

Lamla, Michael J.; Sturm, Jan-Egbert

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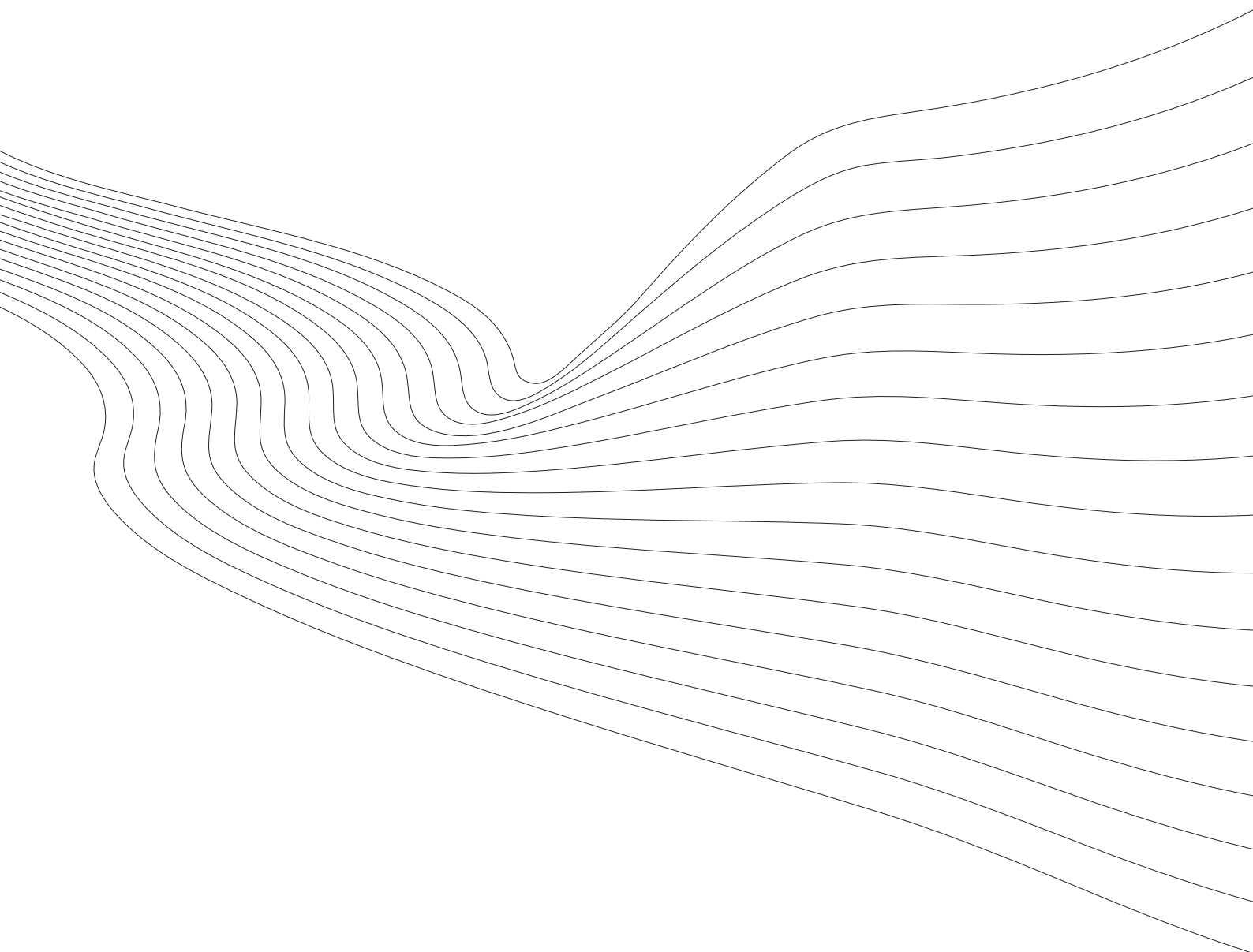
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# KOF Working Papers

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Michael J. Lamla and Jan-Egbert Sturm



