

The Role of Media for Consumers' Inflation Expectation Formation*

Michael J. Lamla[†] and Sarah M. Rupprecht[‡]

August 15, 2007

Very preliminary version; do not quote without permission

Abstract

This paper analyzes the impact of media on inflation expectations. We distinguish two channels via which media influences consumers' expectations. First, the intensity of coverage of inflation reports plays a role (volume channel). Second, the content of reports matters (tone channel). Employing a unique data set capturing media reports on inflation in Germany comprising 01/1998–12/2006 we are able to discriminate between these two effects. We find that the volume effect improves the accuracy of consumer forecasts while the tone channel induces a media bias. Moreover, those effects vary with income, age and education.

JEL classification: E52; D83

Keywords: Monetary policy, expectation formation, media coverage.

*We thank Christine Bensch, Helge Berger, Michael Ehrmann and Jan-Egbert Sturm for helpful comments.

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

[‡]KOF, ETH Zurich, CH-8092 Zurich, Switzerland, E-mail: rupprecht@kof.ethz.ch

1 Introduction

Controlling inflation is the main objective of central banks. Both theoretical considerations and empirical evidence show that inflation expectations are one of the main determinants of future inflation rates. Although central banks nowadays claim that managing consumers' inflation expectations has become one of their most important tasks, still very little is known about the way consumers form their expectations. This paper adds to the understanding of consumers' inflation expectation formation by investigating the role of media as a transmitter and filter of news.

Expectation modeling has moved away from assuming perfectly informed fully rational consumers to sporadically informed and rationally inattentive agents. Consumers are likely to possess only constrained information on current economic developments.

A well-known theoretical approach by [Mankiw and Reis \(2002\)](#) develops the idea that information is sticky, which means that economic agents update their expectations only from time to time. Outside their updating periods consumers are inattentive. One reason for this behavior may be an underlying convex cost function of information processing as proposed by [Sims \(2003\)](#) and [Moscarini \(2004\)](#). On the empirical side [Mankiw et al. \(2003\)](#) find support for their hypothesis focussing on several inflation expectation surveys for the U.S. Those studies highlight two issues. First, people do not use all information available and second, due to the cost effect, they will rely on certain common sources in order to share costs of information acquisition. One such source clearly is the media that provide news relatively cheaply to everybody ([Kwiek, 2006](#)). Anecdotal evidence taken from *The Economist*: "Journalists are writing us into a recession" (4th of October 2006) suggests that media may not only provide information but they might bias the impact of news on consumers' expectations in a certain direction.¹ Some empirical evidence for

¹The reason for this may be the profit maximizing behavior of the media companies. In the choice of which news to transmit, media supply what is demanded: interesting and exciting stories. Hence, for

the claim that media shapes peoples' expectations exists. Berger et al. (2007) show that consumers' inflation expectations across the euro area react to more favorable reporting on the ECB in the main newspapers. Doms and Morin (2004) show that news affect consumers perception on the economy by using the R-word index from *The Economist* measuring the frequency of the word "recession" in the media. Shah et al. (1999) find that the media give only little attention to the economy when it is in good shape but report extensively when it is in bad shape. In a similar fashion see also Groeling and Kernell (1998). DellaVigna and Kaplan (2007) provide evidence that the introduction of biased news reporting has significantly affected voting in the U.S. Hetherington (1996) put forward that media consumption and attention through the mass media negatively shaped voters' retrospective economic assessments in the 1992 election. Overall, these studies suggest that media play an important role in opinion making and also allow for the existence of a media bias.

Our study is related to a study by Carroll (2003) who assumes that consumers update their inflation expectations from the media, which transmit rational expectations of professional forecasters to the general public. The assumption that consumers get their macroeconomic views from the news media instead of investing time into obtaining relevant information from other sources to form their views on the economy seems plausible.² Carroll finds that more frequent media reporting makes consumers' expectations more accurate as they update their beliefs more often than during times of less media coverage. This would imply that consumers' inflation beliefs are rational but they update their information only infrequently as in a Mankiw-Reis fashion, and hence not all consumers have the most actual information on inflation developments. Therefore, the higher the number of media reports on inflation, the more likely consumers update their beliefs and the closer

instance exaggerating bad news might be the profit maximizing choice from a media point of view. See also Hamilton (2004)

²See Sims (2003) and Moscarini (2004).

they are to the rational forecast of professional economists.

A point Carroll does not address is the role the content of the statement plays. It is of great importance not only to account for the amount of news but also for the message that is transmitted. Articles often discuss whether inflation is/was/or will be rising or falling and thus people consuming the report will also absorb an opinion.

