attribute a causal link to them. This last point applies in particular to the variable referring to the media (see below).

Table 9 reports for each regression the value of the estimated coefficients and a summary statistic of the correlation (the adjusted R^2).[45] The term of comparison is the regression in which the only explanatory variable is inflation as measured by the consumer price index (*CPI*), whose R^2 is equal to 0.68 for the estimation period 1997-2001 (regression 5 in the table) and drops to 0.56 when the period is extended to include the two years 2002-03 (regressions 1), exhibiting a discontinuity at the time of the changeover.

The first exercise (regression 2 in the table) considers variables referring to the factors we discussed in Section 4.1, attributable to the presence of asymmetries in the formation of perceptions and in the behaviour of prices:[46]

- the twelve-month rate of increase in the prices of more frequently purchased goods and services (*CPI_high*) and that in the prices of less frequently purchased goods and services (*CPI_low*);
- the standard deviation calculated on the cross-section distribution of the twelve-month percentage changes in the prices of a subset of 48 products in the Istat basket (*STD*).[47]

The coefficients have the expected positive sign and are statistically significant for *CPI_high* and (marginally) for *STD*.[48] The explanatory power is significantly greater than when *CPI* alone is considered.

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[45] The estimation period we consider begins from 1997 in view of the availability of the indicator for the dispersion of price changes. Excluding this regressor, we also made the estimations starting from 1992, obtaining similar results.

[46] Indicators referring to the different composition of the shopping baskets by category of consumer are not included in the regression, since our analysis of inflation by class of expenditure did not find significant differences.

[47] The variable that captures the importance of the extreme price increases (share of total price changes) did not prove significant, consistently with the evidence of Section 4.1b, according to which at the time of the changeover the increase in that share only involved some sectors and was marginal for the index as a whole.

[48] The scant statistical significance of the coefficient of *STD* likely reflects the fact that this variable captures, at least in part, phenomena similar to those captured with the breakdown of inflation by frequency of purchase (the available evidence suggests that the dispersion was higher for more frequently purchased goods). The statistical significance of the variable is greater in the regression (not reported in the table) in which it is considered separately, in addition to the variable *CPI*.

In the second exercise (regression 3) we include, along with *CPI*, the variable that measures the intensity of media coverage of inflation and of the divergence between perceptions and the official measurements, given by the number of articles published in *Il Sole 24 Ore* or *La Stampa* selected with the key words "*inflazione*" or "*caro-vita*" in the headline and "*associazioni*" or "*consumatori*" in the text (*NEWSP*).[49]

In this case too the coefficient has the expected sign and is significant; R^2 rises to 0.77. Given the bidirectional link between perceptions and the variable in question (see Section 4.3), this increase should be read as indicating the possible importance of the reciprocal link between the collective formation of perceptions and the media's treatment of the issue.

Lastly, when all the preceding factors are considered together (regression 4), the correlation rises to 0.80, basically coinciding with the figure we obtain with the same variables when we limit the estimation to the period preceding the changeover (regression 6). When the alternative regressors are included, the break we found for the regression with only officially measured inflation disappears.

[49] See Section 4.3 for a discussion of the key words and the criteria used in the selection of the articles. We excluded the contemporary value of the variable *NEWSP*, even though it proved significant when included, because some of the articles surveyed in each month could have appeared after the consumer survey of the same month.

