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# Stock Price Reaction to ECB Communication: Introductory Statements vs. Questions & Answers\*

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## Abstract

Using textual analysis and high-frequency financial data, this letter emphasizes the informativeness of the different communication phases of the ECB press conference, the Introductory Statement and the Questions & Answers, for market participants. Our results show that, while the tone of the Introductory Statement brings valuable information to stock market participants, the Questions & Answers were mostly informative after the Global Financial Crisis. Moreover, the announcement of unconventional measures triggers stronger reaction from market participants, particularly during the Questions & Answers.

**Keywords:** central bank communication; financial markets; textual analysis.

**JEL classification:** E52, E58, G14

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# 1 Introduction

In this letter, we test whether the tone of European Central Bank (ECB) communication delivers different information to market participants during the two communication phases of the press conference (PC): (i) the Introductory Statement (IS) and (ii) the Questions & Answers (Q&A). During the IS, the President reads an Introductory Statement prepared by the Governing Council where the rationale on the policy decision is presented. When the Introductory Statement ends, the President answers the questions raised by a panel of journalists in order to clarify the official message conveyed to the market. We exploit the structure of this direct interaction between the central bank and the panel of journalists to assess how financial markets react, through stock price changes, to the tone related to the monetary policy decisions and the state of the economy conveyed during the IS and the Q&A.

Studies find that the tone of ECB communication provides valuable information during the PC, and that it can be especially useful in predicting stock prices (Brzeszczyński et al., 2021). Against this background, we proceed in two steps: First, we use a bag-of-words approach to convert the qualitative information contained in the IS and the Q&A into a quantitative indicator that measures the degree of hawkish and dovish tone for the 227 ECB PCs held from January 1999 until December 2019. For this purpose, we rely on the Bennani and Neuenkirch (2017) (BN) dictionary which has been specifically tailored to the context of ECB communication. As a second step, we assess the relationship between the tone of ECB communication and stock prices by testing whether stock price changes are related to the tone of the IS or the tone of the Q&A. The effect of ECB tone on stock returns is, however, a priori unclear. On the one hand, a more hawkish (dovish) tone which indicates a higher probability of a tightening (loosening) monetary policy should lead to a fall (increase) in stock prices due to an increase (decrease) in the expected discount rate. On the other hand, if market participants perceive the hawkish (dovish) tone as being indicative of better (worse) economic conditions, the impact on stock markets may be positive (negative) due to improvements in expected future dividends. Our empirical analysis allows determining the dominant channel.

Our results indicate that the tone conveyed during the PC provide additional information for market participants, since a more hawkish tone of the IS and the Q&A is significantly associated with higher stock price changes, in particular during the

Q&A in the post-crisis period. We show that stock market participants perceive a more hawkish tone as being indicative for better economic conditions, hence, our results are in line with Schmeling and Wagner (2019), who suggest that tone affects stock prices through risk premia.

This letter relates to the literature investigating the effect of ECB communication on financial markets. In a case study, Schmeling and Wagner (2019) show that a more positive tone is associated with higher equity market returns, lower volatility risk premia and lower credit spreads. Amaya and Filbien (2015) find the communication of the ECB to be increasingly similar over time, which has helped stock markets learn from ECB monetary policy. To the best of our knowledge, this letter offers original findings by distinguishing between the qualitative information delivered during IS and Q&A and their effect on stock market returns.

