Central Bank Ad-Hoc Communication and Financial Markets: Evidence from High-Frequency Data

By

Yevhenii Skok

Submitted to

Central European University

Department of Economics and Business

In partial fulfillment of the requirements for the degree of

Masters of Arts

Supervisor: Professor István Kónya

Budapest, Hungary

2020

I, the undersigned [Yevhenii Skok], candidate for the degree of Master of Arts at the Central European University Department of Economics and Business, declare herewith that the present thesis is exclusively my own work, based on my research and only such external information as properly credited in notes and bibliography. I declare that no unidentified and illegitimate use was made of works of others, and no part the thesis infringes on any person's or institution's copyright. I also declare that no part the thesis has been submitted in this form to any other institution of higher education for an academic degree. The data was collected when I pursued my summer internship at the National Bank of Slovakia.

Kuda

Budapest, 2 June 2020

Signature

© by Yevhenii Skok, 2020

All Rights Reserved.

Acknowledgments

I express my sincere gratitude to Dr. Pavel Gertler from the National Bank of Slovakia, who led me during my internship, for the profound and detailed insights, as well as continuous support and guidance that made this research possible. This study also benefited from the research seminar held at the National Bank of Slovakia. I am very thankful to the participants of the seminar for valuable and helpful comments.

Alongside this, I am deeply grateful to Professor István Kónya for his guidance, support, advice, and leading me as my supervisor. I thank Professor Thomas Rooney for his help and the relevant consultations, which improved my writing.

Last but not the least, I would like to thank my family for comprehensive support, love, and encouragement. They all kept me going and motivated during my studies.

ABSTRACT

This study investigates the immediate effects of ad-hoc communication of the European Central Bank Governing Council members on financial markets. I use high frequency (one-minute) financial data series and communication data, which contains unscheduled public statements (media interviews, speeches, and discussions) of all members made from January 2008 to May 2016. Least square regressions reveal that this communication affects interest rates, the stock market, and exchange rates. The strongest immediate response of financial markets, in general, comes about an hour after a communication. Meanwhile, the timing of the market adjustment varies across financial markets. In particular, the foreign exchange market overall adjusts earlier than interest rates and the stock market.

JEL Codes: C1, E5, G21

Key Words: Central Bank, Communication, European Central Bank, Monetary Policy

TABLE OF CONTENTS

Acknowledgments	iii
Abstract	iv
List of Figures	vi
List of Tables	vi
Introduction	1
2 Literature Review	
3 Data, Measurement and Coding	
3.1 Financial Markets Data and Secondary Explanatory Variables	6
3.2 The Central Bank Ad-hoc Communication Data	9
3.3 Final Balanced Panel Dataset: Summary Statistics and Introductory Analysis	
4 Modelling Framework	
5 Main Results	
6 Comprehensive Robustness Check	
7 Conclusions	
Bibliography	
Annex	

LIST OF FIGURES

1	The Structure of the Final Dataset	5
2	EUR/USD Exchange Rate and OIS 3-Month	6
3	Daily Excess Liquidity of the Eurosystem, EUR bn	7
4	Weekly Composite Indicator of Systemic Stress (CISS) and CISS Sub-Indices	7
5	Uncertainty Indices	8
6	The Content Analysis of the Inter-Meeting Statements 1	0
7	The Policy Inclination Index and the ECB Central Bank Communication Index	1
8	Timing and the Frequency Distribution of Communications	4
9	The Reaction of Financial Markets on the Ad-Hoc Communication of the ECB GC	20

LIST OF TABLES

1	Summary Statistics	. 13
2	OLS Estimates of the Response of Financial Markets to the ECB Communication	. 19
3	OLS Estimates of the Second-Round Effects on Interest Rates	. 21
4	OLS Estimates of the Effect of the Central Bank Communication on Financial Markets	. 23

Chapter 1

INTRODUCTION

In recent decades, ad-hoc communication has become one of the main tools, which central bankers have employed to anchor market expectations by hinting future policy and thereby to boost its efficiency. The growing role of the central bank forward guidance has triggered a marked development of empirical studies devoted to ad-hoc communication. Meanwhile, this literature is young and leaves the potential for further research, particularly for the investigation of the timing of the response of financial markets to central bank communication.

The main goal of this empirical study is to shed light on the timing of the immediate response of financial markets to ad-hoc communication of European central bankers. I hypothesis that the timing of the market response and adjustment varies across markets due to specifics of assets traded, including different frequency of trading. Besides, I hypothesis that the immediate effect of central bank communication should be statistically significant not only for interest rates and the stock market, as the recent literature reports, but also for the foreign exchange market. Hence, this study addresses the question concerning the timing of the initial adjustment of financial markets in response to central bank communication with a focus on the foreign exchange market.

For the study purpose, I further develop the dataset and use the methodology represented by Gertler and Horvath (2018). In particular, I add and correspondingly encode 367 new communication events filtered-out from Reuters News of the Thompson Reuters Eikon. As a result, the communication dataset contains 1,751 communications made from January 2008 to May 2016. These communications include unscheduled media interviews, speeches, and discussions of all members of the European Central Bank Governing Council about future conventional and unconventional monetary policy, and economic outlook (inflation and economic growth). I justify the encoding of the communication data by constructing the policy inclination index and comparing this index with the official ECB's Central Bank Communication Index.

Then, I merge the communication data with the high-frequency (one-minute) financial markets data, which include interest rates, the Euro Stoxx50 Index, and foreign exchange rates derived from the Thomson Reuters Tick History database. This merger results in the balanced panel dataset, which contains approximately 317 thousand data points.

I use ordinary least squares for the empirical analysis, which contributes to the existing literature by documenting that the timing of the market's immediate adjustment in response to adhoc communication of the European central bankers varies across financial markets. In particular, the strongest immediate response, in general, comes about an hour after a communication. Meanwhile, the foreign exchange market overall adjusts earlier than interest rates and the stock market. The effect of communication is statistically significant not only for interest rates and the stock market but also for the foreign exchange market.

The effect of communication on the foreign exchange market remains statistically significant even after controlling for the communication climate, market uncertainty, excess liquidity, real monetary conditions, macroeconomic news, and robustness checks, conducted for addressing potential endogeneity issues.

The rest of the paper proceeds as follows. Chapter 2 provides a brief review of the most relevant literature. Chapter 3 explains financial markets and communication data, including its coding and justification of coding. Chapter 4 describes the modeling framework, Chapter 5 the main results, Chapter 6 the results of the comprehensive robustness check, and Chapter 7 concluding remarks.

Chapter 2

LITERATURE REVIEW

As Ben Bernanke stated in 2004: "The more guidance a central bank can provide the public about how policy is likely to evolve the greater the chance that market participants will make appropriate inferences" (El-Erian, 2016). Indeed, with the increasing role of the central bank adhoc communication in guiding future policy changes, a growing number of empirical studies confirm the efficiency of this communication in the proposed context.

Thus, one stream of research proves that ad-hoc communication is an important source of information for financial markets, which hints future decisions of central bankers. In particular, Jansen and de Haan (2005), Ehrmann and Fratzscher (2007), Blinder et al. (2008), and Bennani et al. (2019) provide relevant evidence. While another piece of literature examines the influence of central bank communication on financial markets, including market interest rates [Kohn and Sack (2003), Sawicki (2007)], stock prices [Wongswan (2009), Rosa (2011), Rosa (2016)], and the foreign exchange market.

As for the latter, the earlier papers of Jansen and de Haan (2005), and Fratzscher (2006)] are devoted to the investigation of the effects of such a specific type of central bank communication as exchange rate communication. Later papers, including Ranaldo and Rossi (2010), examine the broader arsenal of the central bank communication, including unscheduled speeches and interviews, as well as scheduled monetary policy announcements. Meanwhile, a recent paper by Gertler and Horvath (2018) is the most relevant for my research since this paper focuses specifically on central bank ad-hoc communication and provides a comprehensive assessment of

its effects on financial markets, including interest rates, the stock market, and the foreign exchange market.

Taking into account the existing literature, this study aims to complement it by offering empirical evidence derived from the recent high-frequency data, which are described in the following chapter.

CHAPTER 3

DATA, MEASUREMENT AND CODING

For this research, I employ the data framework developed by Gertler and Horvath (2018) that consists of the main balanced panel dataset, which includes two subsets of data, the high-frequency (one-minute) financial markets data, and the central bank ad-hoc communication data, as well as other data, which Figure 1 summarizes below.



Figure 1: The Structure of the Final Dataset

This study enhances the dataset by adding more communication events and data series (explanatory variables), which are relevant to the study, including series of CISS sub-indexes for the money market, the stock market, and the foreign exchange market, daily excess liquidity instead of weekly, Monetary Conditions Index, Global Economic Policy Uncertainty Index, the U.S. Financial Stress Indicator (FSI), and the Husted-Rogers-Sun MPU Index for the United States. I provide motivation and rationale for using these additional variables in the following sections.

3.1 Financial Markets Data and Secondary Explanatory Variables

For this study, I use financial markets data as dependent variables that include series of EONIA swap rates (the Overnight Index Swap – OIS) for instruments with different maturity, the Euro Stoxx50 Index, and the EUR/USD, EUR/GPY, EUR/CHF, and EUR/AUD exchange rates from the Thomson Reuters Tick History database. All series have one-minute frequencies and reflected in Annex 1, while Figure 2 illustrates the EUR/USD exchange rate and OIS 3-month.



