OeNB

OESTERREICHISCHE NATIONALBANK
Stability and Security.

WORKSHOPS

Proceedings of OeNB Workshops

Price Setting
and
Inflation Persistence
in Austria

December 15, 2005

EUROSYSTEM

No. 8

Perceived Inflation and the Euro:
Why High? Why Persistent?

Helmut Stix[1]

Oesterreichische Nationalbank

1. Introduction

It is now a well established fact that the euro cash changeover has been accompanied by perceptions of strong price increases. At the same time, official inflation indices have shown only moderate price developments. The wedge between what was measured on the one hand and what was perceived by consumers on the other hand, first, can be observed in most member countries of the euro area and second, has been sizeable. Third and somewhat surprisingly, the gap has turned out to be very persistent. How can this development be explained?

The literature has provided various answers. Some focus on the difference between how consumers perceive inflation and the way official indices reflect price changes (Brachinger, 2005). Other explanations are directly related to the euro cash changeover. Dziuda and Mastrobuoni (2005) highlight the role of consumers' ability to adapt to the new currency, i.e. the role of difficult conversion rates. Traut-Mattausch, Schulz-Hardt, Greitemayer and Frey (2004) attribute high inflation perceptions to the widespread existence of expectations of price increases prior to the cash changeover. Another reason could be that a sizeable fraction of the population still compares euro prices with legacy currencies prices that, in the meantime, are four years old (e.g. Mastrobuoni, 2004).

These approaches provide interesting insights. Nevertheless, the underlying hypotheses have either not been empirically falsified or have only been indirectly confirmed (in experiments or through cross-country comparisons). And if the hypotheses have been tested, they have only been tested in isolation, omitting other

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potentially relevant explanations. Also, what has not been shown is more direct evidence from individual data. The present paper extends the literature in both directions. In particular, it provides evidence from a survey conducted in summer 2004 about perceived inflation. This survey, commissioned by the Oesterreichische Nationalbank (OeNB), and conducted in the summer of 2004 in Austria allows for a judgment about how people think about price increases and what factors drive price perceptions.

Why should we care? We think that understanding the reasons behind the increase in perceived inflation is important for several reasons – some of them going well beyond the specific case of the euro changeover in 2002: First, if a currency conversion is associated with the nimbus of prices increases, then this might undermine the credibility of official price measures and/or aversely affect public support for the new currency. Empirical evidence of the former will be provided in this paper, the latter is reflected in survey responses, which indicate that the share of those saying that they view the new currency negatively is much higher for those that have perceived strong price increases (although, admittedly, the direction of causality is ambiguous). Second, increased price perceptions might have real effects. For example, this might be the case if consumers' overestimation of inflation results in an underestimation of their purchasing power, causing suboptimal consumption decisions (ECB, 2002). Experimental results of Hofmann, Kamleitner, Kirchler and Schulz-Hardt (2006) provide supportive evidence for this conjecture. Furthermore, Janger, Kwapil and Pointner (2005), who conducted a survey among Austrian individuals about (weak) consumption spending in 2004, find that consumers name higher prices as the most important reason why they spent less. Third, price perceptions might also have an impact on the formation of inflation expectations. Evidence that inflation expectations grew with inflation perceptions is provided in Fluch and Stix (2005). And finally, a profound knowledge about the factors affecting inflation perceptions is important in light of the forthcoming introduction of euro cash in some of the new Member States.

The paper is structured as follows. The literature which explains this development is briefly reviewed in section 2. Our hypotheses are discussed in section 3. In section 4 we present the empirical model and in section 5 our results. section 6 concludes.

2. Why Have People Perceived High Inflation Rates? Results from the Literature

In this section we will briefly and selectively summarize the main arguments that have been given in the literature to explain the wedge between perceived and actual inflation. We will first focus on explanations about how consumers realize price

changes and then will discuss some explanations that are specific to the euro cash changeover.[2]

It has been stipulated by various authors that the level of perceived inflation is positively correlated with price increases of frequently purchased goods (ECB 2002 and others). A rigorous formulation of this idea is provided in Brachinger (2005), who utilizes elements from Prospect Theory to formulate a theory of inflation perceptions. In particular, the theory rests on two main hypotheses: First, it is maintained that consumers recognize price changes in the context of an act of purchase. This implies that price changes of more frequently purchased goods are weighted more by consumers than price changes of less frequently purchased goods. Second, Brachinger (2005) assumes that consumers are loss averse in the sense that consumers weight price increases (losses) more strongly than price decreases.[3]

In the case of the euro conversion, this theory would thus imply an increase in perceived inflation if prices of frequently bought goods increased more than prices of less frequently bought goods. For Austria, Haschka (2004) presents evidence that this actually happened. In particular, a price index consisting of a basket of (typically) daily purchased goods, increased on average by 3.3% from 2001 to 2004, while one consisting of a typical weekly purchase increased by 2.5%. In comparison, the HICP grew by only 2%. Furthermore, the proportion of goods which experienced price increases from 2001 to 2004 was higher for daily or weekly goods than for the overall HICP-basket of goods.[4] Similar evidence has been reported for many other countries (cf. Del Giovane and Sabbatini, 2005a) as well as for the euro area as a whole (ECB, 2003).

By making use of the same micro-price data that are used for the compilation of the consumer price index and by utilizing information on the purchase frequency of these goods, Brachinger (2005) recently calculated an index of perceived inflation for Germany. As expected, the index substantially deviates from the consumer price index. In particular, perceived inflation was as high as 10% around 2002 in Germany while HICP-inflation was around 2%. Based on specific parameter assumptions, this index also indicates that, in contrast to evidence derived from

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[2] We will neglect the role of psychological prices (e.g. el Sehity, Hoelzl and Kirchler, 2005; Mostacci and Sabbatini, 2005; Fluch and Stix, 2005) and other explanations that are mainly country-specific.

[3] More specifically, each consumer has a value function. For each price movement, the consumer evaluates his value function where the evaluation is asymmetric with respect to price increases and decreases. The loss aversion parameter is assumed to lie in a range from 1.5 to 2.5 – price increases are perceived 150% to 250% as strong as price decreases.

[4] In the basket of daily and weekly goods, 89% and 87% of all goods got more expensive over the period from 2001 to 2004. In the HICP-basket the corresponding number is 78% (Fluch and Stix, 2005).

surveys, perceived inflation in Germany has not faded and is still about 5 percentage points higher than HICP-inflation (see the appendix on how perceived inflation is measured).

