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**Memory for prices and the euro cash changeover:
An analysis for cinema prices in Italy**

by Vincenzo Cestari, Paolo Del Giovane and Clelia Rossi-Arnaud

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MEMORY FOR PRICES AND THE EURO CASH CHANGEOVER: AN ANALYSIS FOR CINEMA PRICES IN ITALY

by Vincenzo Cestari*, Paolo Del Giovane** and Clelia Rossi-Arnaud***

Abstract

The question addressed by this study is whether consumers remember past prices correctly. We test Italian citizens' memory for cinema prices with questionnaires distributed to movie-goers. The analysis concentrates on the memory of pre-euro prices, but the recall for a more recent period is also investigated. The results show that only a small percentage of respondents recalled the correct price, and that the average prices recalled were much lower than the actual pre-euro prices and dated back to years before the changeover. Price recall is less accurate for the respondents who perceive higher and more persistent inflation; it is also worse for the older respondents and for the less frequent movie-goers.

JEL Classification: D12, D8, E31.

Keywords: prices, memory, perceptions, euro.

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1. Introduction¹

Following the introduction of euro banknotes and coins euro-area residents perceived a much sharper increase in prices than the moderate rise registered by official statistics. The perceived surge in prices was popularly associated with the cash changeover, even though the official estimates of the national statistical institutes and central banks indicated that the impact on consumer prices had been modest.

Several studies have suggested explanations for the disparity between perceived and measured inflation. European Central Bank (2003a,b) and Aucremanne and Collin (2005) discuss the issue for the euro area as a whole, and a series of papers examine individual countries (for a survey see Del Giovane and Sabbatini 2005). In the case of Italy, where the phenomenon was particularly intense and persistent, Del Giovane and Sabbatini (2006) cite several factors that contributed to determining the disparity. They include the combination between the psychological mechanisms at work in the formation of inflation perceptions (stronger impact of more frequently purchased products² and asymmetric perceptions of price increases and decreases³) and the characteristics of the distribution of price changes after the changeover (larger price rises for frequently bought goods and services, an increase in the proportion of prices that changed, whether upwards or downwards, and a higher percentage of very large increases in the service sector). The effect of these factors may have been amplified if there was a link between individuals' expectations about the impact of the cash changeover and their ex-post perceptions (Traut-Mattausch *et al.* 2004).

Gaiotti and Lippi (2004) and Del Giovane and Sabbatini (2006) suggest, further, that the individual perceptions of high inflation may also have been related to an inaccurate memory of pre-euro prices and a difficulty in distinguishing the period of time over which the price change has taken place. This may have induced consumers to blame the euro also for price rises that came before its introduction and had nothing to do with the new currency. In the case of durable goods, which are purchased rarely, for example, it is most likely that consumers, mentally referring to their last purchase, refer to a time before December 2001. For goods and services that are bought more frequently, the consumer's memory might refer not to a single price but to a number of prices observed over a more or less extended span of time or at different sales points.⁴

Little is known about the mechanisms underlying the memory for prices. Although this can be considered as part of the question of everyday memory (Neisser, 1982; Cohen, 1996), evidence from cognitive studies on this issue is seldom found in psychological

¹ We thank Paolo Angelini, Luigi Cannari, Giovanni D'Alessio, Francesco Lippi, Roberto Sabbatini, Stefano Siviero, Daniele Terlizzese and two anonymous referees for useful comments and Pietro Spataro for help with data processing. We also gratefully acknowledge the co-operation of Cinema Nuovo Sacher (with special thanks to Ermanno Nastri) and Cinema Quattro Fontane - Circuito Cinema. The views expressed in this paper are the authors' only and do not necessarily reflect those of the Bank of Italy. E-mail addresses: vincenzo.cestari@ipsifar.rm.cnr.it; paolo.delgiovane@bancaditalia.it; clelia.rossi-arnaud@uniroma1.it.

² This hypothesis is confirmed by the experimental evidence provided by Marques and Dehaene (2004).

³ Relevant examples of the heuristics employed in subjective assessments and asymmetry in subjective evaluation are provided respectively by Tversky and Kahneman (1974) and Kahneman and Tversky (1979).

⁴ Gaiotti and Lippi (2004) report interesting results on Italian restaurant prices, which are a frequently mentioned example of the impact of the new currency. According to this study, the price rise recorded by Italian restaurants in 2002 (about 9 per cent) was only part of an overall increase of 40 per cent between 1998 and 2003. Furthermore, contrary to the popular belief, the restaurant price rises around the changeover period, though large, were not exceptional with respect to the previous period: 2002 was characterized by a surge in the percentage of restaurants that changed prices, not by the greater size of the changes (which actually peaked in 2001, before the introduction of the euro).

research. Rather, it is covered in a broader social sciences literature that includes marketing and consumer behaviour (Dickson and Sawyer 1990; Monroe and Lee 1999).

The present study presents an assessment of the hypothesis that consumers have an imperfect memory for past prices. Although we concentrate on the particular case of the euro changeover, the issue has a broader relevance. The lively debate in the post-changeover period shows that consumers have strong opinions on inflation. In principle, this implies that they should be able to calculate, at least roughly, the rate of change in the prices of the wide range of goods and services included in the official index. To do so, however, they need to remember the past prices of these products. Even considering the individual's personal experience of inflation, rather than the average inflation in a country, consumers should at least be able to remember the past prices of the products that make up their personal consumption basket. The question addressed by this study is whether they actually can.

Our analysis fits in with the recent behavioural economic literature, which postulates deviations from the assumption of rational, computationally unconstrained agents. This literature has explored the implications of consumers' having limited information-processing capacity and being rationally inattentive (see, among others, Sims 2003, Ameriks *et al.* 2004, Levy *et al.* 2006, Reis 2006) or having limited memory (Mullainathan 2002). Mastrobuoni (2004) and Ehrmann (2006) investigate whether imperfect information models can explain the evolution of prices and the mismatch between perceived and actual inflation in the aftermath of the euro cash changeover.

The changeover period is chosen for the study as a particularly interesting case per se and because it bears on the key question of whether inflation perceptions in the post-changeover period are related to the presence of a bias in price recall. Although inflation perceptions have receded in Italy since 2004 (as shown by the European Commission surveys), we are still confronted with the belief by many citizens that the present prices of most products are twice as high, or in any case much higher, than they were before the introduction of the euro. The old prices of many goods and services are commonly believed to have been converted at a rate of 1,000 lire to the euro, rather than at the official rate of 1,936.27. This widespread belief is based on what consumers claim to be precise recall of the pre-euro prices, which is a good reason to investigate whether their confidence in their memory is well-founded. We also consider the possibility of a reversed causal link, from the conviction that many prices have doubled to a "memory" that simply confirms that belief.

Our study focuses on Italian consumers' memory of cinema prices, submitting a questionnaire to movie-goers. We chose this price because it can be reconstructed for the past with extreme precision and is less subject to differences (due to quality or brand) than many other goods and services. And as the survey was conducted in movie theatres we can be sure that the sample consists of people who actually consume that particular service at least occasionally (participants were in any case requested to specify their frequency of movie-going).

The answers on recalled prices are analysed in the light of further questions aimed at elucidating the mechanisms of price recall; measuring the relationship between price memories and such other factors as habits in using the new currency (mental conversion into lire vs. thinking in euro), frequency of movie-going and attitudes toward the euro; and assessing the relationship between the memory of the specific price considered and the perceptions on the average change in the general price level. Lastly, the results on price recall are also related to personal characteristics (age, gender, education and occupation).

To investigate the extent to which consumers' memory for prices is influenced by the change of currency, alternative questionnaires were given to two different sub-groups of

respondents, asking, respectively, the pre-euro price expressed in euro (rather than in lire as in the standard questionnaire) or the price in 2003.

Respondents were asked to recall both the full and the reduced price. Italian cinemas typically offer reduced prices on weekday afternoons or on one weekday evening. In Rome, where the questionnaire was to be given, a Wednesday reduction was introduced in February 1998 and maintained thereafter, including the changeover period. To control that the answers for the full price were not influenced by memory of the reduced price and also to test respondents' memory using a second price we included separate questions for the two prices.

