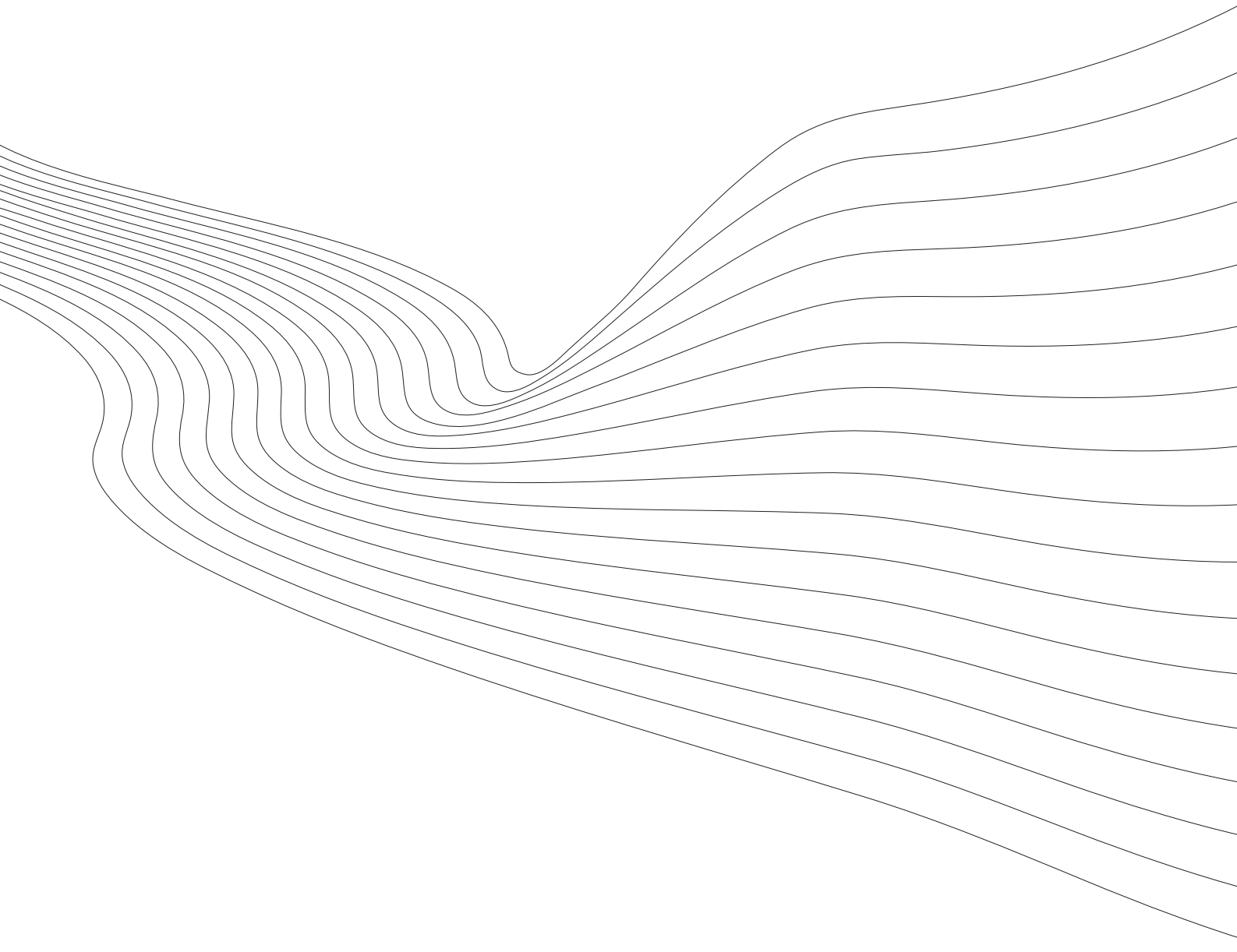
KOF

KOF Working Papers

The Euro Cash Changeover, Inflation Perceptions and the Media

Michael J. Lamla and Sarah M. Lein



No. 254
February 2010

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

KOF

ETH Zurich
KOF Swiss Economic Institute
WEH D 4
Weinbergstrasse 35
8092 Zurich
Switzerland

Phone +41 44 632 42 39
Fax +41 44 632 12 18
www.kof.ethz.ch
kof@kof.ethz.ch

The Euro Cash Changeover, Inflation Perceptions and the Media*

Michael J. Lamla† and Sarah M. Lein‡

February 2010

Abstract

In the aftermath of the euro cash changeover consumers' inflation perceptions rose substantially in the euro area countries while actual inflation figures remained almost unchanged. During that period media reporting on the potentially large inflationary effect of the euro introduction intensified. In this paper we argue that the information set of the public has been distorted through the significant slant in the media. Employing an unique dataset for Germany, we provide evidence that media reporting has a statistically significant and economically meaningful impact on inflation perceptions and contributed to their sharp rise in the aftermath of the euro cash changeover.

JEL classification: E52; D83

Keywords: Monetary policy, inflation perceptions, media coverage, media bias.

*We thank Ulrich Fritsche, Lena Vogel and the participants of the Swiss Society of Economics and Statistics Meeting 2009, Geneve for helpful comments and suggestions. Financial support by the Swiss National Science Foundation (SNF) and the DG ECFIN is gratefully acknowledged. The views expressed in this paper reflect solely the views of the authors and not necessarily those of the Swiss National Bank or the KOF.

†KOF, ETH Zurich, CH-8092 Zurich, Switzerland, E-mail: lamla@kof.ethz.ch

‡Swiss National Bank, Boersenstrasse 15, CH-8022 Zurich, Switzerland, E-mail: sarah.lein@snb.ch

1 Introduction

The introduction of the euro coins in January 2002 led to a surprising surge in inflation perceptions in euro area countries. The balanced statistic of inflation perceptions published by the European Commission for the euro area rose from about 30 at the beginning of 2002 to 60 at the end of the same year and remained at a historically high level for a protracted period of time. Using quantified figures calculated from this qualitative survey, consumers' inflation perceptions edged up from 2.4% in December 2001 to 6.1% in May 2002. At the same time, actual inflation rates fell from 1.4% to 1.1%.

Although several studies have analyzed the reasons for the break in the relationship between inflation perceptions and official inflation rates in 2002, shortly after the introduction of the euro, the potential influence of media reporting on consumers' inflation perceptions has not been examined yet. Media dealt with the introduction of the euro very excessively in 2002. For instance, the word "Teuro", which is a concatenation of the words "teuer" (expensive) and euro, was created by the media, suggesting that goods and services became much more expensive with the introduction of the new currency. Allowing for not fully informed agents, that are not able or not willing to continuously track the latest official statistics, our results suggest that media have affected consumers' views about the evolution of prices and thereby influenced their inflation perceptions.

Media may influence peoples' opinions as they seek for a cost-effective source to update their information sets. Indeed, watching a TV broadcast or reading a newspaper is much less time consuming than searching for new information without these sources. This idea is corroborated by looking at survey data. According to Blinder and Krueger (2004) people indeed obtain their information on current economic conditions mainly through the media, especially through TV broadcasts and newspapers. More precisely, 82 percent say that they receive their information from TVs and 52 percent from newspapers. Looking at theoretical

models, the idea that consumers do not have the ability to process as much information as they need instantaneously and thus do not have perfect information about the current state of the economy is not new. For example, Sims (2003) relaxes the strong assumption that each agent possesses the full information at any point in time. He argues that agents have only finite capacity to process information and consequently cannot observe the state of the economy perfectly. Therefore, they also cannot respond to changes in the environment in the way fully informed rational agents would do. In such an environment media coverage is of importance. Sims (2003) highlights that while people do not actively search and track the latest information regarding for instance price developments any headlines covered in leading media may attract their attention and lead them to update their information set.

Even though inflation perceptions are usually not regarded as important as other macroeconomic variables, understanding how inflation perceptions are formed is nevertheless very useful for gaining insights into consumers' economic behavior and the potential feedback on other economic variables. High inflation perceptions may have real effects: higher perceived inflation rates may lead to an underestimation of the purchasing power of households and therefore to a reduction in spending.[1] Moreover, inflation perception might feed into inflation expectations, which have consequences for wage claims, saving and investment decisions (Ehrmann, 2006). Furthermore, inflation expectations may lead to higher future inflation rates as they may be self-fulfilling (Leduc et al., 2007). Evidence for a possible spillover from inflation perception to inflation expectations is provided by Fluch and Stix (2005). This finding was recently supported by the survey of the Bank of England and the study by Blanchflower and Kelly (2008) who conclude that consumers' price expectations are influenced by past experience of inflation. Finally, although inflation perceptions may play an important role for consumers' economic actions, we still know remarkably little about the formation of inflation perceptions.[2]

[1] See Hofmann et al. (2006) and Stix (2009).

[2] For a overview of the characteristics of inflation perceptions see also Lein and Maag (2008).

Using the media data and data on inflation perceptions, we find evidence for the hypothesis that the media can have a sizeable impact on consumers' perceptions. The remainder of this paper proceeds as follows: In section 2 we shortly review the relevant literature. section 3 presents the data, while section 4 presents the econometric results of our analysis. Finally, section 5 concludes.

2 Literature review

This section briefly outlines the related literature. Our empirical setup is related to two different strands of the literature. The first comprises the determinants that contributed to the observed break in the relationship between inflation perceptions and the officially reported inflation rate in the aftermath of the euro cash changeover. The second part highlights the importance of media reporting in other areas of interest, e.g., political science and voter behavior.