It is well known that prior to the changeover the fear of price increases was very widespread. According to a Flash Eurobarometer survey from November 2001, 70% of the euro area population were afraid of price cheating; for Austria this figure was more modest (52%).[5] The impact of these expectations has been demonstrated by Traut-Mattausch et al. (2004) who have conducted several experiments where three groups of German probands received menus in Deutsche mark and afterwards menus in euro. For one group, prices were converted correctly, the other two groups faced prices that were 15% too high and too low, respectively. Then, the probands were asked to estimate the price changes. The results reveal that price increases were overestimated even when prices were converted correctly. When euro prices were too low, price increases were estimated to be zero and when euro prices were too high, the price increases were estimated to be even higher. Thus, evidence of illusionary price increases due to the euro introduction is found "in spite of the fact that clear disconfirming evidence was available" (Traut-Mattausch et al., 2004, p. 756). The authors assign this effect to a selective error correction mechanism meaning that errors that are consistent with expectations are less likely to be realized than errors that run counter to expectations. For example, if price increases are expected and prices are in fact mistakingly overestimated then this error will less likely be detected by a person which had expected price increases than by a person which had no such expectations.

Hofmann et al. (2006) have repeated this experiment in 2004 for Austria and, even after two years of experience with the euro, obtained similar results. Furthermore the experimental setting has been extended to wages, which were to a large extent perceived correctly. Therefore, the authors conclude that a combination of higher perceived inflation and unchanged wages can result in a subjective loss of purchasing power, probably affecting consumption decisions.

When conducting price comparisons, the reference values which are used by individuals are of great relevance. In this context it is very important that legacy currency prices have been widely used as reference prices for judging price developments. For example, Fluch and Stix (2005) show that as late as in the summer of 2004, almost 40% of all Austrians still always or frequently converted euro prices into Austrian schilling. Since the Austrian schilling prices are now several years old, the level of perceived inflation increases with the temporal distance from the schilling area just due to the normal inflation process. Brachinger (2005) also accounts for the widespread use of legacy currency prices in a variant

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[5] Flash Eurobarometer 11/2001, Question 8: "You're afraid of abuses and cheating on prices."

of his index of perceived inflation. In particular, it is assumed that people estimate price changes relative to a moving reference period which both contains Deutsche mark and euro prices and with the latter getting more weight as time passes by. The results suggest that it is mainly this factor which accounts for the persistent deviation of his index from official measures of inflation.

Another aspect of the conversion has been highlighted by Mastrobuoni (2004) and Dziuda and Mastrobuoni (2005). In particular, these models build upon the idea that a new currency decreases transparency of prices, i.e. consumers are not used to the new currency and recognize prices, due to difficult conversion rates, only with some error. For retailers, this generates an incentive to increase prices. Since the costs of erroneous conversions that arise to consumer are small for goods with a low price, the model predicts that the incentive to increase prices is inversely related to the initial price level. Thus, the model predicts that cheaper goods were subjected to a higher rate of inflation than more expensive goods.

This aspect of the model is tested for Economic and Monetary Union (EMU) and non-EMU countries and an inverse relationship between the price level and inflation can be observed in some EMU-countries. Another aspect of the model is that the strength of this inverse relationship should be positively related to the market power of retailers, which can also be confirmed empirically.[6] Also, it is stipulated that price increases should be correlated with consumers' ability to adapt to the new currency. Dziuda and Mastrobuoni (2005) test for this effect indirectly by approximating consumers' ability by the (aggregate) share of the population which uses old currency prices when making price comparisons and by the share which feels uncomfortable with the euro. In a cross-country regression both variables seem to be correlated with the size of the inverse relationship between inflation and the price level.[7]

Actually, this model provides a plausible explanation of why more frequently purchased goods experienced above average price increases – as these goods typically are the ones which are relatively cheap. Also, the model's assumption that conversion errors are less costly for low priced than for more expensive goods is

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[6] Gaiotti and Lippi (2004) assembled a panel of 2500 restaurants in Italy and also find that local market power was associated with a larger price increase. They also propose a theoretical model for this observation. Hobijn, Ravenna and Tambalotti (2004) use a sticky-price model to argue that the increase in restaurant prices can be explained by menu costs.

[7] In particular, Dziuda and Mastrobuoni (2005) run both a country-wise and a panel regression to estimate the relationship between the price level of goods and the inflation rate. In the latter case, they find a negative correlation for almost all EMU countries, as predicted by the model. In the former case of country-wise regressions, however, the effect is significant only for a few countries. In particular, it is not significant for Germany and Austria, which is somewhat surprising given the evidence presented in our paper.

consistent with how Austrians make price comparisons. In particular, the survey used in this paper shows that exact conversions (with a conversion table or a calculator) are mainly carried out for high price goods. The prices of cheap goods, in turn, are barely converted in this way.[8]

To sum up, we think that all of the discussed hypotheses are very important in explaining the wedge between actual and perceived inflation. Furthermore, their empirical plausibility has been shown in various ways: some explanations are consistent with price movements (in particular some of the propositions from Brachinger 2005) or with cross-country differences in consumers' ability to adapt to the euro (Dziuda and Mastrobuoni's hypotheses). Other hypotheses have been confirmed in experiments (Traut-Mattausch et al., 2004; Hofmann et al., 2006). However, these hypotheses are typically tested in isolation. We think that the use of survey data would allow to answer the following questions: Can these results also be confirmed when all other effects are controlled for? Are some explanations more important than others? Is it possible to identify the reasons why the disparity was so persistent?

3. Data and Hypotheses

To shed some light on these questions we will utilize data from a representative survey conducted in July and August 2004 among the Austrian population. In particular, 2000 persons above the age of 14 were interviewed on a whole range of questions relating to perceived inflation.[9] As the survey questions range from an assessment of whether prices have changed and the specific reasons therefore, to difficulties with euro conversion and the attitude and assessment of the euro, we can test for the relevance of some of the above mentioned hypotheses. In particular, we will test the following three hypotheses which also appear most prominently in the policy debate.

First, Brachinger (2005) has hypothesized that perceived inflation should be higher if prices of frequently bought goods or services increase more than prices of less frequently bought goods and services. Since we do not have information on the frequency of purchases of individual persons, we will not be able to test for this effect directly. However, the survey allows us to follow an indirect approach. In particular, we can utilize information on whether a person runs a household ("HOUSEHOLD"), i.e whether a person is responsible for daily purchases. As these prices grew more strongly than the prices of less frequently purchased goods,

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[8] 33% of those saying that they still convert prices into Austrian schilling, say that they do exactly convert for high price goods. For goods which are bought daily (low price goods), the corresponding percentage is only 6%. In case of the latter goods, 65% do not convert, but buy regardless.

[9] The survey was commissioned by the OeNB and conducted by FESSEL-GfK.

we expect that persons who run the household perceive a higher inflation rate than persons who are not responsible for running the household.