# 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](http://www.kof.ethz.ch)  
[kof@kof.ethz.ch](mailto:kof@kof.ethz.ch)

# Interest Rate Expectations in the Media and Central Bank Communication\*

Michael J. Lamla<sup>†</sup> and Jan-Egbert Sturm<sup>‡</sup>

## Abstract

While there is ample evidence how central bank communication and interest rate decisions are perceived by financial markets, insights regarding the response of the public is lacking. Media is known to be an important transmitter of news to the public. Based on articles in the Financial Times Europe, we test how expectations on the future course of monetary policy presented in the media are affected by central bank communication and interest rate decisions.

**Keywords:** European Central Bank, monetary policy announcements, central bank communication, media expectations.

**JEL Classification:** E52, E58.

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<sup>†</sup>KOF, ETH Zurich, Weinbergstrasse 35, CH-8092 Zurich, Switzerland, E-mail: [lamla@kof.ethz.ch](mailto:lamla@kof.ethz.ch)

<sup>‡</sup>KOF, ETH Zurich, Weinbergstrasse 35 CH-8092 Zurich, Switzerland, E-mail: [sturm@kof.ethz.ch](mailto:sturm@kof.ethz.ch)

# 1 Introduction

Market participants use interest rate decisions as well as communication of the central bank to infer the future path of monetary policy. Studies like Ehrmann and Fratzscher (2009) and Lamla and Lein (2011) explore the importance of central bank communication relative to the announced interest rate decision for guiding money markets. While monitoring market interest rates, they find that the information provided by the press conference is very relevant. Conrad and Lamla (2010) and Hayo and Neuenkirch (2012) find effects of central bank communication on other markets like bonds, stocks and foreign exchange rates.

Interestingly, while there is ample evidence how professionals (markets) respond to central bank communication and interest rate decisions there is almost no research on how the general public perceives the actions of the central bank. Berger et al. (2011b) is a welcome exception. They explain the degree of favorableness of the ECB in the media. As the central bank is managing expectations of the whole society, experts and households, it is of crucial importance to evaluate whether and if yes how the channels identified in earlier studies moving market expectations work for the general public. Or as put by Blinder et al. (2008, 941): “virtually all the research to date has focused on central bank communication with the financial markets. It may be time to pay some attention to communication with the general public.” This is the main contribution of this paper.

The ECB is most likely to reach the general public via the media. In a survey of a random sample of the U.S. population, Blinder and Krueger (2004) identify television and newspapers as the two most important sources of economic information. The ECB receives great attention by the media.<sup>1</sup> Instead of reading the press releases, looking at the data and attending the media conferences of the ECB, it appears rational for the general

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<sup>1</sup>Notably the ECB itself maintains a database of press articles investigating how it is perceived by the media in terms of favorableness.

public to assimilate this kind of information via a generally reliable and cheap source: the media.<sup>2</sup> Hence, to infer the expectations of the public, we survey media releases printed one respectively two days after the ECB’s press conference. In those two days, journalists are likely to write about the consequences that the ECB interest rate decision and its press statement hold for future monetary policy. This paper analyses to what extent the announcements of the ECB as communicated during their monthly press conferences are affecting media coverage and content with respect to future monetary policy.

The paper is structured in the following way. Section 2 describes the data and the econometric methodology. Section 3 presents the results while section 4 concludes.

## 2 Data and Methodology

Our interest rate expectations measure is based on data provided by **Mediatenor**, a media research institute. **Mediatenor** has coded all media articles containing statements regarding the upcoming decision on the main refinancing rate in the aftermath of the governing council meeting. They capture whether a statement in the media says the ECB will increase, sustain or cut the main refinancing rate. The statements are extracted from articles printed in the **Financial Times Europe** (FTE) one and two days after the governing council meeting (see Figure 1) and coded based on the method of **media content analysis**. Media content analysis is a scientific method to capture the content of text passages. Several trained persons, called coders, read the news items and code them according to several characteristics, such as the topic, the tone or the visibility of a news item. The characteristics coded are discussed below. Inter-coder reliability tests guarantee the high quality of the data. One main advantage of these tests is that the coding is done by at

