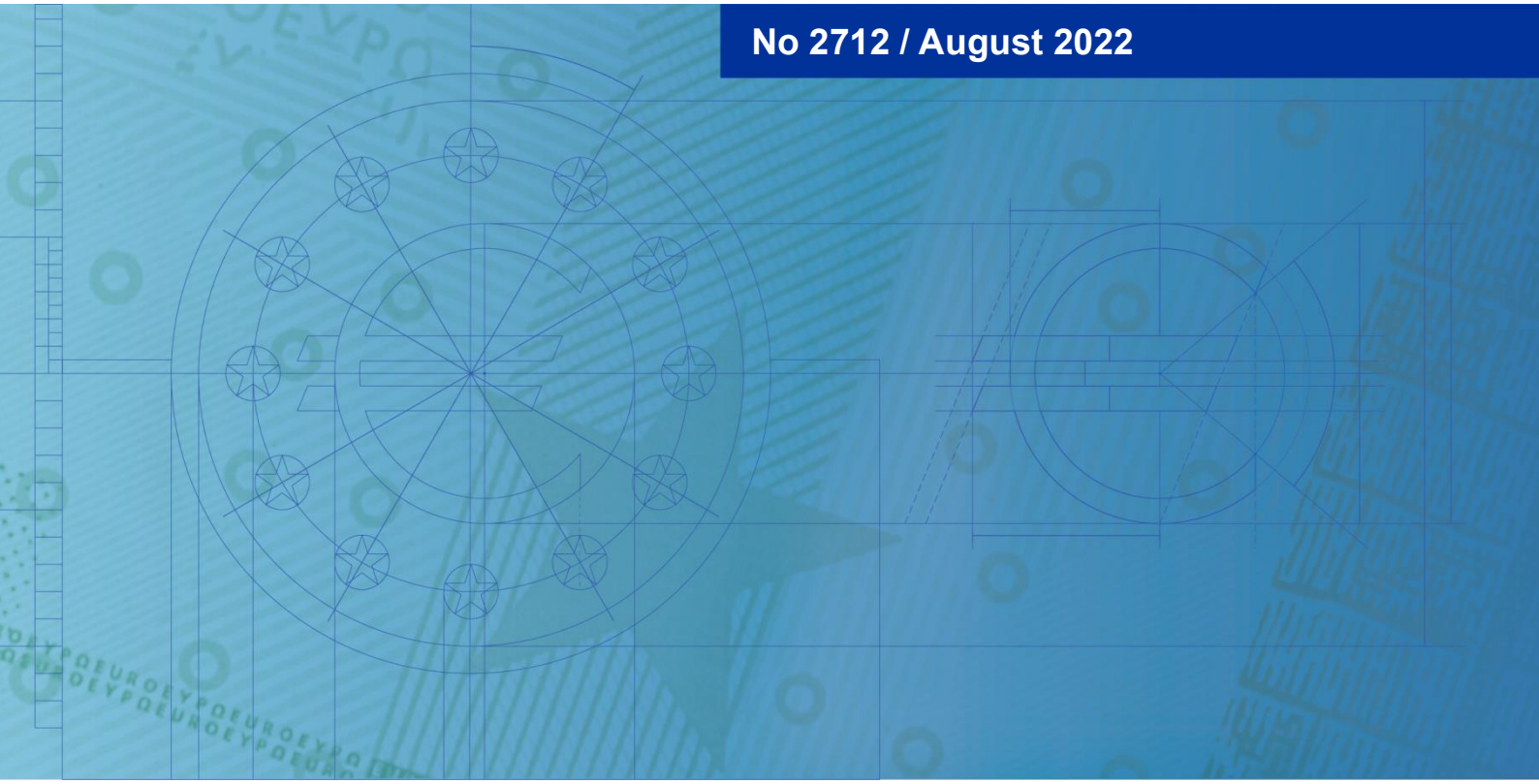
EUROPEAN CENTRAL BANK
EUROSYSTEM

Working Paper Series

Tilman Bletzinger, William Greif, Bernd Schwaab

Can EU bonds serve as euro-denominated safe assets?

