Discussion Paper

Effects of the ECB's communication on government bond spreads

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Non-technical summary

Research question

Central banks can influence financial markets via various communication channels. So far, most research on central bank communication has focused on announcement effects without taking into account the impact of communication via various channels, such as blog posts, interviews and speeches, also outside the announcement days. The question therefore arises to which extent these different communication channels can affect financial markets.

Contribution

We examine the impact of various communication channels on financial markets using the ECB's communication on the Pandemic Emergency Purchase Program (PEPP). We also consider the communication of individual ECB Executive Board members. We focus on the reactions in the euro area government bond market, looking at the reactions both in times of monetary policy easing and in times of monetary policy tightening.

Results

We find that the communication of the ECB Executive Board members outside the official announcements may affect the euro area government bond market. While in our analysis speeches and articles on the ECB's blog do not trigger any significant responses to sovereign bond yields, press releases and interviews have a significant impact on yields in some countries, both during periods of monetary policy easing and tightening. Furthermore, the strength of the financial market reactions depends not only on the communication channel but also on the communicating member of the ECB Executive Board.

Nichttechnische Zusammenfassung

Fragestellung

Zentralbanken können Finanzmärkte über verschiedene Kommunikationskanäle beeinflussen. Die meisten Forschungsarbeiten zur Zentralbankkommunikation konzentrieren sich bislang auf Ankündigungseffekte, ohne den Einfluss der Kommunikation über verschiedene Kanäle wie etwa Blogbeiträge, Interviews und Reden auch außerhalb der Ankündigungstage zu berücksichtigen. Daher stellt sich die Frage, in welchem Ausmaß sich diese unterschiedlichen Kommunikationskanäle auf Finanzmärkte auswirken können.

Beitrag

Wir untersuchen den Einfluss verschiedener Kommunikationskanäle auf Finanzmärkte anhand der EZB-Kommunikation zum Pandemic Emergency Purchase Programme (PEPP). Außerdem betrachten wir die Kommunikation einzelner EZB-Direktoriumsmitglieder. Wir konzentrieren uns dabei auf die Reaktionen am Markt für Staatsanleihen im Euroraum, wobei wir die Reaktionen sowohl in Zeiten der geldpolitischen Lockerung, als auch in Zeiten der geldpolitischen Straffung betrachten.

Ergebnisse

Wir stellen fest, dass die Kommunikation der EZB-Direktoriumsmitglieder außerhalb der offiziellen Ankündigungen den Markt für Staatsanleihen im Euroraum beeinflussen kann. Während in unserer Analyse Reden und Beiträge über den EZB-Blog keine signifikanten Reaktionen der Staatsanleiherenditen auslösen, wirken sich Pressemitteilungen und Interviews auf die Renditen in einigen Ländern sowohl in Zeiten der geldpolitischen Lockerung als auch Straffung signifikant aus. Weiterhin zeigt sich, dass die Stärke der Finanzmarktreaktionen dabei nicht nur vom Kommunikationskanal, sondern auch vom kommunizierenden Mitglied des EZB-Direktoriums abhängt.

Effects of the ECB's Communication on Government Bond Spreads

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Abstract

This paper investigates the financial market effects of the ECB's communication on the Pandemic Emergency Purchase Programme (PEPP). Using data for 10 euro area countries, we first analyse the impact of different communication channels such as press releases, ECB blog contributions, speeches and interviews on changes in government bond spreads. Second, we assess whether spreads react differently to communication by specific ECB Executive Board members. Markets turn out to be sensitive to both the communication channel and the communicating ECB Executive Board member.

1 Introduction

In recent years, central bank communication has become one of the key instruments in steering financial markets. Communication is a particularly important monetary policy tool, especially when conventional measures become infeasible at the effective lower bound.

The outbreak of the Covid-19 pandemic severely hampered economic activity worldwide and triggered ample monetary policy responses to support economic activity. In March 2020, the European Central Bank (ECB) reacted by announcing the Pandemic Emergency Purchase Programme (PEPP), a temporary asset purchase programme for public and private sector securities, to support liquidity and financing conditions for all sectors in the euro area during the pandemic.

This paper investigates the immediate impact of the ECB's communication on the government bond market in the euro area by using the communication events on PEPP provided on the ECB's website non-discretionary dataset. To the best of our knowledge, this is the first research effort using this dataset to analyse programme-specific central bank communication effects on financial markets.

Analysing the communication effects on financial markets is of the utmost importance, as changes in government bond spreads can be regarded as a crucial element of the monetary policy transmission mechanism. Besides this, changes in bond spreads indicate investors' perception of the ability of the monetary policy authority to cope with a crisis. For instance, the communication effect on financial markets became particularly evident when market participants reacted drastically following the statement of Christine Lagarde, the president of the ECB, when she said "...we are not here to close spreads..." at the press conference on 12 March 2020. The day after, Philip Lane, the ECB's chief economist, clarified the statement by adding "... the ECB would not tolerate any risks to the smooth transmission of monetary policy in all jurisdictions of the euro area," using the ECB's blog channel for its very first time.

Our paper contributes to existing research efforts in two ways: First, applying an event study technique, we analyse the effects of the ECB's policy communication on government bond spreads, sorted by communication channel. While several studies, such as Havlik et al. (2022) and Fendel and Neugebauer (2020), show the stabilising impact of policy announcements on government bond markets during economic crises, they do not fully account for the policy signals from the continuous communication of ECB officials. Taking the data on PEPP communication provided on the official ECB website, we therefore investigate the effects of PEPP communication on government bond markets. Second, by breaking down the communication data by ECB Executive Board

members, we analyse whether financial market reactions differ with respect to communication made by a specific member of the ECB Executive Board. From the policymaking perspective, this is particularly important as it sheds light on the credibility of the central bank and the effectiveness of the signalling channel.