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<sup>2</sup>Sims (2003) argues face capacity constraints and thus agents are temporarily rationally inattentive. The importance of media for the quality of inflation expectations have been convincingly demonstrated by Carroll (2003) and Lamla and Lein (2008).

least two different coders, after which the tests check whether the coders came up with the same results. If not, unequally coded passages are recoded. This ensures reproducibility and thus reduces subjectivity to a minimum.<sup>3</sup>

We are interested in media statements on future interest rate decisions by the ECB as published after each governing council meeting. For that reason, we collect information on the number of statements, whether the writer expects a tightening or a loosening of monetary policy and a broad definition of the type of writer (ECB official, journalist or other). The following paragraph exemplifies how a statement is coded.

**Coding Example** "The upshot is that we do not expect the ECB to raise rates at all in 2005"

**Direction** Sustain

**Rating** Neutral

**Source** Journalist

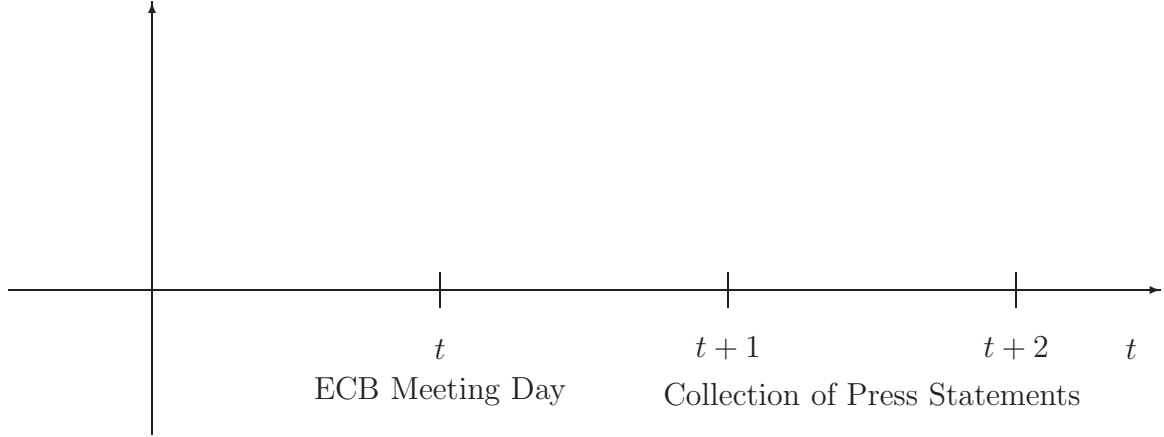
**Time** Present & future

On average we capture about 10 statements dealing with the ECB monetary policy in the aftermath (1-2 days) of a governing council meeting. Overall our database consists of roughly 700 statements on the expected path of the main refinancing rate of the ECB. The resulting dependent variable is calculated as the difference between the total amount of statements expecting a monetary tightening (increasing the main refinancing rate) and the total amount of statements expecting a looser monetary policy (a cut in the main

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<sup>3</sup>Media Tenor's homepage provides more details on media content analysis. See <http://www.mediatenor.com>

Figure 1: Timeline



refinancing rate) divided by the total amount of statements on the future path of the monetary policy:

$$Exp_t = \frac{Expectincrease_t - Expectcut_t}{Expectincrease_t + Expectsustain_t + Expectcut_t} \quad (1)$$

We label this balance variable “Media Expectations”. Note that this effort in coding those article and not only counting some code words substantially restricts our sample to the period 01/1999 to 12/2005.