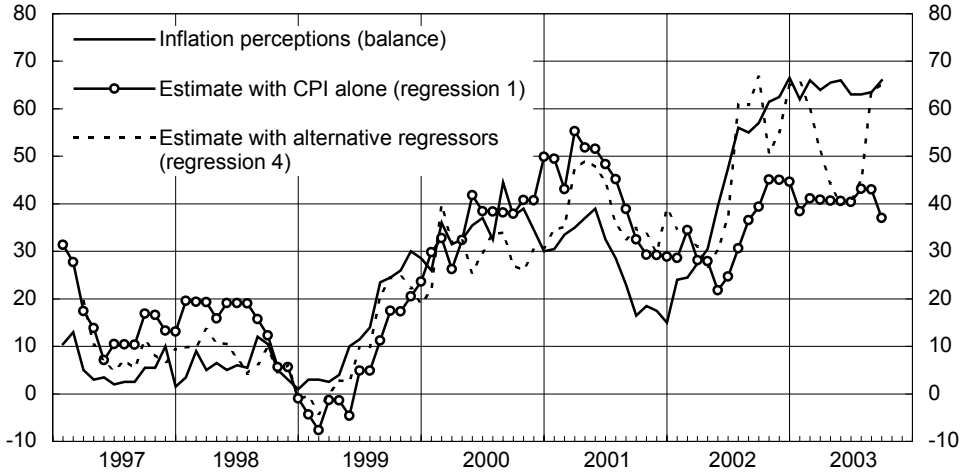
Table 9 – Summary of the correlations
(dependent variable: balance of inflation perceptions) (1)

	Regressors	$\overline{R^2}$
	Estimation period: 1997.4 – 2003.12	
1	CPI_t	0.56
	Coefficients(2):	
	CPI_t 36.27 (10.06)	
	Asymmetries	
2	CPI_high_t. CPI_low_t. STD_{t-2}	0.68
	CPI_high 19.26 (10.95)	
	CPI_low 2.30 (0.80)	
	STD_{t-2} 3.90 (1.86)	
	Media	
3	CPI_t. $NEWSP_{t-1}$. $NEWSP_{t-2}$.$NEWSP_{t-3}$.$NEWSP_{t-4}$	0.77
	CPI_t 14.65 (4.00)	
	$NEWSP_{t-1}$ 1.34 (4.83)	
	$NEWSP_{t-2}$ 0.78 (2.59)	
	$NEWSP_{t-3}$ 0.68 (2.21)	
	$NEWSP_{t-4}$ 0.73 (2.51)	
	Asymmetries and media	
4	CPI_high_t. CPI_low_t. STD_{t-2}. $NEWSP_{t-1}$. $NEWSP_{t-2}$.$NEWSP_{t-3}$.$NEWSP_{t-4}$	0.80
	CPI_high 9.12 (4.64)	
	CPI_low 1.68 (0.57)	
	STD_{t-2} 3.75 (2.26)	
	$NEWSP_{t-1}$ 1.14 (4.29)	
	$NEWSP_{t-2}$ 0.71 (2.53)	
	$NEWSP_{t-3}$ 0.50 (1.73)	
	$NEWSP_{t-4}$ 0.61 (2.27)	
	For comparison: estimation period 1997.4 – 2001.12	
5	CPI_t	0.68
6	CPI_high_t. CPI_low_t. STD_{t-2}. $NEWSP_{t-1}$. $NEWSP_{t-2}$.$NEWSP_{t-3}$.$NEWSP_{t-4}$	0.79

(1) Regression of monthly inflation perceptions (balance of responses to the Isae's consumer survey; see Section 2) on the variables indicated. – (2) t-test in brackets. Legend: *CPI* = 12-month changes in the general index of consumer prices; *CPI_high* = 12-month changes in the price index for frequently purchased goods and services; *CPI_low* = 12-month changes in the price index for less frequently purchased goods and services; *STD* = standard deviation calculated on the cross-section distribution of the 12-month percentage changes in the prices of a subset of 48 goods in the Istat basket; *NEWSP* = number of articles published in *Il Sole 24 Ore* or *La Stampa* selected with the key words "*inflazione*" or "*caro-vita*" in the headline and "*associazioni*" or "*consumatori*" in the text.

The same indication is offered by Figure 15, which shows the behaviour of perceptions and that of the fitted values obtained, respectively, with the regression of perceptions on officially measured inflation alone and with that including all the alternative regressors.

Figure 15 – Inflation perceptions in Italy: balance resulting from the consumer survey and estimates



6. Conclusions

The paper shows that the households' perception of an abrupt pick-up in inflation following the introduction of euro banknotes and coins can be reconciled with the much more modest increase shown by the official statistics. In explaining the gap, it highlights the combination of the characteristics of the distribution of price changes and the psychological mechanisms at work in the formation of inflation perceptions.

