

Perceived Inflation in Austria – Extent, Explanations, Effects

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In the euro area countries, the euro cash changeover was accompanied by the development of a significant gap between actual inflation – as measured by the Harmonised Index of Consumer Prices (HICP) – and the inflation perceived by the general public; in Austria, this difference was temporarily up to 1.9 percentage points.

The present study shows that the difference in question can in part be attributed to the fact that people's perception of inflation seems to be based mainly on the prices of goods they buy frequently, whereas official price indices also take into account goods that are purchased less often. According to recent hypotheses on perceived inflation (Brachinger, 2005a), the public furthermore perceives price increases more strongly than price reductions. Since the prices of frequently bought goods rose faster after the cash changeover than those of rarely purchased goods, and a higher (unweighted) share of goods became more expensive, people may have perceived the general price rise to have been more pronounced than it actually was. This perception seems to have been reinforced by the fact that consumers expected prices to rise as a result of the euro cash changeover and that they used outdated schilling reference prices when assessing prices in euro. Moreover, the initial lack of psychological prices may have made it more difficult for consumers to become used to prices in euro.

Perceived inflation proved to be unexpectedly persistent: It was not until the beginning of 2005 that the gap between perceived inflation and actual inflation was more or less closed. Since then, the close link between actual and perceived inflation that was prevalent before the euro cash changeover seems to have gradually resurfaced. The fact that the above-mentioned gap opened up again in the middle of 2005 can probably be explained by the sharp increase in oil prices.

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Keywords: inflation, perceived inflation.

1 Introduction

As in many other euro area countries, the euro cash changeover in Austria was accompanied by considerable complaints about – what was perceived to be – marked price increases. However, HICP inflation, which was 1.8% in 2002 and 1.3% in 2003, points to only modest price developments. Obviously, the euro cash changeover caused a divergence between perceived inflation and actual inflation.

The present study deals with this divergence and analyzes it from various perspectives, focusing on the following questions: What is the degree of inflation perceived by the general public? In this context, we discuss an index of perceived inflation, inflation estimates taken directly from public surveys, and the development of various price indices over time. At the same time, we examine the degree of perceived inflation in Austria in an international con-

text. Another interesting question is how perceived inflation has developed over time: Three and a half years after the introduction of euro cash, is perceived inflation still high or has it begun to approach the statistically measured inflation rate again?

Given that perceived inflation did not correspond to actual inflation, one must ask what caused this divergence. There is scientific evidence that the price changes perceived by consumers differ from those recorded by official inflation statistics. In the case of the euro cash changeover, this discrepancy may have been reinforced by special factors, such as the initial lack of a good feel for the euro's value and consumers' expectation that prices would increase. We discuss these factors, supporting our argumentation with empirical results from Austria. The latter are based on prices of individual items recorded by Statistics Aus-

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tria and on survey data derived from the monthly *Consumer Confidence Barometer* of the European Commission and a survey on perceived inflation involving 2,000 Austrian citizens, which was carried out on behalf of the OeNB in the summer of 2004 (FESSEL-GfK, 2004). The data collected by FESSEL-GfK in particular facilitates a detailed analysis of the extent to which Austrians perceived price rises in the course of the cash changeover and of the factors which influence the subjective perception of inflation.

In a further section, the effects on monetary policy are evaluated, particular emphasis being placed on the im-

pact of perceived inflation on inflation expectations. Furthermore, we examine the degree of public confidence in different price measures.

The idea that the euro cash changeover caused general price increases is still widespread among the public. In this context, we would like to point out that it is not the aim of this study to disprove consumers' perception of inflation – in a sense, subjective perceptions are always “right.” What our paper aims to do is to give a comprehensive account of the phenomenon perceived inflation, and to examine it in connection with the statistically measured inflation rate.

Box 1

Definition of Inflation-Related Terms Used in This Study

Glossary

In the present study, several inflation-related terms are used. This box presents definitions of these terms and relevant synonyms.

Actual inflation: inflation as measured by the Harmonised Index of Consumer Prices (HICP), which is calculated and published monthly by Statistics Austria. The HICP is defined by EU regulations and based on price index methods. In some cases, however, this study uses the inflation rate based on the national consumer price index (CPI), which – methodologically speaking – somewhat differs from the HICP (for instance for defining special baskets of goods and services, such as mini and micro baskets).

Synonyms used in this study: HICP inflation, statistically measured inflation rate.

Perceived inflation: the subjective perception of price changes by the general public. This perception is influenced by several factors (general psychological phenomena and/or special circumstances, as in the case of the euro cash changeover), which makes it difficult to quantify it. In assessing the development of perceived inflation, analysts currently rely on results gained from the Consumer Confidence Barometer surveys of the European Commission. The latter are carried out every month and include all EU Member States, thus enabling an international comparison. Usually, the percentage balance between respondents stating that prices have risen and those who believe prices have fallen serves as a basis for calculation in this context. Alternatively, perceived inflation may be estimated from survey results. This process is, however, subject to restrictive assumptions.

Index of perceived inflation: a special type of index developed by Brachinger (2005a) which combines elements of price index theory with prospect theory. Related empirical results for Germany will be available soon.

Expected inflation: estimates of price developments in a certain period of time (which usually covers the 12 upcoming months). Similar to perceived inflation, expected inflation cannot be measured directly; it has to be derived from various sources. The present study uses results from the Consumer Confidence Barometer surveys of the European Commission to estimate expected inflation rates. These surveys are based on representative samples and reflect the estimates of the general public.

Synonyms used in this study: expected inflation rate, inflation expectations.

2 Euro Cash Changeover Causes High Perceived Inflation

2.1 Austria's EU Accession and the Euro Cash Changeover "Distort" Inflation Perception

The difference between perceived inflation in Austria and actual inflation as measured by Statistics Austria is shown in chart 1.² A long-term comparison makes it possible to identify three distinct phases in the development of perceived inflation:

- *Low perceived inflation at the time of and after Austria's EU accession:* From 1995 to mid-1997, the inflation rate perceived by Austria's general public was below HICP inflation. This may have been due to the fact that EU accession and integration into the Single Market – supported by scientific opinions and comprehensive information campaigns in the media – led people to expect falling prices or at least reduced price increases. Indeed, price cuts did take place, in particular for agricultural and food products, i.e. products which are frequently bought but cover only around 20% of the consumer price basket (Fluch and Rumler, 2005). In other sectors of the economy, however, such significant price changes did not take place.
- *Roughly parallel development between mid-1997 and 2002:* From 1997 to around 1999, perceived inflation and actual inflation were virtually the same. At the turn of the millennium, perceived inflation

was again lower than the statistically measured inflation rate. This may be attributable to the liberalization of several formerly protected markets. The telecommunications sector, for instance, was opened up at the time, which brought about noticeable price reductions for households.

- *Euro cash changeover increases perceived inflation:* The introduction of euro cash produced fundamental changes in the previously parallel development of perceived and actual inflation. A gap began to develop in February 2002 and did not start to narrow again until the end of 2004, when HICP inflation in Austria was increasing. By February 2005, the difference had dropped to below 0.5 percentage point. Then, perceived inflation rose again, which was probably linked to the strong oil price increases.³

The fact that the increase in perceived inflation at the beginning of 2002 and the introduction of euro cash were linked is evident from survey data. A survey conducted in the summer of 2004 shows that 57% of respondents thought that "many" products were more expensive than two or three years before and 35% thought the same was true for "some" products. A mere 7% thought that no price changes or price reductions had taken place (FESSEL-GfK, 2004). Asked for possible reasons, 59% of those stating that prices had increased answered that this development had been caused by the euro cash changeover. Approximately

² If not stated otherwise, this analysis uses HICP inflation, i.e. the relevant inflation rate from the monetary policy point of view (see also box 1 for the definition of inflation-related terms). The rate of perceived inflation used here is based on survey results obtained from the European Commission's Consumer Confidence Barometer.

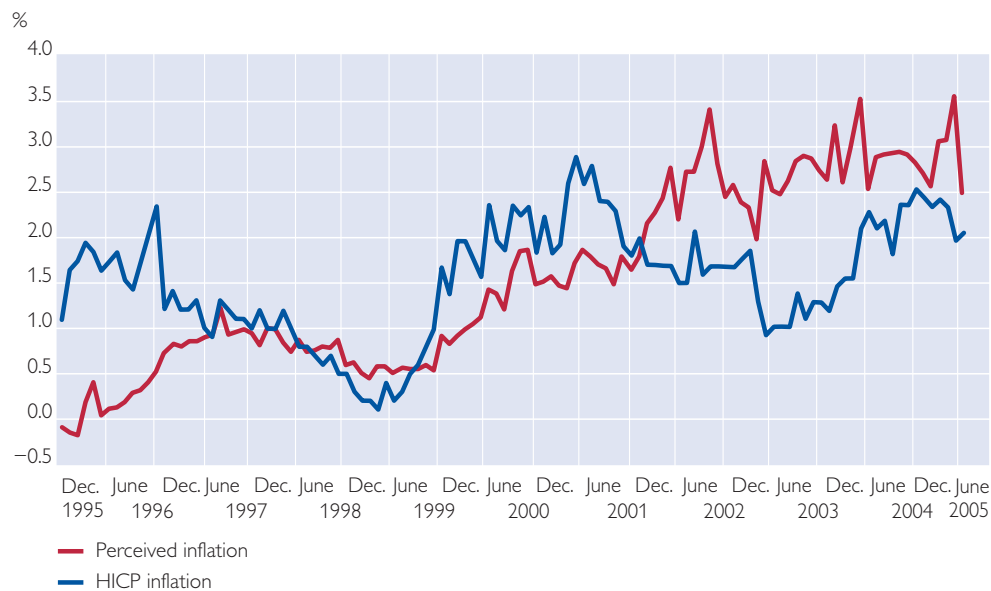
³ The correlation between the product group entitled "liquid fuels and fuels and lubricants for personal transport equipment" and perceived inflation has been approximately 0.37 since January 2002. A similar positive correlation can be observed for services related to housing and in the electricity and gas sector, all of which have been subject to considerable price increases.