Table 1: **Summary statistics**

Variable	Mean	Std. Dev.	Min.	Max.	N
MediaExpectations	-0.08	0.63	-1	1	65
Berger-deHaan-Sturm index (Comm All)	-0.02	1.83	-3.22	3.6	68
Berger-deHaan-Sturm index (Prices)	-0.01	2.08	-3.97	4.24	68
Berger-deHaan-Sturm index (Monetary Agg)	0.01	1.9	-4.46	3.8	67
Berger-deHaan-Sturm index (Real Econ)	0.01	2.25	-3.69	4.54	68
Rosa and Verga index (-2,-1,0,1,2)	0.29	1.22	-2	2	65
Rosa and Verga index (-1,0,1)	0.17	0.77	-1	1	54
Cumulative version of the KOF MPC	-1.28	0.95	-2.75	-0.11	68
Duisenberg wording indicator of H&U	0.05	1.18	-1.95	3.59	68
ECB main refinancing rate ( $i$ )	3.11	0.93	2	4.75	68
mean interest rate surprise (mean_surp)	0.01	0.09	-0.37	0.26	68
median interest rate surprise (median_surp)	0.01	0.09	-0.25	0.25	68



The expectations transmitted or generated by the media should be explained by the ECB's past interest rate decision and the communication. For the interest rate decision we take the main refinancing rate. Moreover, we control for interest rate surprises by deducting the main refinancing rate from the average rate from the survey poll conducted by **Reuters** before each governing council meeting. Regarding the ECB communication indicator we apply a battery of communication indicators. Specifically, we use the same set of indicators also applied in Sturm and de Haan (2011): Berger et al. (2011a), Heinemann and Ullrich (2007), the KOF MPC (Conrad and Lamla, 2010) and Rosa and Verga (2007). The communication indicator of Berger et al. (2011a) can be disaggregated into three policy-relevant topics. It is able to capture the risk to price stability stemming from the real sector, the monetary sector as well as developments related to prices. One drawback, however, is that it only covers the period 01/1999 until 12/2004 and leaves us with 68 observations.<sup>4</sup>

Figure 2 shows the shares of media reports that expect rising, sustained or falling rates together with the ECB's main refinancing rate. Except for 2002 during which expectations quite suddenly switched from falling to rising rates and back again, the overall comovement of the two series is quite strong. Whereas the actual interest rate did not follow media expectations in 2002, the communication indicator of Berger et al. (2011a) shows a pattern similar to our media expectations (see Figure 3). This sharp rise and fall might therefore be seen as a successful (mis-)guidance by the central bank, especially because no interest move happened.

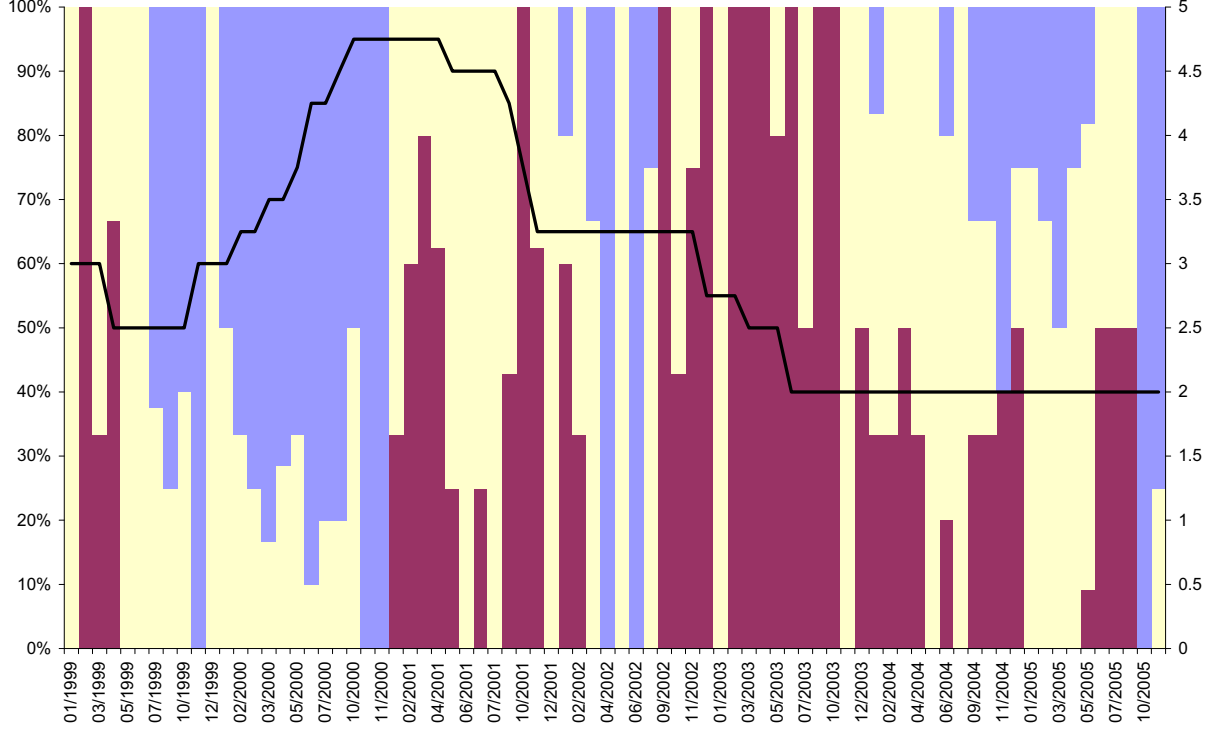
Regarding the econometric analysis we employ the following setup:

$$Exp_t = \alpha + \beta_1 Exp_{t-1} + \beta_2 \Delta ci_t + \Gamma \Delta c_t^j + \varepsilon_t, \quad (2)$$

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<sup>4</sup>Notably, except the KOFMPC all other communication indicators cover also a very restricted sample.

Figure 2: Media Expectations in the aftermath of the Introductory Statement



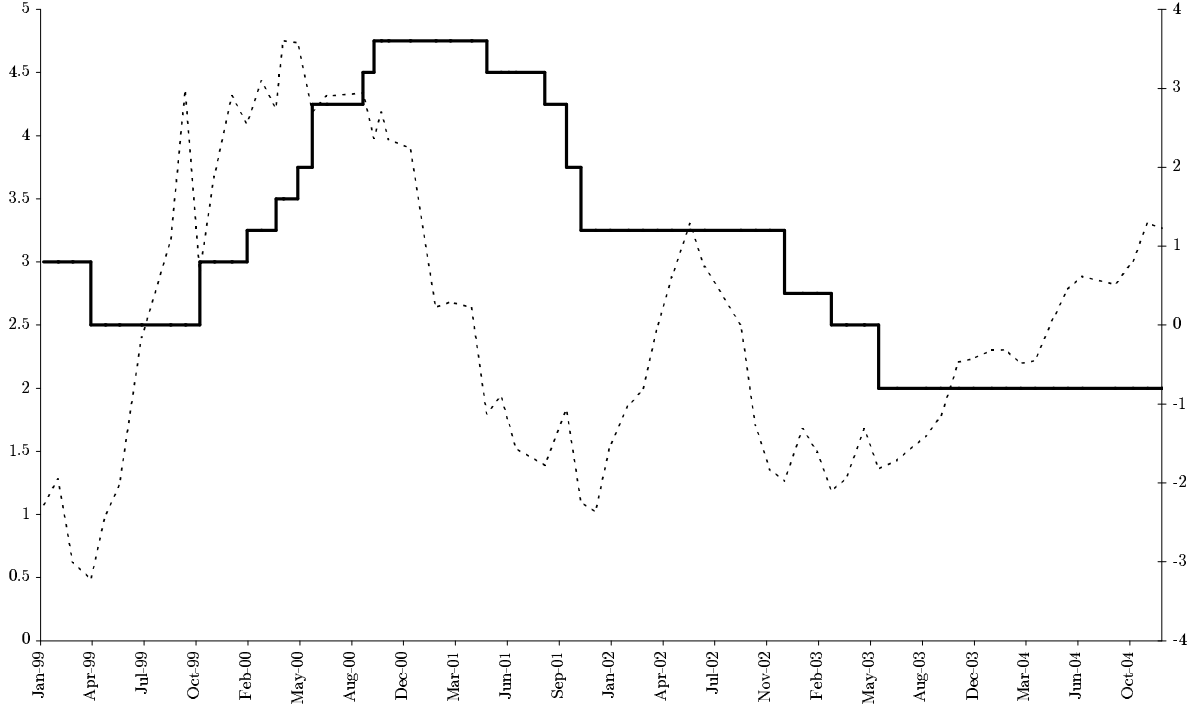
Notes: Solid line ECB Main Refinancing Rate, Bars denote shares of expected interest rates to be rising, sustained or falling. Blue bars denote the share of reports expecting rising rates while red bars represent the share of statements expecting falling rates.