The first part of the paper reviews the methods and procedures used by Istat in collecting prices and calculating the consumer price index. As a whole the available information does not suggest that the indices calculated by Istat measure inflation in a systematically distorted way, underestimating it in particular; however, it does not allow us to rule out the presence of problematic aspects in some phases of the data collection procedures, whose potential impact on measurement should be assessed through specific empirical analyses.

Contrary to what is often asserted in public discussion, Istat's statistics capture the exceptionally high price rises for specific products, even if this is not fully discernable from the data that Istat releases to the public, which are generally based on averaging of single prices. Moreover, the treatment of some specific items (e.g. vegetables and fruit or motor vehicle insurance), although methodologically well-founded, can cause a divergence between the measured and the perceived movement of their prices. These specific aspects, however, are not important enough to justify the phenomenon's general nature and its intensity.

The evidence examined in the paper suggests that other factors contributed to the gap, notably asymmetries in the way in which individual inflation perceptions are formed and in the actual behaviour of prices.

In the first place, the goods and services included in the Istat basket are purchased by the individual consumer with differing frequencies, ranging from every day to less than once a year. In the period following the cash changeover the more frequently purchased products recorded larger price rises than the less frequently purchased ones. If the former have a stronger impact on perceptions, an hypothesis confirmed by some psychological studies and particularly plausible especially in a period in which it was necessary to learn and memorize a multitude of prices expressed in a new currency, these developments are consistent with an increase in perceptions larger than that in average inflation as measured by the official statistics.

Second, in concomitance with the changeover and in the period following it there was an increase in the proportion of prices that changed, whether upwards or downwards, and in the service sector there was a higher percentage of very large increases. On the hypothesis that consumers' perceptions are influenced more by a price increase than by an equivalent decrease — or react excessively to extreme price changes — these developments are consistent with an increase in perceptions larger than that in average inflation as measured by the official statistics.

In addition, the two above-mentioned effects may have been amplified by the link between individuals' apprehension over the possible inflationary effects of the changeover to the euro and the way they perceived these effects after the changeover. Psychological

researches show that the tendency of individuals to overestimate the changeover's impact on prices is the greater, the more pessimistic were the expectations. This relation is attributed to a mechanism called "selective output correction", the propensity to check data that confirm one's expectations less accurately than data that disprove them.

Third, the inflation experienced by individual consumers reflects the behaviour of the prices of the goods and services that compose the personal consumption basket. To the extent that the latter differs from the average basket for the entire population, individual inflation can diverge from the rate calculated for the country as a whole. This seems to be able to explain why perceived inflation is higher for certain categories of consumers, in particular less well-off households. However, the estimates of the inflation experienced by households according to class of expenditure do not exhibit major differences for the two years 2002-03.

The latter finding does not necessarily imply that the perception of a process of impoverishment on the part of some categories of consumers is unfounded. This perception can depend not only on an evaluation referring to experienced inflation but also on other factors affecting the individual's economic situation. Prominent among these, in the period under review, may have been the pronounced rise in the price of items not included in the consumer price index basket (house prices) and the very modest rise in real household incomes, which in 2002 were barely higher than those of 2000 for the population as a whole and were lower for households headed by production or clerical workers.

Fourth, the media paid exceptional attention to price developments and to the contrast between consumers' perceptions and the official statistics, despite the fact that officially measured inflation was basically stable. Abrupt increases in perceptions coincided with unprecedented peaks in the number of articles in which words closely associated with the debate on inflation appeared. This suggests an important role was played by the reciprocal influence between inflation perceptions and the media's coverage of the phenomenon.

Lastly, an imprecise memory of lira prices may have influenced inflation perceptions. In the case of a durable good that is purchased rarely, for example, it is highly likely that the consumer, mentally referring to the time he or she made his last purchase, refers to a time before December 2001. For other goods and services the consumer's memory could refer not to a single price but to an average of the prices observed over a more or less extended span

of time, for example the two or three years before the changeover to the euro. In both cases, the consumer would attribute to the post-changeover period a change that had actually accumulated over a much longer span of time.

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