2.1 Perceptions and the Euro Cash Changeover

The strong rise in inflation perception and its persistence for some euro countries gave rise to an extensive search and debate on the driving forces of inflation perception. Several explanations to rationalize the developments in inflation perceptions are presented, for instance, in Fluch and Stix (2005), Ehrmann (2006), and Del Giovane and Sabbatini (2006) and can be summarized as follows: Price movements in frequently bought products, asymmetry in the perception of price increases relative to price decreases, a priori expected price movements, the complexity of conversion rates, and, finally, media coverage.

The explanations of movements in frequently bought products and asymmetry in the perception of price increases versus price reductions are embedded in the index of perceived inflation constructed by Brachinger (2006). The index is based upon two assumptions.

First, that goods that are bought more frequently receive a greater attention than price changes in less frequent bought product groups (Kahnemann and Tversky, 1979). Second, that consumers notice rather price increases than price reductions (Burgoyne et al., 1999).[3] However, there is not much evidence, that a strong rise in the prices of frequently bought products can explain gap between perceived and actual inflation in the aftermath of the euro cash changeover. For example, Aucremanne et al. (2007) find no evidence that strong rises in prices of frequently bought products can explain the. Also Doehring and Mordonu (2007) show that the out-of-the-pocket expenditure HICP index does not perform any better as the all items containing HICP index in explaining inflation perceptions.

Traut-Mattausch et al. (2004) argue that people like to see their ex ante expectations confirmed. The authors present experimental evidence that links high inflation perceptions in 2002 to the existence of a priori expectations of high price increases before the cash changeover. In their line of argumentation people selectively update only the share of information that complements their own expectations. Thus, if they expect prices to rise, they will most likely focus and react to upward price changes. However, a priori expectations, although significant, have not been sufficiently high to explain the break in the tight relationship between perceived and actual inflation (Doehring and Mordonu, 2007).

Other explanations look at the process of converting the old currencies into euro prices. Ehrmann (2006) compares several euro area countries and finds that the gap is larger in countries with simpler conversion rates, where people are more aware of price increases. Dziuda and Mastrobuoni (2006) find that the longer people stick to converting the euro prices into their old currency the more likely it is that they will overestimate current inflation. The obvious explanation for this phenomenon is that they neglect price increases that would have happened if they stuck to their old currency.

[3] Vogel et al. (2009) test those assumptions for European countries empirically and find strong support for the loss aversion hypothesis before the euro cash changeover.

2.2 The Role of Media

A large body of the literature in political economy and media science deals with the impact of media. For example, DellaVigna and Kaplan (2007) find that media can influence voting decisions. Similarly, Hetherington (1996) puts forward that media consumption and attention through the mass media negatively shaped voters' retrospective economic assessments in the 1992 election. Other studies find that media tend to bias economic news in general, see for instance Gentzkow and Shapiro (2006) and Mullainathan and Shleifer (2005) for theoretical models and Shah et al. (1999) and Groeling and Kernell (1998) for empirical evidence. Hence, there is not only convincing evidence regarding the importance of media reporting on perceptions in other fields of research but also occasions where media slanted information.

Regarding the impact of media on economic figures Carroll (2003) and Lamla and Lein (2008) provide empirical evidence that media reporting influences the formation of consumers' inflation expectations for the US and Germany respectively. They find that media reporting has a strong effect on the accuracy of inflation expectations of consumers compared to professional forecasters. Lamla and Lein (2008) differentiate between a tone and a volume channel the media impact may pass through. While the overall volume of reports raises the accuracy of inflation forecasts of consumers the tone of the media report has the power to impair the accuracy. Moreover, the impact is asymmetric. Especially, bad news and news on rising inflation deteriorate inflation expectations.

3 Data

For the media reports we rely on data kindly provided by the media research institute Mediatenor. The data comprises articles and media releases on a monthly frequency for the time span 01/1998 to 09/2007 in Germany covering statements dealing with inflation

which are at least five lines long in the case of printed media and last at least five seconds for television broadcasts.[4] The coding is based on the standards of the media content analysis and the data contain different specifications.[5] We are provided with the overall number of reports in that given period, the amount of reports dealing with rising or falling inflation, whether the focus of the report was mainly the present, the past or the future, if it was distributed via TV or newspaper and whether it is located on the title page or not. We follow Lamla and Lein (2008) and generate the following measures of media reporting about inflation.

To capture the content of the news stories, we construct a variable summarizing the number of reports on rising inflation (*Rising Inflation.*). In a similar fashion *Falling Inflation* denotes reports containing news on falling inflation.

In addition, we employ simple count variables that capture how often a specific terminology is mentioned in the media. These variables are mainly used as a test for robustness of our main results. The count measures are obtained by searching through `LexisNexis`, an online database of media articles. We use two popular terms to back up our line of argumentation. First, we count the articles using the term "Teuro" (*Teuro*). "Teuro" is a concatenation of the words "teuer", the German equivalent for expensive, and the word euro. Analogously, we count the expression "euro introduction" (*euro*). The latter *per se* does not contain a particular tone as it just reminds the public of a particular event related to their currency. The word "Teuro", however, clearly presumes that inflation has been and/or will be rising and is related to the cash changeover in 2002. Given that there is no evidence that the euro introduction has affected prices in Germany significantly, the Teuro

[4]In detail following news sources are analyzed: Daily press: Frankfurter Allgemeine Zeitung, Welt, Süddeutsche Zeitung, Frankfurter Rundschau, Tageszeitung, Bild, Neue Zürcher Zeitung, Berliner, Volksstimmer, Sächsische, Westdeutsche Allgemeine Zeitung, Kölner Stadt-Anzeiger, Rheinischer Merkur; daily TV-News: ARD Tagesschau, Tagesthemen, ZDF Heute, Heute Journal, RTL Aktuell, SAT.1 18:30, ProSieben Nachrichten; Weekly Press: Spiegel, Focus, Die Woche, Wochenpost, Welt am Sonntag, Bild am Sonntag, Die Zeit.

[5]See www.mediatenor.de for details on media content analysis.

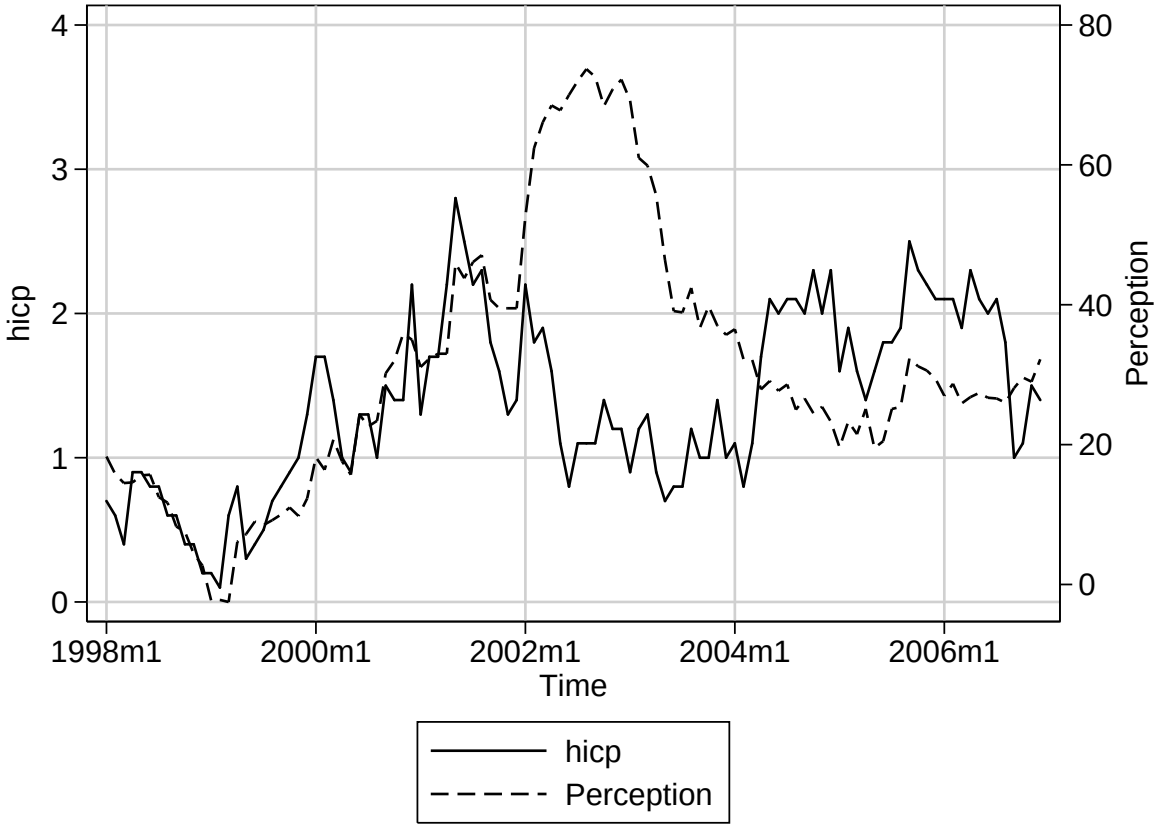
discussion serves as an example for an exaggeration made by the media.

