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We use event study regressions to compare the impact of monetary versus fiscal policy announcements on euro area government bond spreads in the unfolding Covid-19 pandemic. Throughout our specifications and robustness checks, we detect larger effects for monetary than for fiscal announcements. Among monetary policy instruments, the PEPP has the largest spread compressing effects. Comparing the announcement effects for fiscal crisis tools, Next Generation EU shows significant results in contrast to news on pure loan instruments. The relaxation of European fiscal rules through the activation of the emergency-escape clause under the Stability and Growth Pact is associated with rising spreads. We conclude that the stability of euro area bond markets in the presence of a severe solvency shock depends to a large extent on the Eurosystem’s unconstrained sovereign bond purchases. Our results suggest that fiscal support can play a stabilizing role if it includes, like Next Generation EU, a significant transfer component.

1. Introduction

The COVID-19 pandemic has put the public finances of industrial countries under severe stress. The resulting recession has led to shortfalls in tax revenues and increased public expenditures. National governments have embarked on massive rescue packages to protect citizens and companies against the potentially disastrous health, social, and economic consequences of pandemic disruptions. In addition, EU Member States have designed stimulus packages in order to support the economic recovery. For the euro area, soaring public debt levels have recalled bad memories from the years of the global financial crisis and the subsequent euro area debt crisis. The concern has been that this substantial solvency shock could once again trigger a vicious cycle of rising sovereign bond spreads, a destabilization of the financial sector, and a further decline in real economic activity.

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The mechanisms that can push even solvent countries into illiquidity have been extensively researched (De Grauwe 2012; De Grauwe and Ji 2013; Lorenzoni and Werning 2019). Two risk factors crucially determine the probability of a bad equilibrium: first, the fundamental fiscal health of countries hit by the solvency shock; and second, the existence and credibility of crisis mechanisms that can serve as lenders of last resort. Both risk factors still make the euro area particularly vulnerable to new crises of confidence. Already before the pandemic hit, several euro countries continued to show weak fiscal fundamentals and a lack of sustainable budgetary trajectories. The European Commission had classified five euro area countries (Belgium, Spain, France, Italy, Portugal) as “high risk” cases for a lack of public debt sustainability over the medium term in its Debt Sustainability Monitor, published on the eve of the pandemic in January 2020 (European Commission 2020a). Consequently, exactly those countries that particularly suffered from the pandemic shock in 2020, were already confronted with severe fiscal sustainability challenges before. As to the lender of last resort, the euro area debt crisis saw the establishment of new fiscal and monetary liquidity facilities that can have a stabilizing function in an unfolding liquidity crisis. The European Stability Mechanism (ESM) has since then successfully stabilized even a high-debt country such as Greece. The ECB had set up its Outright Monetary Transactions (OMT) program to back-up the ESM liquidity support. While these liquidity mechanisms were in place when the coronavirus arrived in Europe, their effectiveness and credibility was arguably limited. The ESM not only suffered from its constrained lending capacity but also its principle of conditionality which has made it a politically controversial instrument, as potential borrowers are afraid of losing their national policy autonomy once they make use of it. Since the OMT program is conditional on ESM support, any rejection of ESM emergency liquidity also leaves the OMT inaccessible.

Although the euro sovereign bond markets were thus clearly vulnerable at the start of the COVID-19 crisis, no serious escalation has occurred so far. Risk spreads of the higher indebted euro countries started to rise briefly with the onset of the pandemic in spring 2020 (Fig. 1) but nothing of a critical development happened similar to the crisis one decade ago. Sovereign spreads already peaked in March and were more or less stable over the course of the year 2020.

It is our objective to assess the relative importance of European fiscal and monetary crisis support for this remarkable stability in euro area sovereign bond markets that is in stark contrast to the experience of 2010/12. The year 2020 has seen a swift and massive reaction both of fiscal and monetary policy at the European level. Already in March 2020, the ECB Council established another securities purchase program, the Pandemic Emergency Purchase Program (PEPP), which contained important changes regarding the rules of sovereign purchases compared to its predecessor; the Public Sector Purchase Program (PSPP). Furthermore, European fiscal players extended pre-existing fiscal tools (new credit lines both at the ESM and the European Investment Bank). Moreover, there has been a series of fiscal innovations. First, the SURE loan program (temporary Support to mitigate Unemployment Risks in an Emergency) was established. It provides liquidity to EU Member States to fund short-time working schemes and is refinanced from EU borrowing. Second, and more substantial, EU leaders agreed on the fully debt-financed Next Generation EU (NGEU) package, mobilizing 750 billion euros (at 2018 prices) from the EU budget over the coming years to support the recovery.

Fig. 1. Government bond spreads of ten euro area countries in the crisis year 2020. Notes: The figure shows daily government bond spreads of ten euro area countries with the German yield curve functioning as a baseline. The data is fitted as a third-order polynomial yield curve of government bonds with a maturity of ten years. For more information see Section 3.2. Data source: Datastream.
So far, these joint fiscal and monetary efforts have been successful in protecting the euro area sovereign bond markets against a new debt crisis. However, it is unclear which player is the crucial one; the ECB with its PSPP/PEPP support or the EU fiscal level with NGEU and the other newly activated fiscal instruments. Some observers conjecture that the stabilization of risk spreads in the pandemic is not only a consequence of the PEPP support but also reflects the new EU fiscal support (Gros 2021). Others point to the role of monetary policy (Hartley and Rebuucci 2020; Jinjarak et al. 2020; Ortmans and Tripier 2021). However, as yet detailed evidence on the relative importance of monetary and fiscal measures since the outbreak of the pandemic is missing, our event-based study focuses precisely on this question. Thus, we add an important new aspect to the developed literature on the effects of unconventional monetary policy on spreads (surveyed in the next section).

Any evidence to which extent the new fiscal tools already have a measurable impact on spreads is of substantial monetary policy relevance as it may help to assess potential risks for the effective independence of the ECB in the future. Given the increasing debt levels and high asset purchases of central banks, concerns about the risk of fiscal dominance are increasing for industrial countries (Bordo and Levy 2020). In a regime of fiscal dominance, the ECB is effectively forced to continuously finance euro area countries in order to prevent a new debt and financial crisis even if this could risk the primary objective of price stability. If, however, the new fiscal instruments already play a decisive stabilizing role, this brings relief for the ECB. To the extent that the compression of risk spreads in 2020 already reflects the recent European fiscal innovations, this indicates a development towards a more mature European Fiscal Union in which the protection against liquidity crises is effectively achieved through fiscal instruments. Any such development would help the ECB to target its monetary policy objectives with less consideration of solvency and liquidity challenges in the high-debt euro countries.

Our analytical design addresses the question on the relative importance of fiscal and monetary policy for euro area government bond spreads through an event-analytical study. We identify important announcements with a focus on the pandemic crisis measures and study their effects on the sovereign risk spreads in the euro area. Throughout our main specifications, robustness checks, and extensions we detect larger effects for monetary than for fiscal announcements. Among monetary policy instruments, the PEPP has the largest spread compressing effects. In one extension we exploit the “Lagarde gaffe” as an additional negative test for the importance of the PEPP with the result of a very strong confirmation. Comparing the announcement effects among different fiscal crisis tools, Next Generation EU shows significant results in contrast to news on pure loan instruments. The relaxation of European fiscal rules through the activation of the emergency-escape clause under the Stability and Growth Pact is associated with rising spreads.

The paper is structured as follows: Section 2 summarizes the related literature and theoretical considerations. In Section 3, we derive our hypotheses, introduce the data, and outline the empirical strategy. The empirical results are discussed in Section 4. Section 5 concludes.

2. Literature review

The impact of ECB asset purchases and other unconventional central bank measures on sovereign yields and spreads has been studied within an ever-expanding literature. Box 1 describes these unconventional programs with more details. The first government bond purchase program introduced by the ECB was the Securities Markets Program (SMP) in 2010 following the onset of the euro debt crisis (ECB 2010, p.24). It subsequently came to an end in September 2012. Eser and Schwaab (2016) analyze this program for the crisis countries between 2010 and 2011 and find a decrease in the yields of about three basis points for purchases of one per mille of outstanding debt. Likewise, Ghysels et al. (2017) discover that the SMP was successful in reducing government bond yields temporarily by using data from short 15-minute intervals. Furthermore, De Pooter et al. (2018) estimate that in the long term, purchases of one percent of sovereign debt decrease the liquidity premium (i.e., the liquidity component of the yield spread) by 13 to 17 basis points.