8% blamed economic policy, whereas 7% and 6% held the EU (enlargement) and the economy responsible, respec-

tively. Increasing raw material prices were cited by another 5%.

Chart 1

Perceived and Actual Inflation in Austria



Source: Consumer Confidence Barometer of the European Commission, Statistics Austria.

Note: The perceived inflation levels indicated in this chart have been derived from surveys carried out among Austrian households. See box 2 for a detailed discussion of the methodology used.

2.2 Other EMU Members Also Experience Gap between Perceived and Actual Inflation

The association of price increases with the euro cash changeover is not specific to Austria. According to the results of an ongoing international survey carried out by the European Commission, consumers in other EU Member States, too, think that the euro cash changeover had a negative effect on price developments. In spite of low HICP inflation rates throughout the Economic and Monetary Union (EMU), perceived inflation was high in all countries participating in Stage Three of EMU; some of them experienced a gap between perceived and

actual inflation that was much wider than that in Austria.

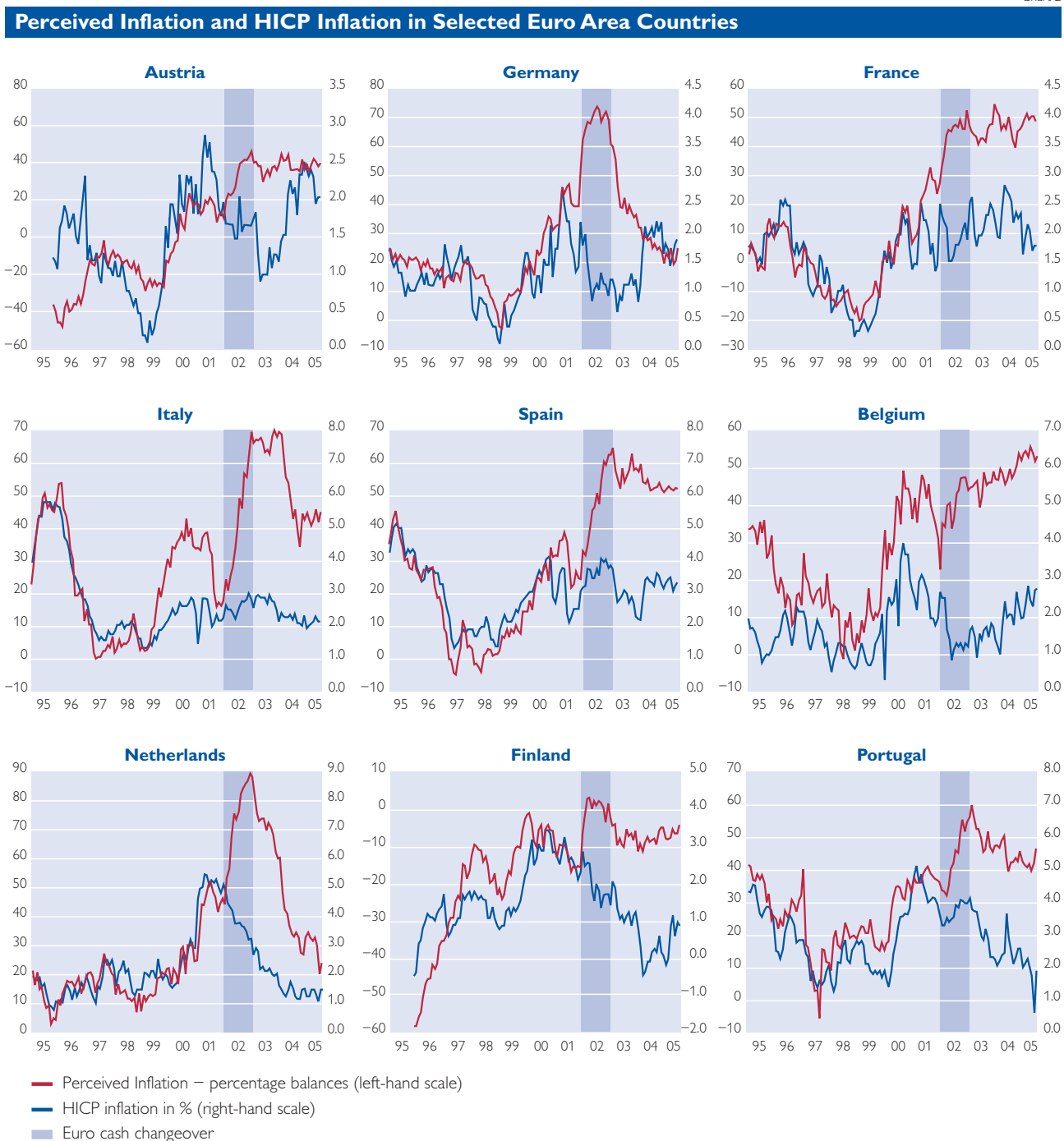
Chart 2 shows the difference between the share of respondents stating that prices have risen over the last 12 months and the share of respondents stating that prices have fallen or remained unchanged over the same period.⁴ At the beginning of 2002, this difference increased in all EU Member States, indicating that consumers who perceived price increases by far outnumbered those perceiving price reductions. In all Member States except for France, Italy and Belgium, the difference in question peaked in late 2002. By contrast, HICP inflation in-

⁴ Thus, a value of 40, as observed in Austria at the end of 2002, means that the share of those stating prices have risen is 40 percentage points higher than the share of those stating prices have not risen.

creased only slightly at the beginning of 2002 and, in many Member States, it was lower during 2003 than prior to the introduction of euro cash.

Latest survey results show that the gap has narrowed in Austria, Germany, the Netherlands and Italy. It has, however, persisted in other Member States.

Chart 2



Source: Consumer Confidence Barometer of the European Commission (seasonally adjusted), OeNB.

Note: The chart provides a summary of monthly survey results regarding perceived inflation and annual HICP inflation developments. The measure used for perceived inflation is the percentage balance between respondents stating that prices have risen and those who believe that prices have fallen.

How are Actual and Perceived Inflation Measured?

Consumers constantly perceive price signals that they process and translate into their individual perception of inflation, consciously or unconsciously using additional information (produced, for instance, by the media or expectations). This means that all consumers perceive their own rate of inflation which is characterized by personal experience. There are different ways of aggregating the multitude of individually perceived inflation rates in order to arrive at a measure of the inflation rate perceived by the general public.

One possibility of measuring perceived inflation consists in calculating the percentage balance between survey respondents stating that prices have risen and those stating the opposite. In Austria, perceived inflation is estimated from the results of the Consumer Confidence Barometer, a survey commissioned by the European Commission. In this survey, 1,500 people are questioned about price developments over the last and in the upcoming 12 months. The data and results are published on the website of the European Commission.⁵

The exact wording of the pertinent question is: “How do you think that consumer prices have developed over the last 12 months?” The possible responses are that these have (a) “risen a lot,” (b) “risen moderately,” (c) “risen slightly,” (d) “stayed about the same,” (e) “fallen,” (f) “don’t know.”

Answers (a) and (e) indicate significant price changes, while answers (b) and (d) imply modest changes in prices. When the percentage balance between the different answers is calculated, this fact is taken into account in the following way.

$$\text{balance} = \text{percentage (a)} + 0.5 \times \text{percentage (b)} - 0.5 \times \text{percentage (d)} - \text{percentage (e)}.$$

Thus, a value of 20 would indicate that the share of those who think prices have risen is 20 percentage points higher than the share of those who think the opposite. This measure was used in chart 2. A disadvantage of this method is the fact that the values derived cannot be directly compared with actual inflation. The development of the percentage balance over time only permits conclusions about trends in perceived inflation, such as: a growing number of citizens are perceiving price increases. Furthermore, it does not allow international comparisons. However, literature on this issue has revealed that one can convert survey data into a figure which can be compared directly with the statistically measured annual inflation rate. This measure is depicted in chart 1.

To be more precise, the estimate of the perceived annual inflation rate used here is based on Berk (1999) as well as Forsells and Kenny (2002), and thus on the assumption that the inflation rate perceived by people is normally distributed with a certain mean and a certain variance. It follows that the shares of different survey responses can be interpreted as probabilities. The proportion of certain responses (e.g. “fallen”) thus can be interpreted as the probability that perceived inflation is between certain upper and lower thresholds. Additionally assuming that these thresholds are symmetrically located around zero, one can, by means of the probabilities derived, derive the relation between the mean and the variance of the distribution in request. In order to calculate the mean of the distribution, one then has to assume that the mean of perceived inflation equals the mean of the statistically measured inflation rate. The mean of the distribution estimated in this way is interpreted as the inflation rate perceived by the general public. All in all, this estimation procedure depends on several assumptions, the plausibility of which may certainly be questioned.