Therefore, we add a second dimension and distinguish *two* theoretical channels on how media reports may affect consumers' inflation expectations. First, in line with [Carroll \(2003\)](#) we argue that the intensity of reporting about inflation matters. This argument is incorporated in our *volume* channel. If newspapers and TV broadcasts deliver more reports on inflation this increases the likelihood that consumers become more aware of inflation and will update their expectations on this issue. As a consequence this implies that consumers' forecast accuracy improves. Second, the *tone* of reporting gives consumers signals in which direction to revise their expectations.³ The latter channel could also increase forecast accuracy if reporting is consistent with what we consider to be the rational forecast. However, the tone within the media can also induce a media bias by, for instance, exaggerating negative news relative to positive ones.⁴

To test the proposed channels we employ an unique and detailed media data set testing the impact of news reporting on the gap between consumers' inflation expectations and professional forecasters' expectations in Germany in the period 1/1998–12/2006 on a monthly basis.

We find support for both channels: the number of reports on inflation leads to a tightening of the gap between consumers and professional forecasters' expectations. The tone within the report points towards the existence of a media bias: the share of news that report rising inflation relative to the share of news reporting falling inflation widens

³See also [Doms and Morin \(2004\)](#).

⁴There is some evidence that indeed negative news more are often reported. See for instance [Groeling and Kernell \(1998\)](#) or [Lamla et al. \(2007\)](#).

the gap. We also show that the relationship breaks down during the phase of the Euro cash changeover, where consumers' inflation perceptions displayed very unusual patterns (Lamla and Rupprecht, 2007). This finding is robust for different specifications. We show that both channels matter most with respect to future developments. Finally, we survey how the observed impact varies with the socio-economic background. We provide evidence that richer and more educated people are less prone to such a bias and for them the improvement of the volume channel is more substantial.

These findings have important implications: as inflation expectations are one of the main determinants of future inflation, our results suggest that media influence these expectations and thereby may influence future inflation. This raises the question how this would alter economic outcomes. Therefore, media could be seen not just as a transmitter of unbiased news but as an economic actor.

The next sections are organized as follows. Section 2 derives the hypothesis we test. Section 3 introduces the data and the methodology we utilize. In section 4 the results are presented and discussed while section 5 concludes.

2 Hypotheses

In this section we will discuss the role that media plays in driving inflation expectations. We will recapitulate preceding studies and formulate our hypothesis.

News reports are means to transmit new information to a broader public. In the transmission process, both the quantity and the content of stories matter. Hence, media can influence inflation expectations of consumers via two channels.⁵

The first channel is the volume or quantity channel. More news reporting provides information for consumers, makes them more attentive and triggers the frequently updat-

⁵Doms and Morin (2004) also incorporates both channels discussing the relationship between media reporting and recessions.

ing of their expectations. If consumers face costs of acquiring, absorbing and processing information, consumers rationally choose to only sporadically update their information (Reis, 2006). It is unlikely that each consumer has full understanding of macroeconomic dynamics and constantly reviews the latest statistics to produce his own inflation forecast. Also not every person is able to read every article in the continuum of news provided every day. This implies that if there are many news stories on inflation within a given month, it is more likely that a consumer reads or watches these news, becomes aware of this specific issue and updates his information set that generates his expectations. Therefore our first hypothesis is: *more media reporting brings consumers' forecasts closer to the rational forecast.*

Hypothesis 1 closely follows the line of argumentation in [Carroll \(2003\)](#): people are assumed to obtain their macroeconomic views from the news media. Not every person pays close attention to all macroeconomic news and therefore individual people are assumed to absorb the economic content of news stories probabilistically, so that it takes time for news of changed macroeconomic circumstances to arrive at all agents in the economy. Carroll assumes that the news media reports the views of professional forecasters, who themselves make rational forecasts. This would imply that consumers update their expectations with the rational forecast. This assumption, however, might be, from our point of view, overly optimistic and thus may not have general validity. Media companies may have some incentives to twist or exaggerate certain development. One could argue that media companies want to increase their profits by catering to the prejudice of the reader. On the other hand the owners of media companies might also have some self interest. In media and political science research it is a common finding that media transmit biased news to their consumers ([Hetherington, 1996](#)).

Second, the contend of the reports if of major importance. This is a point that Carrol does not mention in any way. News are mostly dealing with a specific developments and

not exclusively with a topic in general. This has obvious consequences for expectation formations. For instance, if in a given month fifty reports say that inflation goes up and only ten say it goes down, consumers that form their views from the media should rather revise their expectations upwards than downwards. If no media bias existed, the tone of reports should bring consumer inflation expectations closer to the rational forecast. However, if there is a media bias present, the tone of reports should push away expectations from the rational forecast. We therefore test our second hypothesis: *the content and tone of media reporting affects consumers' forecasts*. Notably, by exaggerating some news, thereby increasing the weight consumers give to these biased news the content would be an instrument to drive away consumers' forecast from the rational forecast.