The OMT program replaced the SMP and was established by the ECB Council in September 2012 but never activated. Altavilla et al. (2016) show that the mere announcement of the program reduced Italian and Spanish sovereign bond rates by 200 basis points, while there was no effect on German and French bond rates. Szczerbowicz (2015), Fratzscher et al. (2016), and Ambler and Rumler (2019) employ event studies to evaluate several unconventional monetary policy announcements, among others the SMP and OMT. Szczerbowicz (2015) and Fratzscher et al. (2016) confirm that the programs were most effective for fiscally weaker periphery countries. Ambler and Rumler (2019) conclude that the SMP and OMT announcements had the strongest negative effect on sovereign bond yields and a positive effect on expected inflation among the unconventional monetary policy announcements between July 2008 and March 2016. Fendel and Neugebauer (2020) analyze unconventional monetary policy announcements between 2007 and 2017. They find that less solvent countries experience stronger sovereign bond yield reductions than more solvent countries following announcements of non-standard monetary policies.

In addition to the purchase programs, Szczerbowicz (2015) also investigates exceptional liquidity provisions such as the three-year LTROs. These measures successfully reduced the tensions on the money market. Finally, Szczerbowicz (2015) looks at two covered bond purchase programs (CBPP1 and CBPP2). An interesting result is that the covered bond purchase programs decreased sovereign bond spreads, although purchases of sovereign bonds also decreased covered bond spreads.

For an overview of papers studying quantitative easing programs outside of the euro area, see Urbschat and Watzka (2020).
well-designed fiscal rules can decrease risk premia (see Eyraud et al. (2018) for an overview). Other papers consider the effect of fiscal rules on sovereign risk premia with the result that credible and put under the EDP. Growth in a number of countries that have an agreement with the European Stability Mechanism (ESM). With the establishment of the EDP or the EDP, the SMP was terminated. As for the SMP, the ECB Council justified the new program with the aim of safeguarding an appropriate monetary policy transmission and a uniform effectiveness of its monetary policy in all parts of the euro area. So far, the SMP has never been activated and has played no role as an option in the pandemic since 2020.

### Box 1 The Eurosystem’s non-standard monetary policy measures.

**LTROs / TLTROs / PELTROs: Longer-term refinancing operations** (LTROs) are measures by the ECB to provide additional liquidity to the euro area money markets with a longer maturity than the usual three months. The first time that the ECB provided LTROs with a longer maturity was in March 2008 with six month LTROs. In May 2009, twelve month LTROs followed and in December 2011, three-year LTROs were introduced (Fratzscher et al. 2016). **Targeted longer-term refinancing operations** (TLTROs) were introduced in June 2014 and borrowing was linked to the banks’ loans to non-financial corporations and households. Further series, TLTRO II and III, were announced in March 2016 and March 2019, respectively (ECB 2021). Finally, in April 2020, the ECB announced **pandemic emergency longer-term refinancing operations** (PELTROs), which would start in May 2020 (ECB 2020b).

**SMP:** Central bank purchases of sovereigns in the euro area started with the **Securities Market Program** (SMP) established in May 2010 as a crisis instrument in the evolving euro area debt crisis. At this time, the euro area sovereign bond markets suffered from a lack of market liquidity for the fiscally fragile Member States with a dramatic widening of spreads. The holdings of the Eurosystem under the SMP reached a maximum of €218 billion in September 2012 (Koetter et al. 2017). The SMP was highly selective as the purchases only included the countries most affected by the debt crisis: Italy, Spain, Greece, Portugal, and Ireland.

**OMT:** Since September 2012, the **Outright Monetary Transaction** (OMT) program offers support for euro area countries that have an agreement with the European Stability Mechanism (ESM). With the establishment of the OMT program, the SMP was terminated. As for the SMP, the OMT has never been activated and has played no role as an option in the pandemic since 2020.

**PSPP:** The **Public Sector Purchase Program** (PSPP) started in March 2015 as the most important component of the Asset Purchase Program (APP) and continues until this day, with the exception of a pause in net purchases between January and October 2019. By the end of November 2020, the cumulated PSPP net purchases of the Eurosystem reached €2445 billion (of which €2189 billion are national debt and €256 billion supranational). With the PSPP, the Eurozone central banks purchase bonds from all euro members with the exception of Greece. APP net purchases currently amount to €20 billion per month plus purchases from an additional coronavirus crisis-related envelope of €120 billion. PSPP net purchases between September and November amounted to €21.2 billion a month (ECB 2015).

**PEPP:** With the **Pandemic Emergency Purchase Program** (PEPP), the Governing Council has added a second purchase program that complements the ongoing APP (ECB 2020a). PEPP is an asset purchase program of private and public sector securities. Compared to the PSPP, the PEPP has relaxed or fully abandoned various rules such as issue and issuer limits and the strict orientation of country allocations to the ECB capital key (Havlik and Heinemann, 2021). Initially, it was set up with a target of €750 billion until the end of 2020. However, the ECB Council increased the envelope further in two steps in June and December 2020 to €1850 billion and extended the horizon for net purchases until at least March 2022. As in the APP, purchases of government bonds are by far the most important item in the PEPP. Under the PEPP, Eurosystem central banks buy bonds from all euro members including Greece. By the end of November 2020, the Eurosystem PEPP holdings of public sector securities amounted to €852 billion, which is 93% of all PEPP purchases. Between September and November 2020, the average monthly PEPP net purchases of public securities reached €67.9 billion.

Several studies have investigated the asset purchase program (APP) and in particular the PSPP. *Urbschat and Watzka (2020)* estimate the effect of APP program announcements between 2014 and 2016 on government bond yields. They find the strongest reduction in yields for the initial announcement of the PSPP with decreasing effects for further announcements. *Altavilla et al. (2015)* confirm the yield-reducing effect with a similar event study. The effect amounts to a decrease of 30 to 50 basis points at ten-year maturity and even double this size for high-yield countries like Spain and Italy. The authors also uncover significant spillover effects to other types of assets not targeted by the APP. *De Santis (2020)* confirms the existence of a substantial announcement effect on government bond yields by taking into account the discussion intensity in the media. Moreover, *Bulligan and Delle Monache (2018)* explicitly study different time periods to compare the size of the effects and again find the strongest effect on government bonds in the initial phase of the APP. By using a VAR model, *Gambetti and Musso (2017)* estimate that the APP had positive effects on GDP and HICP inflation in the first two years of the program. *Brekenfelder et al. (2016)* once again confirm that the announcement of the APP reduced sovereign yields.

The literature that looks at fiscal policy announcements on euro sovereign spreads prior to 2020 is limited. A couple of papers study the signal and credibility effects of the Excessive Deficit Procedure (EDP). *Kalan et al. (2018)* investigate the effect of EDPs on sovereign bond spreads and conclude that sovereign spreads are higher when countries are placed under an EDP. The authors interpret this as an information signal. *Afonso et al. (2020)* confirm that spreads increase if a country is put under the EDP. Other papers consider the effect of fiscal rules on sovereign risk premia with the result that credible and well-designed fiscal rules can decrease risk premia (see *Eyraud et al. (2018)* for an overview).

Summing up the pre-pandemic literature, there is comprehensive evidence that the ECB asset purchasing programs have been effective in lowering both sovereign bond yields and spreads. The role of fiscal policy announcements is largely studied with respect to information signals in the context of the surveillance from national and European fiscal rules and not yet for European loan or transfer instruments that are our key interest.
Since the outbreak of the pandemic a couple of papers have already looked at the drivers of the euro sovereign spreads in this new era. A first paper studying the effects of the PEPP on government bond yields but disregarding fiscal announcements is Hartley and Rebucci (2020). However, they evaluate purchase programs from several central banks around the world and include German sovereign bond yields but none of high-debt euro countries in the context of the PEPP. They find a decrease of 15 basis points over a three-day window following the announcement of the program. Ortmans and Tripier (2021) study how the first ECB announcements in the pandemic have stopped the increase of a country’s number of infections to translate into a rising spread. Jinjarak et al. (2020) take a broader perspective and analyze the relative importance of pandemic-related indicators (e.g., mortality) and both monetary and fiscal policy responses in the first half of 2020. Using a synthetic control group design, they discover that COVID-19 mortality rates had a significant spread-increasing effect for credit default swaps (CDS) which cannot be explained by the fundamentals driving these spreads in normal times. The authors show that national stimulus packages and the resulting indebtedness contributed to a widening of CDS spreads, although the ECB’s PEPP announcement in March 2020 stopped the widening. They account for EU fiscal announcements through a non-differentiated dummy variable, which misses statistical significance. Delatte and Guillaume (2020) apply a similarly broad perspective and study how the countries’ initial fiscal situation, their healthcare capacity, and banking stability interplay with fiscal and monetary announcements on euro area spreads. Related to our approach, they employ event dummies for monetary policy and fiscal announcements. Key findings are that healthcare capacities and initial budgetary and banking conditions mattered for crisis vulnerability. The PEPP announcement in March 2020 is found to be the most powerful spread reducing event and much larger than the French–German proposal from May 2020. Corradin et al. (2021) jointly study sovereign spreads and CDS rates to separate the impact of monetary and fiscal policy announcements on, inter alia, the default and the redenomination risk. They find that the ECB’s announcements of unconventional measures lowers the yields of the more vulnerable countries in particular, while the fiscal announcements lowered yields more uniformly. Fendel et al. (2021) concentrate on the relative role of ECB and ‘European Commission’ (i.e., fiscal) announcements both on the level and the spread of sovereign rates. They find that both fiscal and monetary support compress spreads relative to Germany with a particularly large effect for Italy. Announcements of new European fiscal support tend to increase the yield levels for the more solvent countries such as Germany and the Netherlands. They conclude that investors are concerned about the future fiscal burden from the new fiscal assistance for these countries. Going beyond Corradin et al. (2021) and Fendel et al. (2021), we carefully group fiscal and monetary announcements in order to compare the effect size of different types of instruments (for monetary policy, we compare PSPP and PEPP announcements; for fiscal policy, we distinguish between fiscal aid that excludes/includes a significant transfer element). This implies that we go further back in time to compare the PEPP effect to the PSPP effects. Compared to Fendel et al. (2021) and Delatte and Guillaume (2020) we include the European Council agreement on NGEU in July, which decided a controversial debate in the months before.