As an alternative to the use of survey data, Brachinger (2005a) suggests to directly calculate a price index which is based on a methodology similar to that of existing price indices, but differs from the latter in that it expressly includes psychological factors surrounding perceived inflation.⁶ This innovative index has been calculated for Germany and will be published soon.

The table below summarizes the most significant characteristics of perceived inflation as derived from survey results which are available for all EU Member States.⁷ It has to be emphasized that perceived

⁵ See http://europa.eu.int/comm/economy_finance/indicators/businessandconsumersurveys_en.htm.

⁶ In Brachinger (2005a) both the theoretical framework and the methodological basis for the index of perceived inflation are discussed in detail.

⁷ It should be pointed out that the values given are based solely on the percentage balance between respondents stating that prices have risen and those indicating that prices have fallen in the European Commission’s Consumer Confidence Barometer. They do not take into account any elements of the index developed by Brachinger.

inflation is not measured, but estimated on the basis of surveys which, in turn, take as their starting point individual perceptions of inflation. These are usually formed during the act of buying and thus mainly concentrate on goods that are purchased on a daily basis in shops, most often near people's homes. Additionally, one can assume that the average consumer weights individual goods and services in a way that is different from that used in the HICP.

Actual and Perceived Inflation

Differences in Methodology

Criteria	HICP/CPI	Perceived inflation ¹⁾
Level	whole economy	individual consumer
Household	average household	individual household
Prices observed/ basket	about 800 representative goods and services	convenience goods
Region	20 Austrian towns and cities	local shops
Weighting	according to expenditure shares derived from consumer surveys and national accounts, expert advice	possibly according to the frequency of purchase
Price collection	about 40,000 per month	during the act of buying
Calculation	all price changes (weighted) translated into an index	based on surveys on the public's estimation of price developments over the last 12 months
Methodology	Laspeyres index, for HICP modified and translated into a chain index	weighted percentage balance between "prices have risen" and "prices have fallen" responses, conversion into perceived inflation rate
Use	established and widely used indicator for economics, economic statistics (monetary policy, wage policy)	monetary policy: estimates of inflation by consumers, inflation expectations
Availability	published monthly	monthly, published on the Internet
Public perception	press releases, contracts	consumers' purchases

Source: OeNB.

¹⁾ Based on the Consumer Confidence Barometer of the European Commission.

By contrast, the Austrian HICP and CPI are based on the budget of a representative household and its average expenditure for a wide range of currently some 800 goods and services.⁸ At regular intervals (at least every five years), the basket of goods is derived from comprehensive consumer surveys among about 7,000 households analyzing their expenditures over a one-year period. In order for possible distortions in expenditure-sensitive products (such as alcohol) to be adjusted, the plausibility of the data obtained in the surveys is checked against information from national accounts. Expert advice is also taken into account.

Based on the basket of goods and services, 40,000 prices of individual items – collected in about 3,500 shops in the 20 biggest Austrian towns and cities and centralized surveys by Statistics Austria – are processed and translated into an index that serves as a measure of inflation at the household level. Most importantly, each good or service is assigned a certain weight which is derived from its share in total household expenditure (= private consumption). In this context, not only goods that are consumed regularly and most often are taken into account, but also expenditures on durable goods (e.g. cars, personal computers, mobile phones or skis) as well as services (e.g. domestic and international travel, fees for after-school care or many types of insurances). Taken together, these items form a basket of goods and services representative for Austrian households, even if this basket – in this particular composition – is most probably not consumed by any individual household.⁹

⁸ For a detailed description of the Austrian CPI and HICP see Statistics Austria (2001).

⁹ The definition of special baskets for certain types of households and social groups is in principle possible. For example, a specific price index for pensioners is being created at the moment.

The rate of inflation derived from the HICP/CPI by official statistics is a crucial economic figure. It does not refer to individuals, but is an objective average value. Since the HICP is designed to capture macroeconomic developments of consumer prices, it is the central indicator for inflation developments and, consequently, monetary policy.

These methodological differences have a significant impact on the gap between HICP inflation and perceived inflation.

3 What Factors Fuel Perceived Inflation?

The question why perceived inflation may differ from the statistically measured inflation rate has most notably been dealt with by Brachinger, who, in his latest research work, has incorporated elements of *Prospect Theory* into a theory of perceived inflation (see Brachinger 2004, 2005a and 2005b). Brachinger puts forth the following hypotheses:

- Consumers perceive price changes more powerfully for goods they buy more frequently than for goods they buy less frequently.
- Price increases are perceived more powerfully than price reductions.

Besides these hypotheses of perceived inflation, there are also other explanatory approaches, which focus specifically on factors related to the euro cash changeover that may have had an additional impact on the perception of prices. These explanations are:

- The perception of inflation is distorted by expectations (Traut-Mattausch et al., 2004; Hofmann et al., 2005).
- The use of schilling reference prices reinforces perceived price increases (see e.g. Kamleitner et al., 2005).
- The initial lack of psychological prices made it more difficult for people to get a good feel for the euro's value and, at the same time,

reinforced the perception of price increases (see e.g. Kamleitner et al., 2005; Deutsche Bundesbank, 2004).

In the following, we will discuss these factors in detail, supporting our argumentation with empirical results from Austria. In the discussion below, a difference is made between general factors that always apply and factors which are specific to the euro cash changeover.

3.1 General Factors

3.1.1 Perceived Price Changes in Relation to the Frequency of Purchases

In the summer of 2004, Austrian survey participants were asked in which areas price increases had upset them the most; 21% of respondents named food, 17% said fuels, 13% cited hotels and restaurants, another 7% complained about convenience goods. Expenditures on other products, such as textiles or services (hairdresser, etc.), were named by a mere 3% of respondents (FESSEL-GfK, 2004).¹⁰ Significantly enough, frequently bought goods are often cited, whereas those purchased more rarely are hardly mentioned. Other studies on the gap between perceived inflation and actual inflation also regard convenience goods as the main reason for the divergence between perceived and actual inflation (ECB, 2003 and 2005).

¹⁰ The question asked was: "When you think of the past years, do you remember a situation in which you felt particularly irritated by higher prices? Do you recall what the product concerned was?" (Multiple responses were possible). In the present text, only some answers are cited.

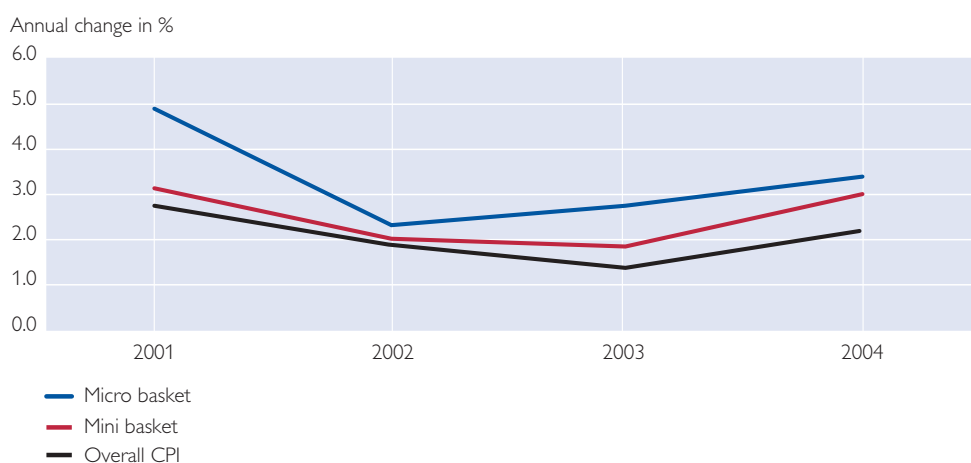
Brachinger (2005a) has utilized the findings of *Prospect Theory*, according to which the perception of economic facts depends on the form and framework in which they present themselves, and incorporated them into a measure of perceived inflation. Specifically, Brachinger (2005a) states that price changes are perceived during the act of buying; if goods are purchased more frequently, price changes will be noticed more often. Thus, the perception of changes in prices of products that are bought more regularly is more powerful than that of equal price changes for products that are purchased less frequently or paid via transfer from bank accounts (e.g. rents). This also implies that perceived inflation is higher at times when the prices of frequently bought items are rising faster than those of rarely bought products. This can be verified by price data on products available in Austria

that cover the time of the euro cash changeover.

Since there are hardly any data available that show how often households buy certain goods, the analysis concentrates on price changes in so-called mini and micro baskets. These represent goods and services purchased on a weekly and daily basis, respectively; the goods and services contained in the baskets were defined in a common effort by Statistics Austria and an expert panel (Haschka, 2004; Haschka and Schimper, 2005). The expenses on the contents of these baskets represent 16% (mini basket, weekly purchases) and 5% (micro basket, daily purchases) of the money spent on the entire basket that is used for measuring CPI inflation. For both mini and micro baskets, price developments from 2001 to 2004 have been calculated (chart 3).¹¹ Price developments for the individual goods included are shown in chart 8 (annex).