3 Data and Methodology

To analyze this issue we need data for inflation expectations of consumers and professional economists as well as a measure for the extent and content of inflation reporting by the media in a given period. For the latter we rely on data kindly provided by Medientenor. The data captures news articles and media releases on a monthly frequency for the time span 1/1998–12/2006 in Germany covering statements dealing with inflation which are at least five lines long in case of printed media and last at least five seconds for television broadcasts.⁶ The data contain different specifications: The measure of news intensity is simply the number of inflation reports within a given month, called *Volume*. The measure for the tone of news is split up into different specifications: First, we measure the number of inflation reports that claim that inflation is rising and second the number that claim

⁶In detail following news sources are analyzed: Daily press: Frankfurter Allgemeine Zeitung, Welt, Süddeutsche Zeitung, Frankfurter Rundschau, Tageszeitung, Bild, Neue Züricher 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.

that it is falling. Third, there are also reports that are neutral in their tone. To construct a measure of the tone we subtract the reports saying inflation is rising from those that are falling and divide this difference by the sum of all reports. This measure is called *Tone*. Moreover, we are able to also count the news stories with regards to the time structure, i.e. whether the story is related to past, present or future inflation. They are constructed the same way as the overall *Tone* measure conditioning on the time horizon.

Data on consumers' inflation perception and expectations are taken from the EU business and consumer survey in a monthly frequency. German consumers are being asked whether they expect prices to rise, fall or remain unchanged in the upcoming 12 months (expected inflation). We also employ disaggregated data based on socio-economic characteristics like age, income, education and gender. Income level is divided into 4 quartiles, age is separated into four groups: 16–29, 30–49, 50–64 and 65+, education is allocated in three groups: primary education, secondary education and further education. Inflation expectations for Germany from professional forecasters are constructed from Consensus Economics forecasts. In that survey, several professional economists are asked about the inflation prospects of the contemporary and upcoming year.

Following the approach of [Carroll \(2003\)](#), we measure the news index by dividing the number of stories on inflation in a given month by the maximum number of inflation stories in any year. The index ranging between zero and one is named $Volume_t$. To measure the deviation of consumers from an optimal forecast we calculate the absolute value of the gap of the difference between the consumers survey (C_t) inflation expectations and those of the consensus economics professional forecasters (P_t) as $absGapExp = ABS(C_t - P_t)$. To make the series comparable we standardize both series, C_t and P_t by dividing each observation by the series' standard deviation. In the original specification Carroll used the squared gap. However, as this measure might overweight specific incidences we decided to employ the absolute gap. Notably, this makes no big difference when it comes to the

conclusion. The summary statistics of our variable set are given in Table 1.⁷ The three important series are depicted in Figure 1