2. The method

2.1 The respondents

Respondents were randomly sampled among members of the audience in movie theatres; they participated on a voluntary basis. Respondents older than 65 years of age were excluded as they enjoyed a discounted ticket in 2001 and/or at the moment of the study. A total of 225 people filled in one of the questionnaires. The number of respondents for each questionnaire, with gender, age and education, is shown in Table 1. The questionnaires were given in two well-know cinemas in Rome⁵ whose price in 2001 coincided with the mode for all first-run movie theatres in Rome. We chose these two cinemas also because they ensured good control on the survey conditions (full co-operation by the employees and a suitable area where people could fill out the questionnaires without interference). It is worth noting that these cinemas are attended by an audience characterized by a high level of education (and presumably income) and rather high frequency of movie-going. The experiment followed a between-subject design, i.e. each group of respondents filled in only one questionnaire.

Table 1. Respondents

| | Questionnaire on pre-euro price in lire | Questionnaire on pre-euro price in euro | Questionnaire on 2003 price |
|-------------------------------|---|---|-----------------------------|
| Number of respondents | 150 | 40 | 35 |
| Male | 53 | 20 | 10 |
| Female | 88 | 18 | 24 |
| Gender not indicated | 9 | 2 | 1 |
| Age range | 19-65 | 18-62 | 18-65 |
| Mean age (stand. dev.) | 42 (11.77) | 40 (12.87) | 44 (15.72) |
| Lower than high-school degree | 3 | | 2 |
| High-school degree | 36 | | 25 |
| University degree | 107 | | 48 |
| Education not indicated | 4 | | 0 |

Note: Information is provided separately for each of the three questionnaires used (see section 2.2).

2.2 The questionnaires

Our standard questionnaire is reproduced in Appendix 1. It comprised 14 questions plus 4 items on personal data (age, gender, education, occupation). The first two questions regarded memory for cinema prices (for the full and the reduced price respectively) with reference to the period immediately preceding the changeover, when prices were still in lire.

The other questions were intended first, to capture the mechanisms through which prices were recovered (e.g. memory vs. calculation); second, to elicit frequency of movie-going, habits in using the new currency (mental conversion into lire vs. thinking in euro) and

⁵ Cinema Nuovo Sacher and Cinema Quattro Fontane.

attitudes towards the euro both before its introduction and currently; third, to record the perceptions on the average change in the general price level.

To investigate how the memory of prices is influenced by the currency changeover, two alternative questionnaires were administered to separate groups of respondents. One was asked to indicate the pre-euro price expressed in euro rather than in lire as in the standard questionnaire, the other the price in 2003. Where necessary the other questions were slightly adjusted. The rationale was to check whether expressing the old price in euros encouraged consumers to better reflect on the difference between the recalled and the present price and on the implicit rate of change, thereby improving the accuracy of the recall. The question on the 2003 price allowed us to verify the correctness of memory with respect to a more recent period that did not coincide with a currency changeover.

2.3 The procedure

The questionnaires were administered by doctoral students in psychology, under the supervision of the authors, on four evenings in May 2006. Participants were asked to answer the questions in order and without reading ahead. They were given no time limit and asked to complete the questionnaire as accurately as possible without communicating with other participants.

The answers on the pre-euro price expressed in euro and on the price in 2003 were compared with those on the pre-euro price expressed in lire by considering, for the latter, only the questionnaires administered in the same movie theatre and on the same evenings.

Price memory was compared with the actual prices in effect before the launch of the euro. Since the questionnaire asked for the price in lire in the period “immediately preceding” the cash changeover we could have simply considered the price at the very end of 2001. However, since several movie theatres in Rome had raised their prices in mid-December 2001, we considered the actual prices both in the first half and in the second half of December, taking into account that: a) the price increase in mid-December could be interpreted as an anticipated effect of the euro and b) the last price in lire might have not been memorized by the public, as it lasted only two weeks.

On 8 December the average cinema price was 12,630 lire, while both the median and the mode were 13,000 lire. On 22 December the mean was slightly higher, the median unchanged and the mode had become 14,000. As to the possibility that the prices in the first half of December had also been affected by the imminent changeover, analysis of the time series in the previous years shows that that this was not the case, since prices had been at about the same levels in the four years preceding the changeover (see below for more evidence).

On this basis we considered as a correct memory for the pre-euro price of the full ticket both 13,000 lire (the mode prevailing until a few weeks before the changeover and in the four previous years except 2000) and 14,000 lire, which was the mode of the very last price in lire. These were the prices charged in the first and second half of December, respectively, in our two cinemas and in other movie theatres with the same quality standard and so correspond closely to the questionnaire (which asked the price in a first-run movie theatre “similar to this one”). The answer 12,000 lire was considered as close to correct, since this was the price still charged by about 20 per cent of the cinemas at the end of 2001.

For the reduced price, the correct answer was 8,000 lire, the price charged by a large majority of the cinemas that offered a discount on Wednesday. At the time of the changeover

that reduced price (agreed and advertised by the association of cinemas in Rome) had been unchanged for almost four years, since its introduction in February 1998.

3. The results

3.1 Documenting the discrepancy between recalled and actual pre-euro prices

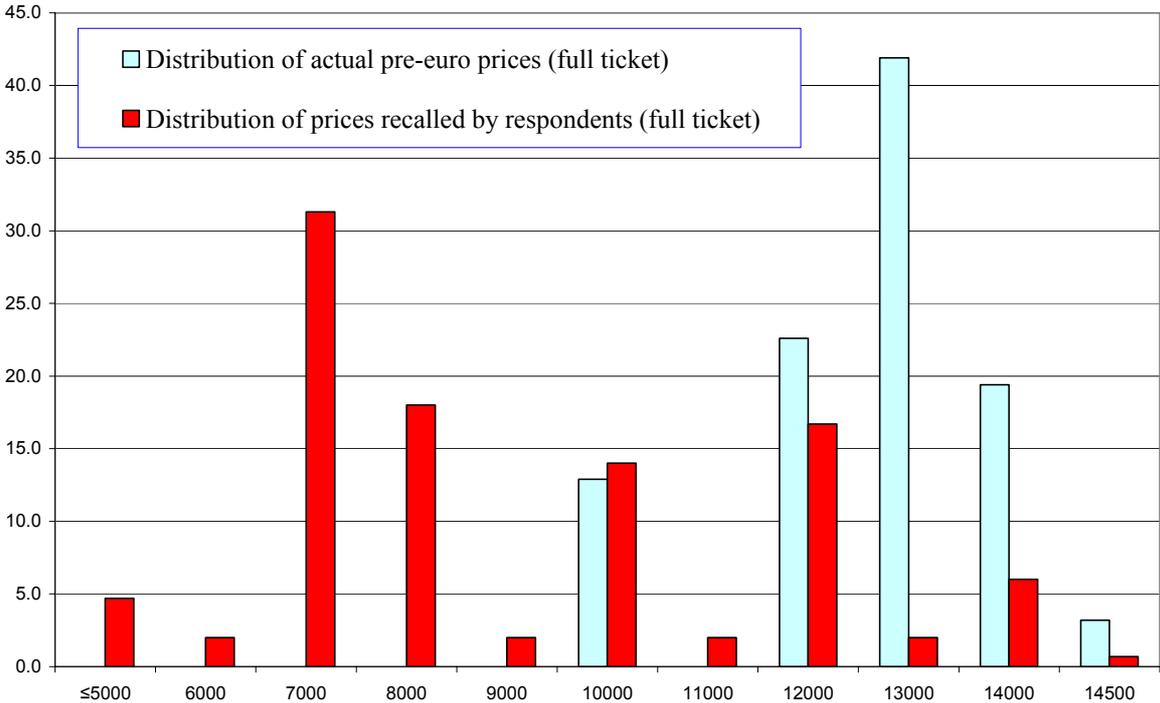
The main finding is that our sample’s recalled pre-euro prices are much lower than the actual prices at the end of 2001. Figure 1 compares the percentage of respondents recalling each price (dark histogram) with the percentage of cinemas that actually charged that price in the first half of December 2001 (light histogram).

Only 8 per cent of the respondents said either 13,000 or 14,000, which we consider to be the correct answers (see Section 2.3). A sixth (16.7 per cent) indicated 12,000, which is close to correct. The majority (56 per cent) indicated prices lower than 10,000 lire, which were non-existent in the months preceding the launch of the euro.

Interestingly, the mode of the recalled price (7,000 lire) corresponds to the mode of the prices at the time of the study (7 euro) converted at a rate of 1,000 lire to 1 euro.