As the measure for perceived inflation we employ survey data collected by the EU Consumer Survey. Inflation perceptions are captured by asking households: "How do you think that consumer prices have developed over the last 12 months? They have...". Respondents express their beliefs on a five-option ordinal scale: "risen a lot, risen moderately, risen slightly, stayed about the same, fallen". We used the balance figures as calculated by `Eurostat`. We illustrate the developments of the actual and perceived inflation rate in Figure 1. The series of inflation perceptions (balance statistics taken from Eurostat) tracks relatively closely the actual HICP inflation rate prior to 2002. After the euro cash changeover, this comovement between the two series breaks down. Inflation perceptions continue to rise until early 2003 and thereafter start to decrease until the beginning of 2004. Interestingly, inflation perceptions remain low and relatively stable from 2004 onwards while actual inflation rises substantially.

Figures 2-4 provide an overview on the dynamics of our key variables in focus. An important issue is how media coverage is related to current inflation. We would expect that if inflation is rising or reaches a high level the amount of reporting that caters this harmful development should increase. Thus we expect a positive correlation. Figure 2 depicts the HICP together with amount of reports on the topic inflation (All News). We can observe that in times where inflation was high the coverage intensity in the media was high. See for instance mid 2001 where due to bad weather prices of vegetables increased substantially. Inflation jumped up and media coverage followed. Another example is the introduction of the euro in January 2002. Interestingly, we can simultaneously observe that there can be high media coverage and low rates of inflation and vice versa. Examples for this phenomenon can be found in mid 2002 as well as in the beginning of 2003. Thus, media coverage does not necessarily co-move with inflation.

To explore this issue further we disentangle all reports into reports dealing with rising

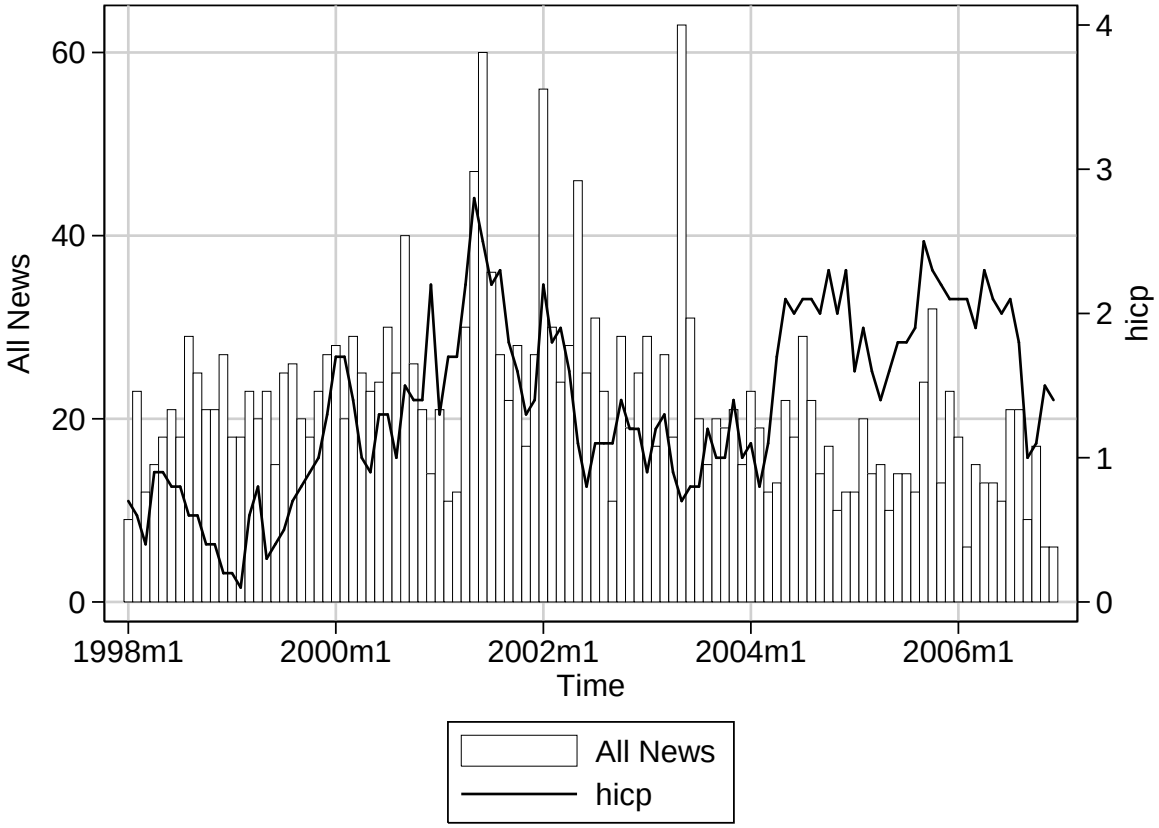
Figure 1: Inflation and Inflation Perceptions



Dashed line: Perceived inflation rate of German consumers; solid line: Actual inflation rate (HICP) Germany.

prices News (*Rising Inflation*) and falling prices News (*Falling Inflation*) and plot them together with HICP in Figure 3. We can observe that if inflation is rising, media reports that inflation is rising and vice versa. Thus, media agencies capture the overall dynamics rightly. However, the amount of reporting does not necessary match the magnitude of price changes. Comparing the spikes in 2002 and 2004 shows that although inflation was as high, the coverage in the media was very different. Moreover, it seems that there is a higher propensity to report more on rising inflation than on falling inflation. The latter result, that there is more reporting on "bad news" than on good news, is a common finding in the media literature (see Hamilton, 2004).

Figure 2: Inflation and Media

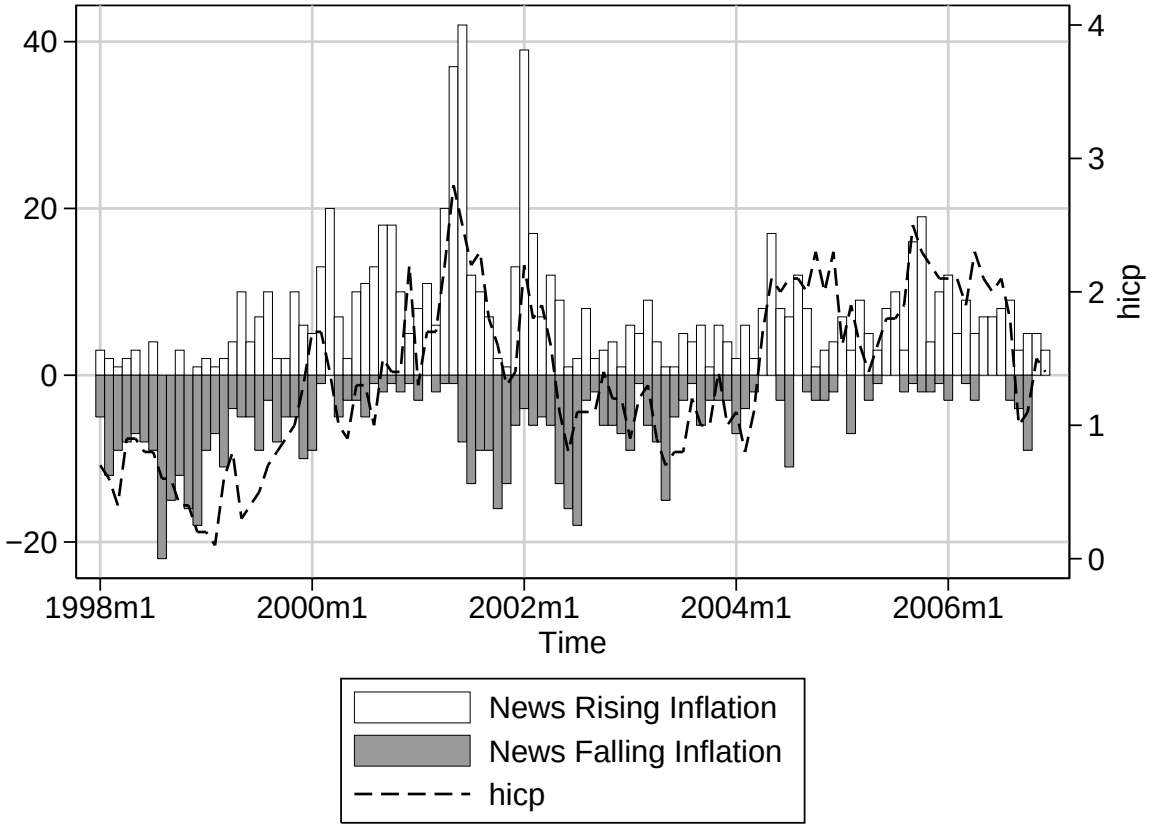


Solid line: HICP inflation, Germany (rhs); bars: all reports on inflation.

We turn back to our main variable in focus. We also disentangle the amount of reporting into news on rising (Rising Inflation) and falling inflation (Falling Inflation) and plot this together with perceived inflation in Figure 4. While the increases in 2001 and 2002 are driven by reporting on rising inflation indeed the fall in 2003 is triggered by news on falling inflation. As the impact on inflation perceptions seems to be rather asymmetrically distributed, we decided to include the media variables into our regression setup separately.