where  $Exp_t$  is our media expectations variable.  $Exp_{t-1}$  is the last value of the expectations measure.  $ci_t$  is the announced interest rate decision and  $c_t^j$  with  $j = a, p, m, r$  represents the communication of the central bank with respect to prices ( $p$ ), monetary aggregates ( $m$ ), the real sector ( $r$ ) and an overall assessment ( $a$ ) in the introductory statement. Note that  $t$  relates to the meeting in each month.  $\Delta$  represents the first difference of the respective variable.<sup>5</sup>  $\varepsilon_t$  is a well-behaved i.i.d. error term.

As we are dealing with a dependent variable that is bounded between  $[-1, 1]$ , ordinary least squares (OLS) might be inappropriate. It has to be taken into account that if  $Exp_t$  is bounded, the marginal effect of any particular explanatory variable cannot be constant

<sup>5</sup>Note that this equation is mathematically equivalent to one where the first difference of the media expectations variable would be our dependent variable; we include a lagged media expectations dependent variable on the right-hand-side without restricting its coefficient.

Figure 3: Interest Rate Changes, ECB Communication and Expectations



Solid line denotes the main refinancing rate of the ECB; the dashed line represents the Berger-deHaan-Sturm Communication Indicator.

throughout its range. Furthermore, the predicted values of OLS regressions cannot be guaranteed to lie within the unit interval. The problem becomes severe if a substantial mass of the distribution is located close to the bounds.

In case we could transform our dependent variable to be  $y \in (0, 1)$  one could use log-odd ratios and apply

$$E\left(\log\left[\frac{y}{(1-y)}\right] \middle| X\right) = X\beta.$$

However, as our dependent variable takes on values at the bounds, i.e.  $y \in [-1, 1]$ , this is not an option. In order to circumvent inference problems we follow Papke and Wooldridge (1996). First, we re-scale our variable to fit into the interval  $[0, 1]$  using the formula

$\hat{y} = (y - \underline{y})/(\bar{y} - \underline{y})$ , where  $y \in [\underline{y}, \bar{y}]$ . Subsequently, we estimate the equation using the Bernoulli log-likelihood function given by

$$l_i(b) = \hat{y}_i \log[G(x_i b)] + (1 - \hat{y}_i) \log[1 - G(x_i b)],$$

where  $G(x_i b)$  is the logistic function  $G(x_i b) = \exp(x_i b) / [1 + \exp(x_i b)]$ .  $\beta$  will be obtained by maximizing

$$\max_b \sum_{i=1}^N l_i(b).$$

The Bernoulli quasi-maximum likelihood estimator (QMLE) is a consistent and asymptotically normal estimator *regardless* of the distribution of  $y$ . To test for the necessity of using the QMLE method Papke and Wooldridge (1996) propose the Ramsey (1969) RESET test. When using our main communication indicator as well as the interest rate decision as explanatory variables, the RESET test applied to a standard OLS regression rejects the null hypothesis that the powers of the fitted dependent variable are zero at the 5 percent level.<sup>6</sup> Hence, using the QMLE estimation is recommended.