Figure 1. Recalled vs. actual cinema prices (full ticket)

On the horizontal axis, the prices of full cinema tickets (in lire); on the vertical axis, the percentage of respondents indicating the price as their recall (dark histogram) and the percentage of cinemas that charged that price in the first half of December 2001 (light histogram).



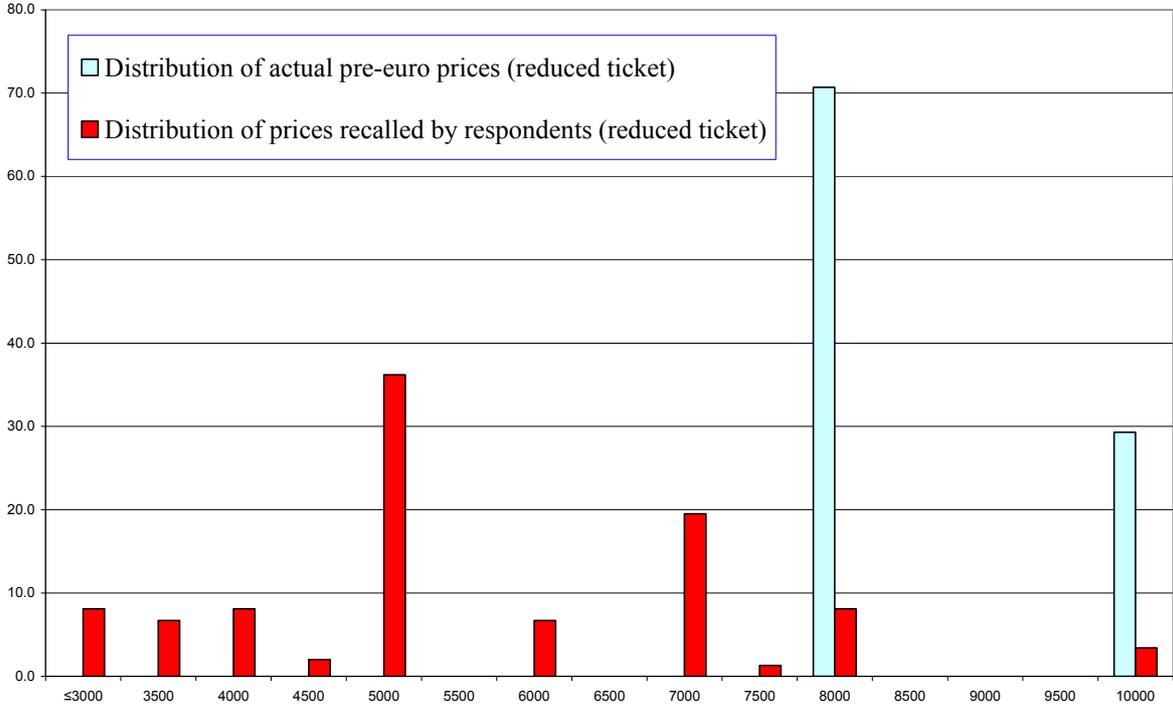
Note: The cinemas considered are those located in Rome showing newly released films. Source: *La Repubblica* daily newspaper.

The findings obtained for the reduced price are similar (Figure 2). Only a very small fraction of the respondents (8 per cent, as in the case of the full price) recall the actual price (8,000 lire). Around a fifth (21 per cent) recall a price (7,000 or 7,500) that is not too far off. Most respondents (61.1 per cent) recall a price (6,000 lire or less) that is much lower than the

actual price. The mean of the recalled price is 5,500 lire. As in the case of the full price, the mode of the recalled price (5,000 lire) corresponds to the mode of the actual prices at the time of the study (5 euro) converted at a rate of 1,000 lire to 1 euro.

Figure 2. Recalled vs. actual cinema prices (reduced ticket)

On the horizontal axis, the prices of reduced cinema tickets (in lire); on the vertical axis, the percentage of respondents indicating the price as their recall (dark histogram) and the percentage of cinemas that charged that price in December 2001 (light histogram).

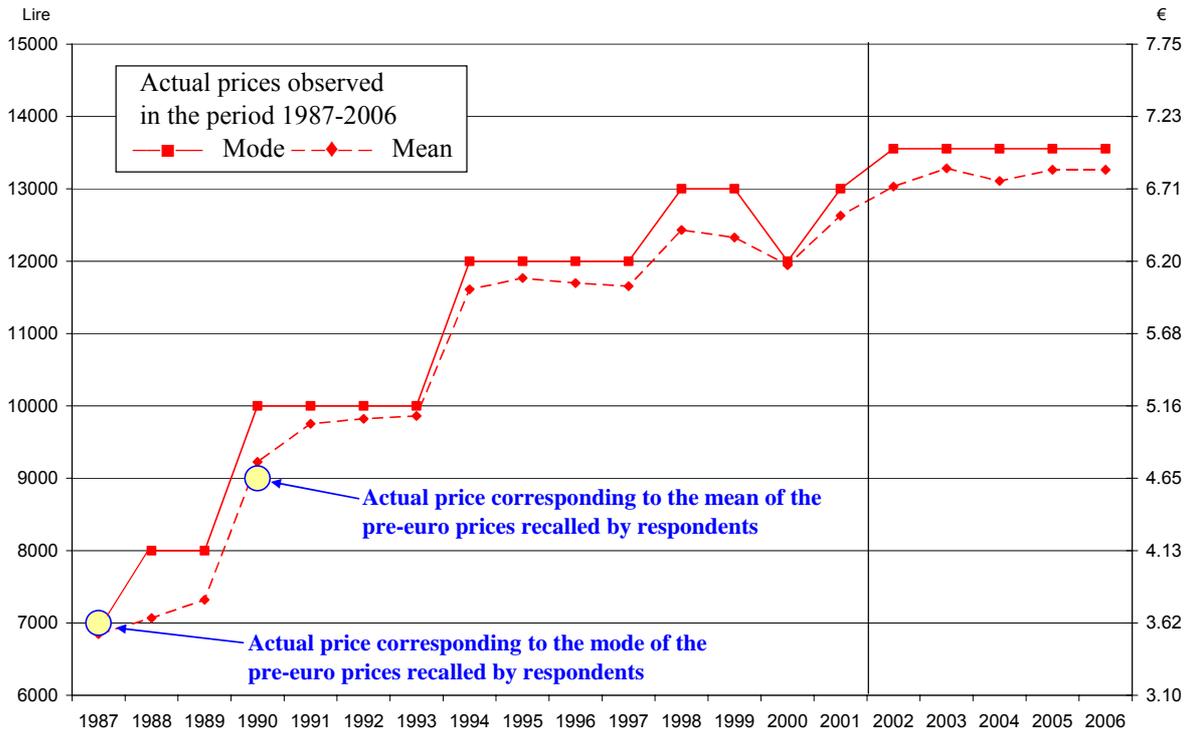


Note: The few cinemas that did not offer a reduced price on Wednesday were excluded from the computation. Source: *La Repubblica* daily newspaper.

Finally, the prices recalled date back to a period long before the changeover: as shown in Figure 3, the mean and the mode of the recalled prices (full ticket) correspond to the actual prices observed, respectively, in 1990 and 1987, more than ten years before the launch of the euro.

Figure 3. Recalled pre-euro prices compared to actual prices in historical perspective

Actual cinema prices over the last twenty years (left-hand scale: lire; right-hand scale: euros). The two circles indicate the actual prices corresponding to the mean and the mode of the pre-euro prices recalled by respondents.



Note: Actual prices are those charged for a full ticket by first-run movie theatres in Rome (source: *La Repubblica*). End-of-year figures (first half of December for 2001, see Section 2.3) with the exception of 2006, for which they refer to May 2006, when we carried out the study.

3.2 Memory inaccuracy: some insights from the respondents' answers

Complete descriptive evidence on the relationship between the price recalled by the respondents and their answers to the other questions is given in Table A1 in Appendix 2.

The results of the statistical analyses for the relation between the recall of full prices and the answers relating to individual memory (reported precision of recall and memory of the changeover year), individual habits concerning mental conversion into lire and frequency of movie-going are given in Table 2. The main findings are:⁶

- no significant difference between the prices indicated by respondents claiming precise recall and by participants having a vague memory;⁷
- participants who correctly indicate 2002 as the year of the euro cash changeover have more accurate memory than those who get the year wrong;⁸

⁶ The same tests were conducted for the reduced price, yielding a similar pattern of results.