3. Empirical analysis

3.1. Study design and hypotheses

We apply an event-analytical design to identify the relative role of monetary and fiscal policy decisions to contain euro area sovereign spreads. Our key interest is the crisis response of the ECB and EU in the pandemic. However, we include a longer time period, going back in some specifications as far as November 2014, in order to validate our approach and compare the results with established findings from the literature.

We have clear hypotheses and sign predictions for most of the monetary and fiscal events. In line with the overwhelming evidence of the literature, we expect that the monetary policy announcements on both conventional and unconventional expansions will compress spreads. We also expect that the spread compressing effect should be more pronounced for the fiscally weaker countries for which the support is more crucial to guarantee their liquidity (e.g., Fendel and Neugebauer (2020) identify differences in yield reactions to monetary policy announcements between fiscally weaker and stronger countries). For the monetary purchase programs, we expect a stronger effect from the PEPP compared to the PSPP as the ECB has explicitly relaxed the commitment to the ECB capital key (and other constraints such as minimum credit rating or issue and issuer limits) for the former (see Box 1 in Section 2). Similarly, if European fiscal liquidity support and transfers have an effect, this should lead in the same direction and lower spreads as it improves the liquidity and – in the case of transfers – even the solvency of beneficiary countries. We expect a stronger effect for a program that includes actual transfers (as it is the case for NGEU, see Box 2) compared to pure loan programs (e.g., the SURE program) whose support is limited to liquidity assistance and a possible slight advantage from preferential interest rates.

We do not have a clear sign expectation for the relaxation of EU fiscal rules as there are counteracting possible effects. On the one hand, markets may welcome more flexibility as a growth-supporting move that enables EU Member States to embark on a more effective counter-cyclical fiscal policy. In this case, the relaxation could lower spreads. On the other hand, investors may take the relaxation as a signal for a less sustainable fiscal trajectory. This negative credibility effect could then increase spreads in line with the empirical findings that weaker fiscal rules tend to damage fiscal credibility and to increase sovereign spreads (Eyraud et al. 2018; Feld et al. 2017; Heinemann et al. 2014; Iara and Wolff 2014).

3 To the extent that investors regard the new transfer and loan instruments also as a significant burden for the more solvent countries as found by Fendel et al. (2021) this will equally have a spread compressing effect.
with this argumentation, contributions from the literature identified the announcement effects of ECB purchase programs and not of the subsequent implementation over time ("flow effect"), which does not provide any additional news. In line after the announcement of the total intended purchases ("stock effect") due to updated expectations among trading agents, chases or fiscal disbursements. According to economic theory, we should expect the market reactions to occur immediately later than 2022 (Darvas 2020).

in July 2020, from which the first smaller payments are not made before mid-2021 with the bulk of money disbursed even actual flow of resources. For example, the European Council reached the crucial political agreement on the NGEU package over, for the pandemic-related fiscal instruments there are very long time lags between the first announcements and the

Box 2 EU fiscal responses to the COVID-19 crisis.

**European Fiscal Framework Flexibility:** On March 13, 2020, the Commission announced its proposal to the European Parliament to activate the general escape clause within the Stability and Growth Pact. The European Parliament then actually proposed it on March 20, 2020. This clause allows the EU Member States to temporarily deviate from their medium-term budgetary objectives and to fulfil the requirements of the excessive deficit procedure at a later point in time, in case they are in the procedure. This flexibility allows the Member States to implement necessary measures such as stimulus packages in their countries to reduce the economic impact of the COVID-19 pandemic (European Commission 2020b; Delivorias 2020).

**Mobilizing the EU budget:** Equally announced on March 13, 2020 was a guarantee of EUR 1 billion from the EU budget to the European Investment Fund (EIF) in order to help small and medium enterprises (SMEs) and small mid-caps with EUR 8 billion of financing (European Commission 2020b).

**Coronavirus Response Investment Initiative:** This initiative, likewise announced on March 13, 2020, provides EUR 37 billion to be spent immediately on healthcare, SMEs, and short time work schemes. This money has not yet been spent under the Multiannual Financial Framework (MFF) 2014–20 Cohesion policy. Moreover, the EU Solidarity Fund was announced to be extended to include health aspects. In this fund, EUR 800 million are available in 2020 (European Commission 2020c).

SURE: The instrument Support to mitigate Unemployment Risks in an Emergency (SURE) was launched to support Member States in their effort to protect jobs by funding short-time work schemes and similar measures in the form of loans of up to EUR 100 billion in total. The basis of SURE are voluntary guarantees of the Member States, depending on their respective relative share of the EU’s gross national income (GNI) (European Commission 2020d). In addition to this, the EU is issuing social bonds to finance SURE (European Commission 2020e). SURE was announced on April 1, 2020. It was agreed upon on April 9, 2020 as part of the EUR 540 billion rescue package (see below).

**EUR 540 billion rescue package:** On April 9, 2020 the EU Finance ministers decided on a large rescue package with a volume of EUR 540 billion. It contains EUR 240 billion, made available under the ESM, a EUR 25 billion guarantee fund that shall mobilize EUR 200 billion for SMEs by the European Investment Bank (EIB) and EUR 100 billion for SURE (Sandford 2020). All components are based on loans without any grant elements.

**French-German Initiative for the European Recovery from the coronavirus crisis:** On May 18, 2020 France and Germany made a joint proposal for different policy measures. It included a Recovery Fund of EUR 500 billion within the MFF 2021–27. This fund was proposed to provide additional EU budgetary expenditure for the sectors which are severely hit by the crisis. The proposal included the possibility for the EU to borrow on markets (German Federal Government 2020). It was the foundation of Next Generation EU (see below).

Next Generation EU: On May 27, 2020 the Commission proposed a new recovery plan – Next Generation EU. EUR 750 billion would be added to the MFF 2021–27. The plan consists of three pillars: (i) support for Member States with investments and reforms, i.e., a recovery and resilience facility, additional cohesion and agricultural spending and funds to support the transition to climate neutrality; (ii) incentives for private investments; (iii) measures preparing for future crises including a health program, a civil protection program, research in health, resilience, green and digital transformations and support for global partners. To finance the recovery plan, the own resources ceiling will be temporarily increased to 2% of the EU’s GNI to be able to borrow the EUR 750 billion on financial markets. On July 21, 2020 the European Council agreed on Next Generation EU costing EUR 750 billion and the MFF 2021–27, which both amount to EUR 1.8 trillion. The EUR 750 billion are divided into EUR 390 billion to be paid out as grants and EUR 360 billion in the form of loans. The repayment is scheduled until the end of 2058 (European Commission 2020f; European Commission 2020g). On May 18, 2020 the Commission proposal was discussed during a special European Council from July 17 to July 21, 2020, which ended with the EU-level agreement after four days of intense negotiations.