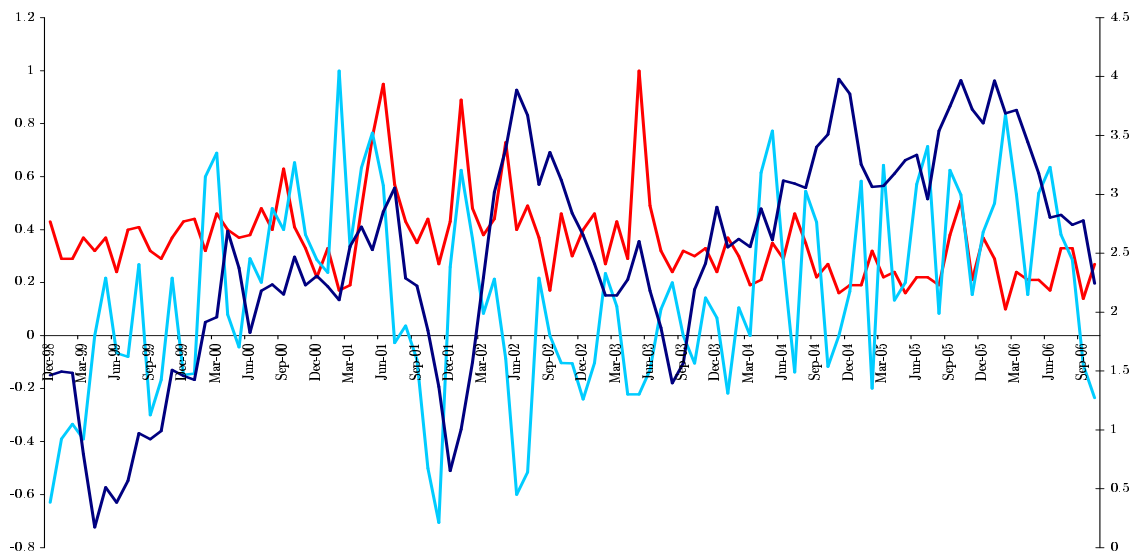
Table 1: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
absGapExpFemale	2.53	0.92	0.27	4.04	94
absGapExpMale	2.42	0.92	0.21	3.93	94
absGapExp65+	2.35	0.91	0.16	3.92	94
absGapExp50-64	2.4	0.88	0.19	4.02	94
absGapExp30-49	2.55	0.96	0.27	4.16	94
absGapExp16-29	2.65	0.92	0.27	4.48	94
absGapExpEdFurth	2.71	0.83	0.58	4.11	94
absGapExpEdSec	2.52	0.88	0.28	4.11	94
absGapExpEdPrim	2.42	0.99	0	4.22	94
absGapExpInc4Q	2.5	0.96	0.11	4.12	94
absGapExpInc3Q	2.3	0.91	0.13	3.91	94
absGapExpInc2Q	2.48	0.85	0.34	4.17	94
absGapExpInc1Q	2.26	0.86	0.24	3.88	94
absGapExp	2.47	0.92	0.17	3.98	94
Tone	0.16	0.36	-0.71	1	94
Volume	0.36	0.16	0.1	1	94
VolumeNeut	0.21	0.12	0	1	94
ToneFuture	0.17	0.45	-1	1	69
ToneContemp	0.17	0.4	-0.64	1	69
TonePast	0.18	0.53	-1	1	69
Exp Prof	1.47	0.6	0.1	2.8	94
ExpConsumer	23.35	12.21	5.2	46.5	94
ToneNeg	0.2	0.17	0	0.76	94
TonePos	0.36	0.22	0.02	1	94
Vol Teuro	0.1	0.19	0	1	94
Vol EuroCashChangeover	0.11	0.14	0.01	1	94

The deviation of consumers' from professional forecasters' inflation expectations should give us a good proxy of the deviation of consumers from the rational forecast. To see whether media reporting plays a role for the deviation of consumers inflation expectations from the rational benchmark, we estimate following equation via OLS controlling for serial

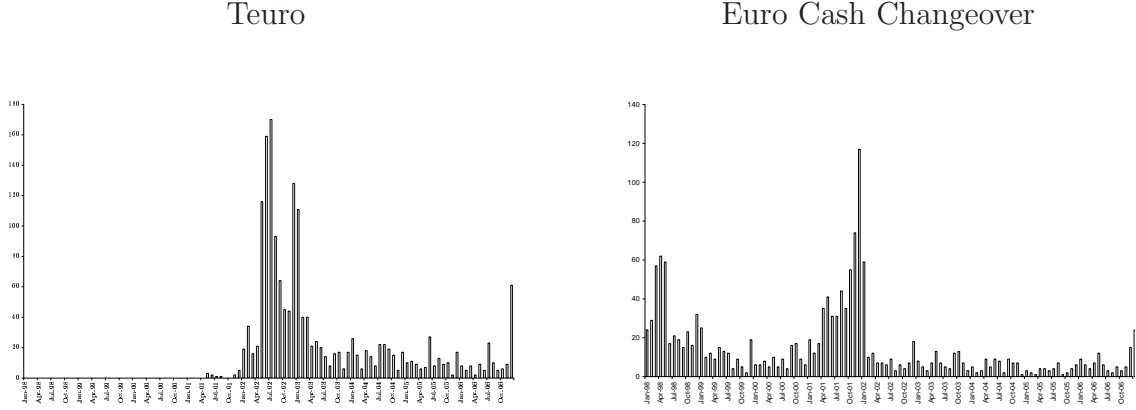
⁷Note that the consumer inflation expectations figure is an index. Thus, the gap is not the difference in the inflation rates.

Figure 1: Media Coverage and Inflation Expectations Gap



Dark Blue Line : absolute gap between consumers' inflation expectations and inflation expectations of professional forecasters;
 Red Line: Sum all reports on Inflation (Volume); Light Blue Line: Share of news of rising inflation relative to news on falling inflation (Tone).

