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Who Should You Listen to in a Crisis? Differences in Communication of Central Bank Policymakers[1]

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Abstract: Communication has become a vital part of modern monetary policy, and its importance is even higher during a crisis when a central bank has to calm the markets down. This paper studies the information content of different styles of communication from individual central bank policymakers in the European Central Bank and the Federal Reserve during a period of very high economic uncertainty, and whether it differs depending on the role or position of the speaker. The findings suggest that during the financial crisis there was a large variance in the information content of different policymakers and styles of communication.

Keywords: Communication, Monetary Policy, Central banking, Central Banks and Their Policies

JEL Classification: D83, E50, E52, E58, E59.

Jay Powell admitted that the rate cut might not have any substantial effect on the US economy, but – apparently – they felt they had to do something to send a signal (but of what?)

– Erik Nielsen (Chief Economist of UniCredit). March 8, 2020

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1. Introduction

Central bank communication has taken a vital role in the conduct of monetary policy in the 20th century. Surprising the markets used to be the common approach to introducing new policy, but the last decades have seen a reversal in most central banks and now policymakers try to keep the public aware of their stance and future targets as well as explain the background of their decisions in great detail. Although the importance of communication is widely acknowledged in the monetary policy literature[2], the effects may vary widely depending on who is conveying the policy message, which market is being studied, and the economic conditions at the time of the communication. This paper aims on increasing the understanding of the information content of central bank communication under high levels of uncertainty, a topic studied by Coenen et al. (2017) and Hansen, McMahon and Tong (2019), combined with whether the information content differs depending on the role or position of the speaker, a topic studied from different points of view under normal times by Heinemann and Huefner (2004), Ehrmann and Fratzscher (2007), Hayo and Neuenkirch (2013) and Bennani and Neuenkirch (2017).

The focus of the paper is on the communication of individual central bank policymakers in the European Central Bank (ECB) and the Federal Reserve (Fed) from 2007 to 2010, the first phase of the financial crisis and a time period of very high uncertainty about the short-term and medium-term future of the global economy. It examines the content of central bank communication and possible differences in the messages conveyed by different policymakers to the public, and whether it is easier to predict the changes in the future path of monetary policy by following the representatives of the board of the ECB, specific national central bank (NCB) governors of the euro area, groups of governors, such as the Federal Open Market Committee (FOMC), in the Fed or individual governors of the Federal Reserve Bank system.

The remainder of the paper is organised as follows: Section 2 introduces previous literature on monetary policy communication, section 3 describes the methodology and data used, section 4 the results of the study, and section 5 concludes.

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[2] For example Amato, Morris and Shin (2002), Issing (2005), Blinder, Ehrmann, Fratzscher, De Haan and Jansen (2008), Hansen and McMahon (2016).

2. Background and theory

The motivation for this paper arises from the increased significance of central bank communication, as there has been a large shift from private policy choices to communicating decisions, as well as explaining the factors affecting those decisions, to the public. The previous literature done on the subject usually concentrates on institutional level communication or central bank presidents during normal times whereas this paper studies the subject from a more granular point of view during a time period of very high uncertainty.

The notable shift in the frequency and level of communication is a facet of central bank transparency, which is a cornerstone of modern monetary policy and imposes a discipline to policymakers as well as provides them with a method for affecting market expectations. As Dincer, Eichengreen and Geraats (2019) note, transparency makes it easier to understand the central banks' policy decisions and how they are made.

Following Geraats (2002), transparency is a wide concept, which can be classified into five categories:

1. political transparency (openness about policy objectives),
2. economic transparency (providing economic data and forecasts),
3. operational transparency (openness about implementation of policy decisions),
4. policy transparency (communicating policy decisions), and
5. procedural transparency (providing systematic information about the decision-making process in central banks).

There is no clear consensus on the relative importance of these five categories (Dincer et al., 2019), but the classification is widely recognised.In practice, modern central banks approach transparency from very similar points of view. The ECB (2022) defines the link between predictability and communication as: "The ECB publicly announces its monetary policy strategy and communicates its regular assessment of economic developments. This helps the markets to understand the systematic response pattern of monetary policy to economic developments and shocks. It makes policy moves more predictable for the markets over the medium term. Market expectations can thus be formed more efficiently and accurately." and the Federal Reserve (2022) summarises the role of communication with: "Federal Reserve's policy communications provide a wealth of information that members of the Congress and the public can use to understand the FOMC's

decisions and assess their implications for the economy. Such communications help ensure that the Fed is accountable to the public."

In their descriptions, both central banks concentrate on their role of revealing the decisions as well as explaining their intended impact to the public. Communication is therefore a way for achieving higher levels of predictability and accountability, although in reality this is not always straightforward as, for example, Moessner, Jansen and de Haan (2017) noted when studying the disconnect between theory and practice in forward guidance and communicating future interest rates. During the past decades, central banks have improved their methods of communication and they have become one of the most important tools of monetary policy.

In the decision-making process of the ECB, individual votes on monetary policy with possible dissents are not published, which is a significant difference to the Fed where all votes are public. This has a direct effect on the transparency of individual preferences in the decision-making process. Riboni and Ruge-Murcia (2010) argue that a consensus model fits actual policy decisions better than other potential voting protocols, and Issing (2005) argues that publishing information about the voting behaviour can include disadvantages. He notes that any effort to make individual policymakers personally accountable by publishing information about their voting behaviour entails the risk of the public attaching more importance to individual opinions than to relevant economic arguments.