⁷ Participants were requested first to say whether their price assessment was a recall of the old lira price or a mental calculation starting from the present euro price. Only respondents who reported the former (95 per cent) were asked to indicate the precision of their own recall.

⁸ Almost half the respondents (47 per cent; Table A1) report the correct year. A third (33 per cent) indicate 2001, which is not surprising, considering that in 2001 the media and the public already paid a lot of attention to the impending introduction of euro banknotes and coins. Note that the respondents who have an incorrect memory of the year are implicitly recalling a pre-euro price that goes back to an earlier or (in a few cases) a later period than the end of 2001. We kept this in mind in the analyses below.

- the price reported by participants who say that they "always think in euro" or "convert rarely" is significantly higher (and thus more accurate) than that recalled by those who say they "convert sometimes", "often" or "always".⁹
- the price recalled by participants who went to the movies twice a month or more is significantly higher than for participants who attended the cinema once a month or less.

Table 2. Price recalled and respondents' answers relating to individual memory, habits of mental conversion and frequency of movie-going

For each group, number of respondents and mean and standard deviation of the price recalled. For each comparison, t-test of difference between means.

| | Reported precision of recall | |
|-----------|---|---|
| | Precise | Vague |
| <i>N</i> | 52 | 80 |
| Mean (SD) | 9173 (2849) | 9125 (2340) |
| T-test | t(130) = 0.10, not significant | |
| | Reported year of the euro cash changeover | |
| | Correct year | Mistaken year |
| <i>N</i> | 68 | 78 |
| Mean (SD) | 9419 (2541) | 8564 (2552) |
| T-test | t(144) = 1.81, p < 0.10 | |
| | Habits of mental conversion in lire | |
| | Answers "always think in euro" or "convert rarely" | Answers "convert sometimes", "often" or "always" |
| <i>N</i> | 72 | 77 |
| Mean (SD) | 9417 (2659) | 8591 (2399) |
| T-test | t(147) = 1.99, p < 0.05 | |
| | Frequency of movie-going | |
| | Twice a month or more | Once a month or less |
| <i>N</i> | 85 | 65 |
| Mean (SD) | 9406 (2527) | 8462 (2487) |
| T-test | t(148) = 2.29, p < 0.05 | |

Note: Number of subjects and degrees of freedom vary depending on the number of missing answers.

3.3 Recall of prices and inflation perceptions

The descriptive statistics (Table A1) suggest a link between the recalled price and individual inflation perceptions (measured by the opinion on the rate of change of the general price level), both in the two years following the changeover and in the two years preceding

⁹ This relationship, however, is no longer significant once we consider it in the context of a multivariate analysis (see Section 3.7).

the study.¹⁰ However, no statistical test could be conducted on the first period due to the extremely asymmetrical distribution of the answers (only 12 respondents answered “fallen”, “stayed about the same” or “risen slightly”).

The statistical analysis was thus conducted by grouping subjects according to their opinion on inflation both in the two years after the changeover and in the two years preceding the study, according to two criteria.

- a) Responses (fallen, stayed about the same, risen slightly, risen moderately, risen a lot) were assigned scores from 1 to 5 and the scores for the two different periods were summed (e.g., a score of 10 corresponds to “risen a lot” for both periods). The sum of the two periods thus corresponds to the time horizon for which we tested memory for prices.
- b) Responses were assigned scores from 1 to 5 and the score for the more recent period was subtracted from that for the two years following the changeover, to capture the persistence of individuals’ beliefs concerning inflation.

The scores thus obtained ranged, respectively, from 5 to 10 and from -4 to 3. They were distributed as reported in Table 3.

Table 3. Perceived increase in the general price level

Measures of the respondents’ opinion concerning the average change in prices. Responses (fallen, stayed about the same, risen slightly, risen moderately, risen a lot), respectively for the two years following the euro cash changeover and for the two years before the study, were assigned scores from 1 to 5. The sum for the two periods was calculated and also the difference between the post-changeover period and the more recent two-year period. The table shows the number of respondents for each combined score.

| | | | | | | | | | |
|-----------------------------|----|----|----|----|----|----|----|----|----|
| Combined score (sum) | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| N | – | – | – | 2 | 8 | 13 | 53 | 32 | 40 |
| Combined score (difference) | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| N | 1 | 1 | 4 | 11 | 67 | 30 | 29 | 5 | – |

The statistical analysis (Table 4) shows that movie prices recalled by participants who indicate low inflation over the entire period are significantly higher than those reported by participants with a high level of perceived inflation, especially when “high perceived inflation” is defined as a combined score of 10 (i.e. “risen a lot” both in the two years following the changeover and the last two years). And the prices recalled by participants who perceived the same degree of price increase for both periods are significantly lower (and thus further from the actual price) than for participants who perceived lower inflation in the more recent period than in the two years following the changeover.

¹⁰ Although referred to longer time horizons, the questions were phrased as in the European Commission survey, with the same list of possible answers. As in the EC survey, respondents were asked to state their views regarding past price developments in qualitative terms, rather than to make a numerical estimate.

Table 4. Price recalled and inflation perceptions

Relationship between the pre-euro price recalled and the respondents' inflation perceptions (based on the combined scores reported in Table 3) and agreement with the statement "1 euro = 1,000 lire". For each group, number of respondents and mean and standard deviation of the price recalled. For each comparison, t-test of difference between means.

| | Inflation perceptions (sum of scores for the entire post-changeover period) | |
|---|--|--|
| | <u>Low perceived inflation (combined scores from 5 to 8)</u> | <u>High perceived inflation (combined scores from 9 to 10)</u> |
| <i>N</i> | 76 | 72 |
| Mean (SD) | 9388 (2524) | 8597 (2544) |
| T-test | t(146) = 1.90, p < 0.10 | |
| | <u>Low perceived inflation (combined scores from 5 to 9)</u> | <u>High perceived inflation (combined score of 10)</u> |
| | <i>N</i> | 108 |
| Mean (SD) | 9310 (2455) | 8175 (2671) |
| T-test | t(146) = 2.35, p < 0.05 | |
| Persistence of inflation perceptions (difference between scores for the two periods considered) | | |
| | Unchanged perceived inflation (0 rating) | Lower perceived inflation in the more recent period (ratings from of 1 to 3) |
| <i>N</i> | 67 | 64 |
| Mean (SD) | 8493 (2683) | 9461 (2493) |
| T-test | t(129) = 2.14, p < 0.05 | |
| Agreement with the statement "What cost 1,000 lire before the introduction of the euro now costs 1 euro" | | |
| | Strong agreement | All others |
| <i>N</i> | 68 | 82 |
| Mean (SD) | 8602 (2622) | 9223 (2449) |
| T-test | t(148) = 1.73, p < 0.10 | |

Opinions on inflation were also investigated by asking for the degree of agreement with the statement "What cost 1,000 lire before the introduction of the euro now costs 1 euro", which is apparently what many Italian consumers believe (implying a price rise of practically 100 per cent). The results do not provide clear indications. They do confirm that this opinion is widely spread, almost half of the respondents (45 per cent) strongly agreeing. And these respondents recall a price that is lower than that recalled, on average, by all the others (Table 4). On the other hand, we obtained the unexpected result that the median and the mode of the prices recalled are the same for those who strongly agree with the statement and for the few respondents who strongly disagree (Table A1). Moreover, in multivariate analysis the relationship between the price recalled and the answers to this specific question is not significant (see Section 3.7).

As to the expected effects of the euro introduction on prices, while the participants who said that they had expected a very strong increase recalled a much lower price, this could not be tested statistically since only 10 subjects belong to this category (Table A1). The vast majority (125 out of 138) report that they had expected no change or a moderate increase and recall very similar prices. The prices recalled are slightly lower for subjects whose opinion on the overall effect of the euro for Italy ranges from very disadvantageous to neutral than for those who believe it to have been rather or very advantageous (Table A1). But the difference is not statistically significant: $t(140) = 0.84$.

3.4 Price recall and age

We divided participants into 3 age groups: age 19-34, 35-50 and 51-65 (Table 5).