In our definitions of “events”, we evaluate the announcement rather than the actual implementation through asset purchases or fiscal disbursements. According to economic theory, we should expect the market reactions to occur immediately after the announcement of the total intended purchases ("stock effect") due to updated expectations among trading agents, and not of the subsequent implementation over time ("flow effect"), which does not provide any additional news. In line with this argumentation, contributions from the literature identified the announcement effects of ECB purchase programs to be responsible for the largest share of the overall program impact (Altavilla et al. 2015; Urbschat and Watzka 2020). Moreover, for the pandemic-related fiscal instruments there are very long time lags between the first announcements and the actual flow of resources. For example, the European Council reached the crucial political agreement on the NGEU package in July 2020, from which the first smaller payments are not made before mid-2021 with the bulk of money disbursed even later than 2022 (Darvas 2020).

3.2. Data on government bond spreads and policy events

This paper employs daily data on government bond yields for eleven Euro area countries (Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain). The data captures end-of-day-courses for all work-
ing days. It is fitted as a third-order polynomial yield curve of government bonds with a maturity of ten years. The largest data sample that we employ for our analysis ranges from November 2014 to October 2020.5 As the major aim of the paper is to track changes in sovereign spreads, we transform the yield data into spreads. We calculate the government bond spreads for each country by subtracting the German benchmark bond yield. This leaves us with a sample of ten countries. The composition of these countries is driven by the availability of data.

For the identification of events, we employ two main sources. Each source provides event dates on either monetary policy announcements or fiscal policy announcements. First, we scanned all ECB press releases6 concerning monetary policy decisions from 2015 onwards to identify adjustments to the key interest rates and announcements of non-standard policy measures. Included programs are the PEPP and PSPP as part of the APP as well as the various longer-term refinancing operations (LTRO, TLTRO, PELTRO). Most of the relevant policy changes are announced through the press releases and the press conferences following the regular monetary policy meetings of the ECB Governing Council. Extraordinary and urgent measures, such as the introduction of the PEPP, are usually published in additional press releases. Second, for comparing effects of monetary policy decisions to fiscal policy decisions, we handpicked announcements of measures to fight the impact of the COVID-19 pandemic taken by the EU. A timeline of EU actions was published by the European Commission on their website and serves as the second main source for events.7 From this list, we selected all announcements concerning the implementation of innovative fiscal instruments and new joint debt instruments.

A potential concern regarding the use of these monetary and fiscal policy announcements in the pandemic is that they might contain only little new information to market participants as the debates and negotiations before such important European decisions are usually well covered in the media. Important for our comparative study on fiscal and monetary events, this concern is not fundamentally different for monetary and fiscal policy announcements since for both players’ decisions usually follow a public debate. The final decisions taken both in the ECB Council on monetary policy and in the European Council on new European fiscal tools are just the last steps of reflection phases that are to a large extent public and extensively covered by financial media. Moreover, we are confident that the news character of important announcements on pandemic crisis tools is still sufficient for a meaningful event analysis. The pandemic shock was unprecedented so that no ready-to-use policy recipes were available. This necessarily created a large market uncertainty on the path of European monetary and fiscal policy. The difficulties to predict ECB and EU policy measures was also confirmed by swift changes in the political positions of some of the leading actors during the unfolding crisis and the large controversies on the right approaches prevailing just until the moment of the final decisions as we describe in the following.

A first example on swift and surprising changes in positions relates to monetary policy. In March 2020 President Christine Lagarde first positioned herself against the idea that the ECB should focus on spread compression (“Lagarde gaffe”) and corrected herself within a few days. In the Q&A session following the ECB press conference on 12 March 2020, Lagarde was asked about possible ECB reactions to an increase of spreads. Her answer was: “Well, we will be there, as I said earlier on, using full flexibility, but we are not here to close spreads. This is not the function or the mission of the ECB. There are other tools for that, and there are other actors to actually deal with those issues” (ECB 2020c). She thus rebuffed the possible market expectation that the ECB would be ready to use monetary policy instruments to dampen spreads. Just six days later, on 18 March 2020, the ECB Governing Council established the PEPP as a new flexible instrument for sovereign bond purchases with exactly the purpose to counteract rising spreads. A second example for a clear surprise relates to fiscal policy and the position of one of the crucial veto players: Over the first months of the pandemic, the German Chancellor Angela Merkel had stuck to the traditional German rejection of “Eurobonds”, i.e., new European debt instruments based on joint European liability. Confronted with calls from the Italian public to accept “Coronabonds”, still in April 2020, Merkel publicly rejected calls for jointly guaranteed European debt.7 Against this seemingly firm resistance of the German government fully consistent with the country’s traditional position, the German-French proposal in May must be seen as a surprising turning point. But even then, the way towards the political agreement of the European Council on NGEU in July was paved with obstacles and large controversies. Prominent resistance against the French-German proposal came from the country group of the so-called ‘frugal four’ (Austria, Finland, the Netherlands, and Sweden, see Bilbiie et al. 2021), each single government with veto power in the final decision. In fact, the news surrounding the final summit from July 17 to July 21 suggest that not only the content of the proposal and the size of the budget were still extensively discussed but also that the summit’s success was uncertain until the very end. It was only in the evening of the day before the official announcement when crucial breakthroughs regarding the new joint debt instrument and the rule of law conditionality were achieved.

Hence, overall, we are confident that the crucial monetary and fiscal policy announcements and decisions in the Covid-19 pandemic had a significant news character. However, we further deal with the possibility that some of our events might have

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4 Data on bond yields is taken from Datastream and is available from 1996 onwards (see https://www.refinitiv.com/en/products/datastream-macroeconomic-analysis). We restrict the sample period because of our selection of events, the first event being observed in 2015.

5 ECB press releases: https://www.ecb.europa.eu/press/pr/activities/mopo/html/index.en.html.

6 EU actions: https://ec.europa.eu/info/live-work-travel-eu/coronavirus-response/timeline-eu-action_en.

7 On Merkel’s rejection of “Coronabonds”, see, e.g., FAZ (20/04/2020), http://www.faz.net/aktuell/wirtschaft/vor- eu-sipfel-merkel-lehnt-eurobonds-ab-16733345.html.

8 On the French-German proposal and the European Commission proposal, see, e.g., The Guardian (26/05/2020), https://www.theguardian.com/world/2020/may/26/franco-german-plan-for-european-recovery-will-face-com-promises), politico (27/05/2020), https://www.politico.eu/article/hurz-cautious-on-commissions-750b-recovery-blueprint-coronavirus-covid19-nff-budget/), politico (28/05/2020, https://www.politico.eu/article/recovery-fund-everything-depends-on-what-happens-next/).
have been less surprising than others and complement our empirical strategy by an extension that looks at those events separately that were arguably the most surprising ones (Section 4.3).

As we are interested in the average effect of different types of monetary and fiscal interventions, we classify events and assign instrument-specific dummies for announcements that relate to the same classification of instrument.\(^9\) For example, as shown in Table 1, there were two ECB announcements regarding the PEPP, first at its implementation (March 18, 2020) and second on the increase of its envelope (June 4, 2020). We use one single dummy named “PEPP expansion”, which is equal to 1 on these two dates and 0 otherwise. By doing so, we identify an overall number of five monetary policy event dummies as shown in Table 1. These capture twelve event dates on which one or more policy announcements were made. In addition, we include two fiscal policy event dummies, capturing eight announcements. The two distinct fiscal dummies refer to the crisis-related relaxation of EU fiscal rules and the establishment of new European financial instruments that provide financial resources to Member States. For the latter we further distinguish between NGEU assistance and the other instruments, which do not entail a transfer component. We follow Fendel and Neugebauer (2020) and do not weigh the events such that each event is considered equally relevant.

### 3.3. Identification and estimation

To estimate the effects of the EU monetary and fiscal policy announcements on government bond spreads of selected EU countries we first employ a panel regression. As our main specification, we estimate the following event-based model:

\[
\Delta y_{i,t} = \alpha + \beta_1 \text{Event}_t + \beta_2 \Delta y_{i,t-1} + \beta_3 \Delta \text{Corp.spread}_t + \beta_4 \Delta \text{CESI}_t + \alpha_i + \varepsilon_{i,t},
\]

\(^9\) The alternative would be to include dummies for every single event rather than grouping the announcements by policy program. We make use of a similar approach in a small excursion when analyzing the changing effects of the PSPP over the considered period.
where \( y_{it} \) is the government bond spread in country \( i \) on day \( t \) with \( i = 1, \ldots, 10 \) (ten countries relative to Germany) and \( t = 1, \ldots, 2189 \) (with November 3, 2014 being the first and October 30, 2020 being the last trading day in the longest sample). Our main variable of interest is \( \text{Event} \), which denotes all events of a certain event group as a dummy. Fig. 1 in the introduction plots the country-specific spreads and suggests that the data is non-stationary. A unit root test for panel data, proposed by Levin et al. (2002), confirms this speculation. We therefore use first differences of the data (denoted by \( \Delta \)).