Chart 3

Inflation Rates for Frequently Bought Goods vs. Change in CPI



Source: Haschka and Schimper (2005).

¹¹ 2001 has been included, since even during the run-up to the euro cash changeover, noticeable price increases were recorded, in particular as regards goods purchased on a daily basis. This might to some extent be attributable to extraordinary factors, such as the BSE crisis or crop failures in Southern Europe.

The most important results may be summarized as follows:

- In the period under review (from 2001 to 2004) average annual inflation recorded for both the micro basket (+3.3%) and the mini basket (+2.5%) significantly exceeded the average CPI inflation rate (+2.0%).
- Both in the micro basket and the mini basket the majority of goods became more expensive.
- In the micro basket, only 2 out of 19 goods purchased on a daily basis were offered at a lower price after the euro cash changeover. In the mini basket, this was true for only 3 out of 55 observed products.
- Prices of 17 goods purchased on a daily basis and of 32 goods purchased on a weekly basis rose more sharply than the CPI; a quarter of these goods showed twofold to threefold price increases.

Thus, measured price increases of frequently purchased goods were above average. Since according to Brachinger's hypothesis consumers perceive inflation via regular purchases, these price increases are likely to leave a lasting impression, although the goods in question represent only a small part of the CPI basket of goods and services. Thus, a great part of perceived inflation may be attributable to this factor. In addition, goods/services whose prices used to be round figures in ATS, such as ATS 10, 50 or 100, now in many cases have round prices in EUR, such as EUR 1,5 or 10¹², which would imply an inflation rate of nearly 40%¹³.

Although not directly linked with the above hypothesis, an interesting

fact is that not only the prices of more frequently purchased goods increased, but that the overall share of goods affected by price rises was higher after the euro cash changeover than before. In concrete terms, during the period from 1999 to 2001, 70% of products became more expensive (9% of products remained more or less unchanged; 21% became cheaper). During the weeks leading up to the euro cash changeover and the weeks that followed (December 2001/January 2002), most prices remained unchanged: In Austria, 60% of prices (Fluch and Rumler, 2005) did not change at all in this period; among those 40% which did change, price increases and price reductions were equally distributed (table 1). Thus, if consumers observed only this brief period of time, there would be hardly any reason for perceived inflation to rise. Since, however, it takes much longer to "learn" new prices, these two months were not of essential importance to consumers. Prices perceived in the following months and years played a more crucial role. From a longer-term perspective it becomes evident that approximately 80% of those products permanently observed in the CPI basket of goods and services have become more expensive since the euro cash changeover; this share is even slightly higher for frequently purchased goods. The larger share of goods which have become more expensive since the euro cash changeover has probably also contributed to consumers' perception of a higher inflation rate.

¹² These include, for instance, small and modest donations, pocket money for children, repair services and the like provided e.g. in neighborly help or in private house construction.

¹³ Based on the following calculation: $ATS\ 100 = EUR\ 10 = ATS\ 137.603$, which equals an increase of 37.6%.

Table 1

Registered Price Changes in the CPI between 2001 and 2004		
2001 to 2004		
in the CPI basket containing about 620 goods and services		
482 became more expensive	78%	Extreme value: university fees: +1,577.2%
43 remained unchanged	7%	
93 became cheaper	15%	Extreme value: personal computer: –66.3%
in the mini basket containing 55 goods purchased on a weekly basis (16% of the CPI)		
48 became more expensive	87%	Extreme value: prescription charge: +26.0%
4 remained unchanged	7%	
3 became cheaper	6%	Extreme value: coffee beans: –18.7%
in the micro basket containing 19 goods purchased on a daily basis (5% of the CPI)		
17 became more expensive	89%	Extreme value: potatoes: +24.1%
0 remained unchanged	0%	
2 became cheaper	11%	Extreme value: lettuce: –2.1%
December 2001 to January 2002		
in the CPI basket containing about 620 goods and services		
became more expensive	20%	
remained unchanged	60%	
became cheaper	20%	

Source: OeNB, Statistics Austria.

3.1.2 Asymmetrical Perception of Price Developments Supports Higher Perceived Inflation

Based on the findings of *Prospect Theory*, Brachinger (2005a) puts forth the hypothesis that the perception of price changes is asymmetrical: As consumers have a loss aversion they perceive losses (price increases) more strongly than gains (price reductions).

Chart 4 illustrates the consequences of this effect (chart 4a), juxtaposing it with statistically measured inflation (chart 4b). While the official price in-

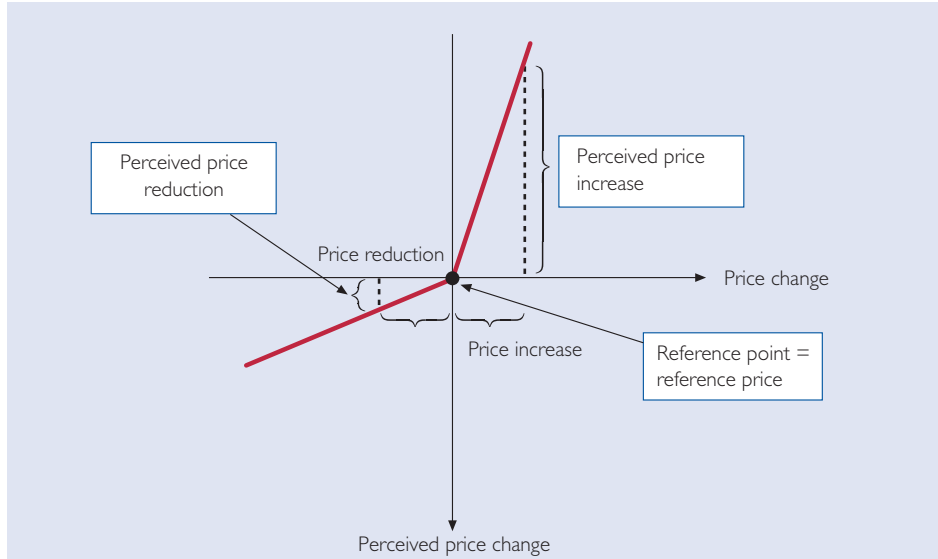
dex assesses price increases and price cuts symmetrically, consumers perceive price increases more powerfully than equal price reductions; the degree of overestimation seems to be by a factor between 1.5 and 2.5 (Brachinger, 2005a).¹⁴

If Brachinger's hypothesis is true, this asymmetry is likely to have reinforced the perception of high inflation which had already been fueled by the price increases in frequently purchased goods and the higher share of goods that became more expensive after the euro cash changeover.

¹⁴ According to Brachinger (2005a), the size of this factor, which has been derived from the findings of *Prospect Theory*, has yet to be examined by empirical studies in the context of price changes.

Chart 4a

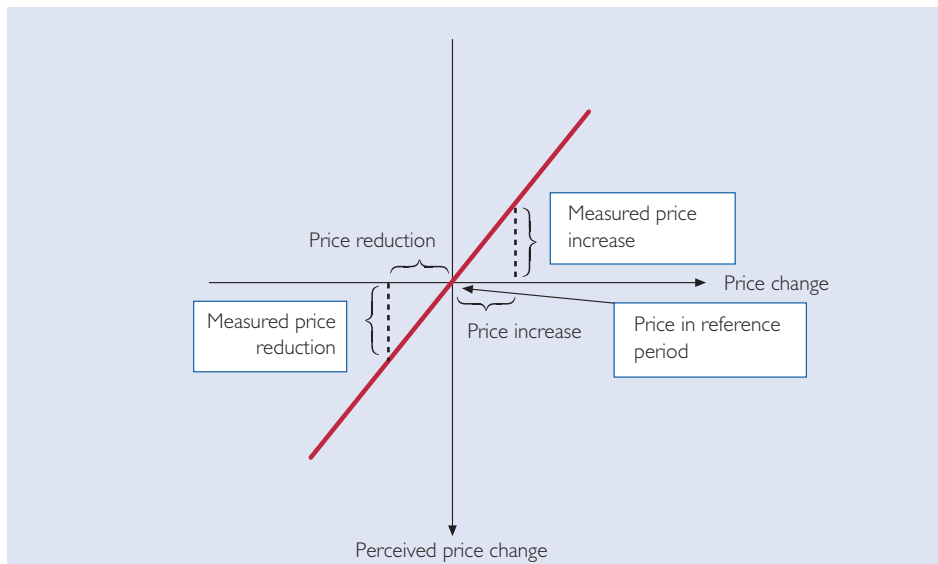
Subjective Assessment of Price Changes According to Prospect Theory



Source: Brachinger (2005a).

Chart 4b

Neutral Assessment of Price Changes in the CPI



Source: Brachinger (2005a).

3.2 Special Factors in the Course of the Euro Cash Changeover

3.2.1 Perception of Prices Distorted by Expected Price Increases

Results from the psychological literature show that expectations play a crucial role in the subjective perception of prices – if price increases are expected, they are also more likely perceived.

These insights are based on an experiment carried out by Traut-Mattausch et al. (2004): Three different groups of students were shown menus, first with prices listed in Deutsche mark, then, in euro. For one group, prices had been converted correctly; in the case of the two other groups, the euro prices displayed were 15% too low and 15% too high, respectively. Then, participants were asked to estimate in percent the difference between the Deutsche mark prices and the euro prices. Interestingly enough, participants detected price increases even where the conversion had been correct. Where the euro prices quoted had been too low, participants estimated that prices had remained unchanged. The group which was confronted with euro prices that were too high overestimated the price increases.