It is difficult to define an optimal method and level for communication. Ehrmann and Fratzscher (2007, 510) have examined the communication strategies of the ECB and Fed for 1999-2004 and the Bank of England for 1997-2004 in a study where they define the communication strategy in the context of the decision-making process and note that "when designing a communication strategy, a central bank has to decide how the individual committee members should communicate with the public, in particular how and whether they should communicate their personal views". The definition of the strategy classification is divided into two categories: collegial strategy and individualistic strategy. In collegial communication strategy, the opinions of policymakers are consistent with each other whereas under individualistic communication strategy these opinions may conflict. Ehrmann and Fratzscher conclude that the predictability of policy decisions differs between different communication strategies, and that there is no single best approach to central bank communication. However, Blinder and Morgan (2005) show with a policy experiment study that groups tend to outperform single policymakers, so assigning a committee to be responsible for the conduct of

monetary policy is preferable to individuals. A more detailed study on monetary decision-making by committee can be found in a recent paper by Rieder (2022).

Geraats (2002) writes that the role of communication is emphasised under uncertainty because of the countless sources of incomplete information. Under rapidly altering economic conditions, the response and actions of central banks must be quick, and they must be communicated well to ensure the predictability of monetary policy. Communicating had a large role for monetary policy during the financial crisis as the rapidly growing uncertainty set new challenges which led to a growing number of disagreements among the policymakers (Meade, Burk and Josselyn, 2015) and a remarkable increase in the length of the minutes of central bank meetings as well as a growing number of disagreements between central bank policymakers as the conduct of monetary policy became more complex (Coenen et al., 2017). However, Lehtimäki and Palmu (2019) show that, despite these increases in disagreements and length of minutes, the predictability of monetary policy decisions was reached quite well on an institutional level in the ECB and the Fed as the financial crisis unfolded, although a survey study by Hayo and Neuenkirch (2015) finds that during the crisis, communication from the Fed was perceived to be more credible[3] by financial market participants. This article assumes that disagreements between individual policymakers about the future path of monetary policy can be detected from the comments made to the media and that, despite the decision-making processes in the ECB and the Fed, the preferences of individuals may vary, and this can be observed in their communication.

Potential differences in the communication of policymakers lead to potential differences in the predictive power of the information they reveal to the public. The differences in preferences are studied by Heinemann and Huefner (2004) and their results give some support for the impact of regional differences in the ECB decision-making process, and that national perspectives of policymakers may cause some bias in the central bank reaction functions. A similar study from Hayo and Neuenkirch (2013) examines potential regional aspects in communication from different Federal Reserve presidents and find that there are notable differences, especially depending on whether the speaker is a voting or a non-voting governor at the time of the communication, as well as depending on the stage of the business cycle. Bennani and Neuenkirch (2017) also find that different policymakers react differently to changes in expectations of growth and inflation

[3] Central bank credibility plays a notable role in the formation of inflation expectations and inflation targets acting as anchors for inflation expectations as identified, for example, by Güler (2021).

in the euro area. These potential asymmetries are not restricted to conventional monetary policy tools, and Beaupain and Girard (2020) find that unconventional measures have altered the communication of the central bank and that core and distressed countries in the euro area react asymmetrically to communication.

This paper combines elements from earlier literature and applies them to study communication during a crisis. Its approach assumes that in central banks some policymakers make statements, which predict the future changes in monetary policy better, than others. At the same time, communication might reflect the allocation of power in the ECB and the Fed. Gertler and Horvath (2018) found that different management styles matter: especially when monetary policy in the ECB required bolder measures, the communication effect on markets was larger and led to markets listening more to the statements of the President than any other single Governing Council member. This paper does not take a stance on what form of communication and decision-making is better, but it does assume that communication strategy tends to become more fragmented during a crisis and high uncertainty. This assumption gets support from the study by Bulir, Cihak and Jansen (2013), who argue that the global financial crisis made communication less clear (in terms of decreased unanimity) in a wide set of central banks and from Nain and Kamaiah (2020) who note that the level of uncertainty will also affect the effectiveness of monetary policy.

3. Material and methods

This paper studies how well the individual preferences of central bank policymakers are revealed in their communication to the public, and whether their stances on monetary policy are revealed in interviews and speeches published in media, usually by international news agencies. As the ECB and the Fed consist of groups of member countries or areas, national and local interests or different cultural backgrounds in the central banks might influence an individual policymaker's stance, and communication reflects the preferences formed by these potential differences.

To study changes in the stance of monetary policy, this paper concentrates on the easiest observable conventional tool, the main refinancing operations (MRO) rate[4]. Communication about programs of quantitative easing and other uncon-

[4] Gocer and Ongan (2020) note that interest rates remain relevant for understanding inflation dynamics as well as for central banks adopting inflation targeting monetary policies by using interest rates as the operational target.

ventional measures, as well as their implementation, differ by nature and potential levels, so work on them is left to future research. The use of communication for increasing transparency about future programs, as well as extending or closing of previous programs, can be expected to qualitatively operate in a similar fashion to conventional tools, but there might be differences in the mechanism of implementation. Bennani, Fanta, Gertler and Horvath (2020) analyse the communication from the ECB and include measures of unconventional monetary policy. The results of the study point to the effects of communication about conventional and unconventional measures to be broadly similar. In addition, Coeuré (2017) notes that communication has been effectively used to ease monetary policy through forward guidance at low or negative interest rates, and Gambacorta, Hofmann and Peersman (2014) also support this from the supply side as they note that an exogenous increase in central bank balance sheets at the zero lower bound leads to a temporary rise in economic activity with the price level as well as output reacting similar to the effects of interest rate shocks. However, a notable difference is that the reaction of the price level is weaker and less persistent. Belke (2018) notes that communication is a very useful tool in improving central bank transparency, and especially important for minimising risks when exiting an environment of unconventional policy.