Figure 2: EUR/USD Exchange Rate and OIS 3-Month

Source: the Thomson Reuters Tick History database

The secondary explanatory variables that I use are excess liquidity, the Composite Indicator of Systemic Stress (CISS) and its sub-indices, as well as the Monetary Conditions Index (MCI). Figure 3 reflects the development of excess liquidity that is the sum of deposits at the deposit facility and current account holdings minus the marginal lending facility and the minimum reserve requirements. To calculate the daily series of excess liquidity, I use ECB data on minimum reserves and liquidity from the ECB website.



Figure 3: Daily Excess Liquidity of the Eurosystem, EUR bn

Source: own calculations based on the ECB data

I use total CISS¹ for controlling the effects of uncertainty on financial markets. In addition to this proxy of uncertainty, I consider CISS sub-indexes for the money market, the stock market, and the foreign exchange market since they could better capture uncertainties specific to these markets. This data is weekly, and I use the latest available/known value of CISS at the time of the central banker's communication. Figure 4 demonstrates the total CISS and CISS sub-indexes.



Figure 4: Weekly Composite Indicator of Systemic Stress (CISS) and CISS Sub-Indices

Source: the ECB website

¹ Holló at el. (2012) provides detailed information concerning this index.

The monetary policy transmission incorporates the relationships between the different financial markets, including links among changes in interest rates and stock prices (Cassola and Morana, 2004), interest rates and exchange rates. From this perspective, an empirical analysis of the effects of central bank communication on financial markets should incorporate interconnectedness among financial markets. To capture the above-mentioned interconnectedness and macroeconomic impact on financial markets, I use the Monetary Conditions Index (MCI), which is calculated by the European Commission Directorate General for Economic and Financial Affairs (DG ECFIN) from a linear combination of the short-run real interest rate and the real effective exchange rate.

Alongside with the U.S. Daily News Economic Policy Uncertainty Index, I also consider the time series of the Global Economic Policy Uncertainty Index, the U.S. Financial Stress Indicator (FSI), and the Husted-Rogers-Sun MPU Index for the United States, which are reflected in Figure 5. These indices complement U.S. Daily News Economic Policy Uncertainty Index as they contain additional information about the uncertainty that is relevant to financial markets.



Figure 5: Uncertainty Indices

Source: Economic Policy Uncertainty

As the main explanatory variable, I use a communication variable named communication news. I also use the policy inclination index as an explanatory variable that reflects the overall communication climate. These two variables are described in detail in the following section devoted to the communication data.

3.2 The Central Bank Ad-hoc Communication Data

Communication data comprises ad-hoc interviews, speeches, and conference discussions of all members of the ECB GC concerning the future monetary policy and economic outlook. Monetary policy communications include guidance for both conventional and unconventional monetary policy. The outlook of economic development contains public statements concerning future economic growth and inflation.

The relevant communications made between the policy decision meetings are filtered out from Reuters News of the Thompson Reuters Eikon. I exclude from the dataset public statements made on the same day of the policy decision (meeting of the ECB Governing Council) since the effects of these communications can be overlapped with the effects of scheduled policy meeting communications.

I apply the same approach for encoding central bank communication data as Gertler and Horvath (2018), as well as Ehrmann and Fratzscher (2007a). I code each observation (communication event) according to the supposed future stance or inclination of the monetary policy and the economy. In particular, if a forward-looking monetary policy communication guides the future weakening of monetary policy, then -1 is attributed to this event, if strengthening +1, and 0 in the case of neutral monetary policy. If the central bank communication hints at the future

weakening of the economic growth and decrease in inflation or corresponding risks, I assign -1, if the acceleration of economic growth and increase in inflation +1, if economic growth and inflation should remain the same, 0. Figure 6 summarizes the approach for the encoding of the content of central bank communication. This series of coded communication content is the main explanatory variable of my interest that named communication news.





I justify the reliability of coding by constructing the policy inclination index, which is a moving average of the previous 20 items of communication news, and comparing this index with the ECB Central Bank Communication Index (hereinafter – CBCI). CBCI is based on the regular and scheduled communication that the President of the ECB makes every month and since January 2015 every 6 weeks explaining the ECB's policy decisions. The policy inclination index follows ad-hoc communication made between the policy meetings.

Figure 7 reports a comparison of the above-mentioned indexes and proves a good fit and justification for coding communications since the inclination index mimics the trajectory of the ECB's communication index of monetary policy. The inclination index matches the monetary policy index better than the economic outlook index because 73 percent of all ad-hoc communications made from July 2008 to May 2016 are associated with the monetary policy issues, while 58 percent of this provided guidance on conventional monetary policy and 42 percent – on unconventional monetary policy, respectively.



Figure 7: The Policy Inclination Index and the ECB Central Bank Communication Index

Source: own calculations and the ECB data

The policy inclination index helps not only justify manual coding of the communication events but also contains additional information. In particular, fluctuations of the policy inclination index below zero levels since 2012 are associated with the easing of monetary policy in times of turbulence in financial markets, as well as an increased risk of a decline in economic activity. Indeed, these risks were realized in 2012 and 2013, when real GDP was negative. A further negative policy inclination index explains easing of monetary policy, including both changes in official interest rates (negative interest rates on deposit facility since the beginning of 2014) and the launch of asset purchases programs and their adjustments, as well as higher deflation risks.

I also use the policy inclination index as an explanatory variable that reflects the communication climate. On top of all of this, I encoded a wide range of characteristics of communication events that enables me to create dummy and control variables and use them for robustness checks. The entire set of the dummy and some control variables, their description, and rationale of usage I introduce in Annex 2.

The following section provides information on the final merged dataset, including summary statistics and preliminary analysis of the dataset.

3.3 Final Balanced Panel Dataset: Summary Statistics and Introductory Analysis

To create the final balanced panel dataset, I merge the financial markets data and communication data (1 751 communication events). To each communication event, a time series of 181 financial market observations with one-minute frequency is appended to create a corresponding time window, 60 minutes before the communication event/news, and 120 minutes after. As a result, each coded public statement corresponds to a certain time window of the high-frequency financial markets data. This approach enables me to create the panel dataset that includes roughly 317 thousand data points.

Table 1 shows that the mean value of communication news is negative, which corresponds to a low inflation environment with risks of deflation and lower economic growth. The global financial crisis and the serial crisis in the Eurozone also contribute to the negative mean of communication news.

Variable	Mean	Std. Dev.	Min	Max
Dependent variables				
Euro Stoxx50 Index	-0.027	0.550	-5.341	3.874
EUR/USD	0.015	0.234	-1.280	1.909
OIS 3-month	0.025	0.713	-5.470	9.664
OIS 6-month	0.015	0.723	-3.858	8.839
OIS 1-year	0.005	0.957	-8.125	9.765
OIS 2-year	0.018	1.248	-10.137	9.325
OIS 3-year	-0.023	1.310	-15.753	7.200
Explanatory variables				
Communication news	-0.183	0.820	-1	1
Communication climate	-0.185	0.496	-1	1
Excess liquidity (EL)	205.006	208.120	-134.833	833.713
CISS	0.174	0.067	0.035	0.289
CISS equity market	0.148	0.059	0.010	0.226
CISS money market	0.086	0.041	0.010	0.145
CISS foreign exchange market	0.090	0.039	0.001	0.143
Monetary Conditions Index (MCI)	-1.445	1.298	-3.869	1.479

Table 1: Summary Statistics

Note: Euro Stoxx50 Index, UER/USD, and OIS rates are the first differences (between 60 min after and 15 min prior to the appearance of communication news in the Reuters)

Overall, the ECB GC members made 44 percent of dovish public statements (coded with negative value -1). In other words, they communicated easing of monetary policy or risks of deflation, or lower economic growth in the future, 30 percent – neutral statements, and the remaining 26 percent were hawkish statements (positive economic outlook or future tightening of monetary policy).

Figure 8 reports the timing and frequency distribution of communications, which shows that members of the ECB GC intensify ad-hoc communications in times of crisis and under the market strains, while they rely less on this tool during normal times. Alongside this, figure 8 shows that the Council members sometimes communicate at night that is explained by the different time zones of the places where these statements are made. I eliminate in the regression analysis statements delivered outside the trading hours of financial markets.



Figure 8: Timing and the Frequency Distribution of Communications



The following chapters provide information concerning the empirical analysis, including the approach to modeling, and main findings of the study.

CHAPTER 4

MODELLING FRAMEWORK

To investigate the immediate impact of the central bank ad-hoc communications on financial markets, I begin with the simplest version of the equation used by Gertler and Horvath (2018). This approach is based on related studies, including Georgiadis and Grab (2016), which examine the effect of the announcement of the ECB's asset purchase program on financial markets, as well as Swanson and Williams (2014a), Swanson and Williams (2014b), and Moessner et al. (2015), which study how macroeconomic news influences treasury yields.

The initial version of the equation is the following:

$$\Delta y_{t+s,t-g} = \alpha_0 + \alpha_1 x_t + \varepsilon_t, \tag{1}$$

where $\Delta y_{t+s,t-q}$ is the response of financial markets; x_t is the value of the communication event (code: +1, 0, -1); *t* represents the time of the communication (its appearance in Reuters News); q = 15, that is, the value of the financial asset 15 minutes before the communication event; and s = 15, 30, 45, 60, 75, 90, 105, 120 (minutes), which represents the value of a financial asset after the communication event.

The above-mentioned approach for timing is consistent with previous relevant studies, including Gertler and Horvath (2018), and Bauer (2015). In particular, the rationale for using the value of a financial asset 15 minutes before the communication event (q) is that 15 minutes elapse between the actual communication and appearance of the corresponding information in Reuters. As for the time after the communication, using regression analysis, I test all the above-mentioned time windows for all studied financial markets, and based on the results I choose the time when

the market response is the strongest. The results of the corresponding tests are reported in the following chapter.