The second hypothesis deals with the way how individuals form their individual price perception. The survey allows to approach this from several directions. The first deals with the conversion into the old currency. If individuals still convert euro into Austrian schilling, then they will perceive higher prices because they compare actual prices with prices that are frozen as of 2001. We can address this issue because the survey contains questions about whether respondents convert into schilling and how regularly they do so. Specifically, the corresponding answers are grouped into those that always ("CONVERT A"), frequently ("CONVERT F") or occasionally ("CONVERT O") convert and those that rarely or never convert into schilling. That this effect can be of relevance is reflected by the fact that two and a half years after the cash changeover, still 13% of the population converted always and 27% converted frequently. Further 34% did so occasionally.[10]

The second set of variables deals with the way how prices are converted. The correct conversion rate for the Austrian schilling is 1 (EUR) = 13.7603 (ATS). Obviously, this conversion rate is difficult to handle in day-to-day situations and hence the typical approximation used is 1:14. However, this approximation can be very misleading as it implies an "inflation rate" of 1.7% which, for example, is higher than the annual HICP-inflation rate in 2003. In fact, 61% of the Austrian population fully agree to the statement "when converting from euro to Austrian schilling, I round tolerantly and convert with 1:14". In the regression we make use of this information by including a dummy variable for this answer ("CONVERT 1:14"). An additional way to cope with how people convert is to directly measure respondents' conversion ability. In particular, survey participants were asked to spontaneously convert the amount of 1.80 euro into schilling. For those that over- or underestimate the correct amount by 10% we define the dummy variables "CONVERT +10%" and "CONVERT –10%".

Our third hypothesis is related to the role of expectations, in particular to the finding that widespread expectations of price increases prior to the euro cash changeover are related to the perception of price increases. The survey contains a question about the attitude towards the euro before the cash changeover. The question was "Which attitude towards the euro did you have prior to the euro's introduction?". The answers are grouped into those with a positive ("ATT POS"), a neutral and a negative attitude ("ATT NEUTRAL", "ATT NEG"). About 37% of the population had a positive, 30% a neutral and 33% a negative attitude. As this question is not directly related to the expectation of price increases we alternatively use the results from another question which directly deals with expected price

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[10] It is clear that the use of dummy variables is a gross simplification of the often complex strategies to learn new prices.

increases:[11] "Do you agree/disagree with the following statement: It was clear to me before the introduction of the euro that prices will increase." This variable is labeled "EXP. INCREASES". Here, the survey shows that a majority (55%) agreed, while 37% disagreed. The rest had no clear opinion.

Regardless of which question is selected, it is clear that the use of recall-questions is not optimal as the ability of respondents to remember their attitude of the year 2002 might be affected by respondents' perception of prices, i.e. the variable might be endogenous.[12] In principle, one could circumvent this by applying some form of instrumental variable approach, however, this is difficult to handle in the context of an ordered response model. In lack of an alternative, we will follow a pragmatic route by testing whether the inclusion of these recall variables affects the other estimated coefficients and standard errors. Furthermore, there are two facts which suggest that endogeneity might not pose a serious problem. First, we can cross-tabulate the answers about the current attitude (at the time of the survey) with the answers on the recalled attitude (referring to the time prior to the cash changeover). This exercise yields that 59% of all respondents had a different view about the current situation than they had before the euro cash changeover. This suggests that the majority of persons differentiated in their answers about the current and the recalled attitude. Moreover, for the recall-question on expected price increases, we are able to check our results with an external data source, in particular a survey by the European Commission which was conducted in November 2001. Reassuringly, we find very similar results indicating that, on aggregate, people remember well (or reveal correctly) their past attitude.[13]

4. Model

To test for the influence of the above mentioned variables we regress several individual characteristics on three separate variables which are assumed to proxy inflation perceptions.

The first dependent variable is derived from a question about whether the introduction of euro cash has induced price increases ("price increases through euro introduction"). In total, 56% of all Austrians answered that many products had become more expensive with the introduction of the euro, 34% said that some products had become more expensive. Since only a very small fraction of

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[11] The question on the attitude towards the euro captures a general assessment which, however, is likely to be positively correlated with expected price increases.

[12] In particular, if a person has perceived price increases, then this might affect the person's answer about his attitude before the cash changeover.

[13] According to the EC survey from November 2001, 52% of all Austrians feared price increases due to the cash changeover. According to the recall question we use, this applies to 55% of all Austrians.

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respondents answered that prices got cheaper, we merge this category with the answers that prices stayed the same, applying in total to 10% of respondents.

The second dependent variable is very similar but refers only to price changes during the last six months before the survey, essentially covering the first six months of 2004 ("price increases during the last six months").[14] Here, 33% and 51% respectively answered that many or some products got more expensive.

The third dependent variable is a direct quantitative estimate of the level of inflation survey participants were asked for ("estimated rate of inflation"). We find that individuals estimate an inflation rate of 5% on average, which is more than twice as high as the HICP-inflation rate which was 2.3% in June 2004. However, the answers also show a excessive degree of variation with estimates of up to 75%! Eliminating all answers with inflation rate estimates above 20%, which applies to 2.5% of the sample, results in a substantially lower estimated mean inflation rate of 2.7%.

We will treat results on the third dependent variable as a proxy and not as a direct measure of perceived inflation. This is because of the exact wording of the question. In particular, respondents were asked for the level of inflation and if respondents didn't know the answer they were asked for an estimate. The fact that we do not know whether individuals actually gave an estimate or whether they knew the level of inflation – or put differently, to what extent answers reflect perceived rather than measured inflation – calls for some cautiousness when interpreting the results. In particular, it could be the case that individuals perceived a higher level of inflation than indicated by the official inflation measure but nevertheless replied the official measure because they knew its level. Thus, this measure is likely to represent a lower bound of the level of perceived inflation.

As the first two dependent variables are first categorical and second ask for an assessment about how many products got more expensive (and not about an categorical assessment of the level of inflation), the question arises whether these variables are in fact correlated with the level of perceived inflation. As the latter is unobserved we cannot provide a direct test. However, we can analyze whether answers on the categorical questions are correlated with survey participants' estimates of the rate of inflation. This is done in table 1 which shows the mean levels of survey participants' estimates of the rate of inflation for each category of the first two dependent variables ("price increases through introduction of the euro", "price increases during the last six months"). The results by and large suggest that the assumption that categorical answers on how many products got more expensive are correlated with the estimated rate of inflation is not unwarranted. For example, those who answered that there were no changes or

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[14] The exact wording is: "In the last months there have been many discussions about price developments. Personally, how do you view the price development during the last 6 months ...."

products got cheaper estimate on average an inflation rate of 3.1%; the corresponding value for those that answered that many goods got more expensive is 6.4%.[15]

Given the categorical nature of the first two dependent variables, the estimation model is specified as the following ordered probit model:

$$y_i = \beta_1 \cdot SD_i + \beta_2 \cdot E_i + \beta_3 \cdot C_i + \varepsilon_i \qquad (1)$$

where y_i represents the inflation perception of individual i, SD_i is a vector of various socio-demographic variables, E_i is a vector of variables capturing the expectations of individual i and C_i is a vector of variables controlling whether individual i converts into schilling and if so how this is done. ε_i is an error term assumed to be normally distributed with mean zero and unit variance. Instead of observing the perceived inflation rate y_i^* directly, we have data on y_i, the categorical survey response of individual i. If there are m categories, then y is in the j-th category if it is in the range given by $\alpha_{j-1} < y < \alpha_j$, where the α's are parameters to be estimated.[16]

For the estimated level of inflation, our third dependent variable, the above model is estimated by ordinary least squares.