Hofmann et al. (2005) confirmed the results of this experiment for Austria as well. Furthermore, these authors showed that wage increases in euro were more likely to be underestimated than rises in schilling wages. Thus, the *impression* of increased prices on the one hand and constant or de-

creasing wages on the other hand induces a *subjective* loss of purchasing power.¹⁵

Traut-Mattausch et al. (2004) and Hofmann et al. (2005) attribute these distortions in perception to the role of expectations: If price increases were expected before the euro cash changeover, they were also more likely to be perceived afterwards, even if, objectively speaking, no price rises took place (a phenomenon referred to as “Teuro” illusion in German, “Teuro” being a portmanteau word combining “euro” and “teuer,” the German word for expensive). In addition, the results produced by Hofmann et al. (2005) point out that this effect could still be observed two years after the introduction of euro cash. The practical significance of this explanatory approach is dependent on how many people actually expected price increases. Here, various survey results have provided a clear picture: According to a survey carried out by the European Commission in November 2001, 70% of all euro area residents feared that prices would go up as a result of the euro cash changeover.¹⁶ In France, Italy and Portugal, this was true for 75% to 80%. The lowest percentages were recorded in Austria (52%) and Finland (59%).¹⁷ In the survey carried out in the summer of 2004, about 55% of respondents answered yes when asked if they had already expected before the cash changeover that prices would go up.

¹⁵ See also the results contained in Janger, Kwapił and Pointner in this issue of *Monetary Policy & the Economy*.

¹⁶ Flash Eurobarometer 115 (November 2001), question 7.

See http://europa.eu.int/comm/public_opinion/flash/fl115_en.pdf.

¹⁷ In Austria, this relatively low percentage can probably be attributed to the comprehensive set of measures taken before the euro cash changeover for the purpose of preventing price increases.

3.2.2 Comparison with Outdated Reference Prices in Schilling Fuels Perceived Inflation

In a survey conducted in the summer of 2004, that is when people had already had two and a half years to become familiar with euro cash, about 13% of Austrians stated they always converted prices into schilling, 27% said they did so often and 34%, sometimes. A mere 26% of respondents said they rarely or never converted into schilling (FESSEL-GfK, 2004).

The fact that reference prices in schilling are still widely used has an immediate effect on the degree of perceived inflation, since these reference prices, which are already three years old, have been “frozen” at their pre-changeover levels, while current prices have increased in line with normal inflation developments. It follows that the bigger the time gap between the reference period (before the introduc-

tion of euro cash) and the current period is, the higher the degree of perceived inflation will be (see also Kamleitner et al., 2005).

Apart from the fact that comparing current prices with outdated reference prices in schilling results in an overestimation of inflation, the conversion into schilling as such influences the degree of perceived inflation as well. If, as a rule of thumb, consumers convert prices with a factor of 1:14 instead of the correct 1:13.7603, they will overestimate prices by 1.7%, which roughly equals an annual inflation rate. That this effect is of considerable relevance has been shown by survey results: When faced with the statement, “When I convert euro into schilling, I usually round liberally, taking 1 euro as the equivalent of 14 schilling,” 60% of Austrians “absolutely agreed” and 16% “strongly agreed” (FESSEL-GfK, 2004).

Table 2

How Are Prices in Euro Converted into Schilling (Summer 2004)?

	When purchasing convenience goods	When purchasing expensive goods
I do not convert at all, but I buy what I need	65	17
I convert exactly by means of a calculator or a table	6	33
I memorize the prices of some products and learn more prices step by step	55	20
I know the equivalent of round euro prices (e.g. EUR 5 and EUR 10) in schilling and estimate other amounts based thereon	56	50
I calculate prices approximately by means of mental arithmetic	65	71

Source: OeNB.

Note: The values given represent percentages relative to the total number of respondents stating that they at least sometimes convert into schilling. Multiple responses were possible.

Table 2 summarizes how Austrians convert into schilling (those who do so at least sometimes). As expected, there are price-related differences. In other words, people are (more) likely to con-

vert exactly when purchasing expensive goods, whereas they hardly do so anymore when purchasing cheaper goods.

3.2.3 Initial Lack of Psychological Prices May Have Fueled Perceived Inflation

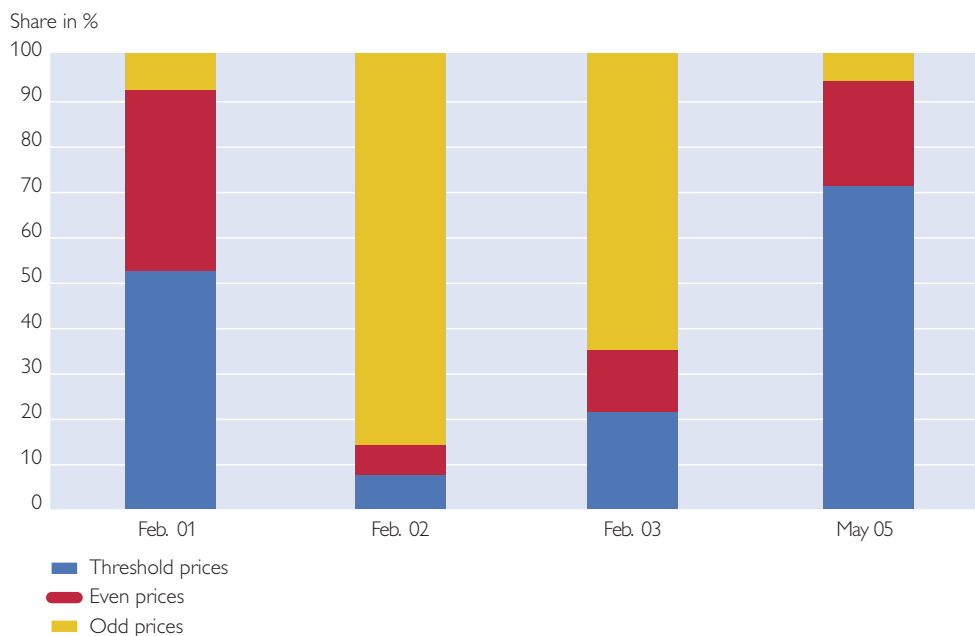
Psychological prices (i.e. prices ending with 00, 50, 90 or 99) influence consumer decisions in various ways: They stimulate impulse buying, have signaling functions and provide consumers with points of reference. Therefore, they are widespread in the food sector and are applied to some industrial

goods as well (they are less widely used in the services and energy sectors).

As shown in chart 5, in 2001, about 50% of prices in Austria ended with 90 in the schilling and/or groschen place (threshold prices); 40% ended with 50 or 00 in the schilling and/or groschen place (even prices). The remaining share was made up by other prices (odd prices).

Chart 5

Price Structures in Austria before and after the Euro Cash Changeover



Source: 2001 to 2003: 40,000 prices of individual items as included in the CPI; 2005: 500 prices of individual items as quoted by grocery chains.

These psychological prices disappeared temporarily during the time of the euro cash changeover. Under the Euro-Related Pricing Act (Euro-Währungsangabengesetz, EWAG), Austrian businesses were obliged to price goods both in schilling and in euro between October 1, 2001, and February 28, 2002. Dual pricing and exact conversion were meant to prevent possible rounding-up and, consequently, inflationary tendencies. This, however, in many cases resulted in odd euro prices which made it more

difficult for consumers to familiarize themselves with the new prices (Kamleitner et al., 2005). Thus, the loss of consumers' previously reliable sense of value and proportions may have fueled perceived inflation. The share of psychological prices decreased from about 90% in 2001 to less than 20% in 2002 (chart 5). The same trend was observed in Germany, where the comparable share fell from 80% to 40% (Chlumsky and Engelhardt, 2002; Deutsche Bundesbank, 2004).

It was not until toward the end of the dual pricing period that businesses gradually returned to a pricing policy promoting threshold prices. In Germany, for instance, psychological prices once more constituted the clear majority in 2003, amounting to approximately 70%. In Austria, changes in this direction did not happen as fast: That same year, the share of psychological prices was only some 35%. This percentage, however, probably continued to increase significantly after this point. In particular, the prices of food or frequently purchased goods are now, once more, to a very large extent subject to psychological pricing. According to a sample of May 2005 involving 500 goods, 70% of them had threshold prices, 23% even prices and only 6% had other prices.¹⁸ Thus, price structures are once again characterized by psychological prices, though it will probably take some time for consumers to get used to them and to memorize them.

3.3 Austrian Microdata Confirm the Influence of Psychological Factors

Several possible explanations for the divergence between actual and perceived inflation have been presented so far. Where possible, the hypotheses in question have been backed with empirical results.

The importance of psychological factors, which has already been discussed at length, is also corroborated by available microdata. Stix (2005), for instance, makes use of individual data of the previously mentioned survey, which was conducted in the summer of 2004 (FESSEL-GfK, 2004), in order

to validate some of the discussed psychological explanations by means of econometric techniques.