After estimating the baseline equation (1), I enhance it by adding control variables.

$$\Delta y_{t+s,t-q} = \alpha_0 + \alpha_1 x_t + \alpha_2 z_{t-u} + \varepsilon_t, \tag{2}$$

where, z_{t-u} represents a set of the control variables, and u > 0.

I apply equations (1) and (2) to study the effect of the central bank ad-hoc communication on the interest rates by using ordinary least squares. With this approach, the corresponding mean effects of the right-hand variables can be derived. To evaluate the impact on the stock and foreign exchange markets, I use the same equations (1) and (2), but with the modified determination of changes (Δ - delta) of financial market variables. Thus, in the initial equations, the change in these variables is defined as the difference in levels at different points in times. In the modified approach, I determine the corresponding change as the difference between means differences.

$$\Delta y_{mean(t+s)-mean(t-q),mean(t-p)-mean(t-d)} = \alpha_0 + \alpha_1 x_t + \varepsilon_t, \tag{3}$$

where, t is the time of the communication, mean represents the mean value of a financial asset over the following 5 minutes intervals: $55 < t + s \le 60$ minutes after the communication; $-10 > t - q \ge -15$ minutes (before the communication); $-15 > t - p \ge 20$ minutes (prior to the communication); and $15 > t - p \ge 20$ minutes (prior to the communication).

Like in equation (2), I expand equation (3) by adding control variables:

$$\Delta y_{mean(t+s)-mean(t-q),mean(t-p)-mean(t-d)} = \alpha_0 + \alpha_1 x_t + z_{t-u} + \varepsilon_t, \tag{4}$$

The use of the equation 3 and 4 removes the possible trend effects from the regressions and eliminates other sources of endogeneity associated with the dynamic of the financial markets data. Moreover, the application of high-frequency (one-minute) data eliminates the problem of overlapping events (for instance, the ECB GC member communication, macroeconomic and other news, events in different financial markets) that could cause corresponding bias estimates. In addition to the baseline empirical analysis, which is based on the equations (1) - (4), I test findings by performing a comprehensive robustness check. For this purpose, I use a wide set of dummy and control variables, reported in Annex 2, which should eliminate remaining endogeneity concerns.

The following chapters provide the main findings obtained from the empirical analysis and the results of robustness checks.

CHAPTER 5

MAIN RESULTS

The first main finding of this study is related to the timing of the adjustment of financial markets in response to the ad-hoc communication of the ECB GC members. I estimate equations (1) and (3) for each time window across all studied financial markets (interest rates, the stock market, and the foreign exchange market) to reveal when and how markets react to communications in terms of time. The corresponding model outputs in Table 2 show that the statistical significance of the results varies considerably across different time horizons (time windows) and financial markets. In particular, regressions reveal that overall the foreign exchange market adjusts faster compared to interest rates and the equity market according to three criteria: reaction start time, reaction peak, and adjustment expiration time after the communication. Figure 9 reports the corresponding results.

The response of the foreign exchange market becomes statistically significant at 15 minutes after the communication, while the stock market and OIS 2-year begin to react to the communication after about 45 minutes. The peak of reaction occurs at 45 minutes in the FX market, while in other financial markets – at 60 minutes. The statistically significant response of the FX market terminates also earlier (at 75 minutes after the communication) compared to interest rates and the stock market. This timing is approximate since the results are tested for the time windows with 15 minutes gaps.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Market Response	in 15 minutes	in 30 minutes	in 45 minutes	in 60 minutes	in 75 minutes	in 90 minutes	in 105 minutes	in 120 minutes
VARIABLES				OIS 2-	year			
Communication news No. of observations	0.032 (0.031) 1,570	0.025 (0.036) 1,568	0.061* (0.036) 1,567	0.118*** (0.038) 1,566	0.098** (0.041) 1,566	0.093** (0.042) 1,565	0.102** (0.045) 1,565	0.093** (0.046) 1,563
				OIS 3-	year			
Communication news No. of observations Communication news No. of observations	0.064** (0.028) 1,424 0.020 (0.019) 892	0.066** (0.033) 1,422 0.026 (0.022) 866	0.084** (0.037) 1,421 0.044* (0.025) 838	0.124*** (0.042) 1,420 Stoxx 0.057** (0.029) 814	0.095** (0.046) 1,420 50 0.056* (0.030) 787	0.080* (0.046) 1,419 0.055* (0.032) 763	0.079 (0.049) 1,419 0.054 (0.034) 740	0.107** (0.052) 1,417 0.045 (0.035) 720
	EUR/USD							
Communication news No. of observations	0.016** (0.007) 1,605	0.017** (0.008) 1,605	0.022** (0.009) 1,605	0.022** (0.009) 1,605	0.018* (0.010) 1,605	0.015 (0.010) 1,605	0.012 (0.011) 1,605	0.012 (0.011) 1,605

Table 2: OLS Estimates of the Response of Financial Markets to the ECB Communication

According to Figure 9, the longest duration of the market response contains interest rates (OIS 2-year and OIS 3-year), which roughly amounted to 75 minutes, while the duration of the stock market adjustment is the shortest (about 45 minutes).







EUR/USD exchange rate 0.035 0.03 0.025 0.02 0.015 0.01 0.005 0 15 min 30 min 45 min 60 min 75 min 90 min 105 min 120 min Time after the communication

Figure 9: The Reaction of Financial Markets on the Ad-Hoc Communication of the ECB GC

Note: The columns reflect one standard deviation around the estimated coefficient α_1 of the equation (1) for interest rates and equation (3) for the stock and foreign exchange markets.

The red bars contain the highest value of α_1 , which is statistically the strongest.

The green bars are associated with the second-round effects on interest rates from earlier changes in the stock market and the foreign exchange market. Alongside this, regressions show that the response of interest rates (OIS 2-year and 3-year) becomes more statistically significant and economically greater compared to the previous value (in terms of the time window) in about 100 minutes after the communication. I assume that these shifts in interest rates incorporate adjustment of the market participants' expectations in response to the initial changes in the stock market and exchange rates. To test the above-mentioned hypothesis, I use regressions with interest rates as a dependent variable, and Stoxx50 as well as exchange rates as explanatory variables. At the same time, I keep consistent the time structure of changes in financial markets. The results of the preliminary regression analysis in Table 3 show that the initial changes in the stock market and foreign exchange market affect further evolvement of interest rates.

	(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)
								OIS 3-
		010.2	· 105 ·			year in		
VARIABLES		OIS 2-year in 105 min				OIS 2-year in 120 min		
EUR/USD in 15 min	-0.489**							
	(0.226)							
Stoxx50 in 60 min	0.469***	0.469***	0.458***	0.434***	0.421***	0.406***	0.388***	0.524***
	(0.083)	(0.084)	(0.085)	(0.086)	(0.088)	(0.089)	(0.090)	(0.099)
Communication news	0.100	0.100	0.098	0.093	0.090	0.088	0.084	0.124
	(0.066)	(0.066)	(0.066)	(0.066)	(0.070)	(0.070)	(0.070)	(0.077)
EUR/USD in 30 min		-0.396*			-0.359*			-0.157
		(0.203)			(0.213)			(0.238)
EUR/USD in 45 min			-0.258			-0.201		
			(0.194)			(0.204)		
EUR/USD in 60 min				-0.064			-0.053	
				(0.181)			(0.190)	
Observations	814	814	814	814	814	814	814	797
Observations	814	814	814	814	814	814	814	797

Table 3: OLS Estimates of the Second-Round Effects on Interest Rates

Standard errors in parentheses $*** p \le 0.01 ** p \le 0.05 * p \le 0.1$

The second main finding of this study is that the economically and statistically strongest market response, in general, occurs 60 minutes after a communication appears in Reuters. For this reason, I use this time as the optimal time window for further regression analysis of communication effects.

The empirical evidence that the ad-hoc communication of central banks immediately affects not only interest rates and the stock market, but also the foreign exchange market, forms the third main finding of this study. I further test this evidence by running regressions with different specifications and controlling for diverse factors. Table 4 shows that the communication effect on exchange rates remains statistically significant at the 5% significance level after controlling for the communication climate, systemic stress (CISS – proxy of the uncertainty), excess liquidity, and changes in real monetary conditions. A positive sign of the coefficients for communication news in regressions for EUR/USD means that central bank forward-looking statements concerning weakening monetary policy or lower economic growth and inflation are associated with the depreciation of the domestic currency (decrease in EUR/USD, which shows how many US Dollars are needed to buy a Euro), which is in line with economic theory.

The third finding complements previous literature, including Gertler and Horvath (2018), according to which there is no or very small impact of ad-hoc central bank communication on exchange rates. Alongside this, the immediate impact of central bank communication on the foreign exchange market is limited since it spreads only on currency pair EUR/USD, while the effect is statistically insignificant for pairs EUR/GPY, EUR/CHF, and EUR/AUD. Overall, communication effects on financial markets are economically insignificant that is in line with the existing literature.