Figure 2: Number of articles containing “Teuro” respectively “Euroeinführung”



correlation using Newey-West standard errors.⁸ This specification is the same as employed in Carroll (2003). As noted before, he only considers what we call the *volume* channel: the more news reporting the more likely consumers update their information set. Therefore, we employ the news measure of all inflation reports, without considering the content *Volume*. Hence, to test for the influence of the news volume we estimate

$$absGapExp_t = \alpha + \beta Volume_{t-1} + \varepsilon_t. \quad (1)$$

Alternatively, we propose to consider a second information that might be important. Many of the articles dealing with inflation carry a certain message. For analyzing the rational behavior of consumers it is important to capture the content of those statements. Therefore, we introduce the variable *Tone* to capture the impact of the *tone* channel. Thus the above equation amends to:

$$absGapExp_t = \alpha + \beta Volume_{t-1} + \gamma Tone_{t-1} + \varepsilon_t. \quad (2)$$

⁸Newey-West standard errors are calculated using lag 3. Notably, the results are not affected by changes in the lag structure.

If $\hat{\beta} < 0$ the gap between consumers' and professional forecasters' inflation expectations narrows with a higher news coverage or volume. Hence, a higher value of the news index brings consumers' expectations closer to rational expectations. As Carroll only considered the first specification, he finds that $\hat{\beta} < 0$. Concerning the contents of reports, a media bias would imply that the coefficient estimate for γ would be significantly different from zero and positive. If $\gamma > 0$ inflation about rising inflation would lead to exaggerated fears of consumers relative to professionals. If $\gamma < 0$ the content of news would give information that is consistent with the views of professional forecasters and therefore be unbiased.

An interesting aspect with respect to the Euro-Area which was already mentioned in the introduction is the Euro cash changeover and the debate about the inflationary consequences which were attributed to it. In order to account for that we count the articles dealing with the cash changeover and separately with the word "Teuro". While the first should capture the discussion of the euro introduction the second should control for the inflationary fears associated with it by the public. Both series are depicted in figure 2. The interesting observation is that while the coverage of the Euro cash changeover breaks down rapidly in February 2002 the coverage of the inflationary consequences gets started. Moreover, it seems to be in the media for about one year on an above average intensity.

4 Results

In the upcoming section will present and discuss the estimated coefficients with respect to changes in the specification and with respect to socio-economic characteristics. We start, however, discussing the average effects.

4.1 The impact of media on aggregate measures of inflation expectations

Table 2 contains the coefficient estimates of the regression setup. In column (1) we test Carroll’s hypothesis for the whole sample available. We can observe that the sign of the coefficient estimate is in line with Carroll’s hypothesis. However, the variable is not significant. As a next step we include our tone variable. Column (2) reveals that the tone exaggerates the information content and increase the gap. Moreover, the volume channels still remains insignificant. This might be due to the fact that for Germany the data include the Euro cash changeover period, where inflation perceptions displayed very unusual patterns. Ehrmann (2006) shows that the gap between perceived and actual inflation widened a lot in Germany during the cash changeover. He finds that the complexity of conversion rates explains the variation in this gap across Euro Area countries. Lamla and Rupprecht (2007) provide evidence that also media reporting play an important role in explaining this discrepancy. Hence, also inflation expectations could be affected by extensive media coverage in that period. Therefore, it seems sensible to discuss how to account for the effects associated with the Euro cash changeover. One obvious way would be to implement dummy variables. With this option one has to decide upon the start and end date of the effect. In order to avoid this possible pitfall we decided to utilize the coverage in the media dealing with the Euro cash changeover. We do this by counting the articles dealing with the euro cash changeover on the one hand and discussing the price increases using the code word “Teuro” on the other.⁹ If we include the articles dealing with “Teuro” we observe a significant positive impact while the Volume channel becomes significant (Column (3)). Thus, we can conclude it is necessary control for this “Teuro” debate. Moreover,

⁹Obviously, there are various ways to deal with this time frame. While this setup seems to be in line with our media focus we also considered using various dummy variables with different lengths. Even if excluding the rather broad time frame covering 01/2001 until 12/2002 the qualitative results remain.

this debate exaggerates the inflationary fears and lead to a deterioration in the inflation beliefs. This result implies that the two effects of media are also present in the data: on the one hand, higher media coverage helps updating believes. On the other hand, if media reports contain a certain opinion or tone, the content is biased and therefore drives a wedge between consumers' and professional forecasters' expectations. In column (4) we control for the Euro cash changeover debate. This debate seems to have a similar impact as the volume channel and reduces the gap significantly. In Column (5) we include both measures and both remain highly significant. As the Euro cash changeover seems to measure qualitatively the same effect as the volume channel we discard it from our further analysis and concentrate on the impact of the tone channel, the volume channel while controlling for the bias generated by the "Teuro" discussion.