This paper combines elements from previous literature[5] to study the predictive capacity of economic communication. Rosa and Verga (2007) argue that communication is best used as a complementary information source for macroeconomic variables rather than a substitute and prior methods, in particular Jansen and De Haan (2009) and Sturm and De Haan (2011), use forward-looking variables combined with a variable for communication. Therefore, the estimated model is an ordered probit of the form:

$$i_t^* = \beta_1 i_{t-1} + \beta_2 \Delta EY_{t-1} + \beta_3 \Delta E\pi_{t-1} + \beta_4 comm_{t-1} + \varepsilon_t \qquad (1)$$

where i_t^* is a monthly decision on the MRO rate, i_{t-1} the previous MRO rate decision, ΔEY_{t-1} the change in the expected real GDP growth, $\Delta E\pi_{t-1}$ the change in expected inflation, and $comm_{t-1}$ the communication during period prior to a decision. This approach takes the viewpoint of the market and uses the information available to the public (as well as policymakers) prior to a monetary policy decision.

[5] Notably Jansen and De Haan (2006), Ehrmann and Fratzscher (2007), De Haan (2008), Jansen and De Haan (2009), and Hayo and Neuenkirch (2010)

Changes in the MRO rate are coded monthly as +1 in the case of a rate hike, 0 if monetary policy remains unchanged and -1 in case of a rate cut. The residuals ε_t follow standard normal distribution and the probabilities of different outcomes (hawkish, neutral or dovish monetary policy) can be written as:

$$Pr[i_t^* = -1|z_t] = \phi(\tau_1 - z_t'\beta) \quad (2)$$

$$Pr[i_t^* = 0|z_t] = \phi(\tau_2 - z_t'\beta) - \phi(\tau_1 - z_t'\beta) \quad (3)$$

$$Pr[i_t^* = +1|z_t] = \phi(\tau_2 - z_t'\beta) \quad (4)$$

In equations (2), (3) and (4), ϕ denotes the cumulative standard normal distribution and z_t is a vector of explanatory variables. The three ordered probit models are estimated using maximum likelihood and the unobserved threshold variables τ_1 and τ_2 are estimated at the same time with the vector β.

The forward-looking control variables, expected output growth and inflation expectations, are formed by interpolating data from the IMF's World Economic Outlook forecasts and using the latest available vintage at the time of interest rate decisions. This means that the paper uses the same information, which was available to policymakers and the markets prior to a monetary policy meeting.

3.1. Coding of statements

Previously, communication specifically concentrated on future expectations of monetary policy has been the obvious choice to contain the most information about future rates. However, for example, Cieslak and Schrimpf (2019) show that non-monetary news have played an important role, especially in the early years of the recovery from the financial crisis. Therefore, this paper also includes statements on expectations on general economic growth and inflation. In addition to the previous literature listed in section 3, a similar classification is also used in the study by Picault and Renault (2017), where the focus was on the communication in the ECB's introductory statements at press conferences. The paper follows the standard protocol of content analysis defined by Neundorf (2002) and Riff, Lacy, Fico and Watson (2019) in the structure of coding the statements:

News Story

News stories are defined as any non-advertising material. All available news stories are included in the sample.

Source

A source is a person making a speech or answering questions of a news reporter. The source is defined explicitly when a news reporter quotes or paraphrases spoken information in a news item. All anonymous comments are excluded (referred to in news stories as "central bank official", "central bank decision-maker", etc.) and only identifiable quotes and statements from policymakers are included.

Story Source

Story source is the context from where a story is picked for analysis. Speeches, interviews and other media quotations are the potential sources in this study.

Primary Story Topic

Monetary policy: topic is the direction of future central bank target rate path.

Inflation: topic is future inflation developments/risks.

Economic outlook: topic is the economic outlook of the central bank or future risks to economic growth.

The message of the policymakers (board members, governors, central bankers) is identified as "hawkish", "neutral" or "dovish" based on the stance of the comments in the news items. The coding follows the previous work by Ehrmann and Fratzscher (2007) and is as follows:

$$\begin{cases} +1 \; for \; a \; hawkish \; stance \\ \; 0 \; for \; a \; neutral \; stance \\ -1 \; for \; a \; dovish \; stance \end{cases}$$

Table 1: Some examples for coding of different communication.

	Hawkish (+1)	Dovish (-1)
Monetary Policy	"Hikes will come sooner or later"	"ready to act if turmoil hits economy"
	"Next rate move is up"	"response needed if conditions worsen"
	"Raise rates as quickly as possible"	"open minded on need for more rate cuts"
	"More tightening may be needed"	"gives breathing room for more rate cuts"
	"Rate hikes possible"	"Weighing needed for more rate cuts"
	"rate hike could come sooner or later"	"policy outlook leans more to cuts"
	"doesn't rule out rate hikes"	"more cuts may be needed"

Inflation	"Inflation remains a challenge"	
	"inflation risks remain"	
	"wants inflation under xx %"	
	"inflation still biggest worry"	
	"more worried by inflation than growth"	
	"not there yet on inflation"	
	"inflation fight not over"	
Economic Growth		"…poses risks to growth"
		"economy weaker than expected"
		"downturn in economy possible"
		"Economy weathering the storm"
		"Systemic economic risk still a worry"
		"economic uncertainty very high"

Table 1 lists various examples of comments and their coding. In this study any statements on monetary policy, economic growth or inflation, where a stance cannot be strongly identified[6] or are general in nature, are coded as neutral. For the purposes of this study, any statements where inflation is the main concern for the future are considered hawkish and any with economic growth as being dovish.