	OIS 3-year								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)			
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***			
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)			
Communication climate		-0.041				-0.036			
		(0.083)				(0.087)			
CISS			-0.456			-0.640			
			(0.525)			(0.743)			
Excess liquidity				-0.000		0.000			
				(0.000)		(0.000)			
Monetary conditions					-0.005	0.017			
-					(0.028)	(0.049)			
Observations	1,420	1,420	1,420	1,420	1,420	1,420			
			Ś	Stoxx50		-			
	(1)	(2)	(3)	(4)	(5)	(6)			
Communication news	0.057**	0.066*	0.054*	0.060**	0.057**	0.065*			
	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)			
Communication climate		-0.028			. ,	-0.037			
		(0.056)				(0.059)			
CISS			-0.821**			-0.591			
			(0.357)			(0.511)			
Excess liquidity				0.000		-0.000			
				(0.000)		(0.000)			
Monetary conditions					-0.035*	-0.020			
-					(0.018)	(0.033)			
No. of observations	814	814	814	814	814	814			
			E	UR/USD					
	(1)	(2)	(3)	(4)	(5)	(6)			
Communication news	0.022**	0.024**	0.022**	0.020**	0.022**	0.024**			
	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)			
Communication climate		-0.007				-0.005			
		(0.018)				(0.019)			
CISS			0.161			-0.039			
			(0.115)			(0.165)			
Excess liquidity				-0.000		0.000			
				(0.000)		(0.000)			
Monetary conditions					0.014**	0.016			
					(0.006)	(0.010)			
No. of observations	1,605	1,605	1,605	1,605	1,605	1,605			

Table 4: OLS Estimates of the Effect of the Central Bank Communication on FinancialMarkets

As expected, real monetary conditions are statistically significant for the foreign exchange market. At the same time, the coefficients for the monetary conditions have opposite signs, which is in line with the economic theory. In particular, monetary conditions include changes in real short-term interest rates that have the opposite effect on the exchange rate. The tightening of monetary conditions (including an increase in interest rates) strengthens the domestic currency (increase in EUR/USD), which explains the positive coefficient of MCI in EUR/USD regressions. Interpreting MCI, I use the rationale through the prevailing impact of the interest rates since the relative weights of the interest rate and the exchange rate component in this index are 6:1.

As for the other control variables, excess liquidity appears to be statistically insignificant in all baseline regressions. This insignificance can be explained by the fact that during the main part of the studied period, the banking system of the eurozone experienced positive excess liquidity and its more stable development/stance after the ECB increased liquidity provision since 2012. Under these conditions, financial market indicators were more rigid towards changes in liquidity compared to the period before 2012, when banks more often experienced shortages and higher volatility in liquidity.

The following chapter reports the results of robustness checks of the third finding.

CHAPTER 6

COMPREHENSIVE ROBUSTNESS CHECK

For robustness checks of the third finding, I use the set of dummy and control variables reported in Annex 2. Since the application of these variables limits the dataset, I conduct robustness checks for restricted samples.

I begin by conducting a regression analysis for various types of communications in terms of their context. The corresponding regressions in Annex 3 show that communications concerning unconventional measures affect the foreign exchange market more significantly than statements about conventional measures. This leads to the conclusion that agents in the foreign exchange market tend to pay more attention to statements about future changes in liquidity (since 65% of communications on unconventional measures are about balance sheet policy that causes changes in liquidity) compared to changes in interest rates or economic prospects.

I also test baseline results by running corresponding regressions separately for different macro-financial environment/conditions (D19 Annex 2). The regression analysis in Annex 5 shows that exchange rates reaction is statistically significant (according to all specifications of baseline regressions) under conditions of financial stress, while their response in normal times is statistically insignificant at all conventional significance levels. The evidence above described hints that agents are especially attentive or selectively attentive to the central bank communications during financial turbulence, although they pay less attention to ECB communications at normal times.

Then, I exclude from the regressions Draghi's London speech (D15 Annex 2) and communications, which central bankers make on the same day as macroeconomic news are released. I eliminate Draghi's speech and other central bank-related communications about this since this speech was uncommon and shifted significantly financial markets having long-term effects. Despite this, Annex 6 reports that the results of the regressions remain close to the baseline ones.

To control for the impact of macroeconomic news on financial markets, I use macroeconomic news from the European Union (D16 Annex 2) and the U.S. macroeconomic news (D17 Annex 2), as it can affect European financial markets, especially the EUR/USD currency pair. Excluding coincided days, I take into consideration the time difference between countries, including the fact that all macroeconomics news is released in the U.S. in the early morning, and Eurozone markets are aware of this news in the second half of the day. Annexes 7 - 9 show that after controlling for the Eurozone macroeconomic news, the U.S. macroeconomic news, and joint control for the EU and U.S. macroeconomic news, the results for exchange rates remain in line with the baseline ones.

Then, I control for the overlapping central bank communications (D6 Annex 2) that could trigger an endogeneity issue. According to Annex 10 exclusion of the overlapping (overlap over the same time window) communications shows that the results for exchange rates remain statistically significant.

I also extend baseline regressions by adding the one-day lagged U.S. Daily News Economic Policy Uncertainty Index (C1 Annex 2), which proxies the global uncertainty, Global Economic Policy Uncertainty Index that should better capture global uncertainty (C2 Annex 2), Financial Stress Indicator (FSI) for the United States, and the U.S. Monetary Policy Uncertainty Index (C3 and C4 Annex 2 respectively) since these indices could capture more explanatory power in the proposed context. The regression outputs in Annex 11 - 13 show that, unlike for interest rates and the stock market, the above-mentioned indices (C1-C4) are statistically insignificant in all the conventional significance levels for the foreign exchange market.

CONCLUSIONS

This study has investigated the immediate effects of the ad-hoc communication of the ECB GC members on financial markets. Communication data comprised unscheduled public statements (media interviews, speeches, and discussions) of all Council members made from July 2008 to May 2016. These statements were forward-looking and guided future changes in monetary policy (both conventional and unconventional) and economic outlook (inflation and growth).

After merging the communication data with the high-frequency (one-minute) financial markets' data, I have used ordinary least squares regressions for the empirical analysis. The latter has contributed to the existing literature by suggesting the following new empirical evidence.

1. The timing of the market adjustment in response to communication varies across financial markets. In particular, the foreign exchange market overall adjusts earlier than interest rates and the stock market.

2. Economically and statistically, the strongest immediate response of financial markets to central bank verbal statements, in general, comes about in an hour after a communication.

3. The effect of policymakers' communication is statistically significant not only for interest rates and the stock market but also for the foreign exchange market.

The third finding has remained statistically significant even after controlling for the communication climate, market uncertainty, excess liquidity, and real monetary conditions. The robustness checks, conducted for addressing potential endogeneity issues, also have not eliminated the statistical significance of the third result, including after controlling for the overlapping

communications, macroeconomic news for the Eurozone and the USA, the global uncertainty and U.S. monetary policy uncertainty, as well as U.S. financial stress development.

Hence, the proposed study has made essential empirical contributions and has provided the grounding for a better understanding of the immediate effects of central bank communication on financial markets. As a result, this study will be of use for monetary authorities, particularly for monetary policy and financial stability purposes.

As for the further extension of this research, it could be done by providing empirical evidence for the period before the global financial crisis, and after May 2016, which remains untouched. The results of the response timing hinted that earlier reactions of the foreign exchange market and the stock market affected further evolvement of interest rates. For this reason, the investigation of second-round communication effects seems to be a promising area for future research.

BIBLIOGRAPHY

Baker, S.R., Bloom, N., Davis, S.J., 2016. Measuring economic policy uncertainty. Q. J.Econ. 131 (4), 1593–1636.

Bauer, M., 2015. Inflation expectations and news. Int. J. Cent. Bank. 10, 1-40.

Bennani H., Fanta N., Gertler P. and Horvath R., 2019. Does Central Bank Communication Signal Future Monetary Policy? The Case of the ECB. IES Working Papers 12/2019. IES FSV. Charles University.

Berger, H., Sturm, J.-E., de Haan, J. (2006). Does money matter in the ECB strategy? New Evidence Based on ECB Communication. CESifo Working Paper, vol. 1652. CESifo, Munich.

Blinder, A.S., Ehrmann, M., Fratzscher, M., de Haan, J., Jansen, D.-J., 2008. Central bank communication and monetary policy: a survey of theory and evidence. J.Econ. Lit. 46 (4), 910–945.

Chappell Jr., H.W., McGregor, R.R., Vermilyea, T., 2004. Majority rule, consensusbuilding, and the power of the chairman: arthur burns and the FOMC. J. MoneyCredit Bank. 36 (3), 407–422.

David-Jan Jansen & Jakob de Haan, 2005. "Is a Word to the Wise Indeed Enough? ECB Statements and the Predictibility of Interest Rate Decisions," DNB Working Papers 075, Netherlands Central Bank, Research Department.

Davis, S. J., 2016. "An Index of Global Economic Policy Uncertainty." Macroeconomic Review, October. Also available as NBER Working Paper No. 22740.

Ehrmann, M., Fratzscher, M., 2007. The timing of central bank communication. Eur. J. Polit. Econ. 23 (1), 124–145.

Mohamed A. El-Erian, 2016. The Only Game in Town: Central Banks, Instability, and Avoiding the Next Collapse. Random House. 296.

Fratzscher, M., 2006. On the long-term effectiveness of exchange rate communication and interventions. J. Int. Money Finance 25 (1), 146–167.

Gertler, P. and Horvath, R., 2018. Central bank communication and financial markets: New high-frequency evidence. Journal of Financial Stability, Elsevier, vol. 36(C), pages 336–345.

Georgiadis, G., Grab, J., 2016. Global financial market impact of the announcement of the ECB's asset purchase programme. J. Financ. Stab. 26, 257–265.

Goodfriend, M., King, R.G., 2005. The incredible volcker disinflation. J. Monet. Econ.52 (5), 981–1015.