As the variable *Volume* contains all press statements we decided to test for the robustness of our results by calculating a variable *VolumeNeut* which excludes statements that contain a certain message about the path of inflation. Despite not statistically significant, the results, presented in column (6), are surprisingly similar. Consequently, this implies that the intensity of inflation reporting triggers an updating of inflation beliefs independent of the message catered.

Next, we test for possible asymmetries. In behavioural economics there exist several studies the highlight the importance of good and bad news for reactions of financial markets.¹⁰ Thus we separate our tone measure into the share of news on rising inflation *TonePos* and share of news on falling inflation *ToneNeg*. Results are presented in column (7). As we can see there is asymmetry present. While both imply an exaggerated response to the information presented as they are both significant the response to news on falling inflation imply a stronger correction. Perhaps the news are tilted towards news of rising inflation and thus revealing news on falling inflation might consequently imply a greater

¹⁰Especially, bad news in good times see to matter most. See for instance [Andersen et al. \(2003\)](#)

movement.

An important issue the time dimension which was neglected in earlier studies and will be addressed in the upcoming paragraph. It seems reasonable to assume that people are highly interested in news about future inflation and that these news affect their expectations about future inflation most. In order to disentangle the different time effects we create the variables denoted as *ToneFut*, *ToneContemp* and *TonePast* representing articles dealing with rising and falling inflation related to future, contemporaneous and past inflation. In column (8) this specifications is tested. We observe that only information with respect to contemporary inflation matters. On a first glance this results might be partially puzzling. Obviously, information on future inflation is of utmost relevance for forming inflation expectations. However, it may be scarcely available and surrounded by a high degree uncertainty. This may explain why people rely on contemporary events to infer the future path of inflation. Notably, due to data restriction the time dimension is only available after 2001. This leads to a substantial loss of available data points and efficiency of our estimates. This in turn could explain why the amount of news on future developments is insignificant. Especially, as we found several specification where news on future inflation were important. On the other hand we can clearly reject the importance of past information.

Overall, our results support the view of Carroll that indeed more news lead to more updating and information processing which finally eventuates in a better inflation forecasts. Going two important steps further we can highlight that, contrary to the positive impact of the amount of news, the specific content of news drive away, even controlling for the Euro cash changeover, expectations and that news on future and contemporaneous inflation are only these that count. This bias might be reasoned by market mechanisms and profit maximizing behaviour of media companies as discussed by [Hamilton \(2004\)](#).

Table 2: Regression with Newey-West Standard Errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Volume	-0.704 (0.630)	-0.596 (0.589)	-1.001* (0.552)	0.024 (0.560)	-0.512 (0.475)		-0.970* (0.532)	-0.849* (0.444)
Tone		0.934*** (0.314)	1.237*** (0.230)	0.835*** (0.290)	1.128*** (0.242)	1.192*** (0.236)		
Teuro			2.172*** (0.523)		1.891*** (0.550)	2.098*** (0.491)	2.146*** (0.537)	1.201** (0.596)
ToneFut								0.293 (0.215)
TonePast								0.173 (0.201)
ToneContemp								0.553* (0.280)
TonePos							0.908* (0.501)	
ToneNeg							-1.665*** (0.519)	
VolumeNeut						-0.605 (0.432)		
VolEuroCashChangeover				-2.144*** (0.480)	-1.508*** (0.399)			
Constant	2.716*** (0.304)	2.536*** (0.272)	2.413*** (0.270)	2.560*** (0.261)	2.446*** (0.268)	2.195*** (0.217)	2.611*** (0.432)	2.757*** (0.244)
Obs.	95	95	95	95	95	95	95	69

Standard errors in parentheses; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Regression Socio Economic Characteristics with Newey-West Standard Errors