Finally, we employ the measure extracted from the `Lexisnexis` database and counting the articles containing the wording "teuro" and "euro changeover". Figure 5 shows the

Figure 3: Inflation and Media Tone

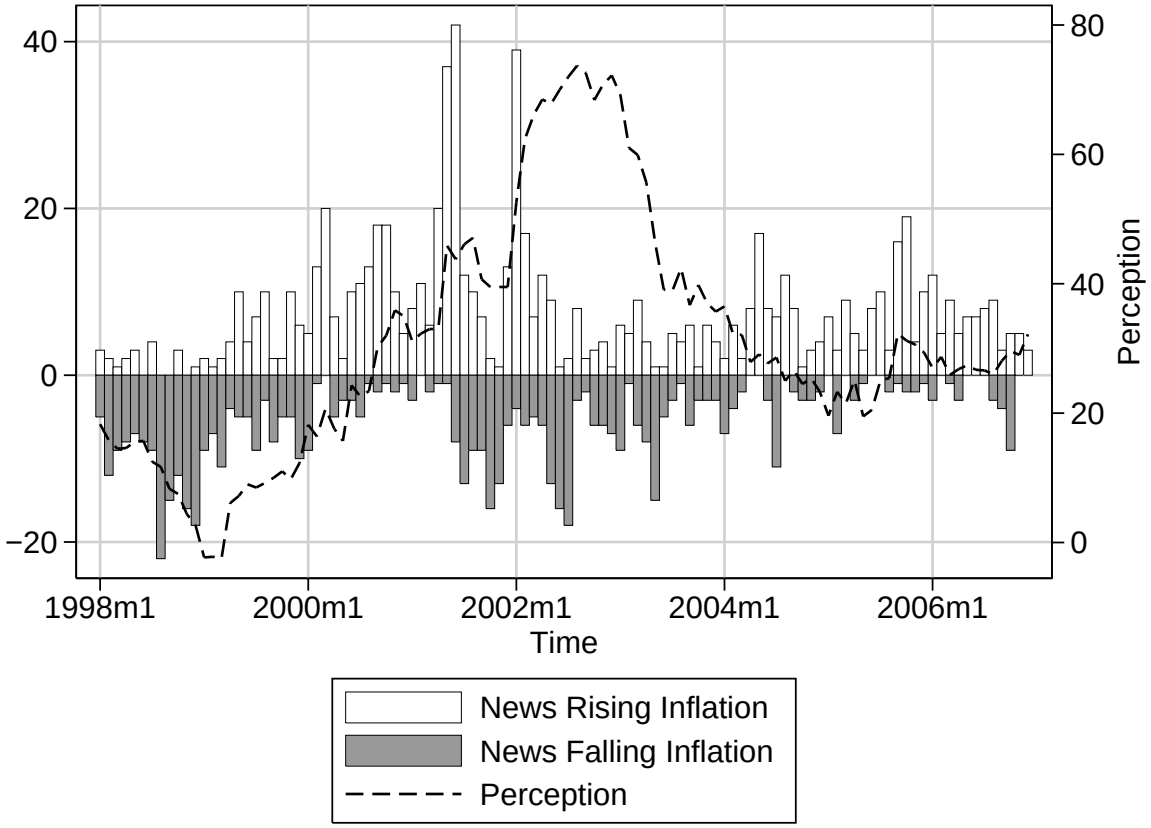


Dashed line: HICP inflation, Germany (lhs); bars: amount of reports on rising and falling inflation, respectively (rhs).

relationship between teuro and inflation perceptions. The sharp rise in inflation perception corresponds with the repeatedly wording of "teuro".

Given the fact that the word "Teuro" was chosen "the word of the year 2002", it is not surprising that the euro introduction was one of the main topics in these year reviews. During the year 2003 both media reports and perceived inflation fall back to a relatively low level. It should be mentioned here, that the appearance of the word Teuro itself captures the topic of a report, but not the content. Arguably, some reports claim that the euro is a "Teuro", whereas others say that it is not. Therefore, we look at the data that explicitly captures the content of reports related to inflation and prices.

Figure 4: Perceptions and Media Tone

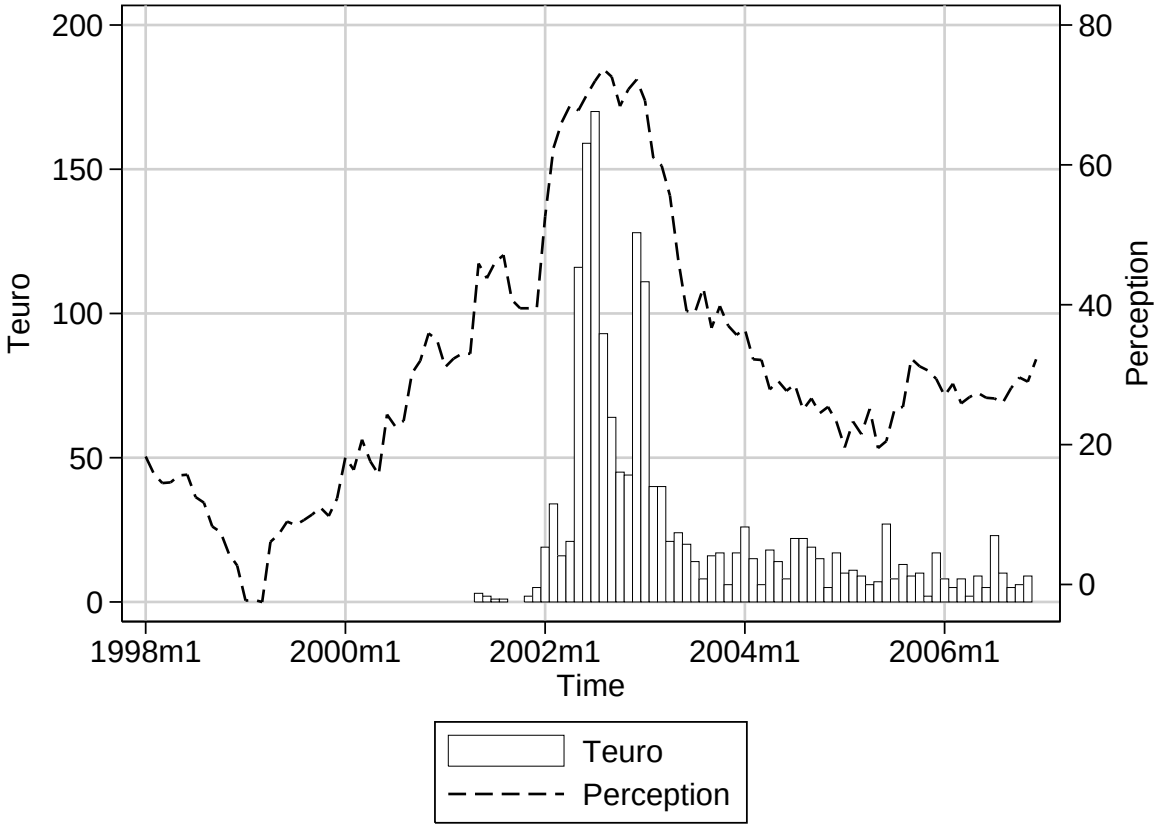


Dashed line: Inflation perceptions, Germany (lhs); bars: number of media reports that claim inflation is rising or falling (rhs).

4 Estimation and Results

This section comprises two parts. First, we use standard econometrics techniques to analyze the data. Following the setup of Doehring and Mordonu (2007) we investigate whether media affects perceptions. Second, we test whether the impact of media reporting has changed over the time. This is done to test whether the period after the introduction of the new currency was unusual in terms of media reporting.

Figure 5: Perceptions and the "Teuro"



Dashed line: Perceived inflation, Germany (rhs); bars: amount of reports containing the word "Teuro" in German print media (lhs).

4.1 Linear Framework

Our starting regression rests on the proposed testing setup by Doehring and Mordonu (2007). We estimate the current perception with its own lag value, inflation expectations, HICP inflation and a dummy variable controlling for the euro cash changeover. Thus, we estimate models in the following form:

$$\pi^{perc} = \alpha + \beta_1 \pi^{perc}_{t-1} + \beta_2 \pi^{exp}_{t-6} + \beta_3 \pi_t + \beta_4 D_{>2002} + \Gamma Media_t + \varepsilon_t.$$

As inflation perceptions (π^{perc}) may have been affected by inflation expectations (π^{exp})

we employ inflation expectations. Following Forsells and Kenny (2004) we use a six month lag of expectations. Notably a 12 month lag produces similar results. However, people have a quite short run memory. To test for the impact of current inflation we employ the HICP index (π).[6] The dummy variable is constructed according to Doehring and Mordonu (2007). It is zero until 2002 and one afterwards. $\Gamma Media$ represents a vector of media variables that will be added to the specification. We estimate the equation using ordinary least squares with robust standard errors. We also apply three stage least squares (3SLS) for means of robustness.

Table 4.1 contains our main findings. The overall results of the basic specification are in line with Doehring and Morduno (2007). We can confirm that the own lag of perceptions measure as well as the expectations act in a self-fulfilling manner. Finally, people also incorporate real economic information as proxied by the HICP. Regarding the variables of interest, the media variables, in column (1) we add both count variables. While the regressors from the entry regressions remain stable, the variable accounting for the Teuro debate has a significant positive impact on inflation perceptions. This is reasonable as there the main message of those articles was indeed to "warn" the public of rising prices with respect to the introduction of the euro. Notably the discussion on the euro introduction itself reveals no such impact. As the HICP becomes insignificant, this implies that people get their information from the media and the figure itself does not have significant additional information content.