To control for other factors affecting government bond spreads, we include three commonly employed control variables. First, as yield changes are likely to depend on previous changes, we include the government bond spread with a lag of one day (Urbschat and Watzka 2020). Second, the corporate bond spread is included to capture general risk sensitivity in the euro area. We follow Eser and Schwaab (2016) and define the corporate bond spread as the difference between BBB and AAA rated corporate bond yields to maturity of bonds with a maturity of ten and more years, covering the whole euro area. Third, to control for macroeconomic surprises other than announcements of monetary or fiscal policy measures, we make use of the Citigroup Economic Surprise Index (CESI) (Fendel and Neugebauer 2020). The CESI index is calculated on a daily basis as a rolling average over the last three months and captures unexpected changes in a series of economic indicators. Summary statistics for all variables are reported in Table A1 in the Appendix.

Finally, we include country fixed effects (\( \gamma_i \)) to control for unobserved country characteristics. In our baseline specification we also include working-day fixed effects (\( \delta_d \)) to allow for a possible weekly pattern in trading activities and price movements (Szczepanowicz 2015). Moreover, to specify a meaningful comparison period, we restrict the sample period in a way that the sample starts two months before the first event in each event group. Hence, the sample for the monetary policy events starts on 01/11/2014 as the first announcement is observed for 22/01/2015. The fiscal policy events took place much later in 2020. Their sample starts in December 2019. Further robustness checks in Section 4.2 show how differences in the definition of the sample period affect the conclusion regarding the announcement impacts of some event types. This concerns in particular the interest rate decreases, (T)LTROs, and PSPP expansions. Their impact changes over the years and the results speak for an equalizing effect on sovereign spreads only in the earlier years of the ECB programs. In all regressions, we use robust standard errors.

In a second step, we estimate the effects for every single country using the following model:

\[
\Delta y_{it} = \alpha + \beta_1 \text{Event}_{it} + \beta_2 \Delta y_{it-1} + \beta_3 \Delta CESI_t + \beta_4 \Delta corp \text{spread}_t + \gamma_i + \delta_d + \epsilon_{it}.
\]

An augmented Dickey-Fuller test suggests that the country-specific data is non-stationary such that we again use first differences. The separate regressions for each country include the same control variables as our panel regression except the country fixed effects.

4. Results

4.1. Baseline panel regressions

Table 2 shows the main results from the panel model in Equation (1). We discuss the results separately for each event group (i.e., monetary policies and fiscal policies).

**Monetary policy events** For the conventional monetary policy instruments in the first two columns of the table, we find rather small and statistically insignificant announcement effects on government spreads of the selected group of EU countries. Contrary to expectations, the announcements of longer-term refinancing operations even tend to have a positive effect on the sovereign spreads. The results regarding the non-standard monetary policies in columns (3) to (6) are more in line with expectations. Here, we further categorize the events and differentiate between expansionary and restrictive monetary policy announcements. As shown in column (3) of Table 2, announcements to expand the ECB’s purchase programs tend to have a negative effect on government spreads. However, this effect is solely driven by the new PEPP, for which we estimate an effect with high statistical significance. The announcement of a PEPP expansion correlates with an average reduction of government bond spreads by 6.6 basis points. The effect appears to be small but it represents an average effect across all countries including those with a top credit rating. We turn to the country-specific effects below. The PSPP also appears to affect sovereign yields with the expected sign, at least when pre-pandemic reductions in purchase volumes are taken into consideration, as shown in column (6). The result that the PSPP’s yield-compressing effect is more pronounced than for the PSPP is equally in line with our expectations. The PEPP as the less constrained program can provide a more targeted support to specific countries with weak fiscal fundamentals and is thus more effective to decrease spreads.

**Fiscal policy events** Turning to the fiscal policy announcements, the estimated coefficients for the two event dummies that capture the relaxation of EU fiscal rules and the various EU fiscal packages to fight the economic consequences of

10 More precisely, the index is calculated as the difference between the released economic indicators and the respective Bloomberg survey median (to capture market expectations). The individual economic indicators (e.g., GDP, manufacturing production, retail sales, purchasing manager index, private sector credit, unemployment, or fiscal balance) are weighted using their announcement impact on exchange rates in the past. In addition, data points from the more distant past receive smaller weights. The mechanics of the index are such that a value above (below) zero marks a more positive (negative) realization of the economic indicators, relative to consensus expectations (Maveé et al. 2016).

11 An exception is the monetary policy program PEPP, which was announced only in 2020. The baseline results for this policy measure are based on a sample starting on 01/01/2020.
the COVID-19 pandemic exhibit different signs. As expected, the announcements of fiscal support measures correlate with a reduction in sovereign spreads even though this effect is rather small and statistically insignificant for the combination of all announced fiscal crisis measures (encompassing the various measures like EIB, SURE, and NGEU support). As explained above (3.1) we would expect a particularly strong effect from NGEU as this is not only the largest but also the only fiscal tool that includes a significant transfer component. For this reason, we separately estimate the announcement effect for NGEU. These results in column (8) of Table 2 show that the Next Generation effect, in contrast to the insignificant combined fiscal events, is measured with statistical precision. Events such as the Commission Proposal or the European Council agreement on NGEU, on average, reduce the spreads by 2.7 basis points. Importantly, even this effect does not at all reach the magnitude of the PEPP announcement effect. The NGEU effect is less than half as large as the PEPP effect. Turning to our second type of fiscal events that cover relaxations of EU fiscal rules we find a spread increasing effect, albeit with marginal significance. Hence, we find weak evidence that the activation of the escape clause is taken as rather unfavorable news for these countries’ fiscal reputation.

Overall, we observe statistically significant coefficient estimates for the PEPP and much smaller but also statistically significant effects for NGEU. In contrast the relaxation of EU fiscal rules function as the benchmark. Robust standard errors in parentheses. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.

4.2. Robustness checks

To test the sensitivity of the main results in Table 2, we present two types of robustness checks. The first one addresses the concern that differences in the sample periods might have an effect on the results. The announcement of a monetary or fiscal policy might have a different effect, depending on the fiscal and economic environment in which it is made. In line with this view, the existing literature identifies a higher effectiveness of central bank asset purchases in environments with particularly high sovereign risk (Altavilla et al. 2015). We therefore re-estimate the models and shorten the sample period for the monetary policy announcements to align it with the sample period for the fiscal policy events and vice versa.

12 We also consider the possibility that, with a long time period and the natural trends in sovereign spreads which are unrelated to the events, the models might mistakenly pick up such trends as an event effect. To address this concern, we estimate an alternative model specification which includes working-day times year fixed effects to preclude the possibility. The results are robust to this adjustment and are available upon request.

Table 2
Panel regressions.

| Event | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Event | Interest rate decrease | Monetary policy events | Fiscal policy events | EU fiscal corona packages | Relaxation of EU fiscal rules |
| ** Constant | -0.0066 | 0.0150 | -0.0112 | 0.0133 | -0.0067*** | 0.0212** | -0.0114 | -0.026*** | 0.0315* |
| Lagged government bond spread | 0.0598 | 0.0599 | 0.0579 | 0.0599 | -0.0014 | 0.0598 | 
| Economic surprise index (CESI) | Economic surprise index (CESI) | Economic surprise index (CESI) | Economic surprise index (CESI) | Economic surprise index (CESI) | Economic surprise index (CESI) | Economic surprise index (CESI) |
| Corporate bond spread | Corporate bond spread | Corporate bond spread | Corporate bond spread | Corporate bond spread | Corporate bond spread | Corporate bond spread | Corporate bond spread | Corporate bond spread |
| Constant | -0.0006 | -0.0007 | -0.0006 | -0.0007 | -0.0005 | -0.0007 | -0.0010 | -0.0009 | -0.0015 |
| Observations | 15,650 | 15,650 | 15,650 | 15,650 | 15,650 | 15,650 | 15,650 | 15,650 | 15,650 |
| Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared | Adjusted R-squared |
| Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects | Country fixed effects |
| Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects | Working-day fixed effects |

Dependent variable: government bond spread

Notes: OLS regressions. Results correspond to Equation (1). The dependent variable captures the government bond spread of ten euro area countries with the German spread functioning as the benchmark. Robust standard errors in parentheses. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.
This assures that our evaluation of the effectiveness of EU monetary vs. fiscal policy is based on the same sample period, which levels the playing field. Importantly, a coefficient can only be estimated if an announcement concerning a certain policy program was made during the respective sample period. For example, there were neither interest rate nor PSPP reductions in or after December 2019, such that Panel (a) of Fig. 2 only contains coefficients for the longer sample period for these policy decisions.

