Prospect Theory and Inflation Perceptions - An Empirical Assessment

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Abstract

Building on the hypotheses of loss aversion with respect to price increases and availability of frequently bought goods, Brachinger (2006, 2008) constructs an alternative index of perceived inflation (IPI), which can reproduce the jump in perceived inflation after the Euro introduction in Germany that was not observable in standard HICP inflation. We test the hypotheses of Prospect Theory with regard to households' inflation perceptions underlying Brachinger's IPI in a panel estimation for 12 European countries. There is evidence that perceptions react more strongly to 'losses' in inflation than to 'gains' before the Euro cash changeover, but not afterwards. Moreover, we find empirical support for the availability hypothesis, where frequently bought goods have a stronger influence on inflation perceptions.

Keywords: Inflation Perceptions, Prospect Theory, Dynamic Panel.

JEL classification: D81, D82, E52, C33.

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1   Introduction

When assessing macroeconomic models empirically, economists mostly use actual data as published by statistical institutes for the theoretical variables in these models. However, there exists overwhelming empirical evidence that peoples' knowledge and perception of these variables deviates considerably from official statistical data and their underlying concepts, questioning the mostly assumed rationality of agents.[1] The gap between the actual figures and individuals' perceptions raises important policy questions. This is especially true for inflation. As argued by van der Klaauw et al. (2008), among others, if individuals have biased beliefs about inflation, this can seriously undermine the central bank's credibility. Furthermore, and relating to the concept of *money illusion*[2], this perception gap may lead to distortions in bargaining if individuals misperceive their actual real purchasing power. To assess the effectiveness of policy propositions suggested by macroeconomic models, it is thus necessary to understand how people form perceptions about macroeconomic variables and how these perceptions influence individual behavior.

Agents' perceptions have been measured empirically since 1985 by the survey of the *Joint Harmonized EU Program of Business and Consumer Surveys* directed by the European Commission[3], questioning individuals directly about their judgments of the level and change of economic variables such as unemployment, GDP and inflation. In order to gain quantitative measures of these perceptions, various methods are used. However, the underlying statistical assumptions are rather restrictive and lead to different results depending on the method applied.[4] These problems have motivated Brachinger (2006, 2008) to construct an alternative *Index of Perceived Inflation*. This

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[1]Blanchflower and Kelly (2008), Blinder and Krueger (2004), Malgarini (2008), Curtin (2007).

[2]See Fisher (1928), and Shafir et al. (2004) for a Behavioral Economics perspective.

[3]European Commission (2008).

[4]See Nardo (2003) for an overview.

approach uses insights of *Prospect Theory*[5], providing several theoretical assumptions about peoples' formation of perceptions. Evaluating their idea for German data, Brachinger (2006) and Jungermann et al. (2007) claim that this index represents a much more adequate way of capturing inflation as perceived by individuals. By contrast, their approach has been criticized by Hoffmann et al. (2006) for its use of arbitrary ad hoc assumptions, while in a larger empirical sample neither Döhring and Mordonu (2007) nor Aucremanne et al. (2007) find that an index of frequently bought goods used as a proxy for Brachinger's index of perceived inflation outperforms the HICP.

Especially one stylized fact has motivated several empirical studies in the area of inflation perceptions, namely the observed jump in perceptions after the Euro cash changeover in 2002 compared to the actual inflation rate that continued to stay on a low level. Explanation for this jump range from *price intransparencies* (Dziuda and Mastrobuoni, 2005), difficulties in applying the *conversion rates* (Ehrmann, 2006), *perceptual crisis* (Eife, 2006, Eife and Coombs, 2007), *macroeconomic illiteracy* (Del Giovane et al., 2008, Cestari et al., 2007), *media bias* (Lamla and Lein, 2008), and *expectancy confirmation* (Traut-Mattausch et al., 2004)

However, less work has been conducted on what determines inflation perceptions in general. An exception is Del Giovane et al. (2008) who designe a detailed survey for Italian consumers in 2006 and investigate the answers econometrically. Especially, they find a strong impact of socioeconomic factors on inflation perceptions. Moreover, in a dynamic panel model for the countries that adopted the Euro in 2002, Döhring and Mordonu (2007) find an influence of inflation expectations on perceptions, in addition to actual inflation.