5. Estimation Results

We start our discussion with perceived price changes through the cash changeover as the dependent variable (table 2). As the responses of this variable are ordered from "no change" to "many goods got more expensive", a positive sign of the coefficients *β* indicates that a variable positively affects the probability that individual *i* perceives a higher inflation.[17]

To control for socio-demographic characteristics, we add dummies variables for six household income classes ("INC") as well as for the age of respondents ("AGE"). The idea is that price increases have a different impact for a high income

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[15] For the question on the price increases during the last six months, there is one inconsistency, namely that the mean inflation rate for those who said that many goods got more expensive is slightly lower than the mean inflation rate for those answering that some goods got more expensive. This however, is due to some outliers and to the weighting of the sample (in table 1 we apply population weights). If either outliers are excluded or the sample is not weighted, as is done in the estimations, then this inconsistency disappears (lower panel of table 1).

[16] The model is estimated by maximum likelihood.

[17] To be precise: a positive *β* coefficient indicates that a variable positively affects the probability of the event "many goods got more expensive".

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household than for a low income household because of liquidity constraints (a low income household spends most of its income with little variation left for savings; the relative costs of price increases are thus higher for low income households). Also, it could be argued that age is important. For example, retired people with low nominal increases of their pensions are more affected by perceived price increases than younger households who can adjust labor supply. On the other hand, one could view this from the side of an information problem. Old persons, specifically those who are retired, have more time to get informed about price movements than young people. Another set of dummy variables controls for the educational level of a person ("EDU"). We include these variables first because they provide additional information on personal income, which is not available in the survey, and second because the level of education might have implications on perceived inflation directly. For example, less educated people might have less information on price movements than more educated people.

Factors determining price perceptions caused by the euro cash changeover: The findings in column 1 of table 2 imply that people aged 65 or over perceive fewer price changes than those aged 35 to 54.[18] Furthermore, the results show a significant influence of education, with the level of perceived inflation decreasing with the level of education. In particular, the point estimates imply that the probability that a person answers that many goods got more expensive is higher by 13% and 9% if this person does not have a university degree or a high school leaving certificate, respectively.

The point estimates from the household income dummies indicate that higher income households (with an income above EUR 2,200) perceive fewer price increases than lower income households, although this effect is not significant statistically. However, if the personal education dummies proxy personal income, the results suggest that income plays some role to what extent prices increases are perceived–in particular for the highest educated or highest income groups against all other income groups. Given that persons without a university degree constitute about 86% of the sample and that people whose household income is not in the highest income group constitute about 75% of the sample, the results support the view that the perception of price increases is prevalent across a wide range of the population.

Next, we turn to our hypotheses: First, the variable which measures whether a person runs an household is highly significant, suggesting that persons who are more often confronted with prices (through daily purchases) perceive a higher rate of inflation. Also, the variables which measure the attitude towards the euro are significant. In particular, persons who had a negative attitude before the changeover have a higher inflation perception than persons who had a neutral or

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[18] The test $\beta_{AGE3544} > \beta_{AGE65+}$ and $\beta_{AGE4554} > \beta_{AGE>65}$ yield test statistics $\chi_1^2 = 6.6$; $p < 0.05$ and $\chi_1^2 = 9.5$; $p < 0.01$ respectively (test statistics for column 1 in table 2).

negative attitude. Similarly, persons who expected price increases before the cash changeover are found to perceive higher inflation.

The effects we find are not only statistically but also economically significant: In particular, the probabilities of the event "many goods got more expensive" increases with "HOUSEHOLD" by 7%, with "EXP. INCREASES" by 10% and with "ATT NEGATIVE" by 5%.

Finally, we turn to the variables which indicate whether people convert and if so how they convert into schilling. First, the results do not only indicate that conversion per se matters but also that the frequency with which a person converts is important. In particular, we find that if prices are always converted then this results in higher perceived inflation than if prices are frequently converted. And if prices are frequently converted then this results in higher perceived inflation than if prices are only occasionally or not converted – the probability of the event "many goods got more expensive" is found to be higher by 17% and 10% respectively for persons who always or frequently convert. Second, the results suggest that the use of a conversion rate of 1:14 also seems to significantly increase perceived inflation.

Columns 2 to 5 of table 2 summarize the results of several different specifications. To account for the possibility that the variables measuring the attitudes before the cash changeover ("ATT NEGATIVE", "ATT NEUTRAL") and the variable measuring expected price increases ("EXP. INCREASES") are correlated, we alternately omit one of them in column 2 and 3. We find that the precision of the point estimates decreases while parameter signs are unchanged. Due to the possible endogeneity of these variables, we omit them altogether in column 4. The fact that the results do not change qualitatively suggests that endogeneity might not pose a problem. Finally, in column 5 we omit the variable measuring the 1:14 conversion, which rests on self assessment of the participants in the survey, and include the variables which measure if respondents over- or underestimated the euro amount of 1,80 by 10%, respectively. As can be seen, people whose way of conversion results in a euro price that is 10% too high have a higher likelihood of reporting price increases.

Do these factors also influence inflation in 2004? The results of applying the same specifications to the perceived price increases within the last six months are summarized in table 3. These results allow to determine whether the factors responsible for higher inflation perceptions in the course of the euro changeover also have an impact on perceived inflation two years after the euro introduction.

Again, the same five empirical specifications as before have been estimated. The results for the socio-demographic variables, which are not shown, indicate that education, again, plays an important role for inflation perceptions with the same sign as in the previous table (the higher the education the fewer price changes are perceived). Also, the results for household income are comparable to the previous

results. In contrast to previous results, we find that people above the age of 55 now perceive a higher rate of inflation than people between 25 and 54.[19]

Concerning the role of expected price increases we find a significantly positive impact whereas the attitude towards the euro is only significant in one specification (when the variable measuring whether a person expected price increases is omitted). Furthermore, we find that the frequency with which a person converts into schilling has the same impact as discussed above whereas the method of conversion ("1:14") is not significant. The calculation error is again significant, in this specification however not only for those who overestimate but also for those who underestimate the euro amount by 10%. Maybe this finding reflects that both variables capture those who still had problems with the euro (irrespective of whether a person under- or overestimates the amount). In contrast to previous results we do not find a significant effect for "HOUSEHOLD".

Thus, these results show that the perception of price increases during the first six months of 2004 – a period for which the euro changeover has no direct bearing – is still significantly influenced by some euro-specific factors. This suggests that cash changeover effects are very persistent. However, we find that fewer variables are significant than in the case of perceived inflation through the cash changeover. An analysis of marginal effects reveals that "EXP. INCREASES" has about the same effect as for perceived inflation in the course of the euro changeover while the effect of converting ("CONVERT ALW") is smaller (the event "some goods got more expensive" increases by 6% compared to 17% before).