### 3 Results

First, we investigate the impact of central bank communication and the interest rate announcement on the created media expectation measure when applying a battery of different communication indicators. In table 2 we report the estimation results using the indicators of Berger-deHaan-Sturm, Rosa and Verga, Heinemann and Ullrich and the KOF Monetary Policy communicator (KOF MPC). While all indicators measure the content of central bank communication their constructions differ. For instance, the Berger-deHaan-Sturm indica-

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<sup>6</sup>F-test(3,58)=3.19; Prob>F=0.03

tor captures the subjective content, whereas the indicator of Rosa and Verga concentrate on certain code words.

Despite differences in construction the estimation results point in the same direction. Taking expectations from Media sources as the dependent variable, both actual interest rate changes as well as central bank communication are important. In this horse-race of indicators on the impact on the media only the coarse grained version of the Rosa and Verga indicator is insignificant.

In a next step we explore what kind of information is most important for the media. Thus, we disaggregate the Berger-deHaan-Sturm indicator into its different dimensions. Table 3 summarizes the results. Column (1) repeats the first column of Table 2 and reveals that both instruments, i.e. ECB communication and the interest rate decision, affect the expectations of the future interest rate path as communicated by the media to the public. While monitoring and interpreting intraday movements in the EUR-US\$ exchange rate, i.e. by looking at financial markets, Ehrmann and Fratzscher (2009), Brand et al. (2006) as well as Conrad and Lamla (2010) find similar results. Columns (2), (3) and (4) investigate the relevance of the topic communicated. In line with recent studies like Lamla and Lein (2011), Conrad and Lamla (2010) as well as Ehrmann and Fratzscher (2009), we confirm that the ECB's assessment of price developments matters most. Moreover, congruent with Berger et al. (2011a) we show that communication on the monetary aggregates is, relative to statements on prices, of minor importance. In Column (5) we include all indicators into the regression. While due to multicollinearity none of them is significant at standard levels of confidence, the coefficient measuring price developments still dominates in terms of size and statistical significance.

Using the Reuters survey, Columns (6) and (7) investigate whether the interest rate signal is mainly driven by market surprises (news). We do find that there is a significant response to surprises. A positive interest rate surprise substantially lowers the expectations

Table 2: Results Different Communication Indicators

	(1)	(2)	(3)	(4)	(5)
	BHS	Rosa and Verga	Rosa and Verga	KOF MPC	Heinemann and Ullrich
Media $Exp_{t-1}$	2.130*** (0.534)	2.379*** (0.537)	2.088*** (0.632)	2.173*** (0.546)	2.365*** (0.519)
$\Delta i$	4.217*** (1.160)	3.883*** (0.862)	3.664*** (1.091)	3.854*** (0.816)	3.709*** (0.947)
$\Delta$ Comm All of Berger-deHaan-Sturm	0.373* (0.205)				
$\Delta$ Rosa and Verga index (-2,-1,0,1,2)		0.792*** (0.240)			
$\Delta$ Rosa and Verga index (-1,0,1)			0.344 (0.484)		
Cumulative version of the KOF MPC				0.320** (0.141)	
$\Delta$ Duisenberg wording indicator of H&U					0.240* (0.131)
Constant	-1.190*** (0.256)	-1.351*** (0.256)	-1.310*** (0.294)	-1.128*** (0.270)	-1.261*** (0.257)
Observations	61	55	44	61	61

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 3: Results Communication

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Media $Exp_{t-1}$	2.130*** (0.534)	2.234*** (0.522)	2.275*** (0.555)	2.290*** (0.538)	2.220*** (0.548)	2.083*** (0.541)	1.848*** (0.537)
$\Delta i$	4.217*** (1.160)	3.869*** (1.017)	4.079*** (1.165)	3.876*** (0.921)	3.926*** (1.243)	5.665*** (1.129)	6.678*** (1.830)
$\Delta$ Comm All	0.373* (0.205)					0.363* (0.189)	0.390** (0.182)
$\Delta$ prices		0.232* (0.136)			0.213 (0.144)		
$\Delta$ money			0.099 (0.156)		0.018 (0.170)		
$\Delta$ real				0.128 (0.151)	0.031 (0.159)		
median_surp						-4.018** (1.985)	
mean_surp							-5.572** (2.550)
Constant	-1.190*** (0.256)	-1.216*** (0.253)	-1.226*** (0.265)	-1.232*** (0.258)	-1.217*** (0.262)	-1.136*** (0.261)	-1.010*** (0.261)
Observations	61	61	59	61	59	61	61