Table 5. Price recalled and age

Pre-euro price recalled and age of respondents. For each age group, number of respondents, mean and standard deviation of age, mean and standard deviation of price recalled.

| | | Age 19-34 | Age 35-50 | Age 51-65 |
|----------------|-----------|--------------|--------------|--------------|
| Age | <i>N</i> | 25 | 86 | 34 |
| | mean (SD) | 28.84 (4.55) | 41.50 (4.65) | 57.65 (3.16) |
| Price recalled | mean (SD) | 10080 (2344) | 9006 (2504) | 8176 (2528) |

The analysis of variance (ANOVA) showed a significant effect of age on the accuracy of price recall ($F(2,144) = 4.23, p < 0.05$). A post hoc test (Scheffe multiple comparison) indicated that respondents aged 51 to 65 recall prices that are significantly lower (and thus more inaccurate) than the 19-34 age group ($p < 0.05$), while the difference between the price recall of the intermediate age group and that of the other two groups was not significant.

No significant differences were found on price recalled according to gender, occupational status and level of education. On education, however, the sample is strongly concentrated at a high level (see Section 2.1).

3.5 Expressing the recalled price in euro

The findings obtained by giving a questionnaire in which respondents were asked to indicate the pre-euro price in euro rather than in lire are summarised in Table 6, where answers expressed in euros are also presented converted in lire to make them comparable with the answers to the standard questionnaire. In doing this we used both the official conversion rate of 1,936.27 lire to the euro and the approximate rate of 2,000 to 1 that Italians use in mental conversions. The answers were compared to the answers expressed in lire by considering, for the latter, only the 46 questionnaires administered in the same movie theatre and on the same evenings. The respondents who were asked to express the pre-euro price in euros had a slightly better recall: the mean recalled price is 4.73 euros, which corresponds to about 9,200 or 9,500 lire depending on the conversion rate, against about 8,900 lire when the price is expressed in lire. But the difference is not statistically significant ($t(84) = 0.53$, and $t(84) = 1.09$, respectively).

3.6 Recalling the 2003 price

The prices recalled for 2003 are reported in Table 6. The analysis of variance (ANOVA) showed that the type of price requested (pre-euro price in lire, pre-euro price in euro, or price in 2003) had a significant effect on accuracy (measured by the percentage difference between the mean recalled price and the corresponding actual price): $F(2,118) = 4.97$, $p < 0.01$. A post hoc test (Scheffe multiple comparison) indicated that the memory error for the 2003 price was smaller than for the pre-euro price in lire ($p < 0.05$) and, though less significantly, for the pre-euro price in euro ($p < 0.10$). Although closer to the actual price than for the pre-euro period, the prices recalled for 2003 are still significantly lower than the actual prices ($t(33) = 5.93$, $p < 0.01$). The mode of the prices recalled is 27 per cent lower than the actual price.

The respondents' memory for 2003 implies a perceived rate of increase in cinema prices of about 8 per cent on an annual basis in the 2003-06 period, while in reality prices were virtually unchanged. This distortion was somewhat less than the corresponding bias for the previous part of the sample period (from the changeover to 2003), for which respondents' recall of pre-euro prices implied an upward bias of about 11 per cent a year (the difference between a perceived implicit rate of increase of 13 per cent and an actual rate of about 2 per cent between December 2001 and mid-2003).¹¹

¹¹ We divided the period between the changeover and May 2006, when we carried out the study, into two sub-periods: from the launch to mid-2003 and from mid-2003 to May 2006. We considered mid-2003 rather than the end of the year because respondents were requested to indicate generically the price "in 2003". In estimating the implicit rates of price increase we kept in mind that some respondents did not correctly remember the year of the euro cash changeover (see Section 3.2), so in annualizing we considered time horizons of varying length, according to the year recalled. The estimate of the implicit rate in the latter period is based on a comparison between the price recalled for 2003 and the actual price observed in May 2006; if respondents had an imperfect knowledge of the current price the rate of increase implicit in their perception would differ correspondingly from our estimate (respondents were not asked to indicate the current price, since it was posted at the box office and easily readable).

Table 6 - Types of price recall: pre-euro price expressed in lire or euros; 2003 price

Answers obtained by giving to three different groups of respondents one of three questionnaires in which respondents were asked to indicate, respectively, the pre-euro price expressed in lire (standard questionnaire), the pre-euro price expressed in euros, or the 2003 price. For comparison, answers expressed in euros are also presented converted in lire, both at the official conversion rate and at the approximate “mental” conversion rate of 2,000 lire to 1 euro. The answers expressed in euros are compared with those expressed in lire by considering, for the latter, only the 46 questionnaires administered in the same movie theatre and on the same evenings.

| | | <i>Pre-euro price recalled in lire</i> | <i>Pre-euro price recalled in euro</i> | | <i>Recalled 2003 price</i> | | | |
|---------|--------|--|--|--------------------------------|--------------------------------|------|--------------------------------|--------------------------------|
| | | | € | lira equivalent ⁽¹⁾ | lira equivalent ⁽²⁾ | € | lira equivalent ⁽¹⁾ | lira equivalent ⁽²⁾ |
| | | (n = 46) | (n = 41) | | (n = 35) | | | |
| full | mean | 8870 | 4.73 | 9159 | 9460 | 5.67 | 10979 | 11340 |
| | median | 8000 | 5.00 | 9681 | 10000 | 6.00 | 11618 | 12000 |
| | mode | 7000 | 5.00 | 9681 | 10000 | 5.00 | 9681 | 10000 |
| | SD | 2475 | 1.23 | 2382 | 2460 | 1.09 | 2111 | 2180 |
| | | (n = 45) | (n = 37) | | (n = 35) | | | |
| reduced | mean | 5622 | 3.10 | 6002 | 6200 | 3.71 | 7184 | 7420 |
| | median | 5000 | 3.00 | 5809 | 6000 | 3.50 | 6777 | 7000 |
| | mode | 5000 | 2.50 | 4841 | 5000 | 3.00 | 5809 | 6000 |
| | SD | 1819 | 1.04 | 2014 | 2080 | 0.92 | 1781 | 1840 |

(1) Price in euros converted into lire at the official conversion rate of 1 euro to 1,936.27 lire.

(2) Price in euros converted into lire at the approximate conversion rate of 1 euro to 2,000 lire

3.7 Regression analysis

As a synthesis of the relationships between the price recalled and the other variables, and to test which variables remain significant when they are considered simultaneously, Table 7 reports the results of linear regressions of the pre-euro price recalled for the full cinema ticket against a set of variables derived from the other questions. Given that the pre-euro price recalled did not differ significantly with the currency in which it was expressed, we considered both the answers to the standard questionnaire (pre-euro price recalled in lire) and those to the alternative questionnaire (pre-euro price recalled in euros). In any case, a dummy variable to control for the possible influence of the currency was also included.¹² All the coefficients have the expected signs. Among the variables that were significantly related to the correctness of recall according to the bivariate analysis (Section 3.2), the coefficients of frequency of movie-going and of perceived inflation – considering either the two years following the changeover or the combined score variable that sums the responses for the two periods – are both significantly different from zero. The coefficient of age is also significantly different from zero, while the coefficient of agreement with the statement “1 euro = 1,000 lire” and of the habits on conversion are not significantly different from zero. For the latter variable, this probably reflects a correlation with age. Older respondents, whose recall is less accurate, are more inclined to mental conversion than younger participants (a significant correlation, $r(145) = 0.20$ $p < 0.05$, was found between age and reported habits on mental conversion). The coefficient for the euro/lire dummy variable is not significantly different from zero, confirming the results reported in Section 3.5.¹³

4. Discussion

The main results described in Section 3 show that most participants had highly inaccurate memory of pre-euro prices in lire. An overwhelming majority indicated prices for the full ticket that were non-existent or in effect in just a few cinemas in the months preceding the launch of the euro, while very few respondents reported prices that can be deemed correct. The prices recalled date to a period long before the changeover – as far back as 1987, in fact. The results for the reduced price were similar, which is particularly interesting considering that this price had been unvaried for almost four years at the moment of the changeover.

Overall these results suggest that the consumers’ common claim that they can properly compare present and pre-euro prices is likely to be less than well-founded. This conclusion is strengthened by our finding that the accuracy of price recall is no better among respondents who claim a precise recall than among those who claim only a vague memory. Many consumers, one could conclude, cannot judge the actual precision of their price recall and are overconfident about its quality.