In his study he relied on a regression model which uses the answers to the following questions as dependent variables: “Do you think that the introduction of the euro has caused price changes?” and “Recently discussions about price developments have abounded. What is your personal view of price developments over the last six months?”¹⁹ For each question, respondents could choose among the following answers: “many products have become more expensive,” “some products have become more expensive,” “no change,” as well as “some products have become cheaper” and “many products have become cheaper.” Based on the responses, the study examines the influence individual characteristics and conversion patterns exert on the probability that somebody will perceive price rises. For instance, one explanatory variable measures if respondents run the household they live in. If so, the hypothesis of selective perception suggests that these people, who do the daily shopping, perceive price increases more strongly than others. Additionally, people were asked whether they converted prices from euro into schilling. The answers were divided into “always,” “often,” “sometimes” and “rarely or never” categories. For the reasons discussed earlier it can be assumed that those converting into schilling more often perceive stronger price rises than those who rarely or never convert.

As was outlined before, many consumers apply the 1:14 approximation,

¹⁸ The sample was based on the prices of about 500 food products and industrial goods as listed on leaflets distributed by various grocery chains (Billa, Dehner, Hofer, Lidl, Merkur, Penny, Mondo, Zielpunkt) in May 2005.

¹⁹ To be more precise, an ordered probit model is estimated. The dependent variable is categorical with the three categories “many products have become more expensive,” “some products have become more expensive” and “no change/some or many products have become cheaper.” The error term is assumed to be normally distributed.

which in itself would provide an explanation for the overestimation of prices. Since respondents were asked about it, this effect can be tested. Furthermore, the imprecision in conversion is taken into account. Survey participants were asked to convert the amount of EUR 1.80 into schilling off-hand. In the regression, those respondents who arrived at an overestimation of more than 10% were compared with the rest.

Finally, the model presented by Stix (2005) analyzes the influence of inflation expectations on the evaluation of price developments. The hypothesis of expectation-induced perception, which was discussed above, implies that consumers who had a negative attitude toward the euro before the cash changeover are more likely to perceive price increases now than those who had a positive one. This hypothesis can be examined by analyzing the responses to the following question: “What was your attitude toward the euro before its introduction? Was it very positive, rather positive, neutral, rather negative or very negative?”²⁰

3.3.1 Role in the Household and Household Income Influence the Probability of Perceiving Price Rises

The results are summarized in table 3 (left column). It can be found that consumers with a monthly household income of EUR 2,900 or more (first two rows) state more rarely that price rises have taken place. This could be explained by the fact that expenses on

frequently purchased goods, which have indeed become more expensive, form a smaller proportion of these households’ income. By contrast, age does not seem to play a role. Furthermore, table 3 shows that people who run a household are more likely to perceive price increases than others. This result is statistically significant and may be interpreted as an indirect verification of the hypothesis of selective perception (perception of price changes is mainly influenced by frequently purchased goods).

3.3.2 Those Converting into Schilling Are More Likely to Perceive Price Rises

Moreover, the table shows that people who always convert into schilling perceive significantly higher price rises, compared to those who sometimes or never convert. This is true even for those who only convert into schilling “often.” No significant difference in the perception of prices is found between those who sometimes and those who never convert. What is more, people who, when converting the amount of EUR 1.80, overestimate the equivalent in schilling by more than 10% and those who calculate with an exchange rate of 1:14 are more likely to perceive price rises. Furthermore, the attitude toward the euro before the cash changeover is shown to have a significant influence on the perception of price increases. People with a negative attitude are more likely to perceive price rises than those with a positive attitude.

²⁰ Ideally, respondents should have been asked this question before the introduction of euro cash. Then, the answers would have been exogenous. In the present case, it cannot be ruled out that actual experience with the euro has influenced the way in which individual attitudes (going back more than two and a half years) were recalled. This means that the variable cannot be interpreted causally. As will be shown later, the results are, however, not influenced by this variable.

In a next step, the regression is repeated for the question about price increases over the last six months (right column). This allows an examination of the persistence of the above-mentioned psychological factors, in other

words: of the extent to which they have an effect even in a period during which price rises cannot be attributed to impacts caused by the euro cash changeover.

Table 3

Influence of Selected Variables on the Perception of Price Increases

	Perceived price increases caused by the euro	Perceived price increases over the last six months
Monthly household income between EUR 2,900 and EUR 3,600	–	n.s
Monthly household income over EUR 3,600 (relative to other incomes)	–	–
Runs the household	+	n.s
Negative attitude toward the euro before its introduction (relative to positive attitude before its introduction)	+	+
Converts by using 1:14 approximation (EUR 1 = ATS 14)	+	n.s
Always converts into schilling	+	+
Often converts	+	n.s
Sometimes converts (relative to never)	n.s.	n.s
Conversion of EUR 1.80: overestimation by more than 10%	+	+

Source: Stix (2005).

Note: The table gives a summary of estimation results of Stix (2005). The + and – characters symbolize the significant impact of a variable on the probability of having perceived price increases (+ = higher probability, – = lower probability, n.s. = not significant). Since most of the variables are mutually exclusive, their impact is represented relative to a reference group (e.g. those running a household relative to those not). The results are based on an – “ordered probit” model. This type of model is used when the dependent variable is qualitative and ordered (no change, some products have become more expensive, many products have become more expensive).

3.3.3 Effect of “Euro-Specific Factors” Is Persistent

Generally speaking, the results of this regression show less significant psychological factors – in particular, the effects of running the household and converting by means of a 1:14 approximation are insignificant. Yet, the effects of comparing prices with reference prices in schilling and of overestimating prices when they are converted are still significant. Similarly, respondents with a negative attitude toward the euro much more often recorded perceived price rises than those with a neutral or positive attitude.

Thus, these results confirm the influence of psychological and conversion factors on the degree of perceived inflation. Moreover, they show that the

latter were relevant even in the case of questions which only referred to 2004, which means the euro cash changeover could not be (directly) linked with perceived price increases. This indicates that the effects of these factors have been surprisingly persistent.

4 Monetary Policy Implications of Higher Perceived Inflation

4.1 Higher Inflation Expectations

Perceived inflation can influence inflation expectations and thus also actual inflation.²¹ Inflation expectations cannot be measured directly, which is why they are usually estimated indirectly from financial market data or surveys (Garcia, 2003). In the above-mentioned *Consumer Confidence Barom-*

²¹ By means of wage negotiations, for example.

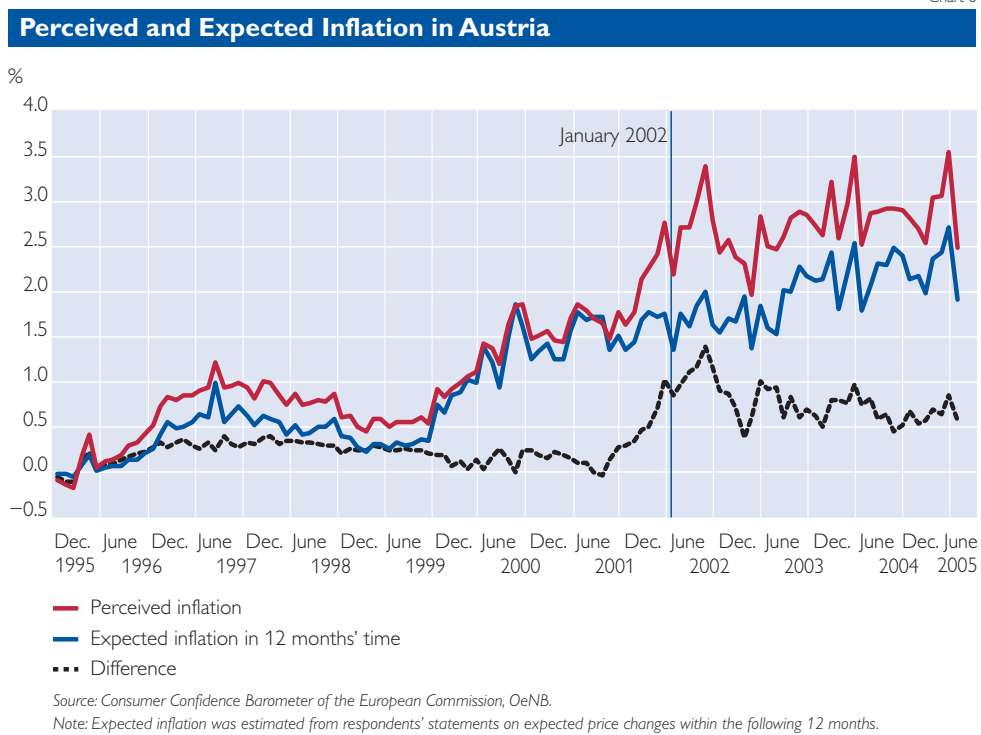
eter, Austrians are also monthly asked about *expected* price developments. The relevant question is: “How do you expect that consumer prices will develop in the next 12 months?” Possible responses include that they will “increase more rapidly,” “increase at the same rate,” “increase at a slower rate,” “stay about the same” or “fall.” As with perceived inflation, the answers given may serve as a basis for calculating average expected inflation. This, however, requires a reference value relative to which price expectations rise, remain unchanged or fall. It seems plausible to assume that consumers use perceived inflation for this purpose.²² If

this assumption is correct, perceived inflation can indirectly influence the expected inflation rate.²³

4.1.1 Perceived Inflation Strongly Influenced Inflation Expectations Over a Long Period Of Time

Chart 6 shows how perceived inflation and inflation expectations developed over time. The values for expected inflation, e.g. for March 2003, indicate the average inflation rate that the Austrian general public expected to materialize 12 months later, i.e. in March 2004. The difference between perceived inflation and expected inflation is represented as well.