We structure our paper as follows: In Section 2, we provide a short overview of the related literature. In Section 3, we lay out some stylised facts on the ECB's communication on the PEPP. Section 4 sets up the empirical analysis framework and discusses the results. Section 5 summarises the main findings of the study and concludes.

2 Literature Overview

So far, substantial research efforts have examined the short-term effects of policy announcements on financial markets using event study techniques. Three strands of literature are predominant in this respect. The first strand concentrates on the general effects of monetary policy announcements on government bond markets. The literature tends to find monetary policy announcements stabilise government bond spreads (Falagiarda and Reitz, 2015, Szczerbowicz, 2015, Bulligan and Monache, 2018).

The second strand of literature analyses the financial market effects of monetary policy announcements of non-standard measures. Afonso et al. (2020) analyse the yield spread effects of monetary and fiscal policy measures using a sample period from January 1999 to July 2017 for 10 euro area countries. For the monetary policy announcements, they conclude that the announcements of the ECB's key interest rates together with the longer-term refinancing operations (LTROs) and the first covered bond purchase programme (CBPP1) negatively affected sovereign yield spreads for the euro area countries under consideration. Altavilla et al. (2016) study the effects of the Outright Monetary Transactions (OMT) announcements by using high-frequency data over a period of three months. Their results indicate that the OMT announcements decreased the government bond yields of Italy and Spain, while the yields of Germany and France remain unchanged. Fendel and Neugebauer (2020) investigate the repercussions of the ECB's non-standard monetary policy announcements on 10-year government bond yields. The study covers numerous euro area countries and a sample period from 1 January 2007 to 31 August 2017. The authors find one day delayed announcement effects and come to the conclusion that the country-specific extent of yield reduction seems inversely related to the solvency rating of the corresponding countries. This could be an explanation for the stronger reduction of spreads for the periphery countries. The authors also confirm their findings with a panel regression.

The third and most recent strand of literature concentrates on the financial

market effects of Covid-19 related monetary and fiscal policy announcements. For instance, Hartley et al. (2020) analyse Covid-19 related quantitative easing announcements of 21 central banks in March and April 2020. In particular, they look at the reaction of daily 10-year government bond yields and observe significant effects. Klose and Tillmann (2021) use a set of more than 400 fiscal and monetary policy announcements at the national and the European level in the spring of 2020 and find significant reactions of stock prices and bond yields in European countries. A further study by Delatte and Guillaume (2020) examines announcements of fiscal and monetary policy measures in the euro area. Their sample period runs from 2 January 2020 to 25 May 2020. They estimate the determinants of sovereign bond spreads and find significant effects of monetary policy announcements of the ECB. Fendel et al. (2021) consider Covid-19 related monetary policy announcements by the ECB and fiscal announcements by the European Commission. Their analysis finds a significant reaction of government bond yields after the announcements. Specifically, the yields of more stable economies increase after fiscal announcements. The authors find no significant reaction for monetary announcements at the country-level. In a panel regression, however, a significant impact of monetary policy announcements for the set of all covered countries and for the more stable economies is observed. Havlik et al. (2022) compare the effects of monetary and fiscal policy announcements on euro area government bond spreads during the pandemic. They come to the conclusion that the effects of monetary announcements are larger than the effects of fiscal announcements. According to their results, the PEPP was the monetary policy instrument with the largest effect on spreads. Given their results, we also concentrate on the PEPP to analyse the ECB's communication effects on financial markets during the Covid-19 pandemic crisis.

Until now, research has concentrated almost exclusively on the effects of policy announcements on financial markets. Only very few studies exist analysing the effects of communication instead of policy announcements on financial markets. A more recent study by Istrefi et al. (2021) analyses the importance of ECB and Eurosystem monetary policy communication for financial markets in various dimensions. For the period 1999 - 2019, they examine the effects of speaking events taking place outside of the monetary policy meeting days. Their results confirm the importance of communication as a monetary policy tool and highlight the relevance of policy communication for financial markets in understanding the monetary policy transmission mechanism. Building on their results, we analyse the effects of the ECB's communication on the PEPP on financial markets during the Covid-19 pandemic crisis.

3 The ECB's Communication on the Pandemic Emergency Purchase Programme

The Covid-19 pandemic crisis dampened economic activity worldwide. In 2020, the growth rate of real GDP was negative in all industrialised countries. The unfolding of the pandemic thus triggered turbulence in the financial markets in spring 2020. To preserve favourable financing conditions in the euro area and to counteract the negative economic implications associated with the pandemic, the ECB introduced a new temporary asset purchase programme, the Pandemic Emergency Purchase Programme (PEPP) in March 2020.

To assess whether the ECB's communication on PEPP during the Covid-19 pandemic had significant effects on financial markets, we analyse the communication events on PEPP provided by the ECB's official website. The events are presented in chronological order covering communication on PEPP by the ECB Governing Council and the members of the ECB's Executive Board. Each entry includes information about the communication date, the communication channel and the communicating ECB Executive Board member. The communication content is also available. For instance, on 1 October 2021 Isabel Schnabel was giving a speech at the Federal Reserve Bank of New York Conference. The presentation slides and notes are publicly available via the ECB website.

Figure 1 shows the ECB communication events on the PEPP by communication channel for the period 1 January 2020 to 31 January 2022. Four channels are covered: (i) press releases, (ii) ECB blog contributions, (iii) interviews and (iv) speeches.