Finally, table 4 summarizes the results with the quantitative measure of the inflation rate as the dependent variable, again in various specifications. As discussed, the answers of respondents show a great deal of variation with some extreme outliers. In order to prevent that these outliers dominate our results, we cut off the highest and lowest 2.5% of the individual answers (estimated inflation rates below 0.6% and above 20%). Furthermore, the dependent variable is transformed into its logarithm.

For the socio-demographic variables we find again that years of schooling is negatively correlated with perceived inflation. For income, no significant effects are found. Interestingly, age seems to be important with all persons above the age of 25 having lower inflation estimates than younger persons.[20] Concerning the point estimates for those variables which control for our hypotheses, we obtain very similar results than in the previous ordered probit regressions. Thus, those running a household, those with a negative attitude and those who convert into Austrian

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[19] Why age plays a different role than before is difficult to answer. One reason could be that the price index for different age groups evolved differently between 2002 and 2004 than during the first six months of 2004.

[20] This result is driven by the fact that persons below the age of 25 estimate on average an inflation rate of 12.2% (median 3%). When outliers are eliminated the mean is still 5% (median 3%).

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schilling perceive a higher rate of inflation. In contrast to previous results, conversion errors or the way how euro are converted ("1:14 conversion") do not have a significant impact. The point estimates imply that "HOUSEHOLD" increases the mean estimated rate of inflation by 6% and a negative attitude by about 9%.[21] Persons who always convert estimate the inflation rate 18% higher than persons who never or rarely convert. Those converting frequently still estimate the inflation rate to be 8% higher.

To summarize, the results show that all three of the tested hypotheses are important in determining the level of perceived inflation caused by the euro changeover. The highest impact is given by the mental conversion into the old currency, followed by the role of expected price increases or a negative attitude towards the euro and by the role of frequent purchases. The findings also demonstrate that some of these factors have a persistent impact. In particular, this accounts to the mental conversion into the old currency. Although, the results for our two measures of perceived inflation during the last six months differ somewhat, a persistent effect also seems to originate in expected price increases.

Does the disconnect of perceived from measured inflation also have other effects? As survey participants were asked whether the inflation rate can truthfully represent the price development we will finally analyze whether the credibility of the measured inflation rate is correlated with perceived inflation.[22]

How Credible are Official Measures of Inflation? In total, 97% of respondents have heard of the term "inflation rate". Amongst them, 13% think that the inflation rate is very credible in representing price movements and 28% think that it is credible. Further 41% give an answer in the "middle" while 16% think that it is not credible. This amounts to 57% who do not have an explicit positive assessment which is quite surprising given the fact that the inflation rate has a long tradition and is such a central measure for economic activity in general and monetary policy in particular.[23] Given this result, the question arises whether the factors which influence perceived inflation also influence the inflation rate credibility. We study this question by re-running previous regressions with the credibility measure as the dependent variable.

As the dependent variable ranges from values of 1 (no credibility) to 5 (high credibility), higher coefficients indicate that individuals assign higher credibility to the inflation rate. The results, which are presented in table 5 show that many of the variable which significantly influence perceived inflation also influence attached credibility. In particular, this applies to education where higher education is

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[21] Calculated as $\exp(\beta_i) - 1$.

[22] The exact questions is: "Do you believe that the inflation rate can truthfully represent the price development. I mean how credible is the rate of inflation in your view."

[23] Since we do not have comparison results from a period when inflation perceptions and measured price increases were closer to each other the results do not allow the conclusion to be drawn that the credibility is bad.

associated with higher credibility. For income no significant effect is found. The findings suggest that credibility significantly declines as age increases, at least for persons above the age of 24. Furthermore, we find that persons with a negative attitude, those who care for daily purchases and those who convert into schilling all have a significantly worse opinion of the inflation rate as a measure of price changes. The way of conversion (e.g. 1:14) however, has no significant impact.

6. Conclusions

This paper empirically analyzes why inflation perceptions got disconnected from official inflation measures in the course of the euro cash changeover. In particular, we employ a micro-dataset to study the role of price increases of frequently purchased goods, expectations and the conversion ability of Austrian individuals – those three factors assigned the greatest relevance by the literature. In contrast to the literature which mainly tests for one effect in isolation, this approach allows to test for all three factors simultaneously while also accounting for socio-demographic differences.

Our results can be summarized as follows: First, we find that persons who are confronted with prices of frequently purchased goods perceive a higher rate of inflation. This provides support for the hypothesis of Brachinger (2005) and others stating that consumers' record price changes through frequently purchased goods. The fact that prices of frequently purchased goods rose faster after the cash changeover than overall inflation has therefore become manifested in higher inflation perceptions. Second, our results point towards a substantial role for expectations of price increases as argued by Traut-Mattausch et al. (2004) and Hofmann et al. (2006). In particular, person who believed prior to the changeover that prices will increase have later perceived a significantly higher rate of inflation than other persons who did not expect price increases. Third, those who mentally convert euro prices into Austrian schilling prices, and thus compare actual prices with prices prior to 2002, perceive a higher rate of inflation. The same effect is obtained for people, who do convert euro into schilling very imprecisely. Thus, our evidence from individual data is largely consistent with the hypotheses stated in the literature as well as with indirect evidence from experiments and aggregate data. Moreover, we find that it is not one of these factors alone which is responsible but all three together.

Astonishingly, we find that the above mentioned factors are rather persistent in the sense that they influence the assessment of inflation even as late as in 2004. In particular, the impact of expectations and of the use of the old currency for price comparisons turn out to be important in this context. As expectations of price increases prior to the cash changeover are fixed as of now, the main driving force behind the persistence seems to be the very large fraction of the Austrian

population which still uses old currency prices as a mental benchmark when making price comparisons.

Furthermore, our results suggest that the factors which influence individual price perceptions also influence the credibility of official measures of inflation. Thus, the more perceived inflation deviates from measured inflation the less people believe that the official measure can truthfully represent price developments. Though we are not aware of any evidence which shows that this actually poses a problem, it is certainly better for economic policy if people believe the published inflation number than if they do not.

Although our results are obtained from Austrian data, we think that they also have some implications for other countries – in particular concerning the role of price comparisons in old currency and of expectations. A European Commission survey in November 2004 confirms that price comparisons in legacy currencies are still very widespread in many countries. In particular, 49% of citizens in euro area countries used old currencies when counting mentally, only 19% counted in euro when purchasing (European Commission, 2004b). For Austria, this survey reports that 46% used old currencies when counting mentally. Thus, the case of Austria is basically comparable to the euro area average. Furthermore, survey results also indicate that expectations of price increases have already settled in the new Member States – 71% of the population fear abuses and cheating on prices in connection with an eventual introduction of the euro (European Commission, 2004a). This development is surprisingly similar to old euro area members where the corresponding number was 70%.