¹² Each variable was assigned a value from 1 and 5 (or 6) according to the sequence of possible answers to the respective question, as reported in Table A1. The exceptions are the regressors “age”, included as collected in the questionnaire, and “recall for the year of the euro launch”, which takes value 0 or 1 depending on whether the answer is wrong or right (assigning to this variable a score that depends on the difference between the answer and 2002 yields similar results). A dummy variable is included for the currency in which prices are recalled (lire or euros).

¹³ As a robustness test, and to capture possible nonlinear relationships, we also ran the regression with an alternative coding of the answers, i.e. 5 (or 6) dummy variables for each question, corresponding to the alternative answers to that question. The results were in line with those reported in Table 7: the coefficients were significantly different from zero only for some of the answers relating to frequency of movie-going, inflation perceptions and age.

Table 7. Summary regressions - dependent variable: recalled price for cinema tickets before the euro cash changeover (1)

Regression of recalled pre-euro cinema prices on other variables derived from the answers to the questionnaire, each variable being assigned a value from 1 to 5 (or 6) according to the sequence of possible answers, as reported in Table A1. The only exceptions are the regressors *age*, included as collected in the questionnaire, and *recall of the year of the euro launch*, which takes 0 for a wrong answer and 1 for right (results assigning a score that depends on the difference between the answer and 2002 are similar). A dummy variable is included for the currency in which prices are recalled (lire or euros). *, ** and *** indicate statistical significance at respectively 0.10, 0.05 and 0.01 levels.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|--|--|---|--|---|---|
| Recall for the year of the euro launch | <i>0.106</i> t = 1.380 p = 0.169 | <i>0.107</i> t = 1.401 p = 0.163 | <i>0.096</i> t = 1.250 p = 0.213 | <i>0.100</i> t = 1.255 p = 0.211 | <i>0.107</i> t = 1.361 p = 0.176 | |
| Frequency of cinema attendance | <i>0.136*</i> t = 1.738 p = 0.084 | <i>0.141 *</i> t = 1.815 p = 0.071 | <i>0.141 *</i> t = 1.826 p = 0.070 | <i>0.162 **</i> t = 1.982 p = 0.049 | <i>0.153 *</i> t = 1.898 p = 0.060 | <i>0.166**</i> t = 2.285 p = 0.024 |
| Mental conversion | <i>-0.109</i> t = -1.444 p = 0.151 | <i>-0.106</i> t = -1.416 p = 0.159 | <i>-0.091</i> t = -1.215 p = 0.226 | <i>-0.093</i> t = -1.184 p = 0.238 | <i>-0.056</i> t = -0.710 p = 0.479 | |
| Currency of response (lire/euro) | <i>-0.001</i> t = -0.013 p = 0.990 | <i>-0.015</i> t = -0.207 p = 0.837 | <i>-0.016</i> t = -0.219 p = 0.827 | <i>-0.024</i> t = -0.310 p = 0.757 | <i>-0.032</i> t = -0.414 p = 0.679 | |
| Inflation perception (2 years following the changeover) | | <i>-0.135 *</i> t = -1.814 p = 0.071 | | | | |
| Inflation perception (2 years following the changeover + last 2 years) | | | <i>-0.153 **</i> t = -2.043 p = 0.043 | <i>-0.135 *</i> t = -1.706 p = 0.090 | <i>-0.140 *</i> t = -1.792 p = 0.075 | <i>-0.172**</i> t = -2.383 p = 0.018 |
| Conversion 1000 lire = 1 euro | | | | <i>-0.003</i> t = -0.037 p = 0.970 | <i>-0.025</i> t = -0.326 p = 0.745 | |
| Expectations | | | | <i>-0.092</i> t = -1.158 p = 0.248 | <i>-0.077</i> t = -0.990 p = 0.324 | |
| General opinion on euro adoption | | | | <i>0.063</i> t = 0.814 p = 0.417 | <i>0.095</i> t = 1.223 p = 0.223 | |
| Age | | | | | <i>-0.197 **</i> t = -2.509 p = 0.013 | <i>-0.189***</i> t = -2.601 p = 0.010 |
| R-squared | 0.053 | 0.071 | 0.076 | 0.088 | 0.124 | 0.096 |
| Adjusted R-squared | 0.031 | 0.044 | 0.049 | 0.041 | 0.073 | 0.080 |

The distorted memory of the pre-euro price cannot apparently be ascribed simply to the length of time that has passed, since memory for prices in 2003 is also quite poor. This suggests that the difficulty in retrieving prices from the past is not specific to the changeover period, although in this case the difference between memory and reality is somewhat smaller than for the pre-euro price. We are planning a study in an EU country that has not adopted the euro, to test price memory over the same span of time unaffected by the currency changeover.

The results from the alternative questionnaire indicate that asking respondents to express the pre-euro price in euros rather than in lire was not enough to stimulate them to compare their answer to the present price and reflect better on the variation implied by the recalled price.

The great discrepancy between the cinema prices recalled and the prices actually in effect before the launch of the euro suggests, *prima facie*, that poor memory could be a relevant factor in explaining individual inflation perceptions. In our study, the recall for the pre-euro period would imply a 50 to 90 per cent rise in cinema prices (depending on whether we consider the mean or the mode) over four and a half years, as against the actual increase of about 5 per cent.

There is a relationship between the price recalled and the general inflation perception (the individual's opinion on the rate of change of the aggregate price level): respondents who perceive higher and more persistent inflation had on average a more inaccurate recall of pre-euro cinema prices.

However, these results must be interpreted with caution. In the first place, the study was conducted in 2006, while the leap in inflation perceptions, in Italy as in other euro-area countries, came in the two years immediately following the changeover. Although we asked separate questions for the post-changeover period and for the more recent period, we are aware that retrospective answers require very careful interpretation. Moreover, it would be hazardous to draw general conclusions on the relation between the individual perception about inflation (i.e. the rate of change in the aggregate price level) and individual price memory from the recalled price of a single item. More evidence is needed, and we plan to conduct further analysis on a range of products and different time spans.

An interesting finding is that the mode of the price recalled – 7,000 lire for the full price and 5,000 lire for the reduced price – corresponds to the mode of the prices prevailing when we conducted the study (7 and 5 euros, respectively) converted at a rate of 1,000 lire. This result suggests the possibility of a back-causation from the fairly widespread conviction that most prices have been converted at a rate of 1,000 lire to 1 euro to the “recall” of a price in lire that corresponds to that belief. Yet, the answers to the question that investigates this belief directly – asking whether the respondent agrees with the statement “What cost 1,000 lire before the introduction of the euro now costs 1 euro” – do not provide a clear indication in this regard. They do show that this opinion is widely shared, and respondents who strongly agree with the statement recall a price that is lower than that recalled, on average, by the other participants. But in multivariate analysis the correlation between the price recalled and the answer to this specific question is not significant. Moreover, unexpectedly, the mode of the price recalled is the same (7,000 lire) for those who strongly agree with the statement and for the few respondents who strongly disagree. While this recall of the pre-euro price – though completely wrong – is perfectly consistent with the belief of the former group, it is difficult indeed to reconcile with the belief of the latter. This inconsistency might be explained to some extent by the fact that we asked participants to express their agreement with a general statement while the memory for prices is measured for the price of cinema tickets only. In principle, we cannot exclude that some respondents considered the statement to be false in

general, but with some exceptions including the price of cinema. However, this result might also suggest difficulty for some respondents in relating the memory for single prices and the assessment on the rate of change of these prices, or more generally of the rate of change of the overall price level.

Another relevant result, in the light of the literature briefly discussed in the Introduction, is that the accuracy of price recall is significantly affected by the frequency of cinema attendance. This suggests that the more frequently they buy items, the better is consumers' memory for prices. This in turn is consistent with the empirical evidence that inflation perceptions are affected disproportionately by the price rises of the goods that are purchased most frequently.

The finding of no significant relationship between prices recalled and attitudes toward the euro (considering both the expectations for prices and the present opinion on the overall effect of the euro for Italy) suggests that these factors did not count much in orienting the memory of prices.¹⁴

The relationship between age and price recall is consistent with the existing literature, showing a progressive age-related decline in various systems of memory (Craik *et al.* 1990, Cockburn and Smith 1991, Baddeley 1999). In this regard, an interesting study is Aalto-Setälä and Rajas (2003), showing a decline in the ability to estimate prices after the euro changeover among Finnish consumers aged above fifty years.