	Gender		Age				Education			Income				
	female	male	65+	50–64	30–49	16–29	further	secondary	primary	4Q	3Q	2Q	1Q	average
Volume	-1.008*	-0.945*	-0.895	-0.796	-1.101**	-0.872	-0.643	-0.851*	-1.086*	-0.874	-0.805	-0.504	-0.863*	-0.955*
	(0.526)	(0.546)	(0.598)	(0.557)	(0.538)	(0.546)	(0.508)	(0.469)	(0.637)	(0.580)	(0.604)	(0.532)	(0.492)	(0.540)
TonePos	0.939*	0.910*	1.169**	0.669	1.032**	0.827*	0.965*	0.737	1.121**	1.023**	0.776	0.883*	0.861*	0.896*
	(0.497)	(0.504)	(0.561)	(0.503)	(0.519)	(0.476)	(0.502)	(0.463)	(0.552)	(0.498)	(0.557)	(0.471)	(0.480)	(0.500)
ToneNeg	-1.696***	-1.633***	-1.315**	-1.665***	-1.713***	-1.859***	-1.064*	-1.734***	-1.678***	-1.623***	-1.587**	-1.292**	-1.400**	-1.691***
	(0.528)	(0.543)	(0.627)	(0.505)	(0.569)	(0.486)	(0.588)	(0.491)	(0.580)	(0.523)	(0.609)	(0.608)	(0.536)	(0.534)
Teuro	2.184***	2.125***	1.947***	1.930***	2.180***	2.273***	1.977***	2.119***	2.194***	2.466***	1.909***	1.983***	1.897***	2.148***
	(0.524)	(0.552)	(0.562)	(0.524)	(0.556)	(0.534)	(0.509)	(0.537)	(0.555)	(0.544)	(0.623)	(0.481)	(0.558)	(0.539)
Constant	2.678***	2.549***	2.323***	2.590***	2.697***	2.816***	2.612***	2.694***	2.529***	2.525***	2.437***	2.402***	2.355***	2.614***
	(0.426)	(0.433)	(0.482)	(0.431)	(0.445)	(0.390)	(0.422)	(0.398)	(0.479)	(0.432)	(0.483)	(0.421)	(0.429)	(0.431)
Obs	94	94	94	94	94	94	94	94	94	94	94	94	94	94

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

4.2 The impact of media on different socioeconomic groups

Several recent studies contended that socioeconomic attributes explain patterns in economic behavior. [Berger et al. \(2007\)](#) provide evidence that male and female hold significantly different opinions regarding ECB’s monetary policy performance. [Inoue et al. \(2006\)](#) show that the response in consumer surveys to news on inflation increases with the level of education. On the other hand [Aucremanne et al. \(2007\)](#) provide evidence that the reaction between those socioeconomic groups was fairly similar during the cash changeover. In an commentary on the demographics of inflation opinion surveys in the U.S., [Bryan and Venkatu \(2001\)](#) point out that the data exhibit a large disparity in inflation estimates of different types of people. They note that young respondents have been found to overestimate inflation, the same is true for low educated people and women. They also controlled impact of ethnicity. Overall they find low variability in their data set which points to a systematic different perception within each socioeconomic group.

We have data for different dimensions of the socioeconomic characteristics of the survey participants (income level, age, education level, profession and sex). Data are taken from the EU Consumer Survey. We replicate the regressions in Table 1 for our preferred specification in column (7) including tone, volume of news and the variable for the Euro cash changeover period capturing the “Teuro” debate. Also the other specifications are fairly robust to splitting the consumer expectations sample in different groups, but not reported here.¹¹ Results are presented in Table 3. Notably, the story holds holds for all groups. Above that, we can see that the coefficients for all socioeconomic characteristics vary. However, judging on statistically different responses becomes difficult as the standard errors are quite high and thus tests of equality conditional of identical samples show no significant differences. Nevertheless, keeping this in mind allows to draw careful conclusions.

¹¹The results would produce too many tables with the similar outcome, therefore we decided to report only our preferred specification. All other results are available upon request.

While the systematic bias captured in the constant are fairly the same in all specification, the reaction to the tone, the teuro bias as well as the volume seems to differ most.

We can observe only a very small difference in reaction between male and female in all dimensions. Thus, the impact of media does not depend on the gender. With respect to age older people are less prone to a bias than younger people. Maybe some learning takes places and some experiences materializes, or as wealth growths with age the marginal costs of inflation increase and the marginal gain of investing in information of inflation rises. Our estimations also indicate that higher educated people are less subject to a media bias induced by the content of the message. Both news on rising or falling inflation are incorporated with a higher efficiency. Moreover, they are less affected by the “Teuro” debate. This makes intuitively sense. Well educated are more likely aware of the bias and thus respond less. Higher educated people are likely to be more interested in the business and economics sections of newspapers, or buy newspapers or watch news that cover economic topics. Turning to the income quartiles following picture can be drawn. The higher the income the more people’s inflation expectations respond to news about inflation transmitted in media reports. In addition they are prone to media induced hypes and topical inflationary fears as the Teuro coefficients clearly shows. The effects of income and education should be interrelated and pointing to the same direction as income is on average a function of education. This is, however, just partly true in our estimates. While education works through immunization with respect to the media bias, rising income induces a better updating of the expectation beliefs due to incoming information.