The policy implications from our result affect mainly those countries which will face a cash changeover. In particular, this regards policy measures which prevent price increases of frequently purchased goods, which convince the population that the expectations of price increases are not warranted – probably very difficult to achieve – and which promote the evolution of a good feeling for the new currency and prices. There might be other important factors which were not analyzed in this paper, however we think that addressing those three issues will contribute a great deal towards preventing similar developments than those experienced in many euro area countries.

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Appendix: By How Much Has Perceived Inflation Deviated From Measured Inflation?

It is not easy to answer how strongly consumers' perceptions deviated from official inflation statistics as it is not clear how inflation perceptions should be quantified. Consequently, several indicators can be found in the literature (cf. Del Giovane and Sabbatini, 2005b).

In the monthly Consumer Confidence Barometer of the European Commission survey respondents around Europe are asked about their assessment of the price development in the past 12 months. An indication of how strongly consumers perceive price increases is obtained by calculating the balance between the share of those answering that prices rose and the share of those who believe prices stayed constant or decreased. chart 1 juxtaposes these balance scores with changes of the Harmonized Index of Consumer Prices (HICP). This chart reveals that in most countries HICP-inflation and the balance score ran almost parallel prior to the year 2000. Then, before or around the cash changeover the close relation markedly loosened. This can be observed for all countries shown. Also, in most countries, the wedge persisted for several years and in some countries it has not closed yet.

Although the balance score is indicative about price trends it has some shortcomings. Most importantly, it is not informative about the level of perceived inflation – it just expresses the relation between the share of the population perceiving price increases relative to those who do not perceive price increases.[24]

Information on the level of perceived inflation can be obtained by applying a method proposed by Berk (1999) which utilizes the distribution of survey responses to estimate perceived inflation rates.[25] Results for Austria are presented

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[24] There are other shortcomings as well: First, assessing the level of perceived inflation solely by visual inspection of the wedge between the plotted balance statistics and HICP-inflation can be misleading insofar as the "proximity" of the two curves is affected by the choice of the starting date – choosing a different starting date can lead to a different visual impression. Second, as countries differ in their average level of the balance statistics, these values are difficult to compare internationally, e.g. it is not possible to say that one country has a higher perceived inflation rate than another country because the wedge is higher in the former country. Of course, one could analyze the deviation of the balance statistics from the historic average. However, then the results depend on the starting date again.

[25] The method rest on the assumption that the answers are normally distributed such that the share of answers falling into a certain category (e.g. "prices have risen") can be interpreted as probabilities that perceived inflation lies in a range between a (numeric) lower and upper bound. The perceived inflation rates are then estimated on the assumption that, on average, consumers perceive inflation rates which are equal to actual inflation rates. Despite of its advantage of providing a quantification of perceived

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in chart 2. Again, the wedge between perceived inflation and measured inflation is clearly visible. If one takes these estimated values literally, then at times inflation perceptions were higher by as much as 1.9 percentage points. On average, perceived inflation was above measured inflation by 0.85, 1.28 and 0.95 percentage points in 2002, 2003, 2004 respectively.[26] Only in the first months of 2005 does the wedge seem to have declined to values comparable to those prevailing in the 1990s.

An alternative approach is presented by Brachinger (2005) who, as discussed, utilizes results from Prospect Theory to postulate a theory of price perception. Based on this theory, he proposes an index of consumer prices where goods are weighted by their purchase frequency, where price increases are weighted more strongly than price decreases and where price comparison are made with respect to reference prices, which are partly denominated in legacy currency. This index was recently calculated for Germany in collaboration with the German national statistics institute ("Statistisches Bundesamt"). Interestingly, it is found that perceived inflation was as high as 10% around 2002 in Germany while HICP-inflation was around 2%. Based on specific parameter assumptions, Brachinger (2005) furthermore reports that, in contrast to the visual impression from the balance score, perceived inflation in Germany has not faded and is still about 5 percentage points higher than HICP-inflation.

Despite the lack of a consensus about how price perceptions should be measured, we think that the presented evidence allows to identify three stylized facts which seem to hold irrespective of the particular method: First, most countries of the euro area experienced an increase in perceived inflation relative to HICP-inflation rates. Second, the difference between these two measures was sizeable. And third, it is a surprising facet of the euro conversion that this wedge turned out to be very persistent.

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inflation, it is clear that this method can be criticized because of doubts about the adequacy of some of the assumption made, in particular concerning the latter assumption.

[26] We thank Ernst Glatzer for providing the data.

Table 1: Estimated Level of Inflation for Different Categorical Answers on Price Increases

	price increases with introduction of euro cash	price increases during the last six months
	class means of estimated rate of inflation	
categorical responses:		
no change or products got cheaper	3.1	3.7
some products got more expensive	3.6	5.5
many products got more expensive	6.4	4.8
	class means of estimated rate of inflation – reduced sample	
no change or products got cheaper	2.3	2.3
some products got more expensive	2.8	2.6
many products got more expensive	2.8	3.2

Note: "estimated rate of inflation" refers to survey participants' estimates of the inflation rate. For the reduced sample all observations with an estimated inflation rate above 20% are excluded.

Source: Author's estimations.

Table 2: Estimation Results: Price Increases through Introduction of the Euro

	Dependent Variable: Price Increases Through Introduction of the Euro (1=no change, 2=some goods more exp., 3=many goods more exp.)				
	(1)	(2)	(3)	(4)	(5)
EDU APP.	-0.14	-0.15	-0.13	-0.14	-0.14
	(0.09)+	(0.09)+	(0.09)	(0.09)+	(0.09)+
EDU HIGH S.	-0.22	-0.24	-0.22	-0.25	-0.23
	(0.09)*	(0.09)*	(0.09)*	(0.09)**	(0.09)*
EDU UNIV.	-0.34	-0.36	-0.35	-0.40	-0.37
	(0.11)**	(0.11)**	(0.11)**	(0.10)**	(0.11)**
INC 1,100 - 1,500	0.05	0.01	0.08	0.03	0.03
	(0.12)	(0.12)	(0.12)	(0.11)	(0.12)
INC 1,500 - 1,850	0.12	0.10	0.13	0.09	0.13
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
INC 1,850 - 2,200	-0.00	-0.03	0.01	-0.03	-0.00
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
INC 2,200 - 2,900	-0.10	-0.13	-0.10	-0.13	-0.10
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
INC > 2,900	-0.08	-0.10	-0.07	-0.11	-0.07
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
AGE 2534	0.07	0.06	0.09	0.07	0.07
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
AGE 3544	0.07	0.05	0.10	0.08	0.07
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
AGE 4554	0.12	0.11	0.15	0.13	0.14
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
AGE 5564	-0.01	-0.02	0.02	-0.00	0.01
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
AGE >65	-0.16	-0.18	-0.14	-0.18	-0.13
	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)

Note: See continuation.