Our paper adds to the literature as follows. Using the balance statistics for inflation perceptions as a rather simple and publicly available measure summarizing the shift in the answer fractions of the underlying qualitative

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[5]Kahneman and Tversky (1979).

data, we forgo dealing with the problem of how to measure quantitative inflation perceptions in the most adequate way. Rather, we test empirically the two main theoretical assumptions on the formation of inflation perceptions, as put forward by Brachinger (2006, 2008). First, we investigate whether individuals code price increases and decreases in a different way and with different weights, implying *loss aversion*. Second, we examine which category of products has the highest impact on perceptions, and whether these are products that are bought more frequently. Using a panel of countries within and outside the Euro Area, we find sound empirical support for both loss aversion in households' inflation perceptions and for an impact of the purchase frequency of different categories of goods. Furthermore, we find significant differences between the periods before and after the Euro introduction.

The paper is structured as follows. Section 2 contains a detailed discussion of the theoretical propositions with regard to inflation perceptions. Section 3 proceeds with describing the data set and the econometric methodology, followed by section 4 in which we discuss our results. Section 5 concludes.

2   Theoretical Hypotheses

In order to develop testable theoretical hypothesis about individuals' formation of inflation perceptions, insights from Behavioral Economics can be used. Especially, one can build on *Prospect Theory*, which was developed by Kahneman and Tversky (1979), and Tversky and Kahneman (1981, 1991) as an alternative decision theory under risk and uncertainty to the traditional expected utility theory.[6] Brachinger (2006, 2008) was the first to apply this theory to inflation perceptions. We follow his approach and test empirically for two fundamental theoretical assumptions underlying his *Index of Perceived Inflation*. The principal ideas of loss aversion and reference depen-

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[6]See Starmer (2004) for an overview of developments in decision theory under risk.

dence of inflation perceptions are summarized in Figure 1.

< Figure 1 here >

1. INDIVIDUALS CODE PRICE CHANGES AND EVALUATE THEM AGAINST A REFERENCE PRICE. HIGHER PRICES ARE PERCEIVED AS LOSSES WHEREAS LOWER PRICES ARE PERCEIVED AS GAINS. PRICE IN-CREASES ARE EVALUATED MORE STRONGLY THAN PRICE DECREASES, THE EXACT QUANTITY BEING CAPTURED BY THE LOSS AVERSION PARAMETER.

   In order to determine the reference price, two routes can be followed. In the context of consumer choice, the reference price is given by the *fair* price, which is determined by consumers' perceptions of sellers' costs. This idea has first been proposed by Thaler (1985) as the original study relating prospect theory to consumer choice and has recently been pursued further by Rotemberg (2005, 2008). With regard to inflation perceptions, Brachinger (2006) argues that one could simply take a past price as the reference price. However, it is not clear whether one should use an average price of a bundle of goods and how long the reference time period should be.

   In the context of inflation perceptions, Jungermann et al. (2007) as the only existing study found a loss aversion parameter of about 2 in an experiment. This relates well to studies of loss aversion in other areas where the same parameter has been found.[7] Hoffmann et al. (2006) question the claim that price increases are judged differently from price decreases, i.e. whether individuals behave asymmetrically with respect to price changes. Whereas Hoch et al. (1994) in an experimental study for US retailers deny any asymmetry, support for Brachinger's hypothesis is given by Hardie et al. (1993) and Camerer (2004). However, both of the quoted studies examine consumers' purchasing reactions to

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[7]See Brachinger (2006) for further references.

price changes, not individuals' changes in perceptions with regard to price changes. To the best of our knowledge, the only existing study dealing with asymmetries in inflation perceptions is Del Giovane et al. (2008). They add an additional question to their survey of Italian consumers, asking respondents whether they have observed any price decrease over the last five years. They then find that those who replied with 'yes' exhibit considerably lower inflation perceptions than the remaining sample, hence providing some support for asymmetric inflation perceptions. Our analysis allows us to directly test for this hypothesis in a more general setup.