As Panel (a) of Fig. 2 shows, aligning the underlying sample periods has relatively little impact on most coefficient estimates. Surprisingly, however, we estimate very large and statistically significant positive effects of (T)LTROs and PSPP expansions when reducing the sample period to the later years. This result stands in contrast to findings from the previous literature which documents a negative effect of both programs on sovereign spreads (see, e.g., Szczerbowicz (2015) for LTRO effects and Altavilla et al. (2015) and Urbschat and Watzka (2020) for effects of the PSPP/APP). However, these contributions only use data on policy announcements until mid-2016. Most importantly, the robustness check confirms the finding that, among the various instruments, it is the PEPP, which most clearly has reduced sovereign spreads. To explore whether the unexpected positive effects from PSPP and (T)LTROs is specific for the crisis environment of the COVID-19 pandemic, Panel (b) of Fig. 2 estimates the effect of (T)LTRO and PSPP expansion announcements before 2020 and in 2020 separately. The results show that the average positive effect of both programs is driven by 2020 announcements. From a market perspective, the fact that the PSPP (and (T)LTRO) announcements had a positive effect on sovereign bond spreads in the evolving pandemic is consistent with a view that markets were disappointed by these measures. In this regard, the results seem to be a confirmation of our hypothesis that the different rules of the PSPP and PEPP should be important (Havlik and Heinemann, 2021). For the PSPP, the ECB Council is committed to allocating purchases across euro countries according to the ECB capital key whereas the PEPP has a high flexibility. However, some caution is required for this specific finding. We only observe the 2020 PSPP expansion decision from 12 March 2020 in combination with the “Lagarde gaffe” (see Section 3.2) that occurred on the same day. Hence we cannot identify a pure PSPP expansion effect. We explore the “Lagarde gaffe” more extensively in Section 4.3 below.

As a second robustness test, we study the announcement effects for alternative definitions of the event windows. We follow the existing literature and consider potential lagged effects of policy announcements (e.g., Fendel and Neugebauer 2020) as well as an extended event window of two days rather than just taking into account the day of the announcement itself. A number of possible reasons could explain the existence of lagged announcement effects. These include: (i) slow market reactions (a relevant group among investors are pension funds and insurance companies who might first need to get official approval for adjustments to their portfolio), (ii) events taking place later in the day such that end-of-the-day courses do not yet fully capture the change in expectations or (iii) a time lag due to the delayed dissemination of the announcements via the media which takes some time.

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12 We also consider the possibility that, with a long time period and the natural trends in sovereign spreads which are unrelated to the events, the models might mistakenly pick up such trends as an event effect. To address this concern, we estimate an alternative model specification which includes working-day times year fixed effects to preclude the possibility. The results are robust to this adjustment and are available upon request.
Fig. 3 replicates the previous results based on event dummies equal to 1 on the day of a policy announcement and 0 otherwise (baseline effect). In addition to this, the figure plots the coefficient estimates when using a lagged event dummy to show market reactions one day after the announcement (delayed effect). Finally, it shows the combined effect of the announcement day and the day after (2 day event window). Similar to Fendel und Neugebauer (2020), we find slightly stronger market reactions for government bonds one day after an announcement for most policy programs. This indicates that there is a rather slow reaction of market participants. Overall, the previous conclusions are confirmed. Yet, in the more complete picture of Fig. 3, the positive coefficient for the dummy that captures the relaxation of EU fiscal rules is now larger than in the preceding regressions and also statistically significant at conventional levels (when taking into account market reactions one day after an announcement). Nevertheless, when it comes to our key question of the pandemic fiscal and monetary policy measures and their relative importance, the finding of a larger importance of the PEPP is even strengthened. For the extended event window of two days, we find a larger and statistically highly significant negative effect for the PEPP, associated with an average reduction in the spreads of 12.2 basis points (18.0 basis points for the day after the announcement). The much smaller effect of NGEU is robust but it does not increase with the extension of the event window.

4.3. Extensions and by-country analysis

In this section, we consider three conceptual extensions to the previous analysis by (i) separately studying events that can be considered particularly surprising, by (ii) considering the effects separately for core vs. periphery countries, and by (iii) analyzing heterogeneous effects with respect to single countries.

The first extension sheds light on events and announcement that were arguably more surprising than others. For monetary policy, we look at the first PEPP announcement and the later PEPP increase separately with the presumption that the start of the program was less predictable than the later increase of the purchase envelope. In addition, we exploit the “Lagarde gaffe” described above (see Section 3.2). The spread reaction to this incident, when the ECB President rejected the central bank’s responsibility for sovereign spreads, serves as another (negative) test to which extent ECB PEPP support has been crucial for the reduction of spreads. For fiscal policy, we distinguish between the three NGEU events to allow for the possibility that one of the three announcements (French-German proposal in mid-May, Commission proposal end of May, Council agreement in July) was particularly surprising. Fig. 4 confirms that some of the separate events had more pronounced impacts than others. Among the fiscal events, the French-German proposal (−5.7 basis points) showed the strongest effect. Among the monetary events, the Lagarde gaffe (+16.0 basis points) and the PEPP launch (−10.3 basis points) show much stronger effects than the increase of the PEPP envelope. While effect sizes increase compared to the average fiscal and monetary effects measured in the preceding section, PEPP support is still associated with a much larger spread reduction compared to NGEU support.

Fig. 3. Delayed effects of policy announcements?. Notes: Coefficient estimates and 95% confidence intervals for each event type. Results correspond to Equation (1) (baseline effect). Coefficient estimates in red and green are based on the same model but with a different coding of events. First, the event dummy is replaced by a dummy equal to 1 one day after the announcement (delayed effect). The second alternative coding uses a two-day event window such that the event dummy is equal to 1 for the day of the announcement and the day after. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

13 We owe the idea for this extension an anonymous reviewer.
The second extension investigates whether the effect size differs by the fiscal strength of a country. As hypothesized above (3.1), countries with a lower borrower reputation are likely to experience a larger reduction in sovereign spreads after an expansionary monetary or fiscal support announcement. We distinguish countries on the basis of their credit ratings. We compare countries that receive an “Aa” rating (Moody’s) or better (Austria, Belgium, Finland, France, Netherlands) to periphery countries with a rating “A” or worse (Greece, Italy, Spain, Portugal, Ireland). Fig. 5 documents the results. In line with expectations, expansionary policy measures correlate in particular with a reduction in government bond spreads for the less solvent countries. The coefficients for the PEPP expansions and NGEU announcements are particularly large and negative in

Fig. 4. Event effects for announcements with a strong surprise factor. Notes: Coefficient estimates and 95% confidence intervals for each event (group). Results correspond to Equation (1) and are based on the sample starting on December 1, 2019. Coefficients in blue represent results that have already been discussed in the context of the preceding tables and figures. Coefficient estimates in red represent newly added events (i.e., Lagarde “gaffe” from March 12, 2020) or consider the individual events of an event group (i.e., PEPP and NGEU) separately to shed light on the drivers of the average event group effects. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Fig. 5. Event effects by country groups (core vs. periphery countries). Notes: Coefficient estimates and 95% confidence intervals for each event type. Results correspond to Equation (1) but show the event effect separately for (i) all 10 countries, (ii) the periphery countries (Spain, Greece, Ireland, Italy, Portugal), and (iii) the core countries (Austria, Belgium, Finland, France, the Netherlands).

The second extension investigates whether the effect size differs by the fiscal strength of a country. As hypothesized above (3.1), countries with a lower borrower reputation are likely to experience a larger reduction in sovereign spreads after an expansionary monetary or fiscal support announcement. We distinguish countries on the basis of their credit ratings. We compare the core countries that receive an “Aa” rating (Moody’s) or better (Austria, Belgium, Finland, France, Netherlands) to periphery countries with a rating “A” or worse (Greece, Italy, Spain, Portugal, Ireland). Fig. 5 documents the results. In line with expectations, expansionary policy measures correlate in particular with a reduction in government bond spreads for the less solvent countries. The coefficients for the PEPP expansions and NGEU announcements are particularly large and negative in

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14 Historical government bond ratings from Moody’s can be found under the following link (registration required): https://www.moodys.com/researchandratings/market-segment/sovereign-supranational/-/0050057?ib=0&type=Methodology.
this group of countries. Somewhat unexpected, a relaxation of EU fiscal rules is a particularly unfavorable message for the group of core countries, possibly because they gain more fiscal freedom to take on new debt compared to already highly-indebted countries with limited capacities to incur much further debt on the market.