Table 2 continued: Estimation Results: Price Increases through Introduction of the Euro

	(1)	(2)	(3)	(4)	(5)
HOUSEHOLD	0.19 (0.06)**	0.20 (0.06)**	0.17 (0.06)**	0.19 (0.06)**	0.19 (0.06)**
ATT NEGATIVE	0.12 (0.07)+		0.22 (0.07)**		0.12 (0.07)+
ATT NEUTRAL	-0.07 (0.07)		-0.04 (0.07)		-0.08 (0.07)
EXP. INCREASES	0.26 (0.06)**	0.30 (0.06)**			0.27 (0.06)**
CONVERT ALW	0.45 (0.11)**	0.45 (0.11)**	0.49 (0.11)**	0.51 (0.11)**	0.46 (0.11)**
CONVERT FRE	0.25 (0.08)**	0.25 (0.08)**	0.24 (0.08)**	0.26 (0.08)**	0.26 (0.08)**
CONVERT OCC	0.01 (0.07)	-0.00 (0.07)	0.02 (0.07)	0.02 (0.07)	0.02 (0.08)
CONVERT 1:14	0.16 (0.06)**	0.16 (0.06)**	0.15 (0.06)**	0.16 (0.06)**	
CONVERT +10%					0.30 (0.15)*
CONVERT -10%					0.01 (0.07)
Observations	1911	1919	1915	1923	1915
LL	-1696.18	-1707.85	-1712.17	-1727.65	-1701.76

*Note: Ordered probit regressions; robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. Results of regional dummies not shown.*

Source: Author's estimations.

Table 3: Estimation Results: Price Increases During the Last 6 Months

| | Dependent Variable: Price Increases During the Last 6 Months (1=no change, 2=some goods more exp., 3=many goods more exp.) | | | | |
	(1)	(2)	(3)	(4)	(5)
HOUSEHOLD	0.04 (0.06)	0.05 (0.06)	0.04 (0.06)	0.06 (0.06)	0.04 (0.06)
ATT NEGATIVE	0.07 (0.07)		0.16 (0.07)*		0.06 (0.07)
ATT NEUTRAL	0.04 (0.06)		0.07 (0.06)		0.04 (0.06)
EXP. INCREASES	0.27 (0.06)**	0.28 (0.05)**			0.27 (0.06)**
CONVERT ALW	0.17 (0.10)+	0.20 (0.10)*	0.20 (0.10)*	0.25 (0.10)*	0.08 (0.10)
CONVERT FRE	0.12 (0.07)+	0.13 (0.07)+	0.12 (0.07)	0.14 (0.07)+	0.04 (0.08)
CONVERT OCC	0.01 (0.07)	0.01 (0.07)	0.02 (0.07)	0.02 (0.07)	-0.08 (0.07)
CONVERT 1:14	-0.08 (0.05)	-0.08 (0.05)	-0.06 (0.05)	-0.06 (0.05)	
CONVERT +10%					0.26 (0.13)*
CONVERT -10%					0.14 (0.06)*
Observations	1909	1918	1915	1924	1914
LL	-1860.66	-1868.65	-1880.33	-1890.66	-1862.70

*Note: Ordered probit regressions; robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. Results of socio-demographical and regional dummy variables not shown.*

Source: Author's estimations.

Table 4: Estimation Results: Estimated Rate of Inflation

	Dependent Variable: Estimated Rate of Inflation (quantitative estimates of survey respondents)				
	(1)	(2)	(3)	(4)	(5)
EDU APP.	-0.09	-0.10	-0.10	-0.10	-0.10
	(0.05)*	(0.05)*	(0.05)*	(0.05)*	(0.05)*
EDU HIGH S.	-0.18	-0.18	-0.18	-0.18	-0.18
	(0.05)**	(0.05)**	(0.05)**	(0.05)**	(0.05)**
EDU UNIV.	-0.24	-0.24	-0.23	-0.24	-0.24
	(0.05)**	(0.05)**	(0.05)**	(0.05)**	(0.05)**
INC 1,100 - 1,500	0.01	-0.01	0.00	-0.01	0.01
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
INC 1,500 - 1,850	0.05	0.03	0.04	0.03	0.05
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
INC 1,850 - 2,200	-0.01	-0.02	-0.01	-0.02	-0.01
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
INC 2,200 - 2,900	0.01	-0.00	0.01	-0.00	0.01
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
INC > 2,900	-0.01	-0.02	-0.01	-0.02	-0.01
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
AGE 2534	-0.25	-0.25	-0.25	-0.25	-0.25
	(0.09)**	(0.09)**	(0.09)**	(0.09)**	(0.09)**
AGE 3544	-0.28	-0.28	-0.29	-0.29	-0.28
	(0.09)**	(0.09)**	(0.09)**	(0.09)**	(0.09)**
AGE 4554	-0.27	-0.27	-0.27	-0.27	-0.26
	(0.09)**	(0.09)**	(0.09)**	(0.09)**	(0.09)**
AGE 5564	-0.31	-0.31	-0.31	-0.31	-0.31
	(0.09)**	(0.09)**	(0.09)**	(0.09)**	(0.09)**
AGE >65	-0.24	-0.25	-0.25	-0.25	-0.24
	(0.09)**	(0.09)**	(0.09)**	(0.09)**	(0.09)**

See continuation.

Table 4 continued: Estimation Results: Estimated Rate of Inflation

	(1)	(2)	(3)	(4)	(5)
HOUSEHOLD	0.05 (0.03)*	0.06 (0.03)*	0.06 (0.03)*	0.06 (0.03)*	0.06 (0.03)*
ATT NEGATIVE	0.09 (0.04)*		0.07 (0.03)*		0.09 (0.04)*
ATT NEUTRAL	0.01 (0.03)		0.01 (0.03)		0.01 (0.03)
EXP. INCREASES	-0.04 (0.03)	-0.02 (0.03)			-0.04 (0.03)
CONVERT ALW	0.15 (0.05)**	0.17 (0.05)**	0.14 (0.05)**	0.16 (0.05)**	0.15 (0.05)**
CONVERT FRE	0.07 (0.03)*	0.08 (0.03)*	0.07 (0.03)*	0.08 (0.03)*	0.07 (0.04)*
CONVERT OCC	0.06 (0.03)*	0.07 (0.03)*	0.06 (0.03)+	0.06 (0.03)*	0.06 (0.03)+
CONVERT 1:14	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	
CONVERT +10%				0.03 (0.06)	
CONVERT -10%				-0.00 (0.03)	
Constant	1.05 (0.13)**	1.06 (0.12)**	1.03 (0.12)**	1.05 (0.12)**	1.05 (0.12)**
Observations	1381	1385	1384	1388	1386
Adjusted R-squared	0.05	0.05	0.05	0.05	0.05

*Note: OLS regressions; robust standard errors in parentheses. + significant at 10%; * significant at 5%; ** significant at 1%. Results of regional dummies not shown.*

Source: Author's estimations.