2. INDIVIDUALS PERCEIVE PRICE CHANGES THE STRONGER THE MORE OFTEN THEY BUY A PARTICULAR PRODUCT.

   Following the *Weber-Fechner Psychophysical Law*[8], inflation perceptions should be linear and depend only on relative price changes, not on the initial price level. Indeed, Tversky and Kahneman (1981) have shown in an experimental study that individuals perceive a price change of 5% stronger for a relatively cheap good than for a relatively expensive one. This can be explained by the *Availability Heuristics* presented by Kahneman and Tversky (1973), claiming that agents will assess the frequency of events by the ease with which they can be remembered. Hence, for inflation perceptions, individuals perceive price changes the stronger, the more often they buy a particular product. In an experimental study for Germany, Jungermann et al. (2007) find empirical support for this hypothesis, and Del Giovane et al. (2008) point to several studies providing further evidence for single countries. In contrast, Hoffmann et al. (2006) state that what matters is the impact of the price increase on the consumer's overall budget, not the frequency of the purchase. Döhring and Mordonu (2007) and Aucremanne et al.

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[8]See Thaler (1980).

(2007) use an index of frequently bought goods (out-of-pocket index) in their panel estimations and do not find any evidence for the hypothesis of Brachinger. We test this hypothesis by evaluating which categories of goods affect inflation perceptions, leaving the question of the assumed linearity of inflation perceptions for further research.

3   Data Set and Methodology

The two hypotheses from Prospect Theory underlying Brachinger's Index of Perceived Inflation are tested empirically for a panel of 12 EU-Countries consisting of Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Sweden and the UK for the time period from January 1996 to November 2008. Our sample thus covers the Euro Area almost completely and allows us to test for differences to non-Euro countries by including Sweden and the United Kingdom as control group. Furthermore, the sample period is long enough to enable us to test for differences between the pre-Euro and the post-Euro periods.

We use the balance statistic of Question 5 of the Joint Harmonized Consumer Survey by the European Commission as our measure of perceived inflation. The survey provides a qualitative measure from a pentachotomous survey, asking participants whether they think prices have risen a lot/ risen moderately/ risen slightly/ stayed about the same/ fallen over the last 12 months. Although this measure cannot be interpreted as a quantitative time series of perceived inflation, changes in the balance statistic nevertheless mirror changes in perceived inflation.[9] Actual inflation rates are measured with

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[9]While most empirical studies on perceived or expected inflation with data from the Joint Harmonized Consumer Survey by the EC also make use of the balance statistic, there exist methods to quantify the qualitative data, most notably the probability method by Carlson and Parkin (1975) and Batchelor and Orr (1988). However, the quantification method demands a scaling series that perceptions, respectively expectations, are assumed to be based upon. Since it is usually assumed that perceptions of inflation are formed relative to actual inflation rates, the quantification method may lead to biased measures

annual inflation rates of harmonized consumer price indices (HICP) from the International Financial Statistics (IFS) database by the IMF. Additionally, in order to be able to test the availability hypothesis, we employ data on the 12 COICOP-Catogories that together form the HICP from Eurostat. All data are available on a monthly basis.

3.1 Unit Root Tests

Both perceptions and inflation rates in our panel are tested for unit roots, where we assess the unit root properties as well as cointegration relations in a panel setting over the whole sample. We apply six different panel unit root tests: The Levin et al. (2002) test, the Breitung (2000) test and the Hadri (2000) test all assume a common unit root process over all series in the sample. Both the Levin-Lin-Chu test and the Breitung test estimate proxies for Δy_{it} and y_{it-1} and test for the null hypothesis $H_0: \alpha = 1$ in the regression $\Delta y_{it}^* = \alpha y_{it-1}^* + \eta_{it}$. The Hadri panel unit root test is constructed similar to the KPSS unit root test, using an LM-statistic to test for the null of no unit root. By contrast, the tests by Im et al. (2003), Maddala and Wu (1999) as well as Choi (2001) (Fisher's ADF and PP test) allow for individual unit root processes. They specify individual unit root tests and derive test statistics to test the null hypothesis $H_0: \alpha_i = 0$, for all i against the alternative that at least one $\alpha_i \neq 0$.