## 2 A quantitative analysis of the Press Conference communication phases

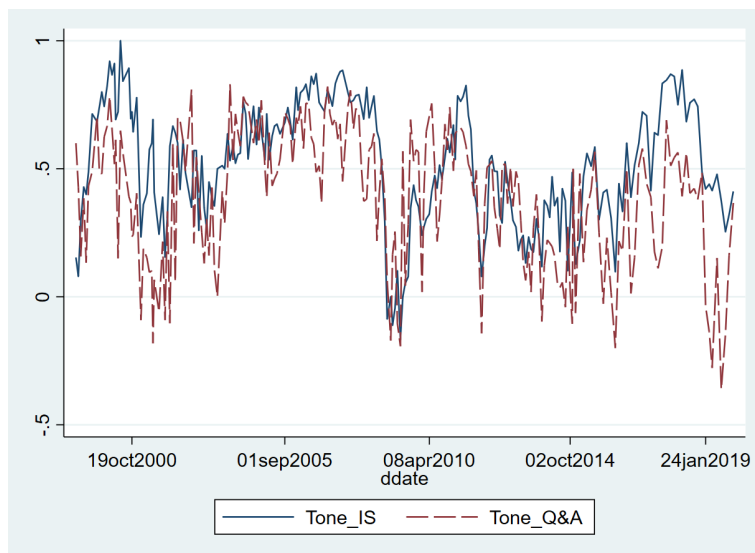
We compute an indicator measuring, on a quantitative scale, the hawkish and dovish tone of the two communication phases of the ECB PC using a bag-of-words approach. To measure tone, we use directional word lists indicating terms associated with hawkish and dovish tone as identified by BN. The BN dictionary is tailored specifically to ECB communication and it contains 26 keywords identified as hawkish and 32 as dovish. We measure the tone of ECB communication as the difference between the number of hawkish ( $haw_t^{com}$ ) and dovish ( $dov_t^{com}$ ) keywords divided by their sum:

$$tone_t^{com} = \frac{haw_t^{com} - dov_t^{com}}{haw_t^{com} + dov_t^{com}}; \quad (1)$$

where  $tone_t^{com}$  is the tone of ECB PC held at month  $t$  during the communication phase  $com$  (with  $com = IS, Q\&A$ ). Figure 1 shows the tone of the IS and the Q&A over the sample period 2001-2019. Both tones have a similar pattern over time, however, while we observe an increasing hawkish tone in both phases in the beginning of the 2000s, the latter decrease dramatically during the period corresponding to the Global Financial Crisis (GFC). Interestingly, the tone of the IS is often more hawkish than the tone of the Q&A (in 168 out of the 227 PCs). This shows that the ECB President is more likely to soften his/her position when replying to journalists, in particular when the

ECB launched its unconventional policy measures.

**Figure 1: Tone of the ECB’s Introductory Statements and Question & Answers**



### 3 Empirical Approach

We follow the literature (Hubert and Labondance, 2021; Gardner et al., 2021) and use an event-study approach to estimate the effect of changes in the tone of the IS and the Q&A on euro area stock price changes around the PC on different maturities. Due to persistence in volatility of stock prices, we use linear regression with GARCH(1,1) errors.<sup>1</sup> We estimate the following model:

$$\begin{aligned} r_t &= \alpha + \beta tone_t^{com} + \gamma term_t + \sigma_t \epsilon_t; \\ \sigma_t^2 &= \phi_0 + \phi_1 \epsilon_{t-1}^2 + \phi_2 \zeta_{t-1}; \end{aligned} \tag{2}$$

where  $r_t$  reflects intraday stock price changes around ECB PC collected from the euro area database created by Altavilla et al. (2019),<sup>2</sup>  $\epsilon_t$  denotes standardized innovations and  $\sigma_t^2$  is its conditional variance. Finally, to control for financial market expectations about future monetary policy, we follow Gerlach-Kristen (2004) and use the term structure

<sup>1</sup>Similar results were obtained when using OLS with heteroskedasticity-robust standard errors. Results are available upon request.

<sup>2</sup>We also used a broad class of euro area assets with various maturities including Overnight Index Swaps, sovereign yields and exchange rates around ECB PC in the empirical specification. However, none of the coefficients associated to these variables is significant.

of interest rates ( $term_t$ ); that is, the difference between the 1 year and the 3 months Euribor rates.