In column (2) we introduce media variables that capture, how many articles contain information on rising inflation and how many news on falling inflation. Notably, only news on rising inflation seem to matter for the public as they increase perceptions. Thus, there appears to be an asymmetry in the relationship between media reporting and inflation

[6]Note that we also employed the out of pocket index (FROOP), as calculated by Eurostat as a measure for inflation perceptions. This index should reflect that perceptions could be more affected by prices of frequently purchased items. The FROOP index does not outperform the HICP in statistical terms as well as economically.

Table 1: Determinants of Inflation Perceptions

	(1)	(2)	(3) < 2002	(4) > 2002	(5) 3SLS
π_{t-1}^{perc}	0.891***	0.925***	0.775***	0.939***	0.927***
	(0.032)	(0.025)	(0.069)	(0.036)	(0.024)
π_{t-6}^{exp}	0.161***	0.162***	0.002	0.166***	0.171***
	(0.050)	(0.039)	(0.082)	(0.038)	(0.050)
π_t	2.494***	0.547	4.969***	1.005	0.002
	(0.716)	(0.570)	(1.547)	(0.983)	(1.050)
Teuro	0.036***				
	(0.013)				
Euro	0.002				
	(0.025)				
Rising Inflation		0.169**	0.058	0.190***	0.251**
		(0.082)	(0.108)	(0.068)	(0.122)
Falling Inflation		-0.054	-0.083	0.078	-0.182
		(0.081)	(0.100)	(0.131)	(0.203)
$Dummy_{>2002}$	1.646	2.888**			2.950**
	(1.575)	(1.104)			(1.184)
Constant	-5.293***	-4.770***	-0.725	-3.854	-4.255**
	(1.738)	(1.423)	(2.403)	(2.409)	(1.764)
Observations	101	102	42	60	102

Newey-West corrected standard errors standard errors in parentheses *** p<0.01 ** p<0.05 * p<0.1. Dependent variable is the inflation perception at time t π_t^{perc}. π^{exp} denotes inflation expectations, π_t the inflation rate in period t. Media variables: *teuro* is the monthly number of articles dealing with the word *Teuro*, euro is the number of articles with the word *euro*, *rising (falling) inflation* is the number of articles reporting on rising (falling) inflation. $Dummy_{>2002}$ is a dummy that takes the value one after December 2001, and zero otherwise. Columns (1) and (2) report the results for the whole sample period, columns (3) and (4) for the sub-sample before and after 2002, respectively. Coulums(1) to (4) are estimates with OLS, while column (5) estimates via 3-stage least squares.

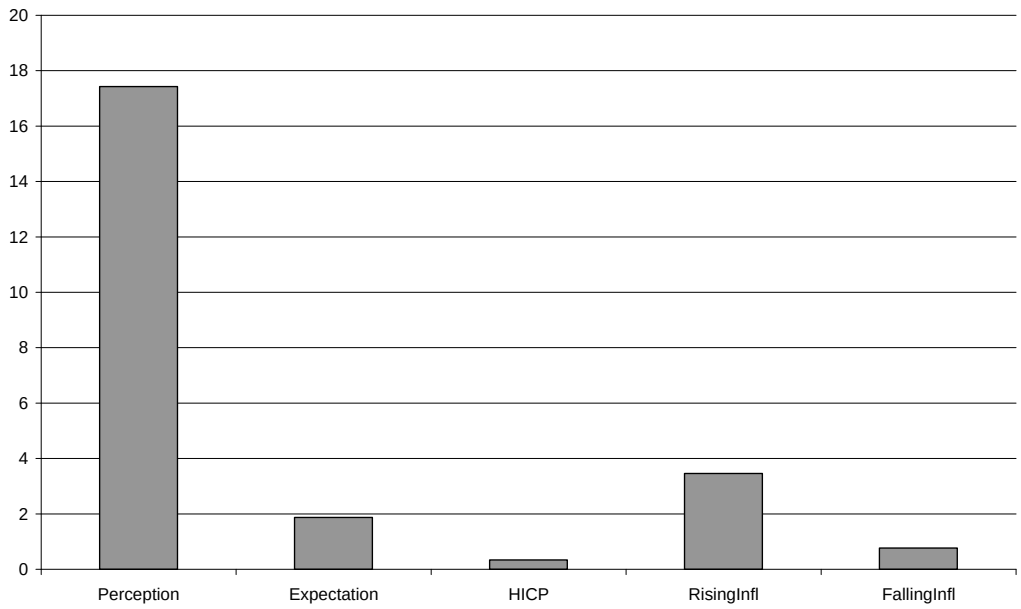
perceptions. Furthermore, the variable HICP does not add any explanatory power if media variables are included in the econometric model. Thus, all necessary information is provided by media agencies. Note, that this result is not influenced by multicollinearity among the regressors, as the correlation between the regressors is well below 0.6. In columns (3) and (4) we split the sample into sub-periods representing the time before and after 2002. Interestingly, media had no explanatory power before the introduction of the euro. Obviously there was no additional information provided by media companies that could not also be referred by looking at the index figure of the HICP. In harsh contrast, after the introduction of the euro, consumers heavily relied on their past expectations as well as on the information provided by the media. This is in line with "agenda-setting approaches" which would imply a threshold effect - once the reporting on a certain topic achieves a certain intensity, it is perceived as a "hot topic" and remains visible for a longer time. Moreover, there no evidence for the expectation confirmation bias before 2002.

In column (5) we address a possible endogeneity problem. One may argue that agencies might cater to the prejudice of their readers and therefore react to inflation perceptions. For this purpose we employ three stage least squares (3SLS) techniques, instrumenting the media variables with their own lags.[7] Notably the results are unaffected.

To investigate the relative economic importance of our variables in focus, we report the impact of each variable on inflation perceptions based on the impulse of a shock of one unit standard deviation of the respective series. Figure 6 pictures the impact. Notably the response to the "rising inflation" variable is found to be much higher compared to the remaining explanatory variables. Thus, not only are media reports statistically significant but they are also economically important.

[7]The method 3SLS is similar to two-stage least squares (2SLS/TSLS) but involves an estimation of the variance-covariance matrix. Similar as in seemingly unrelated regression (SUR) models, the 3SLS makes use of the cross-equations correlation of the disturbances. Thus, in comparison to 2SLS, 3SLS is more efficient, a relative advantage that increases with the strength of the interrelations among the error terms. 3SLS is equivalent to a GMM approach if the errors are homoscedastic.

Figure 6: One period impulse response of a one standard deviation shock of variable 'x' on perceptions.



Results based on coefficient estimates of Table 4.1 column (2)

To fully account for the dynamics between the different variables, especially perceived inflation and media, we employ a vector autoregression (VAR) setup. As variables that are endogenous in the system we set perceived inflation and the media variables. Exogenous variables are the six-month lag of expectations, HICP and the changeover dummy. We also tested monthly as well as yearly dummies. Notably, monthly dummies have no effect. We used four lags since the common lag selection criteria were inconclusive. Table 2 the Granger causality tests are presented. From Table 2 we can extract that lagged media significantly affects perceptions but the reverse causality link is not statistically significant. This confirms that although reverse causality might be rational and present it does not drive our results as the main channel is the link from media to inflation perceptions.

Table 2: Granger Causality

Equation	Excluded	F	df	dfr	Prob > F
Perception	RisingInflation	2.5130129	4	86	0.04742569
Perception	FallingInflation	0.972532	4	86	0.42689236
Perception	ALL	2.2133115	8	86	0.03398656
RisingInflation	Perception	1.5282531	4	86	0.20114295
RisingInflation	FallingInflation	0.97134935	4	86	0.42753571
RisingInflation	ALL	1.1748409	8	86	0.32364854
FallingInflation	Perception	0.89341582	4	86	0.47155867
FallingInflation	RisingInflation	2.59415	4	86	0.04198934
FallingInflation	ALL	1.684462	8	86	0.11372139

4.2 Socioeconomic Characteristics

In the next section we test whether the results established so far hold for different groups of people. Therefore consider socioeconomic characteristics. Several studies provide empirical evidence that socioeconomic characteristics do matter. See for instance Bryan and Venkatu (2001) who show a clear gap in figures of guessed actual inflation for the US. Palmqvist and Stroemberg (2004) prove that similar patterns exist for Sweden. In particular they find a u-shaped relationship between inflation perception and age as well as income. People up to midst of their lifetime improve their inflation expectation which deteriorates when they become elderly. They show that a similar pattern emerges not only for inflation perceptions but also for inflation expectations. Aucremanne et al. (2007) find no significant difference in the response to the cash changeover between different groups. However, they did not possess the data necessary to test this hypothesis in a detail. Moreover, both Stix (2009) and Dziuda and Mastrobuoni (2006) argue that household income, education level or age are factors determining changeover-induced inflation perceptions. Malgarini (2009) enriches this discussion by offering insights on the relationship between personal characteristics and the overestimation of inflation. He shows that in line with the aforementioned studies socioeconomic characteristics matter for the degree of overestimation of inflation figures. He notes that the degree of overestimation is lower the higher the level of education is.