< Table 1 here >

The results in Table 1 imply uniform non-rejection of the null hypothesis of a unit root for perceptions, both assuming common and individual unit root processes. However, evidence for a unit root in the inflation series in our sample is less conclusive: While the Breitung (2000) and the Hadri (2000) test find evidence of a common unit root process in inflation, the other test

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of perceived inflation if an existing bias in the relation between actual and perceived inflation is assumed away.

statistics reject the null of a unit root in favour of (weak) stationarity. This ambiguous result is in line with findings in Lein and Maag (2008), who also find that inflation perceptions are more persistent in a similar panel setting. Generally, empirical evidence on the order of integration of inflation series is mixed, Altissimo et al. (2006) conclude in a survey that empirical findings seem to lean towards stationarity of inflation.

Due to the inconclusive evidence on stationarity of inflation in our panel, we additionally test for panel cointegration between perceived and actual inflation, making use of the Persyn and Westerlund (2008) panel cointegration tests based on Westerlund (2007). The four tests assess cointegration properties in panel data by determining whether there exist error correction for individual panel members or for the panel as a whole. While the Ga and the Gt statistics test for cointegration of panel members individually, the Pa and Pt statistics perform the test for the whole panel by pooling information over all cross-section units. We estimate test statistics with bootstrapped p-values that are robust in the presence of common factors in the time series. Overall, there is evidence of cointegration between actual and perceived inflation for individual countries as well as the panel as a whole. We thus proceed to estimate regressions in the analysis in levels.

3.2   Estimation Design

We assess the existence of loss aversion with respect to inflation and the validity of the availability hypothesis for our sample of EU-countries in two panel regressions. Due to our finding of cointegration between actual and perceived inflation, we estimate all equations in levels and use the dynamic Arellano and Bond (1991) estimator to account for the high degree of persistence in perceived inflation.

In order to test for the existence of loss aversion with respect to rising inflation in the countries in our sample, we construct two threshold-dummies that serve to capture the periods where losses in the form of rising inflation

occurred. If the hypothesis of loss aversion holds, we should find a significantly stronger impact of those 'loss' periods on perceived inflation than 'gain' periods in inflation. This corresponds to the finding of a kink in the perceptions-inflation relation as shown in Figure 1. The threshold-dummies for all $i = 1, 2, ..., 12$ countries in the panel are defined as follows:

$$\text{thold}_{1,it} = \begin{cases} 1 \text{ if } \pi_{it} > \pi_{it}^{MA} \\ 0 \text{ otherwise,} \end{cases}$$

$$\text{thold}_{2,it} = \begin{cases} 1 \text{ if } \pi_{it} > \pi_{it}^{HP} \\ 0 \text{ otherwise,} \end{cases}$$

where π_{it}^{MA} represents a five-month moving-average of inflation and π_{it}^{HP} stands for recursively HP-filtered inflation. The threshold-dummies are then combined with HICP inflation rates to test for a significant difference between periods of 'losses' in prices (i.e. rising inflation) and periods of 'gains' in prices (i.e. stable or falling inflation):

$$perc_{it} = \alpha_0 + \alpha_1 perc_{it-1} + \beta_1 infl_{it} + \beta_2(thold_{1,2it} * infl_{it}) + \varepsilon_{it} \qquad (1)$$

A significantly positive coefficient β_2 in equation 1 suggests higher perceived inflation rates in periods of rising inflation for our panel and, thus, gives evidence of loss aversion with respect to prices.

The availability heuristic is tested in equation 2, were we estimate weights of price inflation of individual COICOP-categories on perceived inflation. The twelve COICOP-categories comprise price indices for those goods categories that form the harmonized consumer price indices, such as food, housing, transport, education etc. A description of the COICOP-categories is given in Table 7 in the appendix.

$$perc_{it} = \alpha_0 + \alpha_1 perc_{it-1} + \sum_{j=1}^{12} \beta_j infl\_COICOP_{j,it} + \varepsilon_{it} \qquad (2)$$

If the availability hypothesis by Brachinger (2006) holds, we should find a significantly stronger effect of inflation of price categories of frequently bought goods, such as food and transport, on inflation perceptions.

4   Results

4.1   Testing for Structural Breaks

Since much of the empirical literature on perceived inflation has found a jump in perceptions occurring shortly after the Euro cash changeover, it seems natural to test for a structural break in the relation between actual and perceived inflation in our panel.