Chart 6



²² It is likely that, in reality, the general public estimates future inflation based on a mixture of the latest perceived and actual inflation values. Since it is not known how the various components are weighted exactly, it was assumed here that people estimate future inflation developments in relation to perceived inflation only. Starting from this, the expected inflation rate is estimated by applying some restrictive assumptions (Berk, 1999). Obviously, the assumption that consumers' inflation expectations are based on perceived inflation has a significant impact on the development of the expected inflation rate.

²³ Other methods of deriving measures for expected inflation, for instance using financial market data, may produce different results.

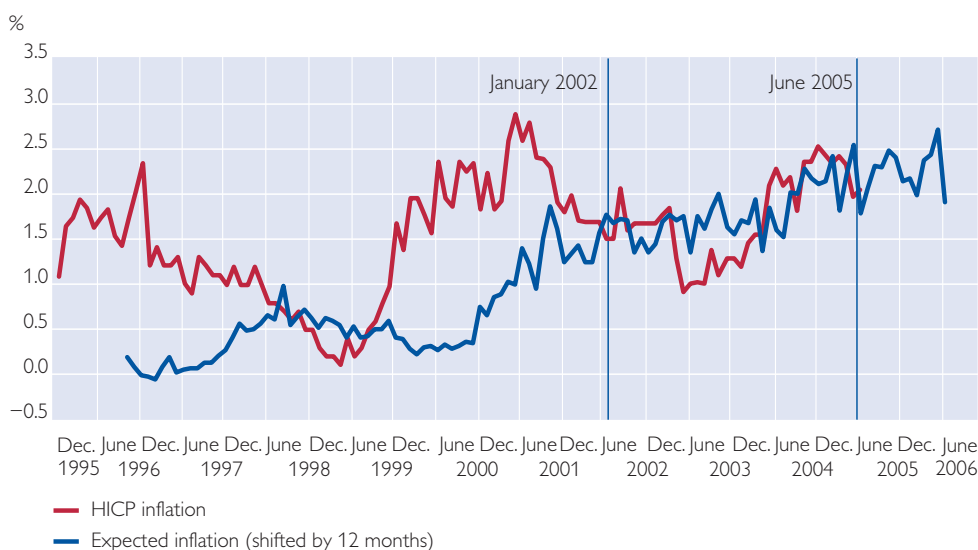
As can be seen from chart 6, perceived and expected inflation developed very similarly over a relatively long period of time: Until the end of 1999, inflation expectations were slightly lower than perceived inflation (the difference came to less than 0.5 percentage point); from 2000 until early 2002, the two rates were almost identical. This picture, however, changed with the euro cash changeover, when perceived inflation rose sharply, while inflation expectations remained relatively constant. For a short period (until mid-2003, approximately), the difference between perceived and expected inflation was 1.5 percentage points. Then, expected inflation was significantly revised upward and, since then, it has come closer to perceived inflation again – the difference between the two rates decreased from about 1 percentage point to slightly above 0.5 percentage point.

4.1.2 Did the Euro Cash Changeover Alter the Way in Which Expectations Are Formed?

The development described above shows that people mainly rely on their current perception of inflation in assessing future price developments, assuming that current (perceived) prices indicate what prices will look like in the following year. However, the euro cash changeover seems to have altered the way in which people’s expectations are formed. This may have two reasons: First, it seems that consumers may have regarded (perceived) price increases as a purely temporary phenomenon which would not have any influence on future inflation. In line with this hypothesis, the fact that the gap between perceived inflation and expected inflation narrowed again from mid-2003 may be explained as follows: Over time, people “learned” that perceived inflation was more persistent than they had expected, which is why

Chart 7

How Accurate Were Inflation Expectations?



Source: Consumer Confidence Barometer of the European Commission, OeNB.

they increasingly based their inflation expectations on perceived inflation again (in this case causing an upward trend). Second, the developments observed would also be in line with the hypothesis that the process of forming expectations as such changed: Instead of relying on the current degree of perceived inflation as a basis for inflation expectations, consumers switched to other reference values after the euro cash changeover, such as an inflation rate of below, but close to 2%, corresponding to the Eurosystem's definition of price stability. In line with this explanation, the increase in perceived inflation since mid-2003 could be attributed to the fact that the reference inflation rate was revised upward due to higher oil prices, etc.

Since this analysis is purely descriptive and as the observation period is short, it is not possible at this point to conclusively assess which hypothesis is true. Nevertheless, the fact that inflation expectations rose in 2003 – although actual inflation was very low and an oil price-induced increase in inflation was not yet in sight – strengthens the case for the hypothesis that the formation of inflation expectations has again become more strongly dependent on perceived inflation.

4.1.3 The Eurosystem's Monetary Policy Makes It Easier for Consumers to Gauge Future Inflation Developments

How “correct” were expectations in reality? In order to shed light on this question, chart 7 compares inflation expectations with actual inflation (the inflation expectations represented in chart 6 now are shifted by 12 months, that is, the value shown for March 2004 represents the average inflation

rate the Austrian general public expected in March 2003 for the following 12 months). This comparison reveals that there were periods during which actual inflation developed quite differently from expected inflation and periods when people's expectations were almost correct. Significant underestimations can be observed in particular in 1997, 2000 and 2001. The average difference between expected and actual inflation was 1.1 percentage points (1997), 2.1 percentage points (2000) and 1.3 percentage points (2001).²⁴ An overestimation took place in 2003, when expected inflation was 0.6 percentage point higher than actual inflation (which was probably due to the unexpectedly low economic growth). In the other years, the recorded differences were mostly minor, ranging from –0.1 to –0.2 percentage point.

On the whole, it seems that forecast errors have declined since 2002, relative to the period before. Even if the number of available observations is probably too small to draw concrete conclusions, this development may be interpreted as a consequence of the stability-oriented monetary policy of the Eurosystem, which makes it easier for consumers to gauge future inflation developments.

4.2 The Public Perception of Price Measures

4.2.1 90% of Austrians are Familiar with the CPI – Only 20% with the HICP

The persistent, if narrowing, gap between perceived and actual inflation, gives rise to the question as to what degree of public confidence the statistically measured inflation rate enjoys.

For the purpose of answering this question, the survey conducted in the summer of 2004 (FESSEL-GfK, 2004)

²⁴ In terms of average monthly differences during one calendar year.

determined which price measures are known in Austria and whether – in the public’s opinion – these can adequately depict price developments (table 4).²⁵ Virtually all respondents were familiar with the terms “inflation rate” and “consumer price index.” A somewhat lower, though still high, percentage is aware of the “basket of goods and services.” The Harmonised Index of Consumer Prices

(HICP) and mini baskets are far less well-known. The low public awareness of the HICP may be attributable to the publication policy of Statistics Austria, which still strongly focuses on the CPI; this index is published in detail on a monthly basis, whereas the HICP is mentioned only as an aggregate measure. Mini baskets, on the other hand, were not created until 2004.

Table 4

Selected Price Measures – Public Awareness and Confidence

	Awareness (% of respondents)	Credibility (mean of grades)
Inflation rate	95	2.69
Consumer price index	88	2.66
Basket of goods and services	65	2.91
Harmonised Index of Consumer Prices	22	2.93
Mini baskets	13	2.98

Source: OeNB: Survey of Summer 2004.

Note: Credibility is expressed as the mean of responses, which ranged from grade 1 (high credibility) to grade 5 (no credibility).

4.2.2 Austrians Think Price Measures Have Mediocre Credibility, But are Fairly Well-Informed on the Current Inflation Rate

The Austrian general public thinks that the ability of official price measures to adequately represent price movements is mediocre; assessed by means of a grading system (1 = very credible, 5 = not credible), the CPI received the best grade (2.66), followed by the inflation rate (2.69). The basket of goods and services, the HICP and the mini baskets achieved fairly poor values just below 3.

Due to the lack of previous reference values, it is difficult to judge how good or bad these grades are. The fact that the survey took place at a time when the statistically measured inflation rate did obviously not corre-

spond to publicly perceived inflation may have prompted respondents to voice stronger skepticism toward official measures than they might have at a different time.

Be that as it may, the question remains whether there is a link between the perceived rate of inflation and the perceived credibility of price measures.

To shed light on this matter, those respondents who were familiar with the term inflation rate were asked to state the current inflation rate. It can be seen from table 5 that the average estimated inflation rate was 5%, which means inflation was clearly overestimated – CPI inflation was 2.2% in July 2004 and 2.3% in August 2004. A more detailed analysis, however, reveals that answers were distorted by significant outliers (some people said the inflation

²⁵ The questions were formulated as follows: “In order for price changes to be observed, various measures may be used. Which of the following criteria or indices have you heard of at least once?” and “Do you think that these measures can depict price developments correctly? In other words, what credibility do they have in your opinion? (Assessment based on a grading system, where 1 means very credible and 5 stands for not credible).”

rate was 75%). Thus, the median has to be regarded as the more stable measure in this case. The relevant result was 2.0%, that is, 50% of respondents estimated an inflation rate below and 50% above this value, indicating that “on average” Austrians are relatively well-informed about the inflation rate.