No 2712 / August 2022



Abstract

A safe asset is of high credit quality, retains its value in bad times, and is traded in liquid markets. We show that bonds issued by the European Union (EU) are widely considered to be of high credit quality, and that their yield spread over German Bunds remained contained during the 2020 Covid-19 pandemic recession. Recent issuances and taps under the EU's SURE and NGEU initiatives helped improve EU bonds' market liquidity from previously low levels, also reducing liquidity risk premia. Eurosystem purchases and holdings of EU bonds did not impair market liquidity. Currently, one obstacle to EU bonds achieving a genuine euro-denominated safe asset status, approaching that of Bunds, lies in the one-off, time-limited nature of the EU's Covid-19-related policy responses.

JEL Classification: E58, G12, H63.

Keywords: European Central Bank, European Union, EU-issued bonds, NextGenerationEU (NGEU), market liquidity, Pandemic Emergency Purchase Programme (PEPP).

Non-technical summary

Modern financial systems rely on safe assets that are characterized by three aspects: quality, robustness, and liquidity. When compared to the United States, the market for euro-denominated safe assets is not only small, but also fragmented across different sub-markets. In light of this shortage and fragmentation, this article studies the quickly growing market of EU-issued bonds, with a view to assessing their prospects for ultimately becoming a genuine euro-denominated safe asset.

We highlight the following empirical findings: (i) EU bonds are widely considered by market participants as low in default risk, even though rating agencies have disagreed somewhat on the extent to which EU bonds are entirely default risk free. (ii) EU-Bund yield spreads remained contained during the Covid-19 pandemic recession, suggesting robustness to market downturns. (iii) Before the issuance of new (SURE) bonds in October 2020, EU bonds were subject to much lower market liquidity (i.e., wider bid-ask spreads) than large euro area member states' sovereign bonds. Bid-ask spreads have decreased since then. (iv) "Tapping" previously-issued EU bonds increased these bonds' secondary market liquidity, and thus appears to be an expedient way to raise EU funding in the future. (v) Changes in EU yields over time are most closely correlated with those of highly rated but less liquid German KfW bonds, suggesting that liquidity risk premia are an important component of EU yields. (vi) EU yield spreads over ten-year German benchmark bonds (Bunds) have decreased notably following recent, Covid-19-related SURE and NGEU bond issuances, suggesting that investors recognized the improved liquidity conditions. Finally, (vii) Eurosystem purchases and lagged holdings of EU bonds did not raise their bid-ask spreads, suggesting that the market is already sufficiently liquid to accommodate these operations.

Overall, we conclude that EU bonds' considerably-improved but still somewhat sub-par market liquidity, along with the time-limited emergency nature of the EU's SURE and NGEU policy initiatives, currently constitute the main obstacles to their long-run prospects for becoming a genuine euro-denominated safe asset. Factors that would promote EU bonds' status as a common safe asset include a permanently bond-financed EU budget, the continuation of a favorable regulatory treatment, and the increase of private market attention.

1. Introduction

Modern financial systems rely on safe assets. They facilitate financial transactions, which often entail a contractual requirement to post safe assets as collateral (e.g., Brunnermeier et al., 2017). In addition, safe assets allow market participants to transfer risks, including liquidity and market risks, without creating new risks, such as counterparty and credit risks, in return (Giovanni, 2013). To comply with liquidity regulations, banks need to hold safe assets to meet their funding needs in a stress scenario. Finally, central banks rely on safe assets when implementing monetary policy, exchanging central bank liquidity against non-cash safe assets (Brunnermeier and Sannikov, 2016).[1]

This article studies the quickly growing market of EU-issued bonds, with a view to assessing their prospects for ultimately becoming a genuine supranational euro-denominated safe asset. Safe assets are characterized by three aspects (Gorton 2017, Brunnermeier et al., 2016, 2017, Brunnermeier and Huang (2018), Gorton and Ordonez (2022)): First, a low default risk, or high asset "quality". Second, like a good friend, a safe asset retains its value during bad times ("robustness").[2] Third, a safe asset can be sold at or near current (robust) market prices in most market conditions ("liquidity"). To aid our assessment, we establish several stylized facts for EU bonds as a growing asset class below.