3.2. Communication data

The data used in the study was collected from the news material of Reuters archive where a policy stance for monetary policy, inflation or economic growth was identifiable according to the coding of statements presented in section 3.1. The final update of a news item is always used in order to avoid any potential double-counting, since the staff of Reuters often update their articles during a day.

Central bank policymakers with very low frequencies of statements were excluded from the sample. This means that the central banks of Malta and Slovakia, as well as the comments from Susan Bies and Sarah Bloom Raskin from the Fed board of governors are dropped. After these exclusions, the sample of the study consists of 3,358 unique news items (1,268 for the ECB and 2,090 for the Fed)[7].

[6] As Bholat, Broughton, Ter Meer and Walczak (2019) note, it is important that the market understands the message in order to react as intended.

[7] Summary tables of the data by policymaker can be found in appendices A and B.

In Austria, Greece, and Ireland, the central bank governors changed during the research period, whereas the Federal Reserve bank governors changed in Boston, Chicago, Minneapolis, New York and St. Louis. In those cases, the comments of all governors (while in office) are included. Observations from Vıtor Constancio are considered to have been made as the Governor of the Bank of Portugal until May of 2010 and then as a member of the Executive Board of the ECB. Janet Yellen was appointed as the Fed vice chair in October 2010, but only her communication as the Fed governor of San Francisco is used in the study. In a majority of these cases, the stances remained unchanged despite the change of policymaker, so there was at least an initial tendency to follow the communication strategy of the predecessor. However, differences can be observed in the frequency of comments, which tends to be somewhat lower in the initial months after an appointment.

4. Results and discussion

Under individualistic communication strategy, the stances of each individual can vary, and this means that it is possible to find potential differences among the messages conveyed by different policymakers. This section studies whether it is possible to predict target rate changes with communication of different groups or individuals, and whether the predictive power of communication changes according to which policymaker is being followed.

4.1. Baselines and leaders

The first part of the analysis studies whether the communication from the leaders of ECB and Fed was useful in predicting decisions. The role of the leader of a central bank is highlighted, for example, by Bennani et al. (2020) who find that following the communication of the ECB President is a very good tool for predicting future rates. The dominant position of a chairman is also studied by Claussen et al. (2012), but they also note that overconfidence of policymakers can play a role in the setting of monetary policy. Results with only the real economy control variables and previous rate decision are also included here as a baseline. In the case of counter-cyclical monetary policy, changes in inflation expectations should have a negative coefficient whereas economic growth expectations should have a positive coefficient.

Table 2: Baseline Results and Presidents

	EA Baseline	ECB President		US Baseline	Fed Chairman	
	(1)	(2)	(3)	(4)	(5)	(6)
Previous Rate Decision	0.950*	-0.412	0.493	0.366	-0.184	0.737
	(0.451)	(0.581)	(0.522)	(0.601)	(0.719)	(0.829)
Inflation Expectations	-0.941*	-2.337***	-0.986*	-0.754**	-1.441**	-0.510*
	(0.562)	(0.820)	(0.569)	(0.316)	(0.630)	(0.274)
Growth Expectations	0.380*	0.979**	0.400*	-0.157	-0.487	0.087
	(0.204)	(0.406)	(0.230)	(0.224)	(0.555)	(0.186)
Monetary Policy Communication$_{t-1}$		2.633***			2.268***	
		(0.585)			(0.770)	
General Economic Communication$_{t-1}$			1.490**			2.667***
			(0.681)			(0.799)
N	48	48	48	48	48	48
pseudo R^2	0.29	0.64	0.41	0.23	0.47	0.50
LR statistic	17.8	39.0	24.9	10.0	20.0	21.4
Log-likelihood	-21.5	-11.0	-18.0	-16.4	-11.4	-10.8

*** significant at 1% level, ** significant at 5%, * significant at 10%. Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

The results for the leaders of both central banks as well as baselines for both areas are presented in table 2. The baseline regressions (1) and (4) show that changes in inflation expectations and the expected economic growth had at least some effect on the target rates in the euro area whereas inflation expectations were the most important factor in the United States.

For the ECB president, both monetary policy and general communication could be used to predict target rate decisions, but following monetary policy communication performs substantially better at predicting rate changes. For the Fed both classes of communication can also be used for predicting rate changes, but following general communication performed slightly better Based on the pseudo R2, the models with communication variables perform better than the baseline versions for both central banks and either class of communication.

4.2. Boards and FOMC

This section discusses the differences in communication between board and non-board policymakers. In all cases, the average stance of all members of the group is used. For the ECB the sample is split between executive board members (including the President and Vice President) and non-board NCB governors. For the Fed the split is done between board members (including the Chairman and Vice Chairman) and other Federal Reserve bank governors. The annually changing composition of the Federal Open Market Committee of the Fed is also included, as it has a substantial responsibility of the conduct, stance and communication of monetary policy.