< Table 2 here >

Table 2 presents results from a Quandt-Likelihood-Ratio test for structural breaks for each country in our sample, that runs individual tests over each time period and selects the date with the maximum Wald F-Statistic as the break date.

< Figure 2 here >

The test is estimated for equation 1 above, with both thresholds. Regardless of the threshold used, it clearly emerges that a highly significant structural break occurred shortly after the Euro cash changeover in January 2002 in all Euro Area countries, with the exception of France, where the break occurred shortly before the changeover. By contrast, the two non-Euro countries in the control group show structural breaks unrelated to the

Euro introduction, thus emphasizing again that the break in perceptions was related to the Euro introduction, see also Figure 2. We thus divide our sample period into pre-Euro (Jan 1996 - Dec 2001) and post-Euro (Jan 2002 - Nov 2008) periods in order to account for the structural break.

4.2 Loss Aversion

We present results of the panel estimation of equation 1 with the two threshold dummies for the pre-Euro period in Table 3.

< Table 3 here >

Both models yield highly significant results, and give evidence of loss aversion with respect to prices: Coefficients on $thold_{1,2it}*infl$ are significantly positive for both threshold1 and threshold2, with slightly higher coefficients for the latter threshold. Hence, perceived inflation is found to be significantly higher for those periods where inflation was above average, i.e. losses in inflation occurred. Comparing estimates over the whole sample to those from a model estimated only for the Euro Area countries, we find slightly higher coefficients on $thold_{1,2it}*infl$ for the Euro Area, implying that loss aversion might have been more pronounced in those countries.

Furthermore, results of the loss aversion estimations for the post-Euro sample are given in Table 4:

< Table 4 here >

While coefficients on the lagged dependent variable and the inflation rate from the later estimation period are approximately comparable to those from the models over the pre-Euro sample period, all coefficients on $thold_{1,2it}*infl$ are now found to be insignificant. This implies that the loss aversion relationship with respect to price changes was disturbed after the introduction of

the Euro, so that we no longer find a significant difference between effects of 'loss' and 'gain' periods of inflation on perceptions. Our finding could have various interpretations: On the one hand, the asymmetry in the perception of 'losses' and 'gains' in inflation as visualized by the kink of the perceptions function at the reference point could have broken down after the Euro introduction. On the other hand, our finding could be due to confusion regarding the reference point after the Euro introduction, so that 'losses' and 'gains' in inflation could no longer be distinguished clearly. This argument relates to Ehrmann (2006), who states that the increase in perceived inflation after the Euro cash changeover might have been due to complex conversion rates that introduced an upwards bias in perceptions caused by rounding errors.

4.3   Availability

Table 5 gives results of the estimations of equation 2, testing the availability hypothesis for the pre-Euro sample period.

< Table 5 here >

Generally, the inflation of the same COICOP-categories is found to significantly affect inflation perceptions in the models for all investigated EU countries and for the Euro Area sample. However, coefficients in the model for the Euro Area are slightly larger. Overall, our results are in favor of Brachinger's hypothesis: We find significant coefficients for inflation of those COICOP-price categories that relate to frequently bought goods, such as food (inflcp1), housing (inflcp4), transport (inflcp7) and, to a lesser degree, also clothing (inflcp3) as well as restaurants and hotels (inflcp11). By contrast, inflation of prices for alcohol, tobacco and narcotics (inflcp2), furnishings (inflcp5), health (inflcp6), communications (inflcp8), recreation and culture (inflcp9) and education (inflcp10) are not found to significantly influence perceived inflation. While there is a certain overlap between categories, such as

prices for alcohol and prices in restaurants, the tendency emerges nevertheless that prices of those categories that are purchased on a frequent basis exert more influence over perceived inflation. Contrary to Brachinger (2006, 2008), we also find that prices of housing, water, gas and electricity have a highly significant impact on inflation perceptions. This result relates to arguments by Del Giovane and Sabbatini (2006) and Döhring and Mordonu (2007) who suggest that prices not included in consumer price indices such as house prices might nonetheless have an impact on inflation perceptions.

Finally, results for the availability test for the post-Euro sample period are given in Table 6.