## 4 Results

### 4.1 Baseline model

Equation 2 is estimated for three sample periods, a full sample (1999M01-2019M12), a pre-crisis sample (1999M01-2008M08), and a post-crisis sample (2008M09-2019M12), for a set of stock price changes with various maturities in the two communication phases, i.e. the IS and the Q&A.<sup>3</sup>

**Table 1: Introductory Statements**

	<i>Full sample</i>				<i>Pre-crisis</i>				<i>Post-crisis</i>			
	Stoxx50		SX7E		Stoxx50		SX7E		Stoxx50		SX7E	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\alpha$	-0.32*** (0.09)	-0.32*** (0.10)	-0.38*** (0.13)	-0.35*** (0.12)	-0.46*** (0.15)	-0.58*** (0.18)	-0.37*** (0.11)	-0.50*** (0.15)	-0.29*** (0.10)	-0.22 (0.14)	-0.37*** (0.14)	-0.17 (0.19)
$\beta$	0.48*** (0.14)	0.48*** (0.14)	0.58*** (0.18)	0.59*** (0.19)	0.68*** (0.28)	0.90*** (0.29)	0.54*** (0.17)	0.87*** (0.31)	0.48*** (0.16)	0.49*** (0.16)	0.56*** (0.20)	0.58*** (0.21)
$\gamma$		-0.02 (0.14)		-0.18 (0.20)		-0.26 (0.20)		-0.41* (0.25)		-0.22 (0.28)		-0.62 (0.48)
Obs.	224	224	224	224	109	109	109	109	115	115	115	115

**Table 2: Questions & Answers**

	<i>Full sample</i>				<i>Pre-crisis</i>				<i>Post-crisis</i>			
	Stoxx50		SX7E		Stoxx50		SX7E		Stoxx50		SX7E	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\alpha$	-0.23*** (0.08)	-0.21*** (0.08)	-0.23* (0.12)	-0.20* (0.11)	0.00 (0.08)	0.02 (0.08)	0.00 (0.06)	0.01 (0.06)	-0.36*** (0.09)	-0.20** (0.10)	-0.55** (0.22)	-0.14 (0.19)
$\beta$	0.39** (0.15)	0.42** (0.16)	0.39* (0.21)	0.47** (0.24)	-0.05 (0.14)	-0.17 (0.19)	-0.05 (0.10)	-0.12 (0.17)	0.83*** (0.19)	1.07*** (0.20)	1.12*** (0.37)	1.32*** (0.44)
$\gamma$		-0.13 (0.17)		-0.29 (0.26)		0.27 (0.27)		0.15 (0.23)		-0.68*** (0.23)		-1.37** (0.55)
Obs.	224	224	224	224	109	109	109	109	115	115	115	115

The results show that for the full sample period, ECB communication, through the tone of the IS and the Q&A, brought valuable information to market participants as evidenced by the significant coefficients related to stock markets. On the one hand, a one-unit increase in the tone of IS (Q&A), corresponding to a more hawkish communication, is associated with an increase of 0.48 percentage points (pp) (0.39 pp) in the Stoxx50, while the increase is equal to 0.48 pp (0.42 pp) when including the term

<sup>3</sup>To save some space, we report only parameters of conditional mean equation.

structure of interest rates in the specification (columns (1) and (2) in Tables 1 and 2). On the other hand, while the coefficient attached to the SX7E is similar, in terms of sign and significance, to the one attached to the Stoxx50, the magnitude is, however, higher.