Finally, while explaining such very bad price memory is beyond the scope of this paper, some possible explanations, in addition to the specific factors considered so far, can be usefully discussed on the basis of the cognitive literature on memory.¹⁵

One possible explanation of incorrect recall is that the price was not encoded (i.e. stored in memory for later retrieval) in the first place. Price knowledge surveys conducted in stores show a surprisingly low level of price knowledge. Dickson and Sawyer (1990) found that only 56 per cent of the respondents knew the price of an item they had just placed in their shopping cart.

Alternatively, the price could have been encoded but no longer present in the subject's long-term memory. The trace could have been removed by proactive inhibition (earlier memories supplanting more recent ones; Underwood 1957) or retroactive interference (forgetting old information due to new information; McGeoch and McDonald 1931, Slamecka 1960). Due to price variation both in time and across locations and sales points, interference is clearly at work on most prices. In our case of cinema tickets, this effect should not be large, as prices were quite stable both in the years preceding the changeover and in the following years and also quite uniform (on 8 December 2001 only four different prices were charged by at least 10 per cent of movie theatres; Figure 1). However, as noted above, the mode of the recalled prices in lire and that of the prices in euro prevailing at the time of the study have a feature in common, namely the prominence of the number 7 for the full ticket and of the number 5 for the reduced one. Therefore, we cannot rule out retroactive interference of the

¹⁴ Naturally, participants' accounts of the expectations they had had before the launch of the euro is subject to the standard objections to all retrospective answers. However, the answers in this study are as a whole consistent with the results of the consumer surveys conducted before the changeover (European Commission 2001), according to which the expectation of strong price increases was less common in Italy than in other euro-area countries, in particular Germany (the country considered by Traut-Mattausch *et al.* 2004).

¹⁵ This discussion takes into account the interdisciplinary character of the paper and the wide interest in the questions it treats. We have therefore tried to minimize or explain specialized language, so as to make this section accessible to both economists and psychologists and, as far as possible, to laymen.

price of the cinema ticket in euro at the time of the survey (7 and 5 euros) with the price recalled (7,000 and 5,000 lire).

A third possibility is that the price is still stored in long-term memory but for some reason cannot be retrieved. A lack of contextual information might explain the difficulty in retrieving the correct price (Tulving 1983), although, following Vanhuele and Drèze (2002), the test was conducted inside movie theatres in order to maximise contextual cues.

Lastly, given that prices have different types of representation in memory (Dehaene 1992 classifies them as auditory verbal code, visual Arabic code, and approximate quantities on a dimension termed number line), one could argue that price recall was influenced by the way in which we have measured price knowledge (see Monroe, Powell and Choudhury 1986). However, most studies investigating memory for price information have focused on recall and this is the main reason why we chose this for the present study. Recall was used instead of recognition also to avoid providing respondents with any information regarding the magnitude of prices in the period considered.

Further research, possibly including experimental work, will help elucidate which of the above memory mechanisms may best explain our results.

5. Summary and conclusions

This study investigated the memory for pre-euro cinema prices, submitting questionnaires to members of the public in movie theatres in Rome. The results show that the prices recalled are much lower than the actual prices that were in effect before the euro cash changeover. In the case of the full ticket, the mode and the mean are 7,000 and 9,000 lire, respectively, compared to the actual price in December 2001 of 13,000 lire at most theatres in Rome. The prices recalled date to a period long before the changeover, indeed as early as 1987. Similar results are obtained for the price of the reduced ticket offered on Wednesdays by most theatres: the mode of the price recalled is 5,000 lire, compared to the actual price of 8,000 lire, which is particularly striking considering that at the time of the changeover this price had been unchanged for almost four years.

Overall, the results suggest that people have highly distorted memories for prices and that the claim of many consumers that they can properly compare present prices with those in being before the introduction of the euro is likely to be less well-founded than they may believe. This conclusion is strengthened by our finding that the quality of price recall is not better for respondents claiming precise recall than for those admitting to having a vague memory, which suggests that many respondents are unaware of the real degree of accuracy of their price recall and overconfident about its quality.

It appears that the distorted memory for the price in 2001 cannot be ascribed simply to amount of time that has elapsed, since memory for the 2003 prices also appears to be quite poor. The results on the 2003 price suggest that the respondents' difficulty in retrieving prices is not specific to the changeover period, although the difference between the price recalled and the actual price is smaller than for the pre-euro price.

A significant relationship is found between the price recalled and subjects' individual inflation perceptions, measured by the assessments of the rate of change of the general price level in the two years following the changeover and in the two years preceding the study. Price recall is less accurate for those who perceive higher and more persistent inflation.

An interesting result is that the mode of the pre-euro price recalled for both full and reduced tickets corresponds to the actual prices at the time of the study (7 and 5 euros

respectively) converted at a rate of 1,000 lire to 1 euro (compared to the official conversion rate of almost 2,000 lire). While this suggests the possibility of a back-causation from the belief that most prices were converted at that rate to a consequent “recall”, the answers to the question specifically investigating that belief do not provide clear indications in this regard.

Finally, price recall is more inaccurate for older respondents, and improves with the frequency of movie-going. The latter result is consistent with the hypothesis that consumers have a better memory for prices the more frequently they buy an item and with the empirical evidence that inflation perceptions are disproportionately affected by the prices of the products that are bought most frequently.

All in all, this paper provides a neat case study. A caveat, however, is essential. While the choice of the item and the size and composition of the sample are appropriate for the objective of the paper, excessive generalization in interpreting the results is unwarranted. In particular, although we find a relationship between the inaccuracy of price recall and individual opinions on inflation, we do not claim that this alone explains the Italian consumers’ perception of a surge in inflation following the cash changeover, because of the long time between that event and the study and the fact that only a single price is considered. Nor do we believe that our results imply that the perception of a process of impoverishment on the part of some categories of consumers is due only to inaccurate memory for past prices or other psychological factors, as the perception may also reflect real factors affecting one’s economic situation – not necessarily related to consumer price inflation but hard to distinguish from it – such as large price increases in items not included or only partially covered in the official index (owner-occupied housing being the main example), modest average increases in real incomes and distributive changes across socio-economic groups, as argued by Boeri and Brandolini (2004) and Del Giovane and Sabbatini (2006).

Appendix 1: Standard Questionnaire (English translation)

1) Could you tell us what was the price in Lire for the full cinema ticket (in a movie theatre showing newly released movies similar to this one) in the period immediately preceding the euro cash changeover?

Price in Lire:.....

2) What was the price for the reduced ticket in that period (Wednesday evening)?

Price in Lire:.....

3) Your answers are yielded from:

- A recall of the old price in lire
- A mental calculation based upon the present price in euro
- Other (please specify).....

4) If your answers were based upon a recall of the price in lire, please specify which type of recall:

- A precise recall of the price
- A precise recall linked to an action (for instance taking the money from your wallet)
- A precise recall linked to a specific event
- A vague memory
- Other (please specify)

5) Roughly how frequently did you go to the movies in the period preceding the euro cash changeover?

- Less than once in 2 months
- Once in 2 months
- Once a month
- Twice or three times a month
- Once a week
- Twice or more a week

6) How frequently do you go to the movies now?

- Less than once in 2 months
- Once in 2 months
- Once a month
- Twice or three times a month
- Once a week
- Twice or more a week

7) If the frequency with which you go to the movies has increased/decreased between the two periods, what is this change due to? (do not answer unless frequency has changed)

- Changes in my personal/family situation
- Changes in my financial position
- Changes in the cinema ticket price
- Alternatives to going to the movies (DVD, Pay-TV)
- Other (please specify)

8) Do you remember at the beginning of which year the euro cash changeover took place?

.....

9) In your opinion, in the 2 years that followed the introduction of the euro banknotes and coins, prices of goods consumed by Italian families have on average:

- Fallen
- Stayed about the same
- Risen slightly
- Risen moderately
- Risen a lot
- Don't know

10) In your opinion, in the last 2 years, prices of goods consumed by Italian families have on average:

- Fallen
- Stayed about the same
- Risen slightly
- Risen moderately
- Risen a lot
- Don't know

11) In your daily shopping how do you do to estimate how much you spend?