< Table 6 here >

While some results remain stable over the whole sample period, similar to our findings with respect to loss aversion, the availability of price categories regarding perceptions also seems to have shifted substantially after the Euro cash changeover. However, the most frequently bought price categories, namely food and transport, remain highly significant also in the post-Euro sample, suggesting that availability of these price changes still significantly influenced inflation perceptions. Yet price changes of clothing and housing and, surprisingly, also restaurant and hotels, are no longer found to be significant in the post-Euro sample models, with the exception of changes in housing prices for the EU12 model. Moreover, we find significant effects of price changes in furnishings, communications, recreation and culture, as well as education on perceptions after the Euro introduction. Overall, it seems that availability of price categories with regard to perceptions generally increased after the Euro cash changeover, but the clear pattern of higher availability of frequently bought goods to some extent broke down. Furthermore, the persistence of the perception series – as measured by the first lag – is stronger. This points to the fact, that perception in itself is more persistent and shocks die out more slowly than before the Euro introduction.

5   Conclusion

This paper investigates whether insights from Behavioral Economics, notably Prospect Theory, can be meaningfully applied to provide explanations for individuals' formation of inflation perceptions. Using a dynamic panel model for 12 European countries, we find sound empirical support for the two main theoretical hypotheses stemming from Prospect Theory that underly Brachinger (2006)'s index of perceived inflation:

First, with regard to loss aversion of households to rising inflation, there is convincing evidence of loss aversion for the whole panel in the pre-Euro sample period. While our results suggest that before the Euro introduction loss aversion was even more pronounced for the countries of the Euro area, there is no indication of loss aversion after the Euro cash changeover in any of the models. This suggests a strong structural break in the perception-inflation relation, where the break-down of loss aversion might be due to confusion regarding the reference price in the new currency. Whether this constitutes a temporary or a permanent effect remains to be investigated in future research.

Second, we find that price inflation of frequently bought goods categories has a significant effect on perceived inflation in the pre-Euro sample period, while inflation rates of other price categories are not found to be significant. Again, this result holds for both models including all EU countries in our sample or only Euro Area countries. For the post-Euro sample period, we find that the most frequently bought categories of goods, such as food and transport, again have a highly significant effect on inflation perceptions, but other, less frequently purchased, categories become significant as well. This suggest a generally increased awareness of rising inflation after the Euro introduction in our sample.

Several areas of future research seem to be worth following up. First, note that it will be interesting to explain why the effect of loss aversion on inflation perceptions has weakened after the Euro introduction and whether this

change will turn out to be stable in the future. Second, the assumed linearity of the underlying value function for inflation perception could be tested making use of smooth transition models. And third, following Del Giovane et al. (2008) and others, we should extend the analysis to account for socioeconomic characteristics of individuals.

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Appendix

Table 1: Panel Unit Root Tests and Cointegration Test for Perceptions and Inflation

	perceptions		inflation	
Method	Statistic	Prob.*	Statistic	Prob.*
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t	0.19097	0.576	-1.64599	0.050
Breitung t-stat	3.3998	1.000	-0.43715	0.331
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.69558	0.757	-4.38754	0.000
ADF - Fisher Chi-square	18.3781	0.784	65.3743	0.000
PP - Fisher Chi-square	20.1849	0.686	61.8072	0.000
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	20.5789	0.000	6.16405	0.000
Westerlund (2007)				
ECM panel cointegration tests				
Gt	-1.598	0.020		
Ga	-4.073	0.240		
Pt	-4.818	0.020		
Pa	-2.683	0.080		

* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 2: Quandt-Likelihood-Ratio Test for Structural Breaks

Country	Model					
	Threshold 4			Threshold 5		
	Max. Wald F	p-value	date	Max. Wald F	p-value	date
Austria	153.670	<0.001	2002M02	160.916	<0.001	2002M02
Belgium	182.587	<0.001	2002M04	161.003	<0.001	2002M04
Spain	284.427	<0.001	2002M05	243.092	<0.001	2002M05
Finland	93.991	<0.001	2002M02	127.207	<0.001	2002M02
France	270.878	<0.001	2001M08	169.536	<0.001	2001M08
Germany	25.488	<0.001	2001M05	16.045	0.0205	2000M09
Greece	465.868	<0.001	2002M09	482.446	<0.001	2002M09
Italy	95.775	<0.001	2002M06	80.281	<0.001	2002M06
Netherlands	71.422	<0.001	2002M05	64.198	<0.001	2002M05
Portugal	62.233	<0.001	2002M05	100.184	<0.001	2002M05
Sweden	65.748	<0.001	2006M10	79.642	<0.001	2006M09
UK	53.291	<0.001	2001M05	40.817	<0.001	2006M03