Table 3: ECB Executive Board and Other Governing Council

	ECB, Executive Board		ECB, Other Governing Council	
	(1)	(2)	(3)	(4)
Previous Rate Decision	-0.912	-0.147	-0.633	-0.630
	(0.672)	(0.620)	(0.617)	(0.741)
Inflation Expectations	-2.536***	-2.155**	-1.331***	-1.313***
	(0.805)	(0.843)	(0.489)	(0.494)
Growth Expectations	0.948**	0.785**	0.504**	0.365*
	(0.376)	(0.399)	(0.216)	(0.217)
Monetary Policy Communication$_{t-1}$	4.991***		5.575***	
	(1.284)		(1.538)	
General Economic Communication$_{t-1}$		5.795***		7.358***
		(1.075)		(2.233)
N	48	48	48	48
pseudo R^2	0.64	0.66	0.54	0.55
LR statistic	38.7	40.5	32.7	33.5
Log-likelihood	-11.1	-10.2	-14.1	-13.7

*** significant at 1% level, ** significant at 5%, * significant at 10%. Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

Table 3 lists the results for the Executive Board and non-board governing council members in the ECB. For both groups, both monetary policy communication as well as general communication were good indicators for target rate changes, with general communication being slightly more accurate. Communication from the Board outperforms communication from the governors of NCBs in predicting MRO rate changes. The monetary policy communication from the President

outperforms the executive board and other governors, but the opposite holds for general economic communication.

Table 4: Fed Board, Fed Governors and FOMC

	Fed, Governors		Fed, Others		Fed, FOMC	
	(1)	(2)	(3)	(4)	(5)	(6)
Previous Rate Decision	-0.022	0.139	-0.502	-0.286	-0.304	0.065
	(0.716)	(0.675)	(0.774)	(0.732)	(0.789)	(0.694)
Inflation Expectations	-0.787**	-0.709**	-0.801***	-0.934***	-0.696**	-0.738**
	(0.337)	(0.306)	(0.281)	(0.353)	(0.272)	(0.311)
Growth Expectations	-0.089	-0.003	-0.019	-0.178	-0.024	-0.023
	(0.199)	(0.190)	(0.220)	(0.217)	(0.279)	(0.184)
Monetary Policy Communication$_{t-1}$	3.390*		4.754**		1.758***	
	(1.944)		(1.969)		(0.672)	
General Economic Communication$_{t-1}$		1.668		2.075**		0.874*
		(1.071)		(0.853)		(0.455)
N	48	48	48	48	48	48
pseudo R^2	0.32	0.31	0.40	0.36	0.50	0.31
LR statistic	13.5	12.9	17.1	15.5	21.5	13.2
Log-likelihood	-14.7	-15.0	-12.9	-13.7	-10.7	-14.8

*** significant at 1% level, ** significant at 5%, * significant at 10%. Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

Table 4 lists the results of the Fed. For the board, only monetary policy communication was slightly useful for predicting rate changes. For non-board Federal Reserve bank governors, as well as the FOMC, monetary policy communication was a better predictor than general communication. The Fed chairman's communication outperforms all groups in all cases excluding the monetary policy communication from the FOMC.

4.3. Individual countries and areas

In the final part, communication from the policymakers of individual euro area countries and Federal Reserve areas are studied separately.

Table 5: Euro Area NCB Governors, Monetary Policy Communication

	AT	BE	CY	FI	FR	DE	GR	IE	IT	LU	NL	SI	ES
Previous Rate Decision	0.423	0.758	0.677	0.735	0.494	0.678	0.866*	0.945**	0.240	1.087**	0.661	0.847*	0.665
	(0.534)	(0.473)	(0.490)	(0.495)	(0.511)	(0.551)	(0.482)	(0.591)	(0.479)	(0.507)	(0.510)	(0.454)	(0.510)
Inflation Expectations	-1.178**	-0.933*	-1.083**	-1.038**	-0.931**	-0.779	-0.909*	-0.943*	-1.486***	-1.357***	-0.993	-1.103**	-1.122**
	(0.462)	(0.518)	(0.492)	(0.501)	(0.441)	(0.561)	(0.564)	(0.567)	(0.448)	(0.497)	(0.658)	(0.475)	(0.504)
Growth Expectations	0.477***	0.368*	0.423**	0.427**	0.368**	0.356*	0.356*	0.380*	0.525***	0.437**	0.394*	0.426**	0.393**
	(0.182)	(0.198)	(0.191)	(0.197)	(0.167)	(0.203)	(0.205)	(0.204)	(0.199)	(0.190)	(0.227)	(0.185)	(0.197)
Monetary Policy Communication$_{t-1}$	0.969*	1.069*	1.403*	0.986	1.579**	1.209**	0.297	0.027	1.330**	1.512**	0.903*	0.609	2.285***
	(0.550)	(0.559)	(0.730)	(0.754)	(0.787)	(0.501)	(0.469)	(0.713)	(0.618)	(0.589)	(0.471)	(0.785)	(0.640)
N	48	48	48	48	48	48	48	48	48	48	48	48	48
pseudo R^2	0.35	0.38	0.39	0.34	0.41	0.42	0.30	0.29	0.40	0.40	0.34	0.31	0.46
LR statistic	21.6	22.9	23.7	20.8	25.1	25.4	18.2	17.8	24.6	24.5	20.9	18.7	28.1
Log-likelihood	-19.6	-19.0	-18.6	-20.0	-17.9	-17.7	-21.3	-18.1	-20.4	-18.2	-20.0	-21.1	-16.4