As a third and final extension, we consider the announcement effects on the individual countries’ spreads (Tables 3–6). They confirm the large empirical relevance of the PEPP, the smaller effect of NGEU, and the disinterest of market participants in the European fiscal rescue announcements, which do not include a significant transfer component. However, the separate

| Table 3 | Country-specific effects – PEPP expansion. |
|---------|------------------------------------------|
| **Dependent variable: Government bond spread** |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Core countries** | Austria | Belgium | Finland | France | Netherlands | Spain | Greece | Ireland | Italy | Portugal |
| PEPP expansion | 0.0735** | -0.0202** | -0.0383*** | -0.0787** | -0.0290 | -0.0602*** | 0.0035 | -0.0667*** | -0.1685*** | -0.0713*** |
| Constant | -0.0340 | 0.0098 | -0.0086 | 0.0053 | -0.0256 | -0.0021 | -0.0104* | -0.0001 | -0.0157 | 0.0026 |
| Observations | 218 | 218 | 218 | 218 | 218 | 218 | 218 | 218 | 218 | 218 |
| Adjusted R-squared | 0.1430 | 0.0015 | 0.0006 | 0.0021 | 0.0023 | 0.0023 | 0.0054 | 0.055 | 0.0177 | 0.0030 |

| Control variables | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Working-day fixed effects | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. ** p < 0.01, * p < 0.1.

| Table 4 | Country-specific effects – EU fiscal corona packages. |
|---------|------------------------------------------|
| **Dependent variable: Government bond spread** |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Core countries** | Austria | Belgium | Finland | France | Netherlands | Spain | Greece | Ireland | Italy | Portugal |
| EU fiscal corona packages | -0.0075 | -0.0028 | 0.0241 | -0.0017 | 0.0120 | -0.0195 | 0.0290 | 0.0022 | -0.0616 | -0.0268 |
| Constant | 0.0135** | -0.0013 | -0.0009 | 0.0017 | -0.0100** | -0.0007 | 0.0103 | 0.0009 | 0.0052 | 0.0013 |
| Observations | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| Adjusted R-squared | 0.1219 | 0.0327 | 0.0943 | 0.0509 | 0.0592 | 0.0699 | 0.0560 | 0.0868 | 0.0312 | 0.0837 |

| Control variables | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Working-day fixed effects | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. ** p < 0.01, * p < 0.1.

| Table 5 | Country-specific effects – NGEU. |
|---------|------------------------------------------|
| **Dependent variable: Government bond spread** |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Core countries** | Austria | Belgium | Finland | France | Netherlands | Spain | Greece | Ireland | Italy | Portugal |
| NGEU | -0.0093 | -0.0128 | -0.0014 | -0.0098 | -0.0004 | -0.0407** | -0.0534** | -0.0098 | -0.0872 | -0.0417** |
| Constant | 0.0135** | -0.0011 | -0.0003 | 0.0019 | -0.0097* | -0.0005 | 0.0123 | -0.0006 | 0.0056 | 0.0015 |
| Observations | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| Adjusted R-squared | 0.1218 | 0.0358 | 0.0458 | 0.0531 | 0.0558 | 0.0750 | 0.0569 | 0.0886 | 0.0316 | 0.0853 |

| Control variables | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Working-day fixed effects | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. ** p < 0.01, * p < 0.1.
country regressions reveal a particularly strong PEPP effect for Italy (16.9 basis points) which is more than double of other larger country effect sizes. NGEU had the largest effect on Spain (4.1 basis points), Portugal (4.2 basis points), and Greece (5.3 basis points) as shown in Table 5.

The relaxation of EU fiscal rules exhibits a robust positive effect, in particular for the group of core countries. However, the largest coefficient is observed for Greece. To rationalize this finding, one might argue that market participants demand a particularly high risk premium on Greek government bonds when this highly indebted country faces a reduction in the incentives for fiscal discipline. As the coefficient for Greece is only statistically significant at the 10 percent level, this result should, however, be interpreted with caution.

The results for the other event dummies are provided in Tables A2–A6 in the Appendix and confirm the previous results.

### 5. Discussion

European emergency measures have so far successfully contributed to shielding euro sovereign markets against another downward spiral of rising spreads and increasing market panics. However, our results suggest that the instruments differ in their effectiveness. For the fiscal instruments, our results point to a fundamental difference between mere loan instruments (SURE, EIB, ESM) and NGEU which entails transfers. Only for the NGEU-related announcements, our method is able to detect a significant spread compressing effect. This indicates that a fiscal liquidity support without a significant redistributive element is not sufficient to restore market confidence in high-debt borrowers when they fall victim to a serious solvency shock.

A second key result is that monetary policy appears to be more powerful in the crisis environment of the pandemic compared even to the strongest type of fiscal instruments. The ECB’s announcements on its pandemic emergency measures have been associated with much more noticeable coefficients, indicating an instantaneous and sizeable spread compression. The single country regressions reveal that this asymmetry holds for Italy in particular where only the PEPP but not NGEU is associated with a significant spread compression effect. Overall, measurable monetary policy effects on spreads are largely limited to the PEPP, whereas interest rate decisions and longer-term refinancing operations did not trigger any noticeable reactions in the relative pricing of sovereign bond market segments over the considered period November 2014 to October 2020.

Fiscal announcements on a temporary relaxation of European fiscal rules through the activation of the emergency-escape clause under the Stability and Growth Pact do not contribute to a more optimistic outlook on fiscal sustainability. If anything, these announcements are taken as bad news and are associated with rising spreads. However, this effect is only statistically significant for the more solvent countries or an extended event window of two days.

We must emphasize two caveats. A first one is typical for almost any event study. It can rarely be fully excluded that there is a downward bias in the measurement of effect sizes because the events may have been anticipated to some extent. As extensively explained above (see Section 3.2) there are good arguments that at least some of our events involved substantial news to the markets. However, depending on whether monetary or fiscal decisions were better predictable this could have an impact on the relative effect sizes. A second caveat relates to the sequence of major events. In the early phase of the Covid-19 pandemic, monetary policy came first with the PEPP, all other major fiscal rescue decisions came second, after the PEPP announcement. Hence, we can only observe the impact of fiscal news in an environment that already benefited from the stabilizing effects of PEPP beforehand. It may well be the case that the spread reducing effects of the fiscal measures would have been larger in the counterfactual situation in the absence of monetary policy support.\(^ {15} \)

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15 The sequence was reversed during the euro area debt crisis 2010/12 when fiscal policy came first (with the coordinated loan packages already starting in 2010) and monetary policy second (with Draghi’s “whatever it takes” and the OMT program only after more than two years of crisis, in August/September 2012). Also with this sequence, it was clearly monetary policy with the OMT that led to a stabilization of spreads while the earlier fiscal tools proved largely ineffective. This could be seen as supportive evidence that our finding might be robust to the sequence. However, NGEU support with its large transfer elements is qualitatively different to the loan packages of 2010/12 so that comparability between both crisis eras is limited.

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### Table 6

| Dependent variable: Government bond spread |
|--------------------------------------------|
|                                            |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Country                        | Core countries | Periphery countries |
| Relaxation of EU fiscal rules  | Austria (0.0070) | Belgium (0.0241) | Finland (0.0115) | France (0.0162) | Netherlands (0.0065) | Spain (0.0390) | Greece (0.0785) | Ireland (0.0313) | Italy (0.0446) | Portugal (0.0432) |
| Strongest PEPP                 | 0.0662***  | 0.0368    | 0.0810***  | 0.0130    | 0.0667***  | 0.0900    | 0.1365***  | 0.0276    | -0.0615   | -0.0311   |
| Control variables              | 0.0134**   | -0.0013   | -0.0005   | 0.0017    | -0.0095*   | -0.0014   | 0.0112    | -0.0008   | 0.0035    | 0.0005    |
| Adjusted R-squared             | 0.1412    | 0.0507    | 0.2098    | 0.0534    | 0.0896    | 0.0659    | 0.0624    | 0.0965    | 0.0249    | 0.0804    |
| Working-day fixed effects      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      | ✔✔✔✔      |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.
However, key results from our analysis that compare the effectiveness of different instruments within the fiscal and monetary arsenals remain valid even if in light of this sequencing issue. First, for European fiscal policy tools to effectively stabilize spreads our results indicate that they must go beyond liquidity support (as provided through the loan facilities from the ESM, EIB, or SURE). If a European fiscal union wants to dispel the shadow of fiscal dominance our results therefore call for a significant transfer element like it is included in NGEU. Second, and with reference to monetary policy, neither conventional tools nor asset purchases as such seem to be reliable instruments for spread containment in a crisis environment. According to our results, only an instrument like PEPP that explicitly resorts to a large flexibility including disproportionate purchases of high-debt countries’ bonds limits the increase of spreads in a reliable way. Overall, these findings have some implications for the ongoing debate on a viable institutional set-up for the euro area. It seems that in the case of new economic shocks, Europe could face the choice between an even more ambitious fiscal union including significant transfers or the conduct of monetary policy that employs increasingly asymmetric sovereign purchases.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