Hess, D., Niessen, A., (2010). The early news catches the attention: on the relative price impact of similar economic indicators. J. Future Mark. 30 (10), 909–937.

Holló, D., Kremer, M. and Lo Duca, M. (2012), "CISS - A Composite Indicator of Systemic Stress in the Financial System", Working Paper Series, No 1426, ECB, March 2012.

Jansen, D.-J., de Haan, J., 2005. Were verbal efforts to support the euro effective? A high-frequency analysis of ECB statements. Eur. J. Polit. Econ. 23 (1), 245–259.

Jiang, G., Lo, I., Verdelhan, A., 2011. Information shocks, liquidity shocks, jumps, and price discovery: evidence from the U.S treasury market. J. Financ. Quant.Anal. 46, 522–551.

Jung, A., Latsos, S., 2015. Do federal reserve bank presidents have a regional bias?Eur. J. Polit. Econ. 40, 173–183.

Kohn, D., Sack, B., 2003. Central bank talk: does it matter and why? Federal Reserve Board Finance and Economics Discussion Series 2003–55

Lucas Husted, John Rogers, and Bo Sun (2019). Monetary policy uncertainty. Journal of Monetary Economics. July 30, 2019, 1-17.

Mayordomo, S., Peⁿa, J.I., Romo, J., 2011. The effect of liquidity on the price discovery process in credit derivatives markets in times of financial distress. Eur. J. Finance 17, 851–881.

Moessner, R., de Haan, J., Jansen, D.-J., 2015. Effectiveness of monetary policy in Sweden. Contemp. Econ. Policy, 1–12.

Püttmann, Lukas, 2018. Patterns of Panic: Financial Crisis Language in Historical Newspapers (April 27, 2018). Available at SSRN: https://ssrn.com/abstract=3156287 or http://dx.doi.org/10.2139/ssrn.3156287.

Ranaldo, A. and Rossi, E., 2010. The reaction of asset markets to Swiss National Bank communication. Journal of International Money and Finance. Vol. 29, issue 3, 486-503.

Reeves, R. and Sawicki M., 200). Do financial markets react to Bank of England communication? European Journal of Political Economy. Volume 23, Issue 1, 207-227.

Rosa, C., 2011. Words that shake traders. the stock market's reaction to central bank communication in real time. J. Empir. Finance 18, 915–934.

Rosa, C., 2016. Fed speak: who moves U.S. asset prices? Int. J. Cent. Bank. 12 (4),223-261.

Swanson, E.T., Williams, J., 2014a. Measuring the effect of the zero lower bound on medium- and longer-term interest rates. Am. Econ. Rev. 104 (10), 3154–3185.

Swanson, E.T., Williams, J., 2014b. Measuring the effect of the zero lower bound on yields and exchange rates in the U.K. and Germany. J. Int. Econ. 92, S2–S21.

Wongswan, J., 2009. The response of global equity indexes to U.S. monetary policyannouncements. J. Int. Money Finance 28, 344–365.

ANNEX



Annex 1: Financial Markets Data (Dependent Variables)

Annex 2: Description of the dummy and some control variables that were applied for the hypothesis testing and robustness checks

Dummy	Attribute	Value	Description and rational for checking
D1	Monetary policy measures	1- if communication related to monetary policy measures; 0- otherwise	Since communication data includes both communications about monetary policy and economic outlook, it is reasonable to separate them since they could be perceived by markets in a different way and correspondingly affect markets differently. This dummy variable includes communication about conventional and unconventional monetary policy.
D2	Non-standard monetary policy measures	1- if communication related to non-standard monetary policy measures; 0-otherwise	This variable reflects communication related to the unconventional monetary policy, in particular if central bankers provide forward guidance concerning excess liquidity, OMT, collateral rules, volumes of the long-term refinancing operations, security purchases. These communications have different content compared to standard guidance on interest rates and inflation and thereby could be differently excepted by the financial markets, especially at the beginning of the launch of new unconventional monetary policy measures.
D3	Real economy outlook	1- if communication related to the real economy guidance, 0- otherwise	These communications potentially could have different properties since they are mainly related to the future economic growth and thereby their content differs from the monetary policy forward-looking statements.
D4	Sequence of the statements with the same content	0 – if statement has different content, 1, 2, 3 if a message is repeated during the short period of time	Thi dummy variable is created to test if repeated massages could have cumulative effect on financial market or repeated content loses its power as proposed by Gertler and Horwath (2018) referring to and Niessen (2010).
D5	Less than 10 days left to the Governing Council meeting	1 – if a statement is delivered no more than 10 days prior to the policy meeting, 0 - otherwise	This dummy variable enables to test if markets pay more attention and correspondingly react more significantly closer to the policy meeting [Gertler and Horwath (2018), Ehrmann and Fratzscher (2007a)].
D6	Non- overlapping communication events	1 – if communication events are overlapped, 0 - otherwise	The overlapped communication events appear within the time difference that is less than 60 minutes. In other words, they communication events have the same time window. Correspondingly their effects could offset each other or make them more powerful that is potential source of endogeneity. Meanwhile, this dummy variable enables include in the regressions only non-overlapped observations. Roughly 9 percent of the communication observations are overlapped in the dataset.
D7	ECB President	1 – if ECB President delivers statements, 0 otherwise	This variable helps to test whether financial markets are mainly focusing on the statements of the ECB President that was empirically proved by Gertler and Horvath (2018). This is also consistent with the findings of Chappell et al., 2004, Goodfriend and King, 2005.
D8	ECB Executive Board	1 – if a member of the ECB Executive Board delivers statements, 0 otherwise	Similar to D7, members of the ECB Executive Board could be more influential in the studied context compared to other members of the ECB Governing Council

D9	Tenure (more experienced central bankers)	1 – if a central banker works as a member of the ECB GC more than 180 days, 0-otherwise	This dummy variable enables to test if more experienced members of the ECB Governing Council are more influential and terms of the financial markets' responses. This variable also serves as a proxy of skills that attributed to/developed at this particular work position. Thus, it could take some time to acquire new skills.
D10	Communication in home countries	1- if statement delivered in home country, homeland (excluding Frankfurt), 0 - otherwise	This is a home bias dummy variable that helps test if homeland communications effect more significantly financial markets since communication language and the "home feel" could trigger more open communication. Gertler and Horvath (2018) test this assumption referring to Jung and Latsos (2015). At least 40 percent of all public statements were delivered in the home cities of the ECB's GC members other than Frankfurt. The latter captures roughly one fifth of all ad-hoc public statements
D11	Communication in a financial center	1 – if public statement is delivered in a financial center, 0-otherwise	Gertler and Horvath (2018) use this variable to test if communication events in financial centers could affect financial markets in a more considerable manner due to higher attendance of the corresponding events or more attention to these communications in the cities with the main trading floors. Financial centers are London, Frankfurt, NYC, Tokyo, Hong Kong, Singapore, Shanghai and Zurich.
D12	NCB Governor of a founding member country of the euro zone	1 – if a Council member from a founding member country, 0 -otherwise	Financial markets could monitor statements of the NCB Governors of a founding member country of the euro zone more closely compared to other regions
D13	NCB Governors of member states that experienced financial stress	1- if member states experienced financial stress, 0 - otherwise	During financial and economic turmoil markets could pay more attention to public statements delivered by central bankers from countries that experienced larger financial stress compared to other country members (e.g., Cyprus, Greece, Italy, Portugal or Spain)
D14	NCB Governors of a core member country	1- if a Council member from a core member country, 0 - otherwise	Financial markets could monitor more closely communications of central bankers from core member countries, including from Austria, Belgium, Germany, France, and Netherlands.
D15	Mario Draghi London Speech	1-for the time of the speech delivery, 0- otherwise	Gertler and Horvath (2018) use this dummy because it was an exceptional event (so-called "whatever it takes speech" delivered on July 26, 2012) that had long-lasting effect on financial markets.
D16	Macroeconomic news	1-on the days when macroeconomic news was delivered, 0- otherwise	This dummy variable enables to eliminate noise from macroeconomic news during estimation of the communication effects by excluding days when macroeconomic news was delivered. This macroeconomic news captures releases of the euro area consumer price index (HICP) and gross domestic product, including their flash estimates. The source of this data is the Eurostat release calendars.
D17	U.S. Macroeconomic news	1-on the days when U.S. macroeconomic news was delivered, 0- otherwise	This dummy variable captures U.S. macroeconomic news concerning consumer inflation, GDP and employment, including advance, preliminary, third and second estimates, final and revised estimates. An initial rational for using this news matches with the previous dummy variable D16. The additional rational is that this news could affect financial markets outside the U.S., including foreign currency markets, particularly currency pair EUR/USD exchange rate. In addition to inflation and GDP, I consider unemployment news

			since it is essential variable in terms of the Fed's policy decision making. Sources of this data are news releases of the U.S. Bureau of Labor Statistics and the U.S. Bureau of Economic Analysis.
D18	Channel of the communication	From 0 to 4	Since markets could have preferences in the sources of the information, and different channels of communication could affect different number of people, the following channels of communication are separated: interview, public speech, Q&A session, writing statement (0 – if channel is not specified).
D19	Macro-financial stress conditions	 if markets experience macro-financial stress, o therwise 	To create this dummy variable, I use the threshold of the excess banking liquidity of the Eurosystem that amounted to EUR 200 bn. According to this approach, financial markets operate under the macro-financial stress, if the level of excess liquidity is below the threshold, and vice versa. Normal conditions – if the liquidity is above the threshold level.
C1	Global environment uncertainty	The U.S. Daily News Economic Policy Uncertainty Index	This index is used since global factors like global uncertainty (not only the local ones, the euro area systemic stress) affect financial markets. This series is developed by Baker et al. (2016) to proxy for global uncertainty and were used by Gertler and Horvath (2018) to conduct robustness check. Taking into account that this index comprises mainly the U.S. risks, I also consider Global Economic Policy Uncertainty Index C2 that comprises risks of 21 countries.
C2	Global Economic Policy Uncertainty	Global Economic Policy Uncertainty Index	This is monthly index that captures uncertainty risks of the following countries: Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United Kingdom, and the United States. This indexed developed by Davis (2016).
C3	U.S. Financial stress	The U.S. Financial Stress Indicator (FSI)	In addition to the euro area stress index and previous variables (C1 and C2) that proxy external uncertainty, I consider a monthly newspaper-based Financial Stress Indicator (FSI) for the United States developed by Lukas Püttmann (2018). The motivation to employ this index is that it could contain more explanatory power or comprise additional information compared to the other mentioned above indices.
C4	U.S. Monetary Policy Uncertainty	The Husted-Rogers-Sun MPU Index for the United States	This monthly index complements a range of uncertainty indices since it reflects monetary policy uncertainty that is especially sensitive information for the financial markets. since financial markets could be especially sensitive to this information. MPU Index developed by Husted et. al. (2019).