*** significant at 1% level, ** significant at 5%, * significant at 10%.

Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

Table 6: Euro Area NCB Governors, General Economic Communication

	AT	BE	FI	FR	DE	GR	IE	IT	LU	NL	PT	SI	ES
Previous Rate Decision	0.277	0.756*	0.836*	0.544	0.719	0.945**	1.062**	0.744	0.981**	0.772	1.051**	0.903**	0.878
	(0.584)	(0.452)	(0.444)	(0.552)	(0.517)	(0.460)	(0.481)	(0.555)	(0.447)	(0.560)	(0.450)	(0.450)	(0.545)
Inflation Expectations	-1.218**	-1.077**	-0.967*	-1.341***	-0.953*	-0.933*	-0.924*	-0.899*	-0.900	-1.000	-0.891	-0.853	-1.272***
	(0.537)	(0.497)	(0.521)	(0.517)	(0.546)	(0.544)	(0.557)	(0.481)	(0.585)	(0.617)	(0.556)	(0.604)	(0.418)
Growth Expectations	0.480**	0.385*	0.366*	0.531***	0.322*	0.372*	0.384*	0.401**	0.310*	0.398*	0.339*	0.355	0.430**
	(0.213)	(0.211)	(0.209)	(0.200)	(0.195)	(0.193)	(0.200)	(0.200)	(0.186)	(0.221)	(0.204)	(0.216)	(0.169)
General Economic Communication$_{t-1}$	1.435***	1.273**	0.624	2.492***	1.791***	-0.060	-0.350	1.443***	1.169	0.324	0.684	0.509	2.404***
	(0.544)	(0.592)	(0.663)	(0.737)	(0.533)	(0.480)	(0.534)	(0.508)	(0.796)	(0.451)	(0.674)	(0.563)	(0.700)
N	48	48	48	48	48	48	48	48	48	48	48	48	48
pseudo R^2	0.39	0.38	0.32	0.51	0.46	0.29	0.30	0.45	0.33	0.30	0.30	0.30	0.52
LR statistic	23.7	22.8	19.2	31.2	28.0	17.8	18.0	27.4	20.0	18.1	18.5	18.3	31.5
Log-likelihood	-18.6	-19.0	-20.8	-14.8	-16.4	-21.5	-21.4	-16.7	-20.4	-21.4	-30.4	-21.3	-14.7

*** significant at 1% level, ** significant at 5%, * significant at 10%.

Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

Tables 5 and 6 present the results for individual euro area member countries. Monetary policy communication from 9 countries was significant at 10% level (1 at 1% level) with communication from France, Germany, Italy, Luxembourg and Spain being the most dependable options for predicting target rate changes. For general communication 6 countries were significant at 10% level (5 at 1% level) with France, Germany, Italy and Spain being the most accurate.

In general, communication from NCB governors of large euro area countries was more accurate in predicting rate changes for both styles of communication. Changes in the expected inflation and expected growth played an important role in the stance of most countries with expected signs.

Tables 7 and 8 present the results for the regional Federal Reserve banks. Monetary policy communication was significant for 6 Federal Reserve Banks at 10% level (4 at 1% level) with communication from Richmond, New York, Minneapolis and San Francisco being most accurate at predicting the changes of interest rate. General communication was significant for 5 Federal Reserve banks at least at 10% level (1 at 1% level).

Changes in expected inflation were a significant factor for interest rate changes, but different to the ECB, changes in expected economic growth were insignificant.

For both fields of communication, the comments from the New York, San Francisco and Richmond performed quite well in predicting MRO rate changes. These banks are also amongst the largest in terms of asset size.

Table 7: Fed Governors, Monetary Policy Communication

	ATL	BOS	CHI	CLE	DAL	KC	MIN	NY	PHI	RCH	SF	STL
Previous Rate Decision	0.309	0.176	0.483	0.361	0.402	0.446	0.095	-0.967	-0.280	-0.417	-1.171	0.409
	(0.613)	(0.625)	(0.639)	(0.609)	(0.616)	(0.611)	(0.735)	(0.639)	(0.682)	(0.780)	(0.755)	(0.639)
Inflation Expectations	-0.670**	-0.955**	-0.876**	-0.798**	-0.775**	-0.774**	-0.920**	-1.375***	-0.925***	-0.996***	-0.682**	-0.877***
	(0.305)	(0.385)	(0.438)	(0.320)	(0.317)	(0.335)	(0.408)	(0.405)	(0.278)	(0.359)	(0.313)	(0.335)
Growth Expectations	-0.090	-0.198	-0.239	-0.171	0.169	-0.244	0.040	-0.113	0.126	-0.143	-0.427	-0.199
	(0.231)	(0.585)	(0.280)	(0.229)	(0.220)	(0.256)	(0.246)	(0.295)	(0.191)	(0.221)	(0.293)	(0.265)
Monetary Policy Communication$_{t-1}$	0.812	0.856	-1.039**	0.528	0.081	0.439	1.966***	2.450***	1.337**	2.117***	2.329***	0.589
	(0.605)	(0.585)	(0.494)	(0.414)	(0.358)	(0.392)	(0.551)	(0.786)	(0.556)	(0.732)	(0.807)	(0.487)
N	48	48	48	48	48	48	48	48	48	48	48	48
pseudo R^2	0.28	0.27	0.34	0.25	0.23	0.26	0.42	0.47	0.36	0.53	0.42	0.29
LR statistic	12.0	11.6	14.7	10.8	10.1	11.1	18.2	20.3	15.3	22.7	17.8	12.4
Log-likelihood	-15.5	-15.7	-14.1	-16.0	-16.4	-15.9	-12.4	-11.3	-13.8	-10.1	-12.5	-15.3