Robust standard errors in parentheses  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

for another future rise in the main refinancing rate. The interest rate decision appears to have come earlier than expected and thus, on average, no further move is expected to be necessary. Nevertheless, the size and significance of the ECB communication indicator is not affected by this.

Finally we investigate whether the two instrument have a different impact on the different information sources used by the journalist. Mediatenor reports on what source the expectations reported in the FT are based. With this information we can analyze whether different groups put different weights on the interest rate and the communication channel of the ECB in their statements in the press.

Results are presented in Table 4. Not surprisingly, the statements of ECB officials are in line with the statements of the ECB governing council. Both, the interest rate signal, as well as the communication device correlate with the expectation made public during interviews. However, if we exclude all statements from ECB officials the picture changes. Whereas we still see a significant response with regard to the interest rate changes, the expectations regarding the future interest rate—although having the correct sign—are not significantly affected by the communication of the ECB. This might indicate that the interest rate move is the dominant source of expectations formation for non-ECB officials when making statements in the press. Or, put differently, central bank communication might not be fully incorporated or understood by both journalists and other non-ECB officials. Notably, those final results rest on very few observation (given the lag structure) and thus have treated with care. Nevertheless, it is important for future how to check how statements from different sources are presented.



Table 4: Results Sources

	(1) Journalist	(2) Other	(3) ECB
$\Delta$ Comm All	0.188 (0.60)	0.336 (0.70)	0.799** (2.77)
$\Delta i$	4.326** (3.10)	4.372 (1.06)	7.786* (2.50)
$Journalist_{t-1}$	2.596*** (4.74)		
$Other_{t-1}$		1.353 (1.66)	
$ECB_{t-1}$			2.219* (2.33)
Constant	-1.368*** (-5.09)	-0.824 (-1.68)	-1.173** (-2.72)
Observations	42	19	12

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## 4 Conclusions

Using media reports we analyze how decisions and actions of the ECB are perceived by journalist and afterwards catered to the public. Because it is costly for the general public to evaluate monetary policy decisions by themselves it is likely that the general public are most likely to update their expectations by reading newspapers. For that reason, the assessment of journalists is likely to shape the perceptions and expectations of the general public with respect to ECB monetary policy. Hence, it is of key importance to understand how the ECB is perceived by the press.

Whereas previous research have focused on financial markets, we generate a novel expectations measure and focus on how ECB communication and actual interest rate decisions affect expectations of future interest rates delivered by the media. We conclude that both interest rate changes as well as central bank communication shape interest rate expectations as transmitted by the media. However, whereas the interest rate signal is significant in *all* specifications, the significance of the communication indicators to some extent depend upon the type of indicator used. With respect to communication, especially information regarding price developments seems to be of major importance. Furthermore, the results indicate that there could be a difference in statements of an ECB officials compared to non-ECB statements. While ECB affiliates incorporate both elements in their statements, statements on the future course of the monetary policy not coming directly from the ECB seem to be mainly based on the interest rate decision and not as much on the communication of the ECB during its monthly press conference. This might indicate a communication problem of the ECB and may be an avenue for future research. Notably, we also need to look at some limitations of our study. Our approach is certainly a first attempt to capture the impetus of central bank announcements on other groups of interest besides financial markets participants. One limitation of this study is certainly that we

cannot control how much of the media news is then absorbed and processed by the general public. Furthermore, using the FTE only is not representative for the media landscape. Hence, it is important to extend the coverage over time and media outlets and finally control how much of these news is then absorbed by the public. Despite that, we believe that this paper serves as a important first step in the right direction.

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