During the period under consideration, the members of the ECB Executive Board and the Governing Council referred to the programme officially through different communication channels covering 133 communication events. Over the time horizon, the ECB Executive Board members gave 62 interviews on the PEPP. This channel therefore represents the most frequently used communication channel, followed by speeches, which cover 45 events. Press releases and conferences are limited by nature as they usually immediately follow the meetings of the Governing Council to communicate the monetary policy decisions taken. This channel encompasses 14 officially scheduled monetary policy decisions, 2 spontaneous press releases concerning the PEPP and 1 press release concerning sustainability-linked bonds. Hence, the study counts 17 press releases in total. ECB blog contributions seem to play a minor role in spreading news and amount to only 9 events.

A significant number of communication events took place directly after the introduction of the programme on 18 March 2020 and when the programme was extended. In June 2020, the month of the first extension of the programme,

Figure 1: ECB communication events on PEPP by channel
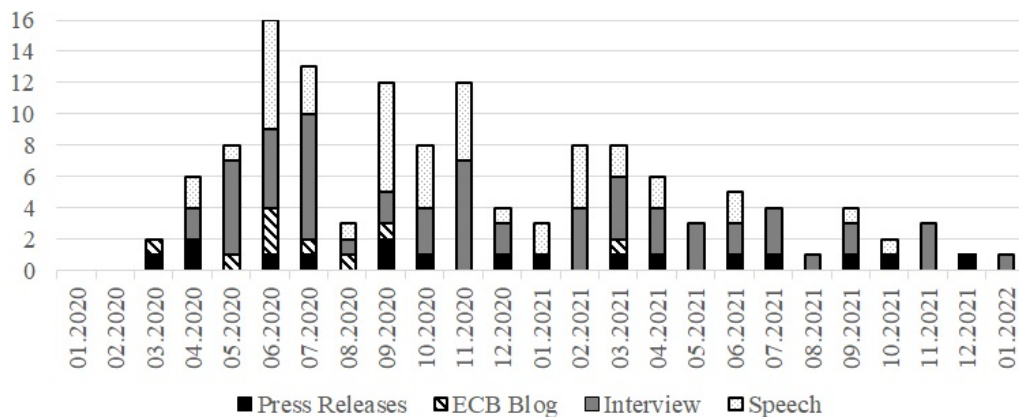
Note: Events are accumulated on a monthly basis for the period from 1 January 2020 to 31 January 2022.

communication on PEPP reached its peak with 16 events. This intense communication might reflect the special need for the central bank to use communication as a tool to amplify the effort to reach favourable financing conditions during the time of the Covid-19 pandemic by explaining the role of the PEPP in addition to the pure initial announcement effect.

To assess whether financial markets react more sensitively to news spread by a particular ECB Executive Board member, we sort the communication dataset by the six ECB Executive Board members. Table 1 displays the number of ECB communication events by communication channel and individual for the period from 1 January 2020 to 31 January 2022.

The 62 interviews are distributed among all members, whereby Schnabel counts with 16 most interviews, followed by Lane with 14. The speeches on PEPP are dominated by Schnabel (14) and Lagarde (12). Overall, Schnabel accounts for 31 events and, hence, communicated the most during the sample period, followed by Lagarde and Lane (with 26 events each). The 9 ECB blog posts relate exclusively to the following 3 members: Lagarde, Lane, and Schnabel.

The observed descriptive patterns appear to be plausible given the assigned responsibilities of the six ECB Executive Board members. As the president of the ECB, Christine Lagarde is responsible for explaining the ECB's monetary policy, i.e. the PEPP as a monetary policy tool. Moreover, Philip Lane as the ECB's chief economist and head of the Directorate General Monetary Policy (DG Monetary Policy) and Economics (DG Economics) and Isabel Schnabel

Table 1: PEPP Communication by ECB Executive Board Member and Channel

	Press Releases	ECB Blog	Interview	Speech	Σ
Governing Council	17	0	0	0	17
L. De Guindos	0	0	10	4	14
F. Elderson[1]	0	0	1	0	1
C. Lagarde	0	3	11	12	26
P. R. Lane	0	5	14	7	26
Y. Mersch[1]	0	0	2	4	6
F. Panetta	0	0	8	4	12
I. Schnabel	0	1	16	14	31
Σ	17	9	62	45	133

[1]Note: F. Elderson (December 15, 2020 - January 31, 2022) replaced Y.Mersch (from 1 January 2020 to 14 December 2020) and took over his responsibilities.

who is head of the DG Market Operations, amongst other roles, are key figures involved in the set-up, the operational design and execution of asset purchase programmes such as the PEPP. In fact, Lane's department is involved in informing the Governing Council on the stance and the pace of purchases, whereas Schnabel's department is responsible for designing and administrating the execution of the PEPP together with the corresponding national central banks.

Given the responsibilities within the ECB, Luis De Guindos (Macroprudential Policy and Financial Stabiliy), Fabio Panetta (Payment Systems, Banknotes), Yves Mersch or Frank Elderson (Banking Supervision) communicate less regarding the PEPP.

4 Empirical Methodology and Results

4.1 Effectiveness by Communication Channel

Based on the communication events outlined in Section 3, we assess empirically which form of communication is effective in steering financial markets. To this end, we apply an event study technique as presented in Fendel and Neugebauer (2020) to analyse whether communication events sorted by different communication channels are statistically significant in explaining changes in sovereign bond spreads. From a policy perspective, the spreads are a widespread indicator to measure financial market effects of monetary policy shocks in the euro area.