Source: Gertler and Horvath (2018), the relevant literature mentioned in the table, and own added dummy variables and hypothesis.

	(1)	(2)	(3)	(4)	(5)	(6)
	OIS 3-					
VARIABLES	month	month	month	month	month	month
Communication news	0.025	0.026	0.025	0.022	0.025	0.025
	(0.023)	(0.027)	(0.023)	(0.023)	(0.023)	(0.027)
Communication climate		-0.002				-0.023
		(0.044)				(0.046)
CISS			-0.044			0.256
			(0.274)			(0.395)
Excess liquidity				-0.000		-0.000
				(0.000)		(0.000)
Monetary conditions					-0.004	-0.030
					(0.014)	(0.025)
Observations	1,480	1,480	1,480	1,480	1,480	1,480

Annex 3: OLS Estimates of the Effect of the ECB's Communication on EONIA Swap Rates with Different Maturities

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)
	OIS 6-					
VARIABLES	month	month	month	month	month	month
Communication news	0.044**	0.049*	0.044**	0.042*	0.044**	0.048*
	(0.023)	(0.027)	(0.023)	(0.023)	(0.023)	(0.027)
Communication climate		-0.014				-0.037
		(0.044)				(0.046)
CISS			-0.228			0.196
			(0.277)			(0.397)
Excess liquidity				-0.000		-0.000
1 5				(0.000)		(0.000)
Monetary conditions				(00000)	-0.015	-0.041
Monetary conditions					(0.013)	(0.025)
					(0.014)	(0.023)
Observations	1,522	1,522	1,522	1,522	1,522	1,522

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OIS 1-year					
Communication news	0.045	0.057	0.045	0.042	0.045	0.055
	(0.030)	(0.035)	(0.030)	(0.030)	(0.030)	(0.035)
Communication climate		-0.035				-0.046
		(0.058)				(0.061)
CISS			-0.328			-0.377
			(0.363)			(0.521)
Excess liquidity				-0.000		-0.000
				(0.000)		(0.000)
Monetary conditions					-0.001	-0.000
					(0.019)	(0.033)
Observations	1,557	1,557	1,557	1,557	1,557	1,557

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OIS 2-year					
Communication news	0.118***	0.138***	0.118***	0.116***	0.118***	0.137***
	(0.038)	(0.045)	(0.038)	(0.039)	(0.038)	(0.045)
Communication climate		-0.060				-0.077
		(0.075)				(0.079)
CISS			-0.265			-0.103
			(0.469)			(0.675)
Excess liquidity				-0.000		-0.000
				(0.000)		(0.000)
Monetary conditions					-0.007	-0.018
					(0.024)	(0.043)
Observations	1,566	1,566	1,566	1,566	1,566	1,566

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OIS 3-year					
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)
Communication climate		-0.041				-0.036
		(0.083)				(0.087)
CISS			-0.456			-0.640
			(0.525)			(0.743)
Excess liquidity				-0.000		0.000
				(0.000)		(0.000)
Monetary conditions					-0.005	0.017
					(0.028)	(0.049)
Observations	1,420	1,420	1,420	1,420	1,420	1,420

Annex 4: Different kind of the ECB's GC members communications and their effect on the financial markets

Communication	s concerning	non-conventi	onal monetar	v policy me	asures	
Communication		sion conventi	OIS	3-vear	454105	
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.112*	0.110	0.095	0.112*	0.115*	0.124*
	(0.064)	(0.072)	(0.064)	(0.064)	(0.064)	(0.072)
Communication climate	()	0.009	()	()		-0.066
		(0.140)				(0.145)
CISS		()	1.703**			0.780
			(0.823)			(1.076)
Excess liquidity				-0.000		0.000
				(0.000)		(0.000)
Monetary conditions					0.117**	0.130
					(0.050)	(0.083)
			Stor	xx50		
	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.056	0.109*	0.057	0.056	0.056	0.114**
	(0.051)	(0.056)	(0.051)	(0.051)	(0.051)	(0.057)
Communication climate		-0.242**				-0.241**
		(0.111)				(0.116)
CISS			-0.180			-0.260
			(0.645)			(0.862)
Excess liquidity				0.000		0.000
				(0.000)		(0.000)
Monetary conditions					0.009	0.051
					(0.038)	(0.065)
			EUR	/USD		
	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.029*	0.042**	0.027*	0.029*	0.030*	0.044**
	(0.016)	(0.018)	(0.017)	(0.017)	(0.017)	(0.019)
Communication climate		-0.055				-0.066*
		(0.035)				(0.037)
CISS			0.196			0.156
			(0.207)			(0.287)
Excess liquidity				-0.000		0.000
				(0.000)		(0.000)
Monetary conditions					0.014	0.012
					(0.012)	(0.020)

Communications concerning conventional monetary policy and economic outlook												
			OIS 3	3-year								
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)						
Communication news	0.133**	0.150**	0.129**	0.136**	0.134**	0.148**						
	(0.054)	(0.066)	(0.054)	(0.056)	(0.054)	(0.066)						
Communication climate		-0.045				-0.052						
		(0.103)				(0.112)						
CISS			-1.240*			-1.443						
			(0.672)			(0.979)						
Excess liquidity				0.000		0.000						
				(0.000)		(0.000)						
Monetary conditions					-0.033	0.015						
					(0.034)	(0.063)						
			Stor	xx50								
	(1)	(2)	(3)	(4)	(5)	(6)						
Communication news	0.060*	0.042	0.051	0.064*	0.060*	0.043						
	(0.035)	(0.042)	(0.035)	(0.035)	(0.035)	(0.042)						
Communication climate		0.051				0.025						
		(0.066)				(0.073)						
CISS			-1.052**			-0.749						
			(0.435)			(0.642)						
Excess liquidity				0.000		-0.000						
				(0.000)		(0.000)						
Monetary conditions					-0.045**	-0.022						
					(0.021)	(0.039)						
			EUR	/USD								
	(1)	(2)	(3)	(4)	(5)	(6)						
Communication news	0.018	0.015	0.019*	0.014	0.018	0.013						
	(0.011)	(0.014)	(0.011)	(0.012)	(0.011)	(0.014)						
Communication climate		0.009				0.014						
		(0.021)				(0.023)						
CISS			0.124			-0.121						
			(0.139)			(0.204)						
Excess liquidity				-0.000		0.000						
				(0.000)		(0.000)						
Monetary conditions					0.014**	0.019						
					(0.007)	(0.013)						

			Financia	al stress			Normal macro-financial conditions					
						OIS 3-	-year					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.138**	0.161**	0.138**	0.118*	0.139**	0.154**	0.099	0.104	0.098	0.098	0.094	0.104
	(0.057)	(0.072)	(0.057)	(0.061)	(0.057)	(0.072)	(0.063)	(0.067)	(0.063)	(0.063)	(0.063)	(0.067)
Communication climate		-0.058				-0.111		-0.036				-0.047
		(0.108)				(0.122)		(0.150)				(0.153)
CISS			-0.184			-0.932			-0.889			-0.815
			(0.727)			(1.024)			(0.730)			(1.126)
Excess liquidity				-0.001		-0.001				0.000		0.000
				(0.001)		(0.001)				(0.000)		(0.000)
Monetary conditions					0.024	0.049					-0.032	-0.006
-					(0.048)	(0.068)					(0.037)	(0.072)
						Stox	x50					
Communication news	0.046	0.050	0.043	0.043	0.044	0.048	0.086*	0.090*	0.082*	0.083*	0.076	0.088*
	(0.036)	(0.045)	(0.036)	(0.038)	(0.036)	(0.045)	(0.049)	(0.051)	(0.049)	(0.049)	(0.049)	(0.052)
Communication climate		-0.012				-0.043		-0.033				-0.060
		(0.069)				(0.079)		(0.114)				(0.117)
CISS			-0.670			-0.535			-1.043*			-1.012
			(0.472)			(0.654)			(0.546)			(0.886)
Excess liquidity				-0.000		-0.000				0.000		0.000
				(0.001)		(0.001)				(0.000)		(0.000)
Monetary conditions					-0.036	-0.021					-0.039	-0.002
					(0.030)	(0.042)					(0.027)	(0.055)
						EUR/	USD					
Communication news	0.023**	0.028*	0.023**	0.022*	0.024**	0.027*	0.016	0.018	0.017	0.017	0.020	0.019
	(0.012)	(0.014)	(0.012)	(0.012)	(0.012)	(0.015)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)
Communication climate		-0.013				-0.013		-0.011				0.009
ction		(0.022)				(0.025)		(0.037)				(0.038)
CISS =			0.059			-0.100			0.305*			0.049
D			(0.150)			(0.211)			(0.178)			(0.288)
Excess liquidity				-0.000		-0.000				-0.000		0.000
CEL				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					0.010	0.013					0.019**	0.019
					(0.009)	(0.013)					(0.009)	(0.018)