Furthermore, he shows that more optimistic respondents are prone to a lower degree of overestimation. Blanchflower and Kelly (2008) report very high non-response rates to inflation perceptions in surveys among the least educated, females, poorest and younger individuals. Furthermore, groups with biased perceptions form biased expectations as well. As Blinder and Krueger (2004) - in a survey for the US - show, people receive the bulk of information from media usage (TV mainly, with a large distance followed by newspapers), but do not actively search for information on economic issues. People with higher income as well as higher education are in general better informed. Furthermore, ideology plays a large role in the formation of public beliefs. This finding was recently reinforced in a survey by the University of Michigan (Curtin, 2007). Therefore the different usage structure of media by different household types might play an important role in explaining differences in perceptions. Information processing capacities - which are possibly not independent from educational status - are stressed as a further source of differing perceptions in the literature, see Sims (2003). With respect to inflation expectations, Inoue et al. (2009)provide evidence that the response of consumers' expectations on news on inflation depend on the level of education. Palmqvist and Bryan (2005) test the near rationality of inflation expectations between countries using micro-level data. Summing up, the literature suggests that higher educated and high income individuals are less prone to deviations from HICP figures.

The regressions summarized in Table 4.2 represent mainly regressions estimated in Table 4.1 - the main difference being that we use balance statistics calculated for certain groups separately. Note that we refrain from considering employment characteristics and focus on gender, earnings, education and age. The main results presented in the previous table hold also for different categories of characteristics. There are only minor differences, and most of them are insignificant. While earlier studies have been quite clear that the uneducated, poor and older people have problems inferring the accurate inflation rate our

results are less clear cut. Formally speaking, there is no statistically different response as the tests on the equality of the mean estimates fail to reject. Nevertheless, some patterns emerge. For instance, the more educated people are the stronger is the link between HICP and inflation perceptions. Those groups also react to news on the "teuro" as well to news on rising inflation. On the positive side this implies that they strongly update on existing statistical figures. On the negative side, especially in the aftermath of the euro introduction, they have been not fully insulated and also reacted to media reporting. Furthermore consumers with further education (above secondary), do not respond significantly to news about rising or falling inflation. Also their respond to the teuro news is much less pronounced. With respect to gender, the estimated coefficients are very similar independent of the regression setup. With respect to income and age no linear trend is observable. Concerning age it seems that there is some inverted u-shape relationship between information income and perceptions. Those active in the workforce seem to respond stronger to news on inflation and published inflation numbers. Consumers in the age category *ag2=30–49* neither respond to news about rising or falling inflation in the whole sample period nor do they respond in the period after 2002 to news about rising inflation, where all other groups responded. This might be due to the fact that these groups are less affected by biased media reporting, because, for example they choose media outlets that report less biased. Concerning income those in the 3rd income quartile respond most to news on inflation as well as HICP. While those results may partly be less clear cut they certainly highlight the relevance of educations. The more educated people are the more they rely on real HICP figures and are less influenced by biased media reporting.

4.3 The Logistic Smooth Transition Model (LSTR)

In this section, we use an alternative way to track the effect of the introduction of the euro, which allows to estimate its effect more flexibly. We use a logistic smooth transition

Table 3: Media and Socioeconomic Characteristics

Variable	(1) total	(2) re1	(3) re2	(4) re3	(5) re4	(6) ed1	(7) ed2	(8) ed3	(9) ag1	(10) ag2	(11) ag3	(12) ag4	(13) mal	(14) fem
π	1.826***	1.898**	1.763*	2.031**	1.718*	1.516**	2.039**	2.778**	1.425**	2.085**	1.976**	1.504**	1.847***	1.822**
	(0.686)	(0.906)	(0.946)	(1.005)	(0.902)	(0.648)	(0.789)	(1.382)	(0.639)	(0.850)	(0.779)	(0.737)	(0.693)	(0.748)
$Dummy_{>2002}$	0.935	1.009	1.501	1.536	1.562	0.926	1.341	0.494	1.471	1.095	1.345	1.065	1.012	1.109
	(1.153)	(1.316)	(1.471)	(1.595)	(1.451)	(1.255)	(1.250)	(1.859)	(1.345)	(1.325)	(1.188)	(1.379)	(1.166)	(1.282)
π	2.494***	2.689***	2.950***	3.282***	2.315**	2.158***	2.853***	3.724**	2.012***	2.804***	2.887***	2.224***	2.591***	2.494***
	(0.716)	(0.974)	(1.050)	(1.064)	(0.993)	(0.689)	(0.826)	(1.470)	(0.656)	(0.900)	(0.804)	(0.804)	(0.713)	(0.802)
Teuro	0.036***	0.042**	0.075**	0.067***	0.039*	0.035**	0.045***	0.072***	0.036*	0.042***	0.054***	0.029**	0.038***	0.040***
	(0.013)	(0.021)	(0.030)	(0.021)	(0.020)	(0.015)	(0.016)	(0.027)	(0.019)	(0.015)	(0.019)	(0.014)	(0.014)	(0.015)
Euro	0.002	-0.007	0.023	0.026	0.013	0.014	-0.008	0.052	-0.007	0.005	0.021	-0.010	-0.000	0.007
	(0.025)	(0.023)	(0.031)	(0.035)	(0.038)	(0.023)	(0.027)	(0.041)	(0.026)	(0.025)	(0.028)	(0.035)	(0.033)	(0.026)
$Dummy_{>2002}$	1.646	1.962	1.133	2.290	2.497	2.082	1.669	0.663	2.031	1.821	2.416	1.266	1.909	1.623
	(1.575)	(1.508)	(2.112)	(1.870)	(1.896)	(1.632)	(1.687)	(2.410)	(1.693)	(1.740)	(1.562)	(1.992)	(1.642)	(1.633)
π	0.547	0.935	0.195	0.707	0.216	0.517	0.664	0.508	0.174	1.137	0.321	0.249	0.347	0.768
	(0.570)	(0.770)	(1.092)	(0.994)	(0.883)	(0.677)	(0.692)	(1.280)	(0.650)	(0.734)	(0.742)	(0.851)	(0.647)	(0.650)
Rising Inflation	0.169**	0.154	0.202*	0.213**	0.184*	0.160**	0.186**	0.236	0.189**	0.138	0.219***	0.151*	0.192**	0.155*
	(0.082)	(0.095)	(0.103)	(0.097)	(0.108)	(0.073)	(0.089)	(0.163)	(0.083)	(0.094)	(0.077)	(0.089)	(0.081)	(0.089)
Falling Inflation	-0.054	0.002	-0.053	0.003	-0.076	-0.013	-0.038	-0.175	0.007	-0.029	-0.065	-0.107	-0.078	-0.015
	(0.081)	(0.101)	(0.127)	(0.115)	(0.118)	(0.076)	(0.094)	(0.162)	(0.106)	(0.093)	(0.088)	(0.114)	(0.081)	(0.095)
$Dummy_{>2002}$	2.888**	3.069**	3.138*	3.868**	3.527**	3.237***	3.136**	2.121	3.209**	3.169**	3.665***	2.648*	3.077***	2.994**
	(1.104)	(1.245)	(1.625)	(1.497)	(1.406)	(1.178)	(1.245)	(1.891)	(1.346)	(1.260)	(1.205)	(1.466)	(1.156)	(1.234)
< 2002														
π	4.969***	6.499***	4.142	5.517**	7.065***	4.899***	5.587***	7.036**	4.922***	6.547***	5.060***	4.109*	4.513***	5.868***
	(1.547)	(1.640)	(2.501)	(2.592)	(1.992)	(1.375)	(1.747)	(3.187)	(1.604)	(1.761)	(1.758)	(2.233)	(1.520)	(1.713)
Rising Inflation	0.058	0.068	0.040	0.106	0.029	0.052	0.052	0.020	0.012	0.042	0.115	-0.009	0.061	0.054
	(0.108)	(0.130)	(0.153)	(0.131)	(0.118)	(0.099)	(0.102)	(0.206)	(0.102)	(0.118)	(0.098)	(0.103)	(0.094)	(0.120)
Falling Inflation	-0.083	-0.013	-0.171	-0.159	-0.131	-0.037	-0.102	-0.199	-0.077	-0.009	-0.146	-0.195	-0.151	0.004
	(0.100)	(0.120)	(0.188)	(0.135)	(0.145)	(0.098)	(0.107)	(0.192)	(0.124)	(0.110)	(0.122)	(0.139)	(0.095)	(0.122)
$>= 2002$														
π	1.005	0.719	-0.281	1.784	0.001	0.328	1.295	0.118	0.227	1.642	0.323	0.685	0.946	0.832
	(0.983)	(1.537)	(1.849)	(1.681)	(1.642)	(1.255)	(1.290)	(2.308)	(0.924)	(1.461)	(1.298)	(1.092)	(1.064)	(1.142)
Rising Inflation	0.190***	0.136*	0.273***	0.209*	0.261**	0.160*	0.220***	0.365***	0.228***	0.119	0.255***	0.222***	0.246***	0.144*
	(0.068)	(0.080)	(0.094)	(0.112)	(0.110)	(0.088)	(0.072)	(0.124)	(0.064)	(0.106)	(0.075)	(0.080)	(0.071)	(0.072)
Falling Inflation	0.078	0.144	0.196	0.227	-0.003	0.133	0.136	-0.137	0.251	0.119	0.032	0.009	0.029	0.150
	(0.131)	(0.202)	(0.189)	(0.189)	(0.180)	(0.130)	(0.151)	(0.284)	(0.172)	(0.149)	(0.131)	(0.176)	(0.116)	(0.170)

Tot stands for total, *re1* to *re4* distinguishes consumers by household income: *re1=1st quartile, re2=2nd quartile, re3=3rd quartile, re4=4th quartile. re1* to *re4* distinguishes consumers by educational level: *ed1=Primary education, ed2=Secondary education, ed3=Further education. ag1* to *ag4* distinguishes respondents by their age: *ag1=16–29, ag2=30–49, ag3=50–64, age4=65+. mal* and *fem* distinguish respondents by sex.

regression (LSTR), where we first test for nonlinearity in the relationship between media reporting and inflation perceptions and secondly estimate a model that defines the coefficient of media reporting as a function of various indicators, e.g., the time trend. As will be shown, we find that the relationship between media reporting and perceptions differs during the euro cash changeover period, without ex ante imposing a break in the relationship.