There is widespread agreement among policy makers that the euro area suffers from a relative lack of euro-denominated safe assets, particularly when compared to the United States (see e.g. Gorton et al, 2012, Juncker et al., 2015, Brunnermeier et al. 2011, 2017, Gossé and Mourjane, 2021). For example, Gossé and Mourjane (2021) estimate that, in 2019, the supply of sovereign bonds rated AA or higher amounted to just 37% of GDP in European Union (EU) member states, compared with 89% of GDP in the United States. In addition, the market for sovereign bonds in the EU is fragmented across different sub-markets, and market participants' perceptions about the relative risks of these sub-markets can change over time. The lack and

[1] Cash is the most obvious safe asset. Non-cash safe assets form near substitutes to cash (quasi-money) but offer somewhat different risk-return profiles and can be held by a wider set of investors.

[2] To our knowledge, Brunnermeier and Huang (2018) coined the "good friend" analogy.

fragmentation of euro-denominated safe assets are unfortunate, since both can increase the risk of vicious bank-sovereign "doom loops," of high public borrowing costs in bad times, and of unwelcome flights-to-safety that increase financial fragmentation (Brunnermeier et al., 2016, 2017).[3]

We highlight the following empirical findings: (i) EU bonds are widely considered by market participants as low in default risk, owing to their guarantee structure and backing by EU member states. However, rating agencies have disagreed somewhat on the extent to which EU bonds are entirely default risk free. (ii) EU-Bund yield spreads remained contained throughout the Covid-19 pandemic recession in 2020, suggesting that EU yields are robust to market downturns. (iii) Before the issuance of new (SURE[4]) bonds in October 2020, EU bonds were subject to much lower market liquidity (i.e., wider bid-ask spreads) than large euro area member states' sovereign bonds, including those of Germany, France, and Italy. Bid-ask spreads have decreased since then. (iv) "Tapping" previously-issued EU bonds increased these bonds' secondary market liquidity, and thus appears to be an expedient way to raise EU funding in the future. The average bond tap in our sample is associated with a decrease of 0.16 basis points (bps) in its bid-ask spread, from 2.78 bps on average pre-tap to 2.62 bps on average post-tap; this result remains similar if tapped bonds are matched to a control group of comparable non-tapped bonds. (v) Changes in EU yields over time are most closely correlated with those of highly rated but less liquid German Kreditanstalt für Wiederaufbau (KfW) bonds, suggesting that liquidity risk premia are an important component of EU yields. (vi) EU yield spreads over ten-year German benchmark bonds (Bunds) have decreased notably following recent, Covid-

[3] In the absence of a supranational euro-denominated (EU) safe asset, a flight-to-safety would be associated with capital leaving, say, Italy, while flowing into, say, Germany, raising Italian yields while lowering German yields. The BTP-Bund yield spread is one measure of financial fragmentation that is frequently commented on in the financial press. So-called "doom loops" can be a consequence of weak banks holding a disproportionate share of flighty assets; see e.g. Brunnermeier et al., 2017 and Leonello (2018).

[4] The temporary Support to mitigate Unemployment Risks in an Emergency (SURE), as well as the Next Generation EU (NGEU) initiative were proposed in the context of the EU's response to the Covid-19 pandemic recession. Financial assistance of up to €100bn can be provided within SURE in the form of loans from the EU to affected member states, mainly to address sudden increases in public expenditure for the preservation of employment. In July 2020, the European Council agreed that the EU borrows up to €750bn (in 2018 prices), i.e. up to €800bn in 2021 (adjusted for inflation), to fund Covid-19 repair and recovery work through its NGEU instrument.

19-related SURE and NGEU bond issuances, suggesting that investors recognized the improved liquidity conditions. Finally, (vii) Eurosystem purchases and lagged holdings of EU bonds did not raise their bid-ask spreads, suggesting that the market is already sufficiently liquid to accommodate unconventional monetary policy operations.

Summing up and weighing all these findings, we conclude that EU bonds' considerably-improved but still somewhat sub-par market liquidity, along with the time-limited emergency nature of the EU's SURE and NGEU policy initiatives, currently constitute the main obstacles to their long-run prospects for becoming a genuine euro-denominated safe asset. Looking forward, factors that could further promote EU bonds' status as a supranational safe asset include a permanently bond-financed EU budget and the increase of private market attention (e.g. in the form of inclusion in sovereign bond indices and the establishment of repo and futures markets).