Annex 5: Baseline regressions under the different financial conditions

		Baseline regressions						Excluding Draghi speech 2012 and related communications					
						OIS 3-	year						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)	
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***	0.116***	0.125**	0.116***	0.115***	0.116***	0.125**	
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)	(0.043)	(0.051)	(0.043)	(0.043)	(0.043)	(0.051)	
Communication climate		-0.041				-0.036		-0.029				-0.025	
		(0.083)				(0.087)		(0.083)				(0.088)	
CISS			-0.456			-0.640			-0.423			-0.612	
			(0.525)			(0.743)			(0.532)			(0.753)	
Excess liquidity				-0.000		0.000				-0.000		0.000	
				(0.000)		(0.000)				(0.000)		(0.000)	
Monetary conditions					-0.005	0.017					-0.004	0.017	
·					(0.028)	(0.049)					(0.028)	(0.050)	
						Stoxx	50					· ·	
Communication news	0.057**	0.066*	0.054*	0.060**	0.057**	0.065*	0.061**	0.070**	0.058**	0.063**	0.060**	0.069**	
	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)	
Communication climate		-0.028				-0.037		-0.027				-0.040	
		(0.056)				(0.059)		(0.056)				(0.060)	
CISS			-0.821**			-0.591			-0.782**			-0.555	
			(0.357)			(0.511)			(0.362)			(0.519)	
Excess liquidity				0.000		-0.000				0.000		-0.000	
				(0.000)		(0.000)				(0.000)		(0.000)	
Monetary conditions					-0.035*	-0.020					-0.033*	-0.021	
·					(0.018)	(0.033)					(0.019)	(0.033)	
					, , , , , , , , , , , , , , , , , , ,	EUR/I	JSD						
Communication news	0.022**	0.024**	0.022**	0.020**	0.022**	0.024**	0.022**	0.025**	0.023**	0.020**	0.023**	0.025**	
	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)	(0.009)	(0.011)	(0.009)	(0.010)	(0.009)	(0.011)	
Communication climate =		-0.007				-0.005		-0.009				-0.010	
ectic		(0.018)				(0.019)		(0.018)				(0.019)	
CISS			0.161			-0.039			0.166			-0.031	
Ê			(0.115)			(0.165)			(0.116)			(0.167)	
Excess liquidity				-0.000		0.000				-0.000*		-0.000	
C T				(0.000)		(0.000)				(0.000)		(0.000)	
Monetary conditions				. ,	0.014**	0.016					0.016***	0.014	
-					(0.006)	(0.010)					(0.006)	(0.011)	

Annex 6: Baseline regressions without Draghi related communications	
---	--

	Baseline regressions						Excluding Eurozone macroeconomic news					
						OIS	3-year					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***	0.125***	0.143***	0.126***	0.125***	0.125***	0.142***
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)	(0.043)	(0.051)	(0.043)	(0.044)	(0.043)	(0.051)
Communication climate		-0.041				-0.036		-0.053				-0.039
		(0.083)				(0.087)		(0.084)				(0.088)
CISS			-0.456			-0.640			-0.317			-0.719
			(0.525)			(0.743)			(0.541)			(0.759)
Excess liquidity				-0.000		0.000				-0.000		0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					-0.005	0.017					0.007	0.039
					(0.028)	(0.049)					(0.029)	(0.051)
						Ste	oxx50					
Communication news	0.057**	0.066*	0.054*	0.060**	0.057**	0.065*	0.046*	0.0517	0.0419	0.0471*	0.0449	0.0483
	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)	(0.028)	(0.0326)	(0.0276)	(0.0279)	(0.0276)	(0.0328)
Communication climate		-0.028				-0.037		-0.0189				-0.0202
		(0.056)				(0.059)		(0.0534)				(0.0573)
CISS			-0.821**			-0.591			-0.648*			-0.628
			(0.357)			(0.511)			(0.349)			(0.496)
Excess liquidity				0.000		-0.000				3.92e-05		-7.79e-06
				(0.000)		(0.000)				(0.000110)		(0.000156)
Monetary conditions					-0.035*	-0.020					-0.0216	-0.00192
					(0.018)	(0.033)					(0.0179)	(0.0317)
						EU	R/USD					
Communication news	0.022**	0.024**	0.022**	0.020**	0.022**	0.024**	0.020**	0.022**	0.020**	0.018*	0.020**	0.022**
	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)
Communication climate.		-0.007				-0.005		-0.006				-0.002
ollec		(0.018)				(0.019)		(0.018)				(0.019)
CISS O			0.161			-0.039			0.186			-0.053
JeT			(0.115)			(0.165)			(0.116)			(0.167)
Excess liquidity				-0.000		0.000				-0.000		0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					0.014**	0.016					0.016***	0.020*
					(0.006)	(0.010)					(0.006)	(0.011)

Annex	7. Baseline	regressions	and contr	olling for	Furozone	macroeconomi	c news
1 miles	/. Dusenne	regressions	und conti	oning for	Larozone	macrocconomi	

			Baseline r	egressions			Excluding U.S. macroeconomic news					
						OIS 3-	year					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***	0.102**	0.129***	0.129***	0.101**	0.101**	0.128***
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)	(0.042)	(0.049)	(0.049)	(0.042)	(0.042)	(0.049)
Communication climate		-0.041				-0.036		-0.083	-0.083			-0.084
		(0.083)				(0.087)		(0.081)	(0.081)			(0.086)
CISS			-0.456			-0.640						-0.177
			(0.525)			(0.743)						(0.727)
Excess liquidity				-0.000		0.000				-0.000		-0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					-0.005	0.017				· /	0.009	0.013
·					(0.028)	(0.049)					(0.028)	(0.048)
						Stoxx	50					/
Communication news	0.057**	0.066*	0.054*	0.060**	0.057**	0.065*	0.050	0.059	0.049	0.053*	0.051	0.057
	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)	(0.032)	(0.038)	(0.032)	(0.032)	(0.032)	(0.038)
Communication climate	· · · ·	-0.028	· · · ·		. ,	-0.037	, í	-0.026	. ,			-0.020
		(0.056)				(0.059)		(0.062)				(0.066)
CISS		· · · ·	-0.821**			-0.591		· /	-0.657*			-0.756
			(0.357)			(0.511)			(0.395)			(0.562)
Excess liquidity				0.000		-0.000				0.000		0.000
1 ,				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions				()	-0.035*	-0.020				()	-0.019	0.009
J					(0.018)	(0.033)					(0.020)	(0.035)
					(1 1 1)	EUR/L	JSD				()	(*****)
Communication news	0.022**	0.024**	0.022**	0.020**	0.022**	0.024**	0.022**	0.023**	0.022**	0.020**	0.022**	0.023*
d	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)	(0.010)	(0.012)	(0.010)	(0.010)	(0.010)	(0.012)
Communication climate	× /	-0.007	· · · ·		· · · ·	-0.005		-0.004	· · · ·		· /	-0.001
Colle		(0.018)				(0.019)		(0.019)				(0.020)
CISS ê		()	0.161			-0.039		()	0.119			-0.124
U e			(0.115)			(0.165)			(0.123)			(0.175)
Excess liquidity			()	-0.000		0.000			()	-0.000		0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions				(0.000)	0.014**	0.016				(0.000)	0.015**	0.020*
					(0.006)	(0.010)					(0.006)	(0.011)

Annex 8: Baseline regressions and controlling for U.S. macroeconomic news

		Baseline regressions					Excluding U.S. macroeconomic news					
						OIS 3-	year					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***	0.101**	0.134***	0.134***	0.100**	0.101**	0.133***
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)	(0.042)	(0.050)	(0.050)	(0.042)	(0.042)	(0.050)
Communication climate		-0.041				-0.036		-0.099	-0.099			-0.093
		(0.083)				(0.087)		(0.082)	(0.082)			(0.086)
CISS			-0.456			-0.640						-0.232
			(0.525)			(0.743)						(0.732)
Excess liquidity				-0.000		0.000				-0.000		0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					-0.005	0.017					0.024	0.037
					(0.028)	(0.049)					(0.028)	(0.049)
						Stoxy	x50					
Communication news	0.057**	0.066*	0.054*	0.060**	0.057**	0.065*	0.040	0.048	0.038	0.040	0.040	0.044
	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)	(0.030)	(0.036)	(0.030)	(0.030)	(0.030)	(0.036)
Communication climate		-0.028				-0.037		-0.024				-0.014
		(0.056)				(0.059)		(0.058)				(0.062)
CISS			-0.821**			-0.591			-0.389			-0.715
			(0.357)			(0.511)			(0.380)			(0.534)
Excess liquidity				0.000		-0.000				-0.000		0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					-0.035*	-0.020					0.000	0.028
					(0.018)	(0.033)					(0.019)	(0.034)
						EUR/U	USD					
Communication news	0.022**	0.024**	0.022**	0.020**	0.022**	0.024**	0.021**	0.024**	0.021**	0.019*	0.022**	0.023**
	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)	(0.010)	(0.012)	(0.010)	(0.010)	(0.010)	(0.012)
Communication climate.5		-0.007				-0.005		-0.007				-0.003
ollec		(0.018)				(0.019)		(0.019)				(0.020)
CISS Ö			0.161			-0.039			0.150			-0.131
JeTJ			(0.115)			(0.165)			(0.124)			(0.176)
Excess liquidity				-0.000		0.000				-0.000		0.000
•				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					0.014**	0.016					0.017***	0.024**
					(0.006)	(0.010)					(0.006)	(0.011)