Table 3: Loss Aversion with Respect to Inflation, Pre-Euro 1996 - 2001

perc	EU12		Euro Area		EU12		Euro Area	
	Coeff.	P>|z|	Coeff.	P>|z|	Coeff.	P>|z|	Coeff.	P>|z|
l.perc	.852847	0.000	.858688	0.000	.8320229	0.000	.82633	0.000
	(.0210437)		(.0214028)		(.0208372)		(.0209261)	
infl	1.214328	0.004	1.139251	0.016	1.297497	0.000	1.396547	0.000
	(.4194957)		(.4720599)		(.226491)		(.2510544)	
thold1*infl	.4219577	0.009	.4402299	0.014	-	-	-	-
	(.1620706)		(.1782283)					
thold2*infl	-	-	-	-	.6237324	0.000	.6974512	0.000
					(.1029286)		(.100349)	
constant	-1.804326	0.015	-1.287728	0.067	-1.976935	0.001	-1.704115	0.005
	(.7409243)		(.7029161)		(.5719075)		(.6048612)	
Sargan test (χ^2)	752.8592	0.691	632.8363	0.717	707.9301	0.831	590.808	0.840
Wald test (χ^2)	2796.7	0.000	3168.76	0.000	2354.69	0.000	2664.16	0.000

Note: Robust standard errors in parentheses.

Table 4: Loss Aversion with Respect to Inflation, Post-Euro 2002 - 2008

perc	EU12 Coeff.	P>|z|	Euro Area Coeff.	P>|z|	EU12 Coeff.	P>|z|	Euro Area Coeff.	P>|z|
l.perc	.8968704	0.000	.8931339	0.000	.8976802	0.000	.8933753	0.000
	(.0117636)		(.0117748)		(.0113822)		(.0108063)	
inf	1.407719	0.000	1.278868	0.000	1.358088	0.004	1.300232	0.013
	(.2977717)		(.2903887)		(.4684549)		(.5236474)	
thold1*inf	.0477518	0.548	.0836383	0.327	-	-	-	-
	(.0794971)		(.085314)					
thold2*inf	-	-	-	-	.0671702	0.729	.0489765	0.824
					(.1941571)		(.2205463)	
constant	0.6364427	0.492	1.767611	0.044	.6918922	0.501	1.747187	0.103
	(.9272901)		(.876386)		(1.028242)		(1.071323)	
Sargan test (χ^2)	1019.566	0.005	837.9442	0.032	1018.066	0.005	836.5434	0.035
Wald test (χ^2)	8206.68	0.000	6320.08	0.000	10495.7	0.000	8480.93	0.000

Note: Robust standard errors in parentheses.

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Table 5: Availability of COICOP-Categories, Pre-Euro 1996 - 2001

perc	EU12 Coeff.	P>|z|	Euro Area Coeff.	P>|z|
l.perc	.7703892	0.000	.7281246	0.000
	(.0299094)		(.0190192)	
inflcp1	.7122323	0.000	.8899393	0.000
	(.1606206)		(.136292)	
inflcp2	.0320991	0.553	.0006377	0.994
	(.0541353)		(.0869715)	
inflcp3	.1830086	0.060	.2855861	0.013
	(.0972879)		(.1152753)	
inflcp4	.4231589	0.000	.5924267	0.000
	(.1072175)		(.1131666)	
inflcp5	-.375758	0.211	-.3744014	0.200
	(.3003987)		(.2922713)	
inflcp6	-.0266812	0.636	-.0192545	0.771
	(.0564381)		(.0661388)	
inflcp7	.6912904	0.000	.6125404	0.000
	(.0727526)		(.0800005)	
inflcp8	.0470002	0.283	.0463733	0.284
	(.0437386)		(.0432477)	
inflcp9	-.2195416	0.306	-.3859244	0.106
	(.2144696)		(.2388365)	
inflcp10	.0324514	0.546	.0456407	0.318
	(.0537584)		(.0456871)	
inflcp11	.6642645	0.029	.834395	0.003
	(.3039393)		(.2834484)	
inflcp12	.171823	0.485	.3949299	0.044
	(.2462501)		(.1962827)	
constant	-4.189458	0.002	-4.546093	0.002
	(1.366289)		(1.456991)	
Sargan test (χ^2)	642.414	0.544	531.4902	0.461
Wald test (χ^2)	7657.35	0.000	3282.74	0.000