Empirical studies such as Havlik et al. (2022) typically use 10-year government bond spreads vis-à-vis the German Bund. To allow for comparison, our empirical investigation also covers daily spreads of 10-year government bond yields of the founding members of the euro area, excluding Luxembourg and including Greece, vis-à-vis its German counterpart. Hence, our analysis covers 10 euro area countries over the time horizon 1 January 2020 - 31 January 2022. This leads to 534 observations per country on a daily basis considering only bank working days. Our analysis could gain further insights by using high-frequency changes in the spreads around the communication events (see for example Kerssenfischer and Schmeling, 2022). Thus, the analysis becomes less likely to measure effects of news not related to the PEPP, which might affect spreads during the trading day. The lower the data frequency, the more important it becomes to chose appropriate control variables to account for other factors that influence the spreads. However, we refrain from using high frequency data for two reasons: First, the exact timing of communication is not available with reasonable effort for many of the events we consider. Second, it is almost impossible to identify the exact point in time, when the relevant information reached the market participants (i.e. during or immediately after the event, when the content of the event was published online). By relying on daily data, we avoid the problem of determining, when the relevant information has been processed by the market.

To analyse whether ECB communication via a particular channel affects government bond spreads, we estimate the following linear regression model for each country under consideration, applying Newey-West standard errors:[1]

$$\Delta sp_t = \alpha + \beta_1 press_t + \beta_2 interview_t + \beta_3 speech_t + \beta_4 blog_t + \delta \Delta X_t + \epsilon_t, \ (1)$$

where $\Delta sp_t = sp_t - sp_{t-1}$ denotes the daily change in the respective government bond spread, α the constant term, and ϵ_t the error term. The vector ΔX_t covers control variables in their first-differences. To ensure comparability with previous studies, we employ a slightly extended set of controls as in Fendel and Neugebauer (2020). Hence, we include the first lag of the dependent variable (sp_{t-1}), the country-specific stock market indices, the Citigroup Economic Surprise Index for the euro area, the 3-month Euribor future rate, the VIX, the US-\$/euro spot exchange rate, and the 10-year US Treasury Inflation-Protected Securities yield rates.[2] Additionally and in contrast to Fendel and Neugebauer (2020), we add the suprises on ECB meeting days taken from the Altavilla et al. (2019) database as

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[1]A panel regression using the same control variables with a country-fixed effects estimator for the 10 countries under consideration is also performed.

[2]The data of the yields are obtained from Bloomberg. We get the data of the US TIPS rates from https://www.federalreserve.gov/data/tips-yield-curve-and-inflation-compensation.htm and the other control variables from Refinitiv.

well as two variables to account for the evolution of the Covid-19 pandemic.[3] The dummy variables $blog_t$, $interview_t$, and $speech_t$ take the value of one on days when an ECB Executive Board member uses one of those channels of communication, and zero otherwise. The dummy variable $press_t$ takes the value of one on days of the press conference usually following the ECB Governing Council meeting and zero otherwise.

Table 2: Estimation results

Country	Press Releases	Inter-view	Speech	ECB Blog
AT	-0.96**	-0.22	-0.17	-1.01
	(0.49)	(0.19)	(0.19)	(1.08)
BE	-0.76	-0.41**	0.01	-1.99
	(0.50)	(0.20)	(0.23)	(1.92)
ES	-1.36*	-0.66**	-0.06	-4.90
	(0.76)	(0.33)	(0.55)	(4.21)
FI	-0.46	-0.23	0.25	-1.12
	(0.30)	(0.15)	(0.21)	(1.05)
FR	-0.84	-0.36	0.20	-1.89
	(0.63)	(0.23)	(0.30)	(1.66)
GR	-4.06**	-0.67	1.15	-20.13
	(1.62)	(0.87)	(1.43)	(16.19)
IE	-1.02	-0.21	0.39	-2.07
	(0.64)	(0.31)	(0.25)	(1.86)
IT	-2.63*	-0.74	0.23	-9.56
	(1.50)	(0.69)	(0.97)	(7.43)
NL	-0.20	-0.24	-0.09	-0.93
	(0.25)	(0.15)	(0.16)	(0.85)
PT	-1.96**	-0.77*	0.54	-5.08
	(0.83)	(0.39)	(0.67)	(4.51)
Panel	-1.39***	-0.60**	0.22*	-4.80**
10 countries	(0.35)	(0.19)	(0.11)	(1.87)

Note: Newey-West standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Output is multiplied by 100 to improve legibility. 534 observations per country. 5,340 observations in the panel regression.

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[3]We account for the country-specific incidences and mortality rates taken from the WHO database.

Table 2 shows the empirical results. To improve legibility, we only present the estimated coefficients of the communication dummy variables.[4] Therefore, our results show the effects of the communication events on daily changes of government bond spreads sorted by communication channel. Our results indicate that spreading official news on the PEPP through ECB press releases, ECB blog contributions and interviews leads to a decline in government bond spreads in all countries under consideration during the time of the Covid-19 pandemic. Hence, our findings are in line with the results of previous studies showing that monetary policy communication on quantitative easing measures has a stabilising effect on the financial markets (Altavilla et al., 2019, Fendel and Neugebauer, 2020).

According to our results, the press conferences and the interview channel appear to be the most powerful tools for steering financial markets on a disaggregated level. In case of the press conference dummy, the results are statistically significant for 5 out of 10 countries and highly significant for the panel. This result is not very surprising given the strong signalling effect of a press conference following a Governing Council meeting. More interestingly, the interview dummy turns out to be significant for 3 countries (Belgium, Spain, and Portugal) while the other forms of communication are insignificant throughout the sample on the disaggregated level. For instance, PEPP communication in an interview reduces the spread of the Spanish 10-year government bond yield vis-à-vis the German counterpart by 0.66 basis points on average. An intuitive explanation for the interviews being a dominant communication channel is that they represent the most interactive form of the four communication channels under consideration. Depending on the questions in a live interview, an ECB Executive Board member might give a spontaneous response or provide more information to the audience than initially planned. Moreover, facial expressions might provide important information relevant for financial markets during an interview. This seems plausible given the findings of Akansu et al. (2017) who show that a CEO's facial emotions during the first two minutes of an interview have a significant effect on the firm's financial performance. This might also hold for the financial market reactions following interviews of ECB Executive Board members. However, further research is needed to allow for conclusions on the importance of facial emotions to financial markets participants.