*** significant at 1% level, ** significant at 5%, * significant at 10%.

Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

Table 8: Fed Governors, General Economic Communication

	ATL	BOS	CHI	CLE	DAL	KC	MIN	NY	PHI	RCH	SF	STL
Previous Rate Decision	0.439	0.205	0.367	0.243	0.361	0.378	0.322	0.108	0.377	0.200	0.574	0.318
	(0.673)	(0.694)	(0.599)	(0.641)	(0.610)	(0.593)	(0.625)	(0.651)	(0.612)	(0.633)	(0.744)	(0.629)
Inflation Expectations	-0.927***	-0.892**	-0.755**	-0.779***	-0.754**	-0.936**	-0.775**	-1.340***	0.734**	-1.016***	-0.666**	-0.888***
	(0.294)	(0.393)	(0.309)	(0.279)	(0.316)	(0.422)	(0.330)	(0.421)	(0.302)	(0.342)	(0.308)	(0.269)
Growth Expectations	-0.293	-0.257	-0.156	-0.146	-0.157	-0.370	-0.158	-0.127	-0.162	0.174	-0.007	-0.187
	(0.287)	(0.273)	(0.237)	(0.186)	(0.223)	(0.372)	(0.222)	(0.260)	(0.212)	(0.211)	(0.163)	(0.206)
General Economic Communication$_{t-1}$	2.594**	0.593	-0.014	1.157	0.039	-1.065	0.583	-1.814**	0.907	-1.881*	2.308***	1.746**
	(1.168)	(0.969)	(0.694)	(0.947)	(0.838)	(0.985)	(0.971)	(0.829)	(0.875)	(0.962)	(0.816)	(0.755)
N	48	48	48	48	48	48	48	48	48	48	48	48
pseudo R^2	0.38	0.24	0.23	0.26	0.23	0.25	0.24	0.34	0.25	0.30	0.47	0.31
LR statistic	16.3	10.3	10.0	11.2	10.0	10.8	10.4	14.8	10.8	13.0	20.0	13.2
Log-likelihood	-13.3	-16.3	-16.4	-15.8	-16.4	-16.0	-16.3	-14.1	-16.1	-14.9	-11.4	-14.8

*** significant at 1% level, ** significant at 5%, * significant at 10%.

Ordered Probit estimations, dependent variable: MRO Rate decisions. Huber-White covariance coefficients with standard errors in parentheses.

5. Conclusions

Previous literature has noted that during times of high economic uncertainty monetary policy communication is quite consistent with actions at an institutional level. However, the results of this paper suggest that large differences arise when studying communication from individual policymakers and that communication from different central bank authorities is far from being equally useful in predicting future changes in monetary policy.

According to the findings, more relevant information about central bank future policy changes could be received by following the statements of the President and the Executive Board of the ECB and the Chairman, the FOMC and non-board governors for the Fed. There was a large variance in the level at which different forms of communication from individual euro area policymakers and Fed areas predicted changes in interest rates. Following the average communication of groups of policymakers seems to be a better choice compared to concentrating on communication from individuals. A strong case can also be made for following general economic communication instead of only concentrating on comments specifically about the future conduct of monetary policy.

A notable difference between the two studied central banks are the reactions to changes in expectations of macroeconomic variables. For the ECB, changes in expected inflation as well as economic growth played a role whereas in the Fed only changes in expected inflation were useful. This difference could potentially be related to the ECB having an explicit and public inflation target during a time period where observed inflation was very low whereas the Fed only began communicating its target in 2012. Previous rate decisions were largely insignificant, which points to an absence of interest rate smoothing during a crisis.

This paper concentrated on an easily observable instrument of monetary policy, the MRO rate. While the effect of signalling any easing or tightening of monetary policy can be presumed to be broadly similar, the different nature and mechanism of quantitative easing programs could be a source of differences in how well following communication can be used to predict changes of stance in unconventional monetary policy at or around the zero lower bound. These potential differences are left to future research. Another potential venue of future research would be to use high-frequency data following Gertler and Horvath (2018) to study whether the markets immediately react to individual policymakers' public statements about monetary policy or the economic outlook, and whether the tendency of markets to overreact in the short run (Naini and Naderian, 2016), as well as the magnitude of the reaction, is increased during times of high uncertainty.

Finally, a potential avenue of future research would be to study communication and reactions on new channels of interaction such as social media platforms. For example Korhonen and Newby (2019) and Ehrmann and Wabitsch (2022) study central bank communication on Twitter.