As an alternative to calculating the median, implausible answers can also be ignored. For instance, in the second row of table 5 all responses indicating an estimated inflation rate above 20% have been disregarded, which applies to about 5% of respondents.²⁶ Based

on this limited sample, the mean value of the estimated inflation rates is 2.3%, which is close to the statistically measured inflation rate.

In a further step, we have broken answers down by the degree of credibility attached to the inflation rate. This shows that inflation estimates are the higher, the lower the credibility of the inflation rate becomes (and vice versa); the difference in mean estimated inflation between those respondents deeming the CPI very credible and those who think it is not credible is 1.3 percentage points.²⁷

Table 5

Rates of Inflation Estimated by the Austrian General Public in Summer 2004

	Mean	Median	Minimum	Maximum	Observations
Total	5.0	2.0	0.0	75	1,381
Estimates below 20%	2.3	2.0	0.0	20	1,315
Assessment of CPI credibility					
1 = very credible	1.9	2.0	0.0	5	189
2	2.2	2.0	0.0	15	377
3	2.6	2.0	0.0	15	485
4	2.7	2.0	0.1	12	145
5 = not credible at all	3.2	2.0	0.0	12	86

Source: OeNB: Survey of Summer 2004.

Note: The table contains descriptive statistics on the inflation rate estimated by respondents. Only those respondents who had stated they were familiar with the inflation rate as a price measure were asked to quote the current inflation rate. The second row only refers to those respondents whose estimations were below 20%. In the lower part of the table, results are broken down by degree of assessed credibility.

5 Summary and Conclusions

Though perceived inflation in Austria had time and again deviated from the statistically measured inflation rate before the euro cash changeover, this phenomenon was particularly pronounced after the introduction of euro cash. Estimates based on survey data suggest that, between 2002 and mid-2005, the average annual inflation rate perceived by the general public was between 0.7 and 1.3 percentage points

higher than HICP inflation. This was probably accompanied by a distortion in inflation expectations. In early 2005, the gap between perceived and actual inflation narrowed again to about 0.3 percentage point, which is a normal value, when judged against pre-changeover levels. This entire development is not a phenomenon specific to Austria – significant subjective price increases were perceived in virtually all euro area countries after the cash changeover.

²⁶ Surprisingly, knowledge about the rate of inflation was particularly poor among respondents below the age of 20. On average, members of this group estimated inflation at 15% (!), with a median of 5%. It is quite conceivable that some respondents did not want to admit that they do not know the current inflation rate and therefore made an arbitrary estimate. Thus, it seems perfectly justified to disregard the 5% of observations with implausible estimates.

²⁷ A variance analysis has proven that the results are both economically and statistically different.

How is it possible for inflation data collected by official statistics and the perception of prices to diverge so strongly? Are statistical measures incorrect or are people mistaken in their perception of inflation? By means of an objective and methodologically well-founded procedure, official statistics measure price changes in goods and services that are consumed by an average household; goods and services that are purchased or paid for less frequently (e.g. rents) are included as well. By contrast, the perception of inflation is fundamentally *subjective* and based on *individual* consumer behavior. The theory of perceived inflation discussed in this study (Brachinger, 2005a) assumes that the perception of prices is influenced by various factors, all of which have a significant effect on the degree of perceived inflation. Accordingly, (1) changes in the prices of frequently purchased goods are more likely to be perceived than with those purchased less frequently, and (2) price rises are more strongly perceived than price reductions. The present study has shown that, after the euro cash changeover, the prices of frequently bought goods in Austria did rise more sharply than the prices of less frequently purchased goods, and that a higher (unweighted) share of goods became more expensive. This probably led the Austrian population to perceive more price rises, thus, in part, accounting for the gap between actual and perceived inflation.

In the case of the euro cash changeover, there were additional factors which most likely further fueled perceived inflation. The present study has, for instance, provided empirical evidence for the fact that (3) outdated reference prices in schilling, which are still quite often used, increase perceived inflation (schilling prices are

now almost four years old!), and that (4) expectations distort the perception of prices (if consumers expect price rises, they will be more likely to perceive them). Moreover, (5) the initial lack of a good feel for the euro's value, which may in part have been attributable to a lack of psychological prices, seems to have raised the degree of perceived inflation.

In summary, the following conclusions may be drawn from this study:

- The difference between the statistically measured inflation rate and perceived inflation can be explained by the fact that official statistics measure price changes differently from consumers, who base their assessment of price changes on their subjective and selective perception.
- Based on the experience gained over the past years and on the limited public confidence the different price measures enjoy, it seems advisable to more actively inform people about the different price indices provided by official statistics and about perceived inflation values as derived from survey results. The index of perceived inflation that was developed and empirically calculated for Germany by Brachinger could prove useful in this context.
- Perceived inflation reflects *subjective* perceptions of inflation. Since monetary policy, however, aims at macroeconomic price stability, it is crucial to base monetary policy decisions on a measure of inflation that is *objective*, methodologically well-founded, internationally harmonized, comparable over time and which represents the *average* consumer behavior – in short: the HICP inflation rate.

- Perceived inflation is important for monetary policy in that it may influence inflation expectations. It is essential to prevent subjective perceptions of price rises from inducing higher actual inflation via increased inflation expectations.

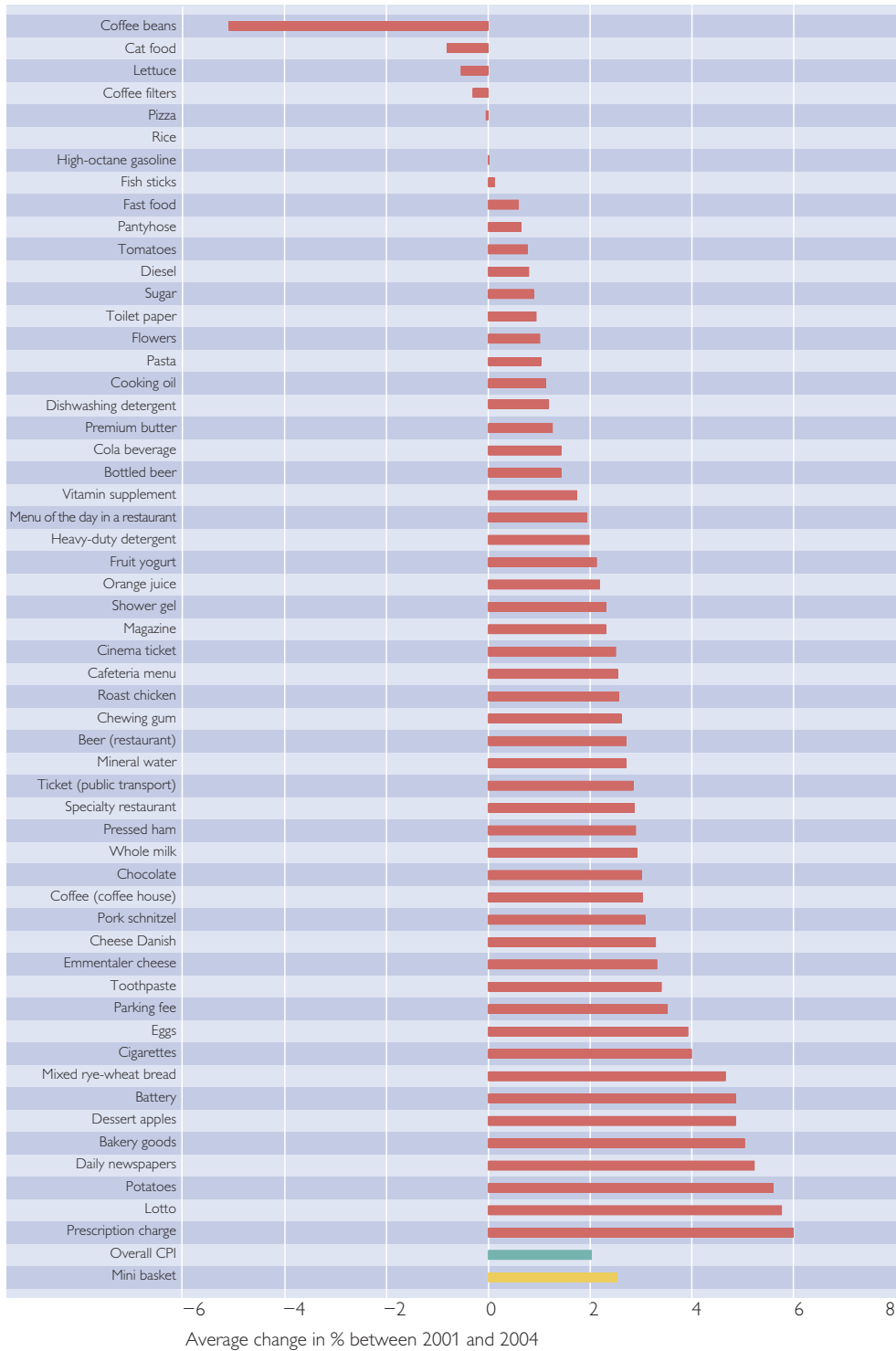
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Annex

Chart 8

**Changes in the Prices of Goods Purchased on a Weekly Basis (Mini Basket)
between 2001 and 2004**



Source: OeNB, Statistics Austria.