By contrast, speeches and blog contributions are less spontaneous, meaning that information transmitted through these channels is less likely to surprise the market. This might explain why the coefficient for the speech and blog dummy turns out to be insignificant for all specifications on the disaggregated level, despite the significant result for the panel. Given the importance of speeches as a communication tool and the empirical evidence in the literature (Anand et al., 2021, Ferrara, 2020, Glas and Müller, 2021), this outcome is surprising. However,

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[4]The full output is available upon request.

compared to the interview channel, the signalling effect via the speech channel is less pronounced. Speeches tend to be aimed more at explaining monetary policy decisions and providing information about the state of the monetary transmission mechanism and, hence, do not necessarily provide new information to the market.

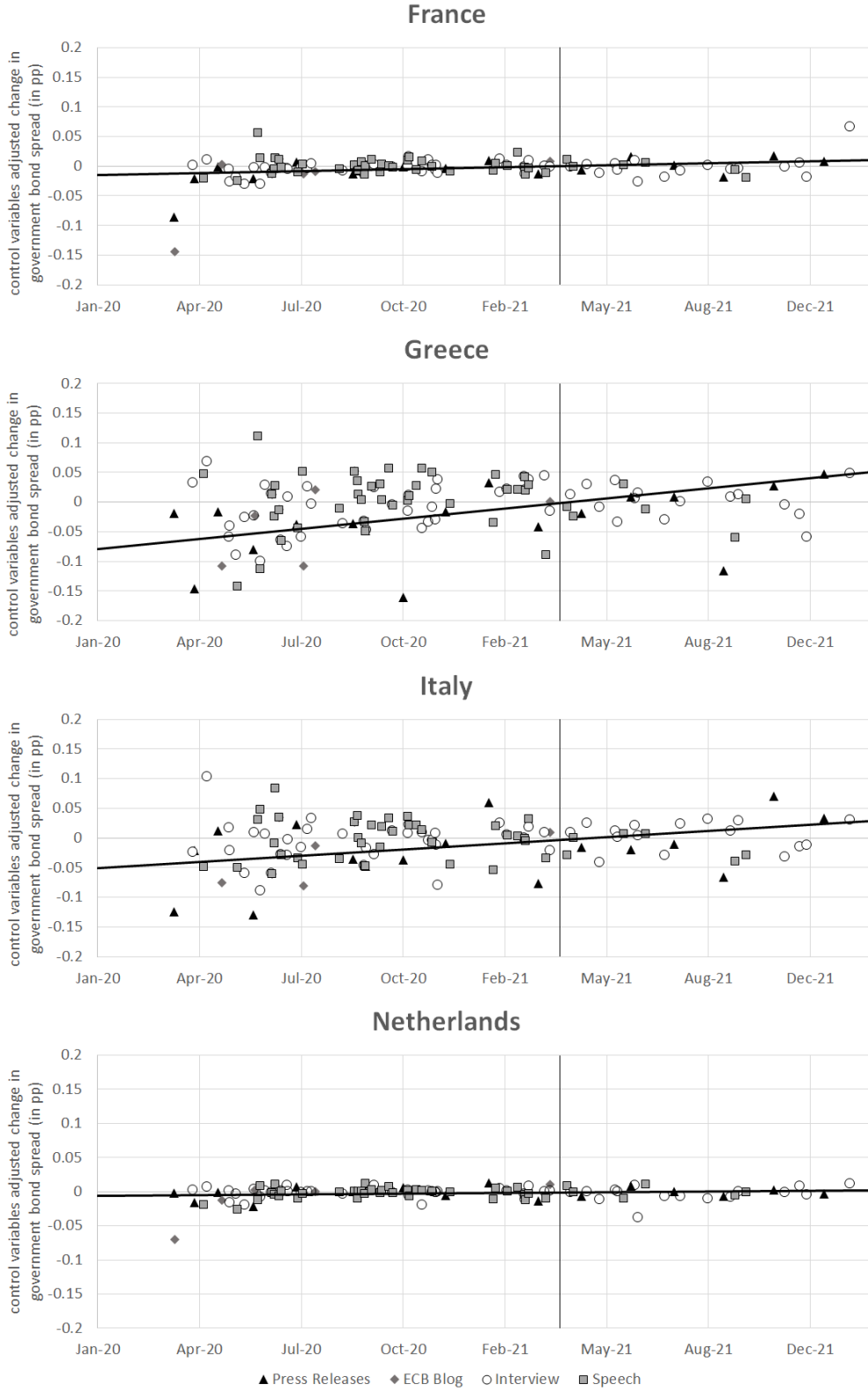## 4.2 Effectiveness by Communication Channel during Easing and Tightening Periods

The empirical results we present in Section 4.1 clearly indicate a negative relationship between the communication event and the daily change in the respective government bond spread over the considered period for 3 out of 4 communication channels. Hence, our results can be interpreted as a sign of rather dovish communication, as in most cases financial market reactions are in line with easing monetary policy conditions. Speeches, however, seem to represent an exception here. The coefficient for the speech dummy shows a positive sign for 7 out of 10 countries and turns out to be positive and statistically significant in the panel specification.