When we distinguish between the pre-GFC and the post-GFC periods, we observe that stock markets were less reactive to the IS tone after the crisis. As an illustration, a one-unit increase in the IS tone, which implies a more hawkish communication, is associated with an increase of 0.9 pp (0.87 pp) in the Stoxx50 (SX7E) before the crisis, and 0.49 pp (0.58 pp) after the crisis, when including the term structure of interest rates in the specification (columns 6, 8, 10 and 12 in Table 1). Interestingly, while the Q&A communication phase was not a key source of information for the stock markets before the GFC, it became one after the crisis. This is shown through the positive and significant relationship between the Q&A tone and the changes in the Stoxx50 and the SX7E prices in columns (9)-(12) in Table 2. These findings suggest that the source of information for market participants shifted after the crisis. Before the crisis, the information delivered during the IS mainly moved the stock markets while after the crisis, market participants also reacted to the tone delivered during the Q&A. This result is in line with Hayo et al. (2022), who find that in the aftermath of the 2008 financial crisis, the increasing complexity in ECB communication shifted trading activity towards the Q&A session, and Dossani (2021), who shows that the impact of central bank tone on currency markets comes primarily from the Q&A.

## 4.2 Tone in times of unconventional monetary policy announcements

The additional information delivered when announcing the implementation of unconventional monetary policies may exert additional effects on financial markets. To account for the differentiated impact of the unconventional measures during the different communication phases, we include a dummy variable ( $Uncon_t$ ) that takes the value 1 when a QE announcement is made during a press conference. Next, we interact  $Uncon_t$  with the tone. Model 2 becomes:

$$\begin{aligned}
 r_t &= \alpha + \beta_1 tone_t^{com} + \gamma term_t + \eta Uncon_t + \beta_2 [Uncon_t \times tone_t^{com}] + \sigma_t \epsilon_t; \\
 \sigma_t^2 &= \phi_0 + \phi_1 \epsilon_{t-1}^2 + \phi_2 \zeta_{t-1};
 \end{aligned}
 \tag{3}$$

where  $\beta_1$  shows the relationship between the tone of ECB communication and stock prices during the communication phase *com* (with *com* = IS or Q&A) when no QE announcement is made, while  $\beta_1 + \beta_2$  measures this relationship when a QE measure is announced. Table 3 shows the estimated results of model 3 for the post-GFC period.

**Table 3: Tone and Unconventional Announcements**

Variable	<i>Introductory Statements</i>				<i>Questions &amp; Answers</i>			
	Stoxx50		SX7E		Stoxx50		SX7E	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\alpha$	-0.26** (0.11)	-0.19 (0.14)	-0.32* (0.18)	-0.13 (0.21)	-0.39*** (0.08)	-0.21* (0.11)	-0.52*** (0.24)	-0.11*** (0.21)
$\beta_1$	0.42** (0.18)	0.42** (0.18)	0.48* (0.25)	0.50* (0.26)	0.90*** (0.17)	1.10*** (0.24)	1.04*** (0.38)	1.61*** (0.)
$\beta_2$	1.87 (1.41)	1.79 (1.41)	1.54 (1.15)	1.27 (1.19)	3.75*** (0.43)	3.16*** (0.95)	3.71*** (1.36)	3.61*** (1.14)
$\gamma$	-0.48 (0.37)	-0.48 (0.37)	-0.44** (0.21)	-0.46** (0.21)	0.01 (0.19)	0.40* (0.21)	0.55** (0.27)	0.51** (0.24)
$\eta$		-0.20 (0.28)		-0.63 (0.51)		-0.65*** (0.25)		-1.33** (0.57)
Obs.	115	102	102	102	102	102	102	102

We find that the interaction term is positive and significant only during the Q&A, thus showing that the announcement of unconventional measures triggers a stronger reaction from financial markets, particularly when the ECB President answers to the questions raised by the journalists. This result suggests that stock markets were collecting and processing additional information from the ECB during this specific communication phase.

## Conclusion

In this letter, we aim to disentangle the informativeness of the different communication phases of the ECB press conference, the IS and the Q&A, for stock market participants. Our results show that the tone of the IS is very informative for stock market participants, while the Q&A became an essential source of information after the Global Financial Crisis. We also consider the impact of announcing the unconventional measures during the press conference, which we find to trigger stronger reaction from market participants during the Q&A communication phase. These findings suggest that the Q&A became an additional source of information for market participants about ECB monetary policy



following the crisis.

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