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A. Descriptive Statistics

			Monetary Policy		General Economic Outlook	
European Central Bank		N	mean	std. dev.	mean	std. dev.
France (president)	Trichet	226	0.042	0.573	0.063	0.366
Portugal (vice president)	Constancio	74	-0.042	0.202	-0.010	0.263
Austria (board)	Tumpell-Gugerell	41	0.052	0.330	0.052	0.375
Germany (board)	Stark	115	0.271	0.526	0.240	0.484
Greece (board)	Papademos	41	0.010	0.263	0.073	0.386
Italy (board)	Bini Smaghi	93	0.146	0.526	0.146	0.516
Spain (board)	Gonzalez-Paramo	78	-0.052	0.497	-0.010	0.478
Austria	Liebscher, Nowotny	165	0.042	0.534	0.104	0.505
Belgium	Quaden	57	-0.021	0.526	0.000	0.536
Cyprus	Orphanides	28	-0.063	0.381	-0.021	0.325
Finland	Liikanen	106	-0.063	0.381	0.073	0.425
France	Noyer	63	0.000	0.372	-0.021	0.385
Germany	Weber	189	0.344	0.670	0.219	0.535
Greece	Garganas, Provopoulos	64	-0.010	0.467	0.167	0.454
Ireland	Hurley, Honohan	26	-0.021	0.252	-0.021	0.325
Italy	Draghi	19	-0.063	0.381	0.104	0.555
Luxembourg	Mersch	75	0.042	0.410	0.083	0.279
Netherlands	Wellink	55	-0.031	0.466	0.021	0.449
Slovenia	Kranjec	28	0.094	0.321	-0.031	0.333
Spain	Ordonez	64	-0.115	0.375	-0.010	0.379
Federal Reserve						
Board (chair)	Bernanke	196	-0.375	0.531	-0.208	0.339
Board (vice chair)	Kohn	110	-0.104	0.472	-0.135	0.287
Board	Duke	27	-0.021	0.144	-0.083	0.215
Board	Kroszner	51	-0.042	0.289	-0.083	0.215
Board	Mishkin	58	-0.063	0.381	-0.031	0.217
Board	Tarullo	17	-0.042	0.202	-0.042	0.140
Board	Warsh	40	0.021	0.325	-0.073	0.206
Atlanta	Lockhart	121	-0.021	0.483	-0.188	0.265
Boston	Minehan, Rosengren	89	-0.146	0.461	-0.104	0.272
Chicago	Moskow, Evans	143	-0.063	0.561	-0.104	0.341
Cleveland	Pianalto	67	-0.083	0.454	-0.094	0.266
Dallas	Fisher	204	0.125	0.640	-0.115	0.346
Kansas City	Hoenig	134	0.375	0.606	-0.083	0.279
Minneapolis	Stern, Kocherlakota	103	0.063	0.480	-0.094	0.245
New York	Geithner, Dudley	72	-0.250	0.473	-0.135	0.287
Philadelphia	Plosser	157	0.260	0.565	-0.042	0.270
Richmond	Lacker	168	0.104	0.627	0.125	0.301
St. Louis	Poole, Bullard	208	0.063	0.561	-0.021	0.291
San Francisco	Yellen	125	-0.313	0.468	-0.219	0.371

B. Distribution of all Communication

European Central Bank		N	Hawkish	Neutral	Dovish
France (president)	Trichet	226	13.5%	70.1%	17.4%
Austria (board)	Tumpell-Gugerell	41	13.1%	78.9%	8.0%
Germany (board)	Stark	115	38.7%	54.8%	6.4%
Greece (board)	Papademos	41	30.3%	54.5%	15.2%
Italy (board)	Bini Smaghi	93	26.0%	63.6%	10.4%
Spain (board)	Gonzalez-Paramo	78	16.7%	63.3%	20.0%
Austria	Liebscher, Nowotny	165	22.8%	62.5%	14.7%
Belgium	Quaden	57	15.8%	65.8%	18.4%
Cyprus	Orphanides	28	10.0%	70.0%	20.0%
Finland	Liikanen	106	15.5%	69.0%	15.5%
France	Noyer	63	17.0%	73.6%	9.4%
Germany	Weber	189	38.4%	52.7%	8.9%
Greece	Garganas, Provopoulos	64	28.6%	59.2%	12.2%
Ireland	Hurley, Honohan	26	15.0%	70.0%	15.0%
Italy	Draghi	19	5.3%	63.2%	21.1%
Luxembourg	Mersch	75	22.6%	71.7%	5.7%
Netherlands	Wellink	55	23.9%	54.3%	21.7%
Portugal	Constancio	74	3.6%	81.8%	14.6%
Slovenia	Kranjec	28	20.0%	75.0%	5.0%
Spain	Ordonez	64	17.5%	57.5%	25.0%
Federal Reserve					
Board (chair)	Bernanke	196	10.2%	52.0%	37.8%
Board (vice chair)	Kohn	110	9.1%	57.3%	33.6%
Board	Duke	27	3.7%	70.4%	25.9%
Board	Kroszner	51	7.8%	56.9%	35.3%
Board	Mishkin	58	17.2%	43.1%	39.7%
Board	Tarullo	17	0.0%	64.7%	35.3%
Board	Warsh	40	20.0%	40.0%	40.0%
Atlanta	Lockhart	121	10.7%	53.7%	35.5%
Boston	Minehan, Rosengren	89	6.7%	57.3%	36.0%
Chicago	Moskow, Evans	143	14.0%	55.2%	30.8%
Cleveland	Pianalto	67	16.4%	47.8%	35.8%
Dallas	Fisher	204	22.2%	52.7%	24.6%
Kansas City	Hoenig	134	38.1%	35.8%	25.4%
Minneapolis	Stern, Kocherlakota	103	12.6%	59.2%	28.2%
New York	Geithner, Dudley	72	1.4%	77.8%	20.8%
Philadelphia	Plosser	157	24.8%	49.0%	25.5%
Richmond	Lacker	168	31.0%	53.0%	14.9%
St. Louis	Poole, Bullard	208	16.3%	62.0%	21.6%
San Francisco	Yellen	125	11.2%	50.4%	38.4%