In the next step we analyse whether the communication effect has changed over the considered time span. This seems to be convenient as the content of one communication event might have been rather dovish, i.e. at the start of the PEPP to support monetary policy easing, while the content of another event, i.e. towards the end of net asset purchases under the PEPP might have been rather hawkish to prepare the change towards a normalisation and tightening of monetary policy in the course of 2021. Although we are not analysing the content of the events in this study, splitting the sample into subsets for the easing period and the tightening period might provide crucial results.

Figure 2 shows the daily change in the respective control variable-adjusted government bond spread on the day of PEPP communication events anecdotally for the countries France, Greece, Italy, and the Netherlands for the period 1 January 2020 - 31 January 2022. The set of figures for all countries under consideration is available upon request. The control variable-adjusted government bond spreads represent residuals taken from the following equation: $\Delta sp_t = \alpha + \delta \Delta X_t + \epsilon_t$. The regression line corresponds to $\epsilon_t = \alpha + \beta * t + u_t$. In any case, we observe a positive trend with respect to the daily change in the adjusted bond spread following a communication event over the considered period.

The negative y-intercept and the corresponding positive slope indicate that, after accounting for the average effect of communication events during our sample, communication tended to have a negative effect on government bond spreads during the time of PEPP introduction and expansion, but a positive effect towards

Figure 2: Effects of communication events on the adjusted daily change in government bond spreads

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the end of our sample. This might reflect a change in the ECB's monetary policy with respect to the PEPP, as it started to reduce the pace of purchases under the PEPP in September 2021 and ultimately decided to end net asset parchases under the PEPP by March 2022 at its December 2021 meeting.

To allow for a more in-depth analysis, we therefore split our dataset into two subsamples, assessing the effect of the events on the financial market since the onset of the PEPP up to the last increase of the net asset purchases (1 January 2020 - 31 March 2021) and the time hereafter (1 April 2021 - 31 January 2022), including the tightening of the PEPP from September 2021 onward.

Table 3 shows the empirical results for the easing and the tightening period. The subsample results represent the effect of a communication event on the daily change in the respective government bond spreads sorted by communication channel. As we do not observe any ECB blog contribution during the period 1 April 2021 - 31 January 2022, we drop this channel for the tightening period.

Splitting the data into the identified subsamples supports the outcome of Section 4.1, as the press release channel and the interview channel represent the most powerful tools (in terms of statistical significance) to steer the markets, irrespective of the monetary policy stance.

The sign of the coefficients for the easing period is negative in most cases, indicating that the communication effect suppresses the respective bond spreads during the time of PEPP introduction and expansion. Hence, ECB communication supported the intention of the programme to preserve favourable financing conditions during that time. In particular, press releases turn out to be very effective in steering the markets, as the results are significant for 6 out of 10 cases. For Spain and Greece, the results turn even out to be highly significant on a 1 percent significance level. While the results for the ECB blog contributions turn out to be insignificant throughout the subsample and the speech dummy turns out to be significant only in case of Ireland, the interview dummy seems to play an important role when it comes to monetary policy communication. In fact, the results are significant in 4 out of 10 cases and show the expected sign.

The outcome for the tightening period is particularly interesting. In contrast to the easing period, we observe a positive sign of the estimated coefficients in case of the press release dummy for 8 out of 10 cases. In case of France, the result is positive and statistically significant. This outcome underlines the effectiveness of the ECB's potential to steer the markets into a certain direction. With respect to the interview dummy, however, we do not observe such a regime switch. Despite the tightening of the PEPP, the results indicate a decline in the respective government bond spread following an interview by an ECB Executve Board member in all countries, except

Italy. In case of Spain, Finland, and Greece, the results are statistically significant at the 5 percent significance level. There may be several reasons to explain why financial markets reacted in an opposite way after an interview compared to the financial market effect of a press release during the period in which the PEPP was tightened. First, interviews are the most interactive type of communication channel under consideration. Hence, it might well be the case that because of the spontaneous reaction of the interviewee, the message sent might have led to an unanticipated reaction of the financial market. Another explanation would be that the interview tool was used on purpose by the ECB to steer the markets into the opposite direction in order to correct for the reaction of the markets following monetary policy decisions. Content related research, in particular, would most likely allow for more conclusive results on this aspect.

Table 3: Estimation results for subperiods

Country	Easing Period				Tightening Period		
	Press Release	Inter-view	Speech	ECB Blog	Press Release	Inter-view	Speech
AT	-1.25*	-0.15	-0.22	-0.91	0.26	-0.18	0.11
	(0.68)	(0.26)	(0.25)	(1.03)	(0.27)	(0.26)	(0.18)
BE	-1.38*	-0.46*	0.03	-1.95	0.26	-0.29	-0.02
	(0.74)	(0.28)	(0.31)	(1.89)	(0.38)	(0.25)	(0.36)
ES	-2.41***	-0.78*	-0.06	-4.78	1.54	-0.69**	-0.29
	(0.79)	(0.45)	(0.69)	(4.16)	(1.11)	(0.34)	(0.36)
FI	-0.32	0.01	0.30	-1.03	-0.07	-0.50**	-0.05
	(0.34)	(0.18)	(0.26)	(1.04)	(0.43)	(0.25)	(0.15)
FR	-1.47	-0.43*	0.30	-1.77	0.74**	-0.19	-0.08
	(0.95)	(0.23)	(0.37)	(1.62)	(0.33)	(0.49)	(0.42)
GR	-6.04***	-0.91	1.90	-19.88	0.17	-1.25**	-0.71
	(2.21)	(1.40)	(1.79)	(15.98)	(0.71)	(0.62)	(0.54)
IE	-1.62	0.02	0.58*	-1.95	0.57	-0.58	0.19
	(0.98)	(0.42)	(0.31)	(1.76)	(0.38)	(0.36)	(0.35)
IT	-3.73**	-1.04	0.67	-9.21	1.66	0.05	-0.61
	(1.83)	(1.01)	(1.18)	(7.20)	(1.05)	(0.61)	(0.62)
NL	-0.23	-0.14	-0.15	-0.93	0.19	-0.34	0.12
	(0.35)	(0.17)	(0.19)	(0.87)	(0.15)	(0.24)	(0.27)
PT	-2.50**	-1.05*	0.41	-4.97	-0.02	-0.28	1.73
	(1.17)	(0.55)	(0.75)	(4.49)	(0.76)	(0.38)	(1.78)
Panel	-1.93***	-0.68**	0.36*	-4.71**	0.45*	-0.47***	0.02
10 countries	(0.44)	(0.28)	(0.17)	(1.83)	(0.20)	(0.12)	(0.21)