At the end of this section we would like to address some general issue. One could argue that news are partly demand driven. Profit-maximizing incentives lead to excessive catering to the prejudice of the reader. This would imply some endogeneity present as people want more news but also the amount of news affect the expectations. Nevertheless, there are some good reasons that this issue does not play a role in the setup chosen in

this paper. First, the indicator constructed uses data covering news of the preceding month relative to the questionnaire that establishes the inflation expectations. Thus, per definition, news last period cannot be demanded by expectations today. Second, we use the share of news on rising inflation relative to falling inflation which should not depend on the intensity of the coverage. Also, in the case of an endogeneity problem, the endogeneity would imply a positive coefficient of the volume channel, which is , conditional on the information transmitted, not confirmed in our results.

5 Conclusion

In this paper we identify two channels via which media might have an impact on consumers' inflation expectations. On the one hand, more media reporting makes consumers more likely to pick up news on inflation, induces an update of their expectations and brings them closer to the full information rational forecast. This is what we call the volume channel. On the other hand, media reports can contain opinion or tone, which then is taken up by consumers. This is what we denote as the tone channel.

We provide evidence that both channels play a role. Overall, our results support the view of [Carroll \(2003\)](#) that indeed more news lead to more updating and information processing which finally eventuates in a better inflation forecasts. Furthermore, we can highlight that, contrary to the positive impact of the amount of news, the specific content of news drives away consumer expectations from the rational benchmark. In addition, socioeconomic factors influence the reaction to media. Educated and older people are less exposed to the media bias. Moreover, our results indicate the special role of the Euro cash changeover. Especially, the “Teuro” debate has significantly increased the gap. Finally, the content of news matters with respect to the time horizon it addresses: the inflation reports that transmit a message related to the future outlook and present situation of inflation

significantly affect expectations, whereas reports dealing with past inflation do not matter for consumers expectations.

Our findings have important implications for the discussions on modeling expectation formation, the role of media agencies and the assumptions on rationality of consumers' economic behavior: media can have the power to bias consumers' expectations. Such bias could be transmitted into future inflation. Hence, for understanding expectation formation and inflation dynamics, the role of media and the failure to digest the optimal amount of information should clearly be taken into account.

References

- Andersen, T. G., Bollerslev, T., Diebold, F. X., and Vega, C. (2003). Micro effects of macro announcements: Real-time price discovery in foreign exchange. *American Economic Review*, 93(1):38–62.
- 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? NBB Working Paper 112, National Bank of Belgium.
- Berger, H., Ehrmann, M., and Fratzscher, M. (2007). Monetary policy and the media. mimeo, European Central Bank.
- Bryan, M. F. and Venkatu, G. (2001). The demographics of inflation opinion surveys. Commentary, Federal Reserve Bank of Cleveland.
- Carroll, C. D. (2003). Macroeconomic expectations of households and professional forecasters. *The Quarterly Journal of Economics*, 118(1):269–298.
- DellaVigna, S. and Kaplan, E. (2007). The Fox News effect: Media bias and voting. *The Quarterly Journal of Economics*. forthcoming.
- Doms, M. and Morin, N. (2004). Consumer sentiment, the economy, and the news media. FRBSF Working Paper 2004-09, Federal Reserve Bank of San Francisco.
- Ehrmann, M. (2006). Rational inattention, inflation developments and perceptions after the Euro cash changeover. Working Paper Series 588, European Central Bank.
- Groeling, T. and Kernell, S. (1998). Is network news coverage of the president biased? *Journal of Politics*, 60:1063–1087.

- Hamilton, J. (2004). *All the News Thats Fit to Sell: How the Market Transforms Information into News*. Princeton University Press, Princeton, N.J.
- Hetherington, M. J. (1996). The medias role in forming voters national economic evaluations in 1992. *American Journal of Political Science*, 40:372–395.
- Inoue, A., Kilian, L., and Kiraz, F. B. (2006). Do actions speak louder than words? household expectations of inflation based on micro consumption data. Technical report.
- Kwiek, M. (2006). Mass media: constrained information and heterogenous public. Technical Report 0606, University of Southampton.
- Lamla, M. J. and Rupprecht, S. M. (2007). The impact of media on perceived inflation during the euro cash changeover. mimeo, KOF ETH Zurich.
- Mankiw, N. G. and Reis, R. (2002). Sticky information versus sticky prices: A proposal to replace the new keynesian phillips curve. *The Quarterly Journal of Economics*, 117(4):1295–1328.
- Mankiw, N. G., Reis, R., and Wolfers, J. (2003). Disagreement about inflation expectations. Working Paper 9796, NBER.
- Moscarini, G. (2004). Limited information capacity as a source of inertia. *Journal of Economic Dynamics and Control*, 28(10):2003–2035.
- Reis, R. (2006). Inattentive consumers. *Journal of Monetary Economics*, 53(8):1761–1800.
- 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.