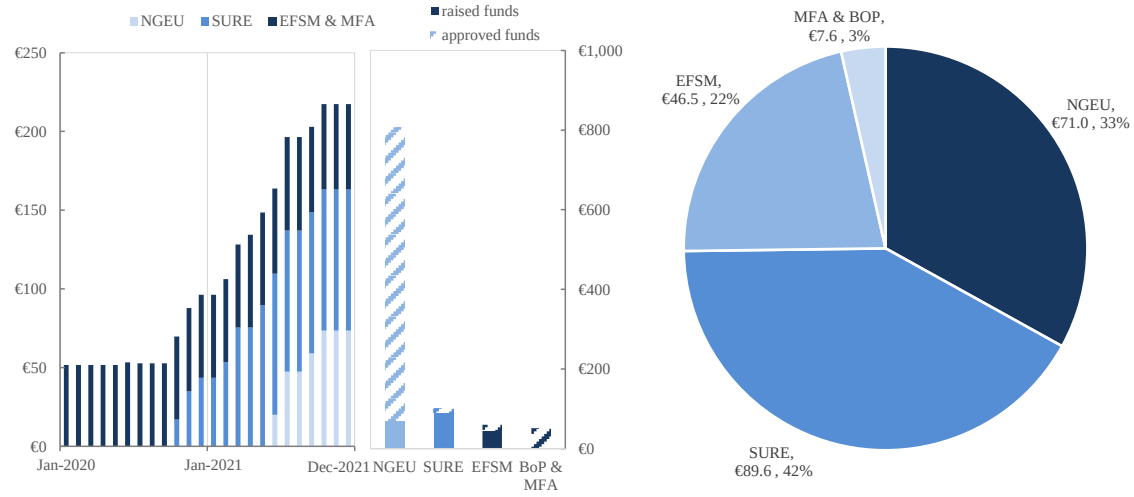
2. Data and market structure

The data for our study are obtained from the European Commission's website (bond characteristics and identifiers), Bloomberg and Refinitiv (outstanding volumes, bid and ask quotes), and Moody's, S&P, Fitch, DBRS (for credit ratings).

The implementation of SURE and NGEU in 2020 and 2021 marked a watershed in the landscape of the EU's common fiscal policy, both regarding the sizable volumes and the independent funding structures. Historically, EU borrowing has taken place since the early 1980s and has traditionally been used to finance loans to individual EU member states and other entities. In the past, EU funds were typically lent to beneficiary countries in a back-to-back fashion, meaning that countries' loan repayments to the EU were matched one for one with the EU's own coupon and principal payments. While this strategy successfully addressed smaller funding needs in the past, the much larger SURE and NGEU-related volumes have required a more active liquidity management of the EU's balance sheet. In April 2021, the practice of back-to-back lending was therefore not made a requirement for the NGEU initiative, giving instead way to a more flexible management of EU funds.

Figure 1 indicates that, as of December 2021, the amount of outstanding EU bonds has grown to €215 billion (bn) in total. The outstanding volumes are mostly related to three initiatives: The European Financial Stability Mechanism (EFSM), SURE, and NGEU. The Macro-Financial Assistance (MFA) and Balance of Payment (BOP) Programs are smaller and play only a minor role for EU funding.[5] The first SURE bonds were issued in October 2020, while the first NGEU bonds were issued in June 2021. By December 2021, SURE and NGEU-related bonds account for three-quarters of all outstanding debt. By 2028, NGEU volumes are foreseen to reach €800 bn, more than twelve times the December 2021 volume. Together with the approved funding for the SURE, EFSM, and BOP programs, with limits of €100 bn, €60 bn and €50 bn each, the total available amount of EU bonds is scheduled to exceed €1 trillion by 2028. This amount corresponds to approximately 43% of Germany's public debt in 2020, and to approximately 65% of Spain's.

Figure 1: EU debt and programs



Left panel: Total outstanding debt by EU program in EUR bn between January 2020 and December 2021. NGEU and SURE are Covid-19-related recovery initiatives. EFSM refers to the European Financial Stability Mechanism. MFA refers to Macro-Financial Assistance to non-EU countries. BOP refers to the EU's Balance of Payments program. Right panel: EU debt in percent of total outstanding debt in December 2021.

[5] The EFSM, together with the European Financial Stability