Note: Newey-West standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
Output is multiplied by 100 to improve legibility. The easing period refers to the time
horizon 1 January 2020 - 31 March 2021, covering 318 observations per country. The
tightening period refers to the time horizon 1 April 2020 - 31 January 2022, covering 216
observations per country.

4.3 Effectiveness by ECB Executive Board Member

In this section, we analyse whether financial market reactions differ with respect to communication by individual ECB Executive Board members. Using data on the ECB's communication on the PEPP, we now assess empirically the effect of the ECB communication on financial markets sorted by ECB Executive Board member. Hence, we sort the communication events by the following members of the ECB's Executive Board: C. Lagarde, L. de Guindos, P. R. Lane, F. Panetta, and I. Schnabel. The analysis excludes Y. Mersch and F. Elderson, who account for fewer than 10 communication events and were not members of the Executive Board for the entirety of the period under consideration.

To assess the specific effect of communication by the respective ECB Executive Board member on the government bond spreads, we run a linear regression as follows, applying Newey-West standard errors for each individual country:[5]

$$\Delta sp_t = \alpha + \beta_1 Lagarde_t + \beta_2 DeGuindos_t + \beta_3 Lane_t$$
$$+ \beta_4 Panetta_t + \beta_5 Schnabel_t + \delta \Delta X_t + \epsilon_t, \tag{2}$$

where $\Delta sp_t = sp_t - sp_{t-1}$ denotes the daily change in the respective spread, α the constant term, and ϵ_t the error term. The vector ΔX_t covers control variables as discussed in Section 4.1. The dummy variables $Lagarde_t$, $DeGuindos_t$, $Lane_t$, $Panetta_t$, and $Schnabel_t$ take the value of one on days when the respective Executive Board member officially communicated using a channel as discussed in previous sections, and zero otherwise.

Table 4 shows the estimation results sorted by individuals. We do not distinguish between the easing and tightening period here, as limited observations by individual would impair an adequate comparison. Moreover, the interview channel turned out to suppress the spreads in both subsamples. Therefore, we expect the results not to depend too strongly on the dates of the interviews. None of the individuals communicate more than seven times during the tightening period under consideration. Panetta does not actually say anything related to the PEPP during the tightening period. The following conclusions relate to the personal communication effects of the ECB Executive Board members for the entire period. It could be that a particular Board member has a positive effect on the spread during the tightening period and a negative effect during the easing period possibly leading to insignificance on average. To improve legibility, we only present the estimated coefficients of the dummy variables.[6] Hence, our results show the effects of the communication events on daily changes of government

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[5]A panel regression using the same control variables with a country-fixed effects estimator for the 10 countries under consideration is also performed.

[6]The full output is available upon request.

bond spreads sorted by individual members of the ECB Executive Board.

Our results indicate that financial markets react particularly strongly to communication by Lane. For 7 out of 10 countries, the decline in the government bond spreads following a communication event by the chief economist turns out to be statistically significant for the period under consideration. For instance, a PEPP communication event by Lane reduces the spread of the Italian 10-year government bond yield vis-à-vis the German counterpart on average by almost 3 basis points during the time of the Covid-19 pandemic. Given the fact that Lane is the ECB's chief economist and responsible for the Directorate General Economics and Directorate General Monetary Policy, financial market participants are sensitive to his statements and announcements and adapt their investment decisions accordingly. Hence, our results indicate that communication by Lane plays a crucial role with respect to the monetary policy signalling channel and significantly contributed to the preserving of favourable financing conditions in the euro area.

The communication events on PEPP by the remaining members of the ECB's Executive Board seem to be less relevant for financial markets. While the results for Lagarde turn out to be statistically significant for the panel specification, the dummy coefficients are insignificant on the disaggregated level, with Austria representing an exception. Remarkably, all coefficients are negative. For the members De Guindos, Panetta, and Schnabel, the results turn out to be statistically insignificant indicating that, on average for the entire period, official communication on PEPP by these members does not lead to changes in 10-year government bond spreads with the results for Portugal in case of communication by De Guindos representing an exception.

This outcome is interesting as it demonstrates the relative importance of the message transmitted by the individual Executive Board member to financial market participants. Given their different responsibilities within the Executive Board as well as their ability to shape the design of asset purchase programmes within the Governing Council, it is not surprising that the chief economist, Philip Lane, plays a significant role for financial markets when it comes to the communication with respect to PEPP.