The LSTR model is defined as follows:

$$y_t = \phi' z_t + \theta' z_t (1 + exp\{-\gamma \prod_{k=1}^{K} (s_t - c_k)\} \ , \gamma > 0 \tag{1}$$

where $\gamma > 0$ is an identifying restriction. A more detailed explanation of the model is presented in Teräsvirta (2004). We test for the LSTR1 ($K = 1$) and LSTR2 ($K = 2$). In the LSTR1 model, the parameters change monotonically as a function of s_t from ϕ to $\phi + \theta$. In the LSTR2 model, they change symmetrically around the midpoint $(c_1 + c_2)/2$, where the logistic function has its minimum value. This minimum value is between zero (for $\gamma \to \infty$) and 0.5 (for $c_1 = c_2$). When $\gamma = 0$, the LSTR2 model is equivalent to the linear model. This implies that in the LSTR1 model, the coefficient of interest changes from one regime to the other, whereas in the LSTR2 model, the regime is the same for high and low values of the transition variable s_t, but differs in the middle range. We shall explain this in more detail below.

The transition variable s_t can be chosen as a stochastic variable contained in z_t, but it may also be a variable that is not part of the set of other explanatory variables. Another interesting case for our purposes is that s_t is a linear trend ($s_t = t$), which yields a linear model with deterministically changing parameters. In the following, we start our analysis by testing whether we need to specify a non-linear model, i.e. we test the linear model against the LSTR model with different types (i.e., $K = 1$ and $K = 2$) and a set of potential transition variables s_t.

The transition variable plays an important role in the economic interpretation of our model. This variable determines the current slope coefficient. In other words, if the model selection tests show that the appropriate model is the LSTR1 model with media reporting, then the relationship between our dependent variable and the explanatory variables (in the non-linear part of the model) changes with the intensity of media reporting. The set of potential transition variables should be chosen from theory. As suggested earlier, we expect that the relationship between media reporting and inflation perceptions may change due to more media reporting, due to the euro cash changeover, or that during high inflation periods, the impact on perceptions was higher than during low inflation periods. Thus, we test the linear model against the LSTR1 and LSTR2 model, with different transition variables: the time trend, the intensity of media reporting, and the level of inflation.

Our model can be written as follows

$$\pi_t^{perc} = (\phi_1 \pi_{t-1}^{perc} + \phi_2 \pi_t + \phi_3 media_{t-1}) + (\theta_1 \pi_{t-1}^{perc} + \theta_3 media_{t-1})(1 + exp\{-\gamma \prod_{k=1}^{K} (s_t - c_k)\}) \quad (2)$$

where we include subsequently the variables $timetrend$, $media_{t-1}$, π_t and π_{t-1}^{perc} into s_t, and test the LSTR1 and LSTR2 against the linear model. The testing procedure has two steps. First, the linear model is tested against the nonlinear model.

Like many nonlinear models, the LSTR model is only identified under the alternative, not the null hypothesis due to the nuisance parameters θ and c. Therefore, the transition function in the LSTR model is substituted by a third-order Taylor approximation around the null. The model LSTR1 is assumed, which allows testing both for LSTR1 and LSTR2[8]. The test is based on the following auxiliary regression equation

[8]This has been suggested by Teräsvirta (1998, 2004).

$$y_t = \beta_0' z_t + \sum_{j=1}^{3} \beta_j' \tilde{z}_t s_t^j + u_t^* \tag{3}$$

where $z_t = (1, \tilde{z}_t)'$ and $u_t^* = u_t + R(\gamma, c, s_t)\theta' z_t$ with the remainder $R(\gamma, c, s_t)$. The null hypothesis of linearity is $H_0 = \beta_1 = \beta_2 = \beta_3 = 0$. Because under H_0, the asymptotic distribution theory is not affected if an LM-type test is used. The test statistic has an asymptotic χ^2-distribution when the null is valid. However, the statistic can be distorted in a small sample, and hence an F-statistic is computed instead, as the F-statistic has better small sample properties (the empirical size of the test remains close to the nominal size while the power is good), as shown by Granger and Teräsvirta (1993, Ch 7) and Teräsvirta (1998, 2004). Note, that if linearity was not rejected in the first step, the modelling cycle ends and the linear model is chosen. Then, when linearity is rejected, tests have to be performed to decide between the LSTR1 and LSTR2 model. The test makes use of the auxiliary regression 3. The following sequence of null hypotheses is defined

$$\begin{aligned} H_4 : \ \beta_3 &= 0 \\ H_3 : \ \beta_2 &= 0 | \beta_3 = 0 \\ H_2 : \ \beta_1 &= 0 | \beta_3 = \beta_2 = 0 \end{aligned}$$

Granger and Teräsvirta (1993, ch 7) show that in this test sequence, if the rejection of H_3 is the strongest of the three tests, then a LSTR2 model is chosen. Otherwise a LSTR1 model is selected. All three hypotheses can be rejected simultaneously, hence the strongest rejection indicates the best choice of the model. Test results are reported in table 4. The first column (F) reports the p-value for the F-statistic of the first step test (linearity), the following three columns (F4, F3, F2) report the p-values of the tests for the appropriate model, according to the null hypotheses defined in the second step testing

sequence. The final column lists the suggested model. Each row reports the testing results for the respective transition variable.

The linearity tests suggested by Luukonen et al. (1988) and Teräsvirta (1994) favor the LSTR2 model with the time trend as transition variable. The coefficient on inflation is set to remain linear, as we expect that the impact of the true inflation rate remains stable, when controlling for lagged perceptions and media reporting. Furthermore, we included the inflation rate in the non-linear part and it turned out to be insignificant. Thus, the autoregressive term and the intensity of media reporting are included in the non-linear part of the LSTR2 model.

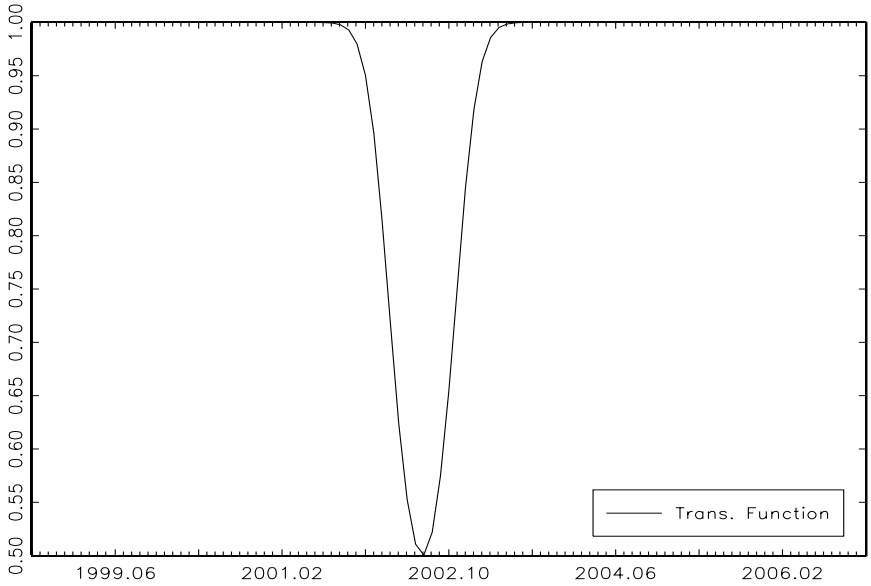
Table 4: Linearity tests

transition variable	F	F4	F3	F2	suggested model
π_{t-1}^{perc}	0.458	0.517	0.761	0.144	Linear
π_t	0.383	0.130	0.536	0.543	Linear
Volume(t-1)	0.373	0.133	0.632	0.431	Linear
TREND*	0.017	0.990	0.003	0.262	LSTR2

Our results are reported in table 5. The estimated transition function is illustrated in figure 7.

We find that media reporting has first had minor importance (the transition function is close to 1 up to 2002, which implies that the impact of media reports is $\phi_3 + \theta_3 = 0.53$). Then, during the year 2002, the transition function declines and attains its minimum value (0.5), which implies that the impact of media reporting rises to a maximum of $\phi_3 + \theta_3 * 0.5 = 5.3$. At the same time, the persistence of perceived inflation falls from 0.67 to -1.01 during the changeover period in 2002. Furthermore, the constant is higher during the changeover period. These findings suggest that, during the changeover in 2002, the dynamics of perceived inflation rates have changed and that media reporting gained importance. This result from the non-linear estimation complements the outcome from the linear regression model which indicates a substantial break in the inflation perception

Figure 7: Transition function over time.



relationship in the aftermath of the cash changeover. In addition, the non-linear model offers us – by considering the shape of the transition function – the insight that the effect of the media is only temporary and that the relationship between inflation perceptions and the media turned back to normal over the recent years.