Note: Robust standard errors in parentheses.

Table 6: Availability of COICOP-Categories, Post-Euro 2002 - 2008

perc	EU12 Coeff.	P>|z|	Euro Area Coeff.	P>|z|
l.perc	.8499106	0.000	.8483622	0.000
	(.0091533)		(.0055578)	
inflcp1	.4162143	0.000	.3187173	0.000
	(.0825739)		(.0593311)	
inflcp2	.0155146	0.684	-.0106763	0.811
	(.0381589)		(.0446808)	
inflcp3	.0134627	0.861	-.0152707	0.879
	(.0767594)		(.1001727)	
inflcp4	-.1635216	0.026	-.1658669	0.114
	(.0735169)		(.1048117)	
inflcp5	.7070433	0.001	.9927675	0.000
	(.2072086)		(.2795812)	
inflcp6	.0523735	0.481	.0527741	0.510
	(.0743288)		(.0800861)	
inflcp7	.4930715	0.000	.4570764	0.000
	(.0609472)		(.0603101)	
inflcp8	.121475	0.003	.1193416	0.004
	(.0415875)		(.0412238)	
inflcp9	.3158016	0.001	.3681189	0.000
	(.0990786)		(.0893152)	
inflcp10	.1067449	0.000	.0955047	0.003
	(.027195)		(.0323031)	
inflcp11	.0859813	0.646	.0550418	0.777
	(.1873337)		(.1944053)	
inflcp12	.2144138	0.325	.1233348	0.695
	(.217717)		(.3146065)	
constant	1.723171	0.129	3.213742	0.000
	(1.134855)		(.7621522)	
Sargan test (χ^2)	964.6409	0.083	789.162	0.257
Wald test (χ^2)	982.39	0.000	887.21	0.000

Note: Robust standard errors in parentheses.

Table 7: COICOP-Categories

|	
cp1	Food and non-alcoholic beverages
cp2	Alcoholic beverages, tobacco and narcotics
cp3	Clothing and footwear
cp4	Housing, water, electricity, gas and other fuels
cp5	Furnishings, household equipment and routine maintenance of the house
cp6	Health
cp7	Transport
cp8	Communications
cp9	Recreation and culture
cp10	Education
cp11	Restaurants and hotels
cp12	Miscellaneous goods and services

Figure 1: Prospect Theory and Inflation Perceptions
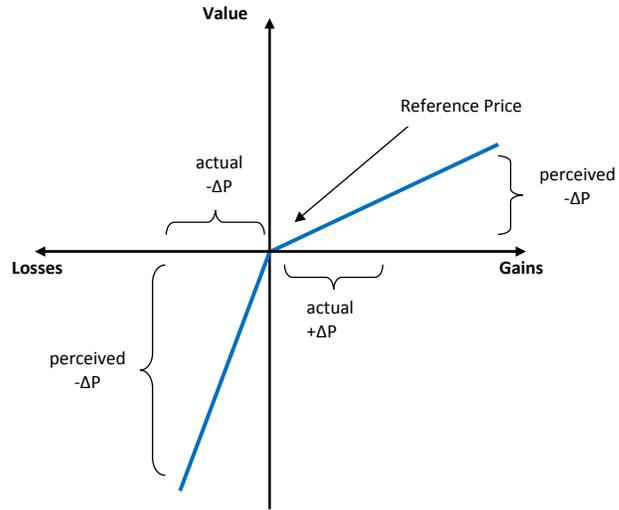
Figure 2: Quandt-Likelihood-Ratio Test for Structural Breaks in Equation 1 for Individual Countries