Communication on PEPP by L. De Guindos and F. Panetta, on the other hand, does not have an effect on financial markets, which is not surprising given their responsibilities within the ECB's Executive Board. The outcome with respect to communication on PEPP by I. Schnabel is more surprising. Despite her being responsible for the administration of the execution of the purchase programmes, communication by I. Schnabel does not seem to have shaped financial markets, at least when considering the entire period. These results are in line with our

Table 4: Estimation results by ECB official

Country	C. Lagarde	L. De Guindos	P. R. Lane	F. Panetta	I. Schnabel
AT	-0.74*	0.29	-0.66**	0.57	0.00
	(0.41)	(0.43)	(0.30)	(0.44)	(0.15)
BE	-0.99	-0.15	-0.81***	-0.08	0.06
	(0.73)	(0.47)	(0.30)	(0.41)	(0.24)
ES	-2.33	0.38	-1.79***	0.19	0.21
	(1.75)	(0.48)	(0.55)	(0.75)	(0.44)
FI	-0.21	-0.14	-0.52*	-0.10	0.21
	(0.46)	(0.31)	(0.26)	(0.38)	(0.17)
FR	-0.66	-0.08	-0.54	-0.17	-0.06
	(0.73)	(0.31)	(0.44)	(0.30)	(0.27)
GR	-6.41	1.00	-1.51	1.14	-0.95
	(6.54)	(1.48)	(1.36)	(2.18)	(1.01)
IE	-0.82	-0.10	0.19	-0.24	0.14
	(0.73)	(0.63)	(0.58)	(0.39)	(0.26)
IT	-3.60	0.67	-2.94***	0.37	0.21
	(3.06)	(1.30)	(1.11)	(1.54)	(0.78)
NL	-0.49	0.03	-0.70***	0.20	-0.02
	(0.36)	(0.19)	(0.25)	(0.21)	(0.16)
PT	-2.11	1.88*	-1.48**	-0.45	-0.28
	(1.87)	(1.13)	(0.66)	(0.76)	(0.57)
Panel	-1.87**	0.19	-1.18***	0.04	-0.04
10 countries	(0.65)	(0.24)	(0.32)	(0.10)	(0.09)

Note: Newey-West standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Output is multiplied by 100 to improve legibility. 534 observations per country.

findings in Section 4, indicating that speeches are less significant than interviews in influencing financial markets. Given that Schnabel held the most speeches, her communication on PEPP did not lead to strong financial market effects during the time under consideration. By contrast, the fact that Lane predominantly communicated via interviews might explain the relevance of the interview channel as well as the opposite reaction of the market following an interview during the tightening period as compared to the reaction of the market following a press release. In fact, there was a debate ongoing in the Governing Council if and when to end net asset purchases under the PEPP until a decision was reached in December 2021. Lane was perceived as one of the more dovish members of the Governing Council, with a rather cautious attitude to ending the programme. Further content related research is, however, needed to shed more light on this aspect.

Furthermore, our results underline that the ECB reaches the attention of financial market participants as they appear to believe in the power of the ECB to steer the markets. The results indicate that financial investors adjust their decisions to the announcements and comments of the ECB's chief economist, Lane. Given his responsibilities within the ECB's Executive Board, he significantly shaped the decisions of the Governing Council with respect to the design of the PEPP, including the volume and the extensions during the time period under consideration. Being aware of that fact, financial market participants take into account the communication signals of Lane.

Additionally, our results support the outcome of Istrefi et al. (2021) that looking only at monetary policy announcements neglects important policy signals coming from the communication of ECB officials outside of regular meeting days. In this respect, however, a certain communication event might not have been possible without the other communication event, as the Board members divide up the work. Unfortunately, the limited amount of events under consideration does not allow us to account for interaction effects between different ECB Executive Board members or the interaction between a specific communication form and the member using it.

5   Conclusion

During the Covid-19 pandemic crisis, many central banks introduced non-standard monetary policy measures to cope with the risks of deteriorating financial markets. The ECB, for instance, introduced the PEPP, a temporary asset purchase programme to stabilise bond markets. While extensive research efforts have examined the policy announcement effects on financial markets, it is of eminent interest to analyse which of a central bank's communication channels is most effective in steering the markets.

Based on an event study technique, we analyse the ECB's PEPP communication effects on daily changes in government bonds spreads for 10 euro area countries for the period 1 January 2020 - 31 January 2022. Our results indicate that bond markets are sensitive to both the ECB's communication channel and the ECB Board member spreading the news.

Using an official source to identify communication events on PEPP, i.e. the ECB's website, our results are remarkable and confirm the importance of communication as a monetary policy tool. Adding to the existing literature, our results indicate that central bank communication has a far reaching effect on financial markets.

First, our results suggest that, besides press releases, interviews appear to be a powerful communication channel for steering bond markets. Speeches and blog contributions, on the other hand, tend to be statistically insignificant. This result is robust to the distinction between the easing and tightening period of the PEPP. Interestingly, our estimated results show a different reaction of the financial markets with respect to the communication channel during the tightening period. While bond spreads tended to widen in the wake of a press release, interviews seem to have had dampened the spreads, despite the tightening of the PEPP. While the communication of specific ECB Executive Board members might provide a possible explanation for this phenomenon, further content-related research is needed to gain deeper insights here.

Second, our results show that communication on the PEPP by the ECB's chief economist Lane turns out to be particularly important to financial market participants throughout the considered period. Our results indicate that for 7 out of 10 countries, the change in the daily government bond spread following a communication event by the chief economist turns out to be statistically significant. The fact that Lane predominantly communicated via interviews might explain the relevance of the interview channel as well as the opposite reaction of the market following his interviews during the tightening period compared to the reaction of the market following a press release. In future reseach, interaction effects might shed more light on this issue and analysing the communication by the Eurosystem's national central bank governors might provide additional insights.

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