To go one step further, we investigate the role of the tone of media reports. If the tone of media reports triggered the change in the relationship between inflation perceptions and media reporting, we should find that in our data. Thus, we test for the nonlinearity in our model adding the tone of media reports (rising inflation, falling inflation, reports that do not contain a tone) to the model. Again, we test the LSTR1 and LSTR2 against the linear model with all possible transition variables. Our results are reported in table 6. Interestingly, when adding the tone variables, the non-linearity vanishes and the tests favor the linear model for all possible transition variables. This finding suggests that the change in the dynamics of inflation perceptions is indeed driven by the tone of media reports.

Table 5: LSTR Results

	start	estimate	SD	t-stat	p-value
linear part					
const	3.89903	10.50324	1.3567	7.7419	0
π_{t-1}^{perc}	0.10189	-2.14554	0.3901	-5.5004	0
π_t	0.03063	0.1022	0.0561	1.8216	0.0716
$Volume_{t-1}$	2.52849	10.17467	2.6288	3.8704	0.0002
nonlinear part					
const	-3.20822	-10.31524	1.3703	-7.5275	0
π_{t-1}^{perc}	0.31353	2.81507	0.4191	6.7162	0
$Volume_{t-1}$	-2.37693	-9.64421	2.6941	-3.5798	0.0005
γ	10	61.55845	12.3455	-	-
c_1	52.17241	53.80561	5.4663	-	-
c_2	52.17241	53.80561	5.4663	-	-
R^2	0.89				
$AdjR^2$	0.89				

Table 6: Linearity tests with tone variables

transition variable	F	F4	F3	F2	suggested model
π_{t-1}^{perc}	0.175	0.024	0.071	0.108	Linear
π_t	0.852	0.420	0.823	0.802	Linear
Volume(t-1)	0.052	0.021	0.222	0.524	Linear
VolumeNeut(t-1)	0.479	0.197	0.510	0.691	Linear
FallingInfl(t-1)	0.940	0.573	0.749	0.970	Linear
RisingInfl(t-1)	0.131	0.128	0.146	0.457	Linear
TREND	0.189	0.425	0.137	0.260	Linear

5 Conclusion

Several reasons have been proposed to drive inflation perceptions especially in the aftermath of the euro cash changeover. In this paper we propose an alternative explanation and test whether the media may be responsible for these dynamics. Employing a detailed data set on media coverage for Germany 01/1998–09/2007 we are able to confirm that media reporting has a strong impact on the inflation perceptions of consumers.

First, we analyze the pattern of reporting in the aftermath of the cash changeover and

show that even though inflation rates were very moderate and even close to deflation, the media kept discussing the rise in inflation rates, thereby pushing up inflation perceptions.

Second, we test the impact of media econometrically and confirm that media reporting is significantly related to inflation perceptions. Especially in the post-euro phase the response of inflation perceptions to a standard deviation shock in media reporting is substantially higher than to a standard deviation shock to the actual inflation rate. Turning to the results of our smooth transition model, media influenced inflation perceptions, particularly in the year after the euro introduction. This indicates that media can only temporarily drive away perceptions from the realized inflation rate.

This paper has important implications. First, it highlights that media is an important driver of inflation perceptions. Second, it shows that media may have the power to disturb the precision of perceptions. Therefore, it is necessary that the authorities engage actively in countermeasures to avoid such unfavorable developments. The latter implication is especially relevant as inflation perceptions have become more persistent in the aftermath of the cash changeover.

References

Aucremanne, L., Collin, M., and Stragier, T. (2007). Assessing the gap between observed and perceived inflation in the euro area: is the credibility of the HICP at stake? Working papers series 122, National Bank of Belgium.

Blanchflower, D. G. and Kelly, R. (2008). Macroeconomic literacy, numeracy and the implications for monetary policy. Speech, Bank of England.

Blinder, A. S. and Krueger, A. B. (2004). What does the public know about economic policy, and how does it know it? NBER Working Papers 10787, National Bureau of Economic Research, Inc.

Brachinger, H. W. (2006). Euro or 'Teuro'? The euro-induced perceived inflation in Germany. Department of Quantitative Economics Working Paper 5, University of Fribourg.

Bryan, M. F. and Venkatu, G. (2001). The demographics of inflation opinion surveys. Commentary, Federal Reserve Bank of Cleveland.

Burgoyne, C. B., Routh, D. A., and Ellis, A.-M. (1999). The transition to the euro: Some perspectives from economic psychology. *Journal of Consumer Policy*, 22.

Carroll, C. D. (2003). Macroeconomic expectations of households and professional forecasters. *The Quarterly Journal of Economics*, 118(1):269–298.

Curtin, R. (2007). What U.S. consumers know about economic conditions. mimeo.

Del Giovane, P. and Sabbatini, R. (2006). Perceived and measured inflation after the launch of the euro: Explaining the gap in Italy. Giornale degli economisti e annali di economia, Bank of Italy.

DellaVigna, S. and Kaplan, E. (2007). The Fox News effect: Media bias and voting. *The Quarterly Journal of Economics*, 122(3):1187–1234.

Doehring, B. and Mordonu, A. (2007). What drives inflation perceptions? A dynamic panel data analysis. Economic Papers 284, European Commission.

Dziuda, W. and Mastrobuoni, G. (2006). The euro changeover and its effects on price transparency and inflation. Working paper, Collegio Carlo Alberto.

Ehrmann, M. (2006). Rational inattention, inflation developments and perceptions after the Euro cash changeover. Working Paper Series 588, European Central Bank.

Fluch, M. and Stix, H. (2005). Perceived inflation in austria - extent, explanations, effects, monetary policy and the economy. Report 3, National Bank of Austria.

Forsells, M. and Kenny, G. (2004). Survey expectations, rationality and the dynamics of euro area inflation. *Journal of Business Cycle Measurement and Analysis*, 1(1):13–41.

Gentzkow, M. and Shapiro, J. M. (2006). What drives media slant? Evidence from U.S. daily newspapers. NBER Working Papers 12707, National Bureau of Economic Research, Inc.

Granger, C. and Teräsvirta, T. (1993). *Modelling Non-Linear Economic Relationships*. Oxford University Press.

Groeling, T. and Kernell, S. (1998). Is network news coverage of the president biased? *Journal of Politics*, 60:1063–1087.

Hetherington, M. J. (1996). The medias role in forming voters national economic evaluations in 1992. *American Journal of Political Science*, 40:372–395.

Hofmann, E., Kamleitner, B., Kirchler, E., and Schulz-Hardt, S. (2006). Kaufkraftschwund nach der Waehrungsumstellung: Zur erwartungsgeleiteten Wahrnehmung des (t)euro. *Wirtschaftspsychologie*, 1.

Inoue, A., Kilian, L., and Kiraz, F. B. (2009). Do actions speak louder than words? household expectations of inflation based on micro consumption data. *Journal of Money, Credit and Banking*, 41(7):1331–1363.

Kahnemann, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2):263–91.

Lamla, M. J. and Lein, S. M. (2008). The role of media for consumers' inflation expectation formation. KOF Working Paper 201, KOF Swiss Economic Institute.

Leduc, S., Sill, K., and Stark, T. (2007). Self-fulfilling expectations and the inflation of the 1970s: Evidence from the livingston survey. *Journal of Monetary Economics*, 54(2):433–459.

Lein, S. M. and Maag, T. (2008). The formation of inflation perceptions–some empirical facts for European countries. Working Paper 204, KOF Swiss Economic Institute.

Luukonen, R., Saikkonen, P., and Teräsvirta, T. (1988). Testing linearity against smooth transition autoregressive models. *Biometrika*, 491-499.

Malgarini, M. (2009). Quantitative inflation perceptions and expectations of italian consumers. *Giornale degli Economisti*, 68(1):53–80.

Mullainathan, S. and Shleifer, A. (2005). The market for news. *American Economic Review*, 95(4):1031–1053.

Palmqvist, S. and Bryan, M. F. (2005). Testing near-rationality using detail survey data. Computing in economics and finance 2005, Society for Computational Economics.

Palmqvist, S. and Stroemberg, L. (2004). Households' inflation opinions - a tale of two surveys. Economic Review 2004:4, Sveriges Riksbank.

Shah, D. V., Watts, M. D., Domke, D., Fan, D., and Fibison, M. (1999). News coverage, economic cues, and the publics presidential performance, 1984-1996. *Journal of Politics*, 61:914–943.

Sims, C. (2003). Implications of rational inattention. *Journal of Monetary Economics*, 50(3):665–690.

Stix, H. (2009). Perceived inflation and the euro: Evidence from an Austrian survey. *European Journal of Political Economy*, 25(4):547 – 561.

Teräsvirta, T. (1994). Specification, estimation and evaluation of smooth transition autoregressive models. *Journal of the American Statistical Association*, 89:208–218.

Teräsvirta, T. (2004). *Applied Time Series Econometrics*, chapter Smooth Transition Regression Modelling. Cambridge University Press.

Traut-Mattausch, E., Schulz-Hardt, S., Greitemayer, T., and Frey, D. (2004). Expectancy confirmation in spite of disconfirming evidence: The case of price increases due to the introduction of the euro. *European Journal of Social Psychology*, 34:739–760.

Vogel, L., Menz, J.-O., and Fritsche, U. (2009). Prospect theory and inflation perceptions - an empirical assessment. Macroeconomics and Finance Series 200903, Hamburg University, Department Wirtschaft und Politik.