Table A1
Summary statistics.

| Variable | Description | N   | Mean     | SD     | Min     | Max     | Relevant datastream mnemonic |
|----------|-------------|-----|----------|--------|---------|---------|------------------------------|
| Panel sample |             |     |          |        |         |         |                              |
| Δyt      | Ten-year government bond yield spread against German bond (3rd-order polynomial yield curve, first difference) | 15.650 | 1.3129   | 1.9318 | 0.0324  | 18.5483 |                              |
| Δyt-1    | One day lag of Δyt | 15.650 | -0.0006  | 0.0911 | -5.4185 | 3.3286  |                              |
| ΔCESt    | Citi Bank Economic Surprise Index | 15.650 | 0.0866   | 8.2635 | -170.3000 | 89,9000 |                              |
| ΔCorp_spreadt | Corporate bond spread (difference between BBB and AAA rated corporate bonds) | 15.650 | 0.0002   | 0.0194 | 0.2070  | 0.1560  |                              |

Single countries samples

| Variable | Description | N   | Mean     | SD     | Min     | Max     | Relevant datastream mnemonic |
|----------|-------------|-----|----------|--------|---------|---------|------------------------------|
| Δyt,AT   | Δyt for Austria | 1.565 | 0.0000   | 0.0223 | -0.1693 | 0.1656  | GVOE03(CM10)                  |
| Δyt,BE   | Δyt for Belgium | 1.565 | -0.0001  | 0.0186 | -0.1542 | 0.1484  | GVBG03(CM10)                  |
| Δyt,FI   | Δyt for Finland | 1.565 | 0.0000   | 0.0130 | -0.1132 | 0.1357  | GVFN03(CM10)                  |
| Δyt,FR   | Δyt for France | 1.565 | 0.0000   | 0.0186 | -0.2305 | 0.1603  | GVFR03(CM10)                  |
| Δyt,NL   | Δyt for Netherlands | 1.565 | -0.0001  | 0.0182 | -0.0852 | 0.1248  | GVNL03(CM10)                  |
| Δyt,ES   | Δyt for Spain | 1.565 | -0.0003  | 0.0441 | -0.3788 | 0.3264  | GVES03(CM10)                  |
| Δyt,GR   | Δyt for Greece | 1.565 | -0.0036  | 0.2642 | -5.4185 | 3.3286  | GVGR03(CM10)                  |
| Δyt,IE   | Δyt for Ireland | 1.565 | -0.0005  | 0.0267 | -0.1745 | 0.2031  | GVIR03(CM10)                  |
| Δyt,IT   | Δyt for Italy | 1.565 | -0.0001  | 0.0701 | -0.7314 | 0.6156  | GVIL03(CM10)                  |
| Δyt,PT   | Δyt for Portugal | 1.565 | -0.0013  | 0.0631 | -0.4406 | 0.4436  | GVPT03(CM10)                  |
| Δyt,1,AT | Δyt,1 for Austria | 1.565 | 0.0000   | 0.0223 | -0.1693 | 0.1484  | GVOE03(CM10)                  |
| Δyt,1,BE | Δyt,1 for Belgium | 1.565 | -0.0001  | 0.0186 | -0.1542 | 0.1484  | GVBG03(CM10)                  |
| Δyt,1,FI | Δyt,1 for Finland | 1.565 | 0.0000   | 0.0130 | -0.1132 | 0.1357  | GVFN03(CM10)                  |
| Δyt,1,FR | Δyt,1 for France | 1.565 | 0.0000   | 0.0186 | -0.2305 | 0.1603  | GVFR03(CM10)                  |
| Δyt,1,NL | Δyt,1 for Netherlands | 1.565 | -0.0001  | 0.0182 | -0.0852 | 0.1248  | GVNL03(CM10)                  |
| Δyt,1,ES | Δyt,1 for Spain | 1.565 | -0.0004  | 0.0441 | -0.3788 | 0.3264  | GVES03(CM10)                  |
| Δyt,1,GR | Δyt,1 for Greece | 1.565 | -0.0035  | 0.2643 | -5.4185 | 3.3286  | GVGR03(CM10)                  |
| Δyt,1,IE | Δyt,1 for Ireland | 1.565 | -0.0005  | 0.0267 | -0.1745 | 0.2031  | GVIR03(CM10)                  |
| Δyt,1,IT | Δyt,1 for Italy | 1.565 | -0.0002  | 0.0701 | -0.7314 | 0.6156  | GVIL03(CM10)                  |
| Δyt,1,PT | Δyt,1 for Portugal | 1.565 | -0.0013  | 0.0632 | -0.4406 | 0.4436  | GVPT03(CM10)                  |

Notes: Own calculations. Source: Datastream.
Table A2  
Country-specific effects – Interest rate decrease.

| Core countries | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Austria | Belgium | Finland | France | Netherlands | Spain | Greece | Ireland | Italy | Portugal |
| Interest rate decrease | -0.0013 | -0.0020 | -0.0104** | -0.0032 | -0.0196 | 0.0054 | -0.0146 | 0.0019 | -0.0179 | -0.0009 |
| Constant | 0.0017 | 0.0008 | -0.0002 | 0.0022* | -0.0020** | -0.0020 | 0.0299* | -0.0023 | 0.0009 | -0.0025 |
| Observations | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 |
| Adjusted R-squared | 0.0101 | 0.0439 | 0.0344 | 0.0487 | 0.0637 | 0.0568 | 0.0478 | 0.0465 | 0.0431 | 0.0747 |
| Control variables | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Working-day fixed effects | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A3  
Country-specific effects – (T)LTRO.

| Core countries | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Austria | Belgium | Finland | France | Netherlands | Spain | Greece | Ireland | Italy | Portugal |
| (T)LTRO | 0.0119 | 0.0261 | -0.0030 | 0.0308 | -0.0106 | 0.0083 | -0.0186 | 0.0078 | 0.0712 | 0.0035 |
| Constant | 0.0017 | 0.0008 | -0.0002 | 0.0022* | -0.0020** | -0.0020 | 0.0299* | -0.0023 | 0.0009 | -0.0025 |
| Observations | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 |
| Adjusted R-squared | 0.1011 | 0.0439 | 0.0344 | 0.0487 | 0.0637 | 0.0568 | 0.0478 | 0.0465 | 0.0431 | 0.0747 |
| Control variables | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Working-day fixed effects | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A4  
Country-specific effects – PSPP and PEPP expansion.

| Core countries | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Austria | Belgium | Finland | France | Netherlands | Spain | Greece | Ireland | Italy | Portugal |
| PSPP and PEPP expansion | -0.0131 | -0.0073 | -0.0177*** | -0.0029 | -0.0299** | -0.0021 | -0.0412 | -0.0111 | 0.0136 | -0.0077 |
| Constant | 0.0017 | 0.0008 | -0.0002 | 0.0022* | -0.0020** | -0.0020 | 0.0299* | -0.0023 | 0.0009 | -0.0025 |
| Observations | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 | 1565 |
| Adjusted R-squared | 0.1025 | 0.0446 | 0.0413 | 0.0488 | 0.0734 | 0.0568 | 0.0479 | 0.0472 | 0.0431 | 0.0747 |
| Control variables | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |
| Working-day fixed effects | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ | ✔ |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.
Country-specific effects – PSPP reduction.

| Core countries | Dependent variable: Government bond spread |
|----------------|------------------------------------------|
| Austria        | 0.0116                                   |
| Belgium        | 0.0217                                   |
| Finland        | -0.0094**                                |
| France         | 0.0273                                   |
| Netherlands    | -0.0320**                                |
| Periphery countries |                             |
| Spain          | 0.0190                                   |
| Greece         | 0.0217                                   |
| Italy          | 0.0320                                   |
| Portugal       | 0.0273                                   |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A6
Country-specific effects – PSPP reduction.

| Country | Dependent variable: Government bond spread |
|---------|------------------------------------------|
| Core countries |                                             |
| Austria   | -0.0053                                  |
| Belgium   | 0.0033                                   |
| Finland   | 0.0056                                   |
| France    | 0.0060                                   |
| Netherlands | 0.0159                                  |
| Periphery countries |                                      |
| Spain     | 0.0012                                   |
| Greece    | 0.0629**                                 |
| Italy     | 0.0253                                   |
| Portugal  | 0.0113                                   |

Notes: OLS regressions. Results correspond to Equation (2). Robust standard errors in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

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