Table 5: Factors Affecting the Credibility of the Inflation Rate

	Dependent Variable: Credibility of the Inflation Rate (1=no credibility, … 5=high credibility)				
	(1)	(2)	(3)	(4)	(5)
HOUSEHOLD	-0.15 (0.06)*	-0.16 (0.06)**	-0.15 (0.06)**	-0.17 (0.06)**	-0.14 (0.06)*
ATT NEGATIVE	-0.14 (0.07)*		-0.16 (0.06)*		-0.14 (0.07)*
ATT NEUTRAL	-0.07 (0.06)		-0.08 (0.06)		-0.07 (0.06)
EXP. INCREASES	-0.08 (0.05)	-0.11 (0.05)*			-0.09 (0.05)+
CONVERT ALW	-0.36 (0.10)**	-0.38 (0.10)**	-0.37 (0.10)**	-0.41 (0.10)**	-0.31 (0.10)**
CONVERT FRE	-0.10 (0.07)	-0.12 (0.07)+	-0.10 (0.07)	-0.12 (0.07)+	-0.05 (0.07)
CONVERT OCC	-0.02 (0.07)	-0.02 (0.07)	-0.02 (0.07)	-0.03 (0.07)	0.03 (0.07)
CONVERT 1:14	-0.03 (0.05)	-0.02 (0.05)	-0.03 (0.05)	-0.04 (0.05)	
CONVERT +10%					-0.13 (0.13)
CONVERT -10%					-0.13 (0.06)*
Observations	1842	1849	1847	1854	1846
LL	-2535.37	-2545.68	-2543.50	-2555.04	-2538.56

Note: Ordered probit regressions; robust standard errors in parentheses + significant at 10%; * significant at 5%; ** significant at 1%. Results of socio-demographical and regional dummy variables not shown
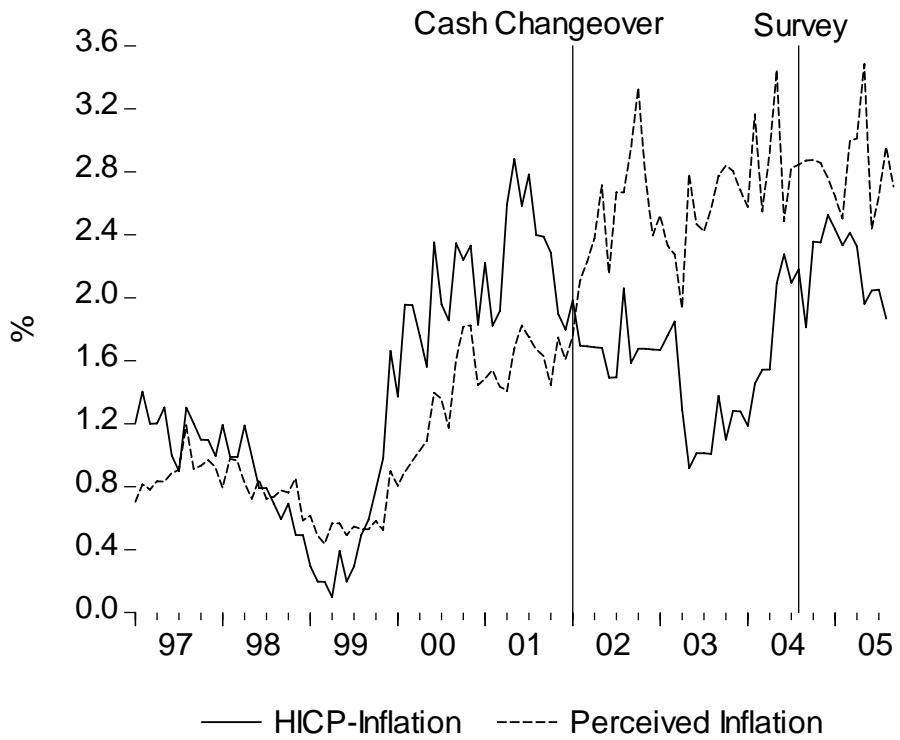
Source: Author's estimations.

Chart 1: Perceived Inflation (Balance Scores) and HICP-Inflation

−HICP-inflation rate - left scale
···perceived inflation (balance score) - right scale
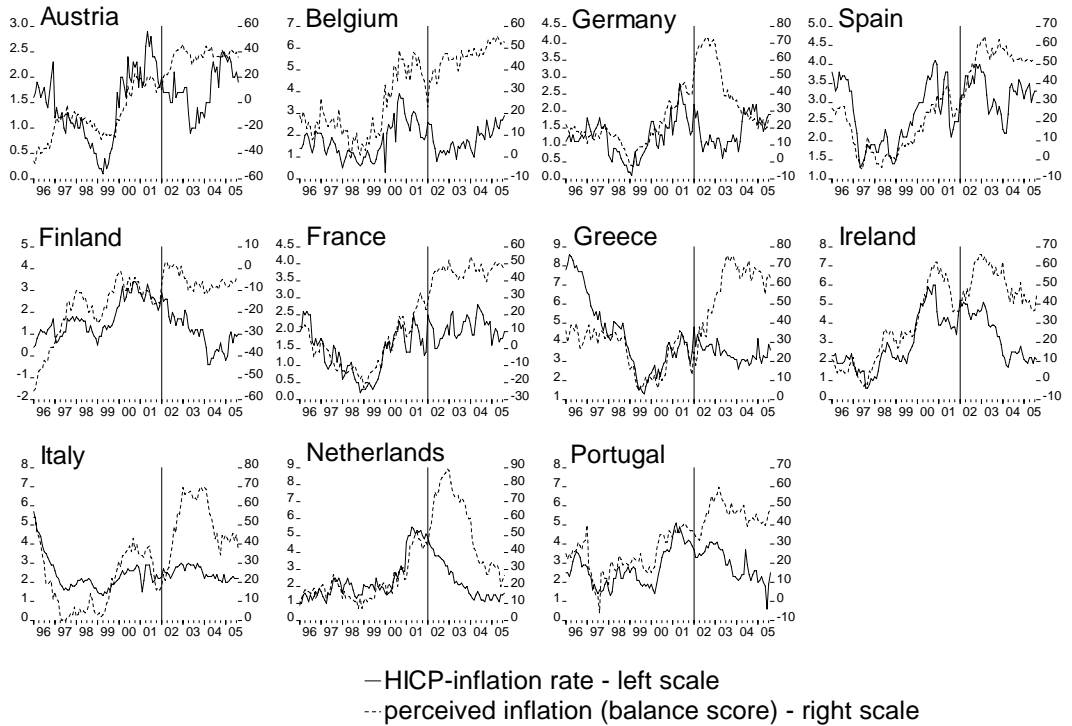
Source: EU-Commission (balance scores), OeNB.

Chart 2: HICP-Inflation Rate and Perceived Inflation Rate in Austria

Source: OeNB.