- I always think in euros
- I rarely convert into lire
- I sometimes convert into lire
- I often convert into lire
- I always convert into lire
- Don't know

12) Before the euro cash changeover, you expected that the euro would cause:

- A sharp decrease in prices
- A moderate decrease in prices
- Neither an increase nor a decrease in prices
- A moderate increase in prices
- A sharp increase in prices
- Don't know

13) In your opinion, overall for Italy the adoption of the euro has been:

- Very disadvantageous
- Rather disadvantageous
- Neither disadvantageous nor advantageous
- Rather advantageous
- Very advantageous
- Don't know

14) What is your degree of agreement with the statement "What cost 1,000 lire before the introduction of the euro now costs 1 euro" :

- Strongly disagree
- Partially disagree
- Neither agree nor disagree
- Partially agree
- Strongly agree
- Don't know

Questions on gender, age, education and occupation (not included here) completed the questionnaire

Appendix 2: Descriptive statistics

Table A1

| | | Precision of recall | | | | | | |
|---|--------|---|-----------------------------------|---|--------------------------------|----------------------------|----------------------------------|---------|
| | | Precise | Precise, linked to action | Precise, linked to specific event | Vague | Don't know | | |
| | | (n=36) | (n=13) | (n=3) | (n=80) | (n=3) | (n=135) | |
| full | mean | 9500 | 7692 | 11667 | 9125 | 7000 | 9096 | |
| | median | 9000 | 8000 | 11000 | 8000 | 7000 | 8000 | |
| | mode | 7000 | 8000 | 10000 | 7000 | 7000 | 7000 | |
| reduced | mean | 5819 | 4538 | 5000 | 5663 | 5000 | 5567 | |
| | median | 5000 | 4000 | 5000 | 5000 | 5000 | 5000 | |
| | mode | 5000 | 3000 | 5000 | 5000 | 4000 | 5000 | |
| Recall of the year of the euro cash changeover | | | | | | | | |
| | | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
| | | (n=2) | (n=20) | (n=48) | (n=68) | (n=7) | (n=1) | (n=146) |
| full | mean | 6500 | 8700 | 8917 | 9419 | 7571 | 7000 | 9010 |
| | median | 6500 | 8000 | 8000 | 9000 | 7000 | 7000 | 8000 |
| | mode | 6000 | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 |
| reduced | mean | 4000 | 5225 | 5365 | 5799 | 5429 | 4000 | 5521 |
| | median | 4000 | 5000 | 5000 | 5000 | 5000 | 4000 | 5000 |
| | mode | 3000 | 5000 | 5000 | 5000 | 5000 | 4000 | 5000 |
| Habits on mental conversion to lire | | | | | | | | |
| | | Always think in euro (f=50) | Convert Rarely (f=22) | Convert sometimes (f=38) | Convert often (f=32) | Convert always (f=7) | | (f=149) |
| full | mean | 9360 | 9545 | 8526 | 8703 | 8429 | 8990 | |
| | median | 8500 | 10000 | 8000 | 8000 | 7000 | 8000 | |
| | mode | 7000 | 7000 | 7000 | 7000 | 7000 | 7000 | |
| reduced | mean | 5740 | 5932 | 5184 | 5452 | 4857 | 5524 | |
| | median | 5000 | 5500 | 5000 | 5000 | 5000 | 5000 | |
| | mode | 5000 | 5000 | 5000 | 5000 | 4000 | 5000 | |
| Frequency of movie-going before the euro | | | | | | | | |
| | | Less than once in 2 months (n=15) | Once in 2 months (n=15) | Once a month (n=35) | 2-3 times a month (n=54) | Once a week (n=25) | Twice or more a week (n=6) | (n=150) |
| full | mean | 8667 | 8200 | 8486 | 9176 | 9440 | 11333 | 8997 |
| | median | 7000 | 7000 | 8000 | 8000 | 10000 | 12500 | 8000 |
| | mode | 7000 | 7000 | 7000 | 7000 | 10000 | 14000 | 7000 |
| reduced | mean | 5267 | 5214 | 5329 | 5620 | 5700 | 6667 | 5534 |
| | median | 5000 | 5000 | 5000 | 5000 | 5000 | 7000 | 5000 |
| | mode | 3000 | 5000 | 5000 | 5000 | 5000 | 5000 | 5000 |
| Perceived change in prices in the two years following the changeover | | | | | | | | |
| Price | | Fallen (n=1) | Stayed about the same (n=3) | Risen slightly (n=8) | Risen moderately (n=46) | Risen a lot (n=92) | Total (n=150) | |
| full | mean | 12000 | 10667 | 9500 | 8957 | 8886 | 8997 | |
| | median | 12000 | 10000 | 10000 | 8000 | 8000 | 8000 | |
| | mode | 12000 | 10000 | 10000 | 8000 | 7000 | 7000 | |
| reduced | mean | 6000 | 8000 | 5688 | 5344 | 5527 | 5534 | |
| | median | 6000 | 7000 | 5500 | 5000 | 5000 | 5000 | |
| | mode | 6000 | 7000 | 5000 | 5000 | 5000 | 5000 | |

| | | Perceived change in prices in the last two years | | | | | |
|-------------------|--------|--|------------------------------------|--|--------------------------------|-----------------------------|------------------|
| | | Fallen (n=0) | Stayed about the same (n=11) | Risen slightly (n=33) | Risen moderately (n=49) | Risen a lot (n=55) | (n=148) |
| full | mean | - | 9091 | 9682 | 9143 | 8455 | 9003 |
| | median | - | 8000 | 10000 | 8000 | 7500 | 8000 |
| | mode | - | 7000 | 12000 | 7000 | 7000 | 7000 |
| reduced | mean | - | 5318 | 5939 | 5646 | 5164 | 5507 |
| | median | - | 5000 | 7000 | 5000 | 5000 | 5000 |
| | mode | - | 5000 | 7000 | 5000 | 5000 | 5000 |
| | | Degree of agreement with the statement "1,000 lire equal to 1 euro" | | | | | |
| | | Strongly disagree (n=22) | Partially disagree (n=8) | Neither agree nor disagree (n=5) | Partially agree (n=47) | Strongly agree (n=68) | (n=150) |
| full | mean | 8841 | 9125 | 11600 | 9340 | 8603 | 8997 |
| | median | 8000 | 9000 | 12000 | 10000 | 8000 | 8000 |
| | mode | 7000 | 7000 | 12000 | 7000 | 7000 | 7000 |
| reduced | mean | 5114 | 5875 | 7600 | 5745 | 5328 | 5534 |
| | median | 5000 | 5500 | 7000 | 5000 | 5000 | 5000 |
| | mode | 5000 | 4000 | 7000 | 5000 | 5000 | 5000 |
| | | Expected effect on prices of the euro introduction | | | | | |
| Recalled Price | | Sharp decrease (f=1) | Moderate decrease (f=2) | Neither increase nor decrease (f=80) | Moderate increase (f=45) | Sharp increase (f=10) | Total (f=138) |
| full | mean | 14000 | 9500 | 9094 | 9167 | 7850 | 9069 |
| | median | 14000 | 9500 | 8000 | 8000 | 7250 | 8000 |
| | mode | 8000 | 7000 | 7000 | 7000 | 7000 | 7000 |
| reduced | mean | 8000 | 6000 | 5722 | 5300 | 4900 | 5544 |
| | median | 8000 | 6000 | 5000 | 5000 | 5000 | 5000 |
| | mode | 8000 | 4000 | 5000 | 5000 | 5000 | 5000 |
| | | Opinion on the overall effect of the euro adoption for Italy | | | | | |
| | | Very disadvant. (f=18) | Rather disadvant. (f=39) | Neither disadv. nor advant. (f=17) | Rather advant. (f=46) | Very advant. (f=22) | (f=142) |
| full | mean | 8722 | 8962 | 8824 | 9348 | 9000 | 9046 |
| | median | 8000 | 8000 | 8000 | 8000 | 8000 | 8000 |
| | mode | 7000 | 7000 | 8000 | 7000 | 7000 | 7000 |
| reduced | mean | 5639 | 5303 | 5265 | 5902 | 5591 | 5582 |
| | median | 5000 | 5000 | 5000 | 5000 | 5500 | 5000 |
| | mode | 5000 | 5000 | 5000 | 5000 | 5000 | 5000 |

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