A	\cap	D 1'	•	1		11	•	c	TT	α	1	1 1				•	
Annow		Vacalina	1000000000000	on d	aantra		1100	t ~ **		<u> </u>	0100		L11#070#0	100 0 0100	000100100	10 10 0111	a -
Annex	9	Бахенне	reorections	ани	((())))))))))))))))))))))))))))))))))))		IIIO –	1431			2110		ETHOZOHE	THACTO		IC HEW	
I MILLON .	/ • •	Duseinie		unu	COntro.	ц.		IUI	\sim .		unu			macro			

			Baseline r	egressions	Excluding overlapped communications							
						OIS 3-	year					
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
Communication news	0.124***	0.137***	0.124***	0.123***	0.124***	0.136***	0.114**	0.129**	0.129**	0.115**	0.114**	0.128**
	(0.042)	(0.050)	(0.042)	(0.043)	(0.042)	(0.050)	(0.045)	(0.053)	(0.053)	(0.046)	(0.045)	(0.053)
Communication climate		-0.041				-0.036		-0.048	-0.048			-0.027
		(0.083)				(0.087)		(0.088)	(0.088)			(0.092)
CISS			-0.456			-0.640						-0.951
			(0.525)			(0.743)						(0.789)
Excess liquidity				-0.000		0.000				0.000		0.000
				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions					-0.005	0.017					-0.003	0.040
·					(0.028)	(0.049)					(0.030)	(0.052)
						Stoxx	50					
Communication news	0.057**	0.066*	0.054*	0.060**	0.057**	0.065*	0.052*	0.050	0.048	0.054*	0.051*	0.048
	(0.029)	(0.034)	(0.029)	(0.029)	(0.029)	(0.034)	(0.031)	(0.036)	(0.031)	(0.031)	(0.031)	(0.036)
Communication climate	· · · ·	-0.028	· /	. ,	· /	-0.037		0.006		· /		-0.005
		(0.056)				(0.059)		(0.060)				(0.064)
CISS		. ,	-0.821**			-0.591		. ,	-1.029***			-0.806
			(0.357)			(0.511)			(0.386)			(0.555)
Excess liquidity			· /	0.000		-0.000				0.000		-0.000
1 7				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions				· /	-0.035*	-0.020					-0.041**	-0.020
,					(0.018)	(0.033)					(0.020)	(0.035)
						EUR/L	JSD					
Communication news	0.022**	0.024**	0.022**	0.020**	0.022**	0.024**	0.022**	0.019*	0.022**	0.019*	0.022**	0.019*
	(0.009)	(0.011)	(0.009)	(0.009)	(0.009)	(0.011)	(0.010)	(0.011)	(0.010)	(0.010)	(0.010)	(0.011)
Communication climate.5		-0.007	. ,			-0.005		0.007	. ,	. ,	. ,	0.007
llect		(0.018)				(0.019)		(0.019)				(0.019)
CISS [°]			0.161			-0.039			0.134			-0.073
eTL			(0.115)			(0.165)			(0.119)			(0.170)
Excess liquidity			· /	-0.000		0.000			· · /	-0.000*		-0.000
1 5 0				(0.000)		(0.000)				(0.000)		(0.000)
Monetary conditions				× /	0.014**	0.016				× /	0.015**	0.016
-					(0.006)	(0.010)					(0.006)	(0.011)

Annex 10: Baseline regressions and exclusion of the overlapping communications

Annex 11: Baseli	ine regressions	for interest rates	swaps and contr	ol for the dif	fferent measures	s of uncertainty	and the U.S.	Financial
Stress Index								

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
			0.115444	0.11.4.4.4.4	0.1.004444		0.100++++	0.105444	0.10544	0.100444
Communication news	0.124***	0.12/***	0.115***	0.114***	0.132***	0.136***	0.138***	0.135***	0.127**	0.139***
	(0.042)	(0.042)	(0.043)	(0.043)	(0.042)	(0.050)	(0.050)	(0.050)	(0.050)	(0.050)
US daily news econ. uncertainty		-0.001**					-0.001*			
		(0.000)	0.001				(0.001)	0.001		
Global econ. pol. uncertainty			-0.001					-0.001		
U.S. Financial Stress Indicator			(0.001)					(0.002)		
(FSI)				-0.052**					-0.158***	
()				(0.025)					(0.049)	
U.S. Monetary Policy Uncertainty					0.001*					0.002*
5 5 5					(0.001)					(0.001)
Communication climate					. ,	-0.036	-0.030	-0.053	-0.098	-0.022
						(0.087)	(0.087)	(0.089)	(0.089)	(0.087)
CISS						-0.640	-0.217	-0.304	0.948	-0.647
						(0.743)	(0.774)	(0.845)	(0.888)	(0.743)
Excess liquidity						0.000	0.000	0.000	0.000	-0.000
						(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Monetary conditions						0.017	0.026	0.010	0.106*	0.038
						(0.049)	(0.050)	(0.050)	(0.056)	(0.051)
	1 400	1 420	1 420	1 420	1 420	1 420	1 420	1 420	1 420	1 420
Observations	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420
Standard errors in parentlisses. *** p<	0.01, ** p<0	.05, * p<0.1								
Co										
eTD										
CEU										

Annex 12: Baseline regressions for the stock market and control for the different measures of uncertainty and the U.S. Financial Stress Index

	Stoxx50											
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
Communication news	0.057**	0.056**	0.041	0.043	0.056*	0.065*	0.064*	0.062*	0.058*	0.063*		
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)		
US daily news econ. uncertainty		-0.001**					-0.000					
		(0.000)					(0.000)					
Global econ. pol. uncertainty			-0.002**					-0.002**				
			(0.001)					(0.001)				
U.S. Financial Stress Indicator (FSI)				-0.049***					-0.071**			
				(0.016)					(0.033)			
U.S. Monetary Policy Uncertainty					-0.000					-0.001		
					(0.001)					(0.001)		
Communication climate						-0.037	-0.034	-0.070	-0.069	-0.043		
						(0.059)	(0.060)	(0.061)	(0.061)	(0.060)		
CISS						-0.591	-0.416	0.045	0.153	-0.595		
						(0.511)	(0.534)	(0.577)	(0.615)	(0.511)		
Excess liquidity						-0.000	-0.000	0.000	-0.000	-0.000		
						(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		
Monetary conditions						-0.020	-0.016	-0.033	0.018	-0.029		
-						(0.033)	(0.033)	(0.033)	(0.037)	(0.034)		
U							· /	× ,		· · · ·		
Observations	814	814	814	814	814	814	814	814	814	814		
Standard errors in parentlieses. *** p<0).01, ** p<0.	05, * p<0.1										
Ee												
CEL												

					EUI	R/USD				
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Communication news	0.022**	0.022**	0.019*	0.024**	0.022**	0.024**	0.024**	0.023**	0.023**	0.024**
	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
US daily news econ. uncertainty		0.000					0.000			
		(0.000)					(0.000)			
Global econ. pol. uncertainty			-0.000					-0.001**		
			(0.000)					(0.000)		
U.S. Financial Stress Indicator										
(FSI)				0.008					-0.007	
				(0.005)					(0.010)	
U.S. Monetary Policy Uncertainty					-0.000					0.000
					(0.000)					(0.000)
Communication climate						-0.005	-0.006	-0.014	-0.009	-0.004
						(0.019)	(0.019)	(0.019)	(0.020)	(0.019)
CISS						-0.039	-0.063	0.141	0.038	-0.035
						(0.165)	(0.172)	(0.187)	(0.200)	(0.165)
Excess liquidity						0.000	-0.000	0.000	0.000	-0.000
						(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Monetary conditions						0.016	0.015	0.012	0.019	0.017
						(0.010)	(0.010)	(0.011)	(0.012)	(0.011)
Observations	1,605	1,605	1,605	1,605	1,605	1,605	1,605	1,605	1,605	1,605
(FSI) U.S. Monetary Policy Uncertainty Communication climate CISS Excess liquidity Monetary conditions Observations	1,605 0.01 ** p<0	<u>1,605</u>	1,605	0.008 (0.005) 1,605	-0.000 (0.000) 1,605	$\begin{array}{c} -0.005\\ (0.019)\\ -0.039\\ (0.165)\\ 0.000\\ (0.000)\\ 0.016\\ (0.010)\\ 1,605\end{array}$	-0.006 (0.019) -0.063 (0.172) -0.000 (0.000) 0.015 (0.010) 1,605	-0.014 (0.019) 0.141 (0.187) 0.000 (0.000) 0.012 (0.011) 1,605	-0.007 (0.010) -0.009 (0.020) 0.038 (0.200) 0.000 (0.000) 0.019 (0.012) 1,605	$\begin{array}{c} 0.000\\ (0.000\\ -0.004\\ (0.019\\ -0.03\\ (0.165\\ -0.006\\ (0.000\\ 0.011\\ (0.011\\ 1,600\end{array}$

Annex 13: Baseline regressions for the exchange rates and control for the different measures of uncertainty and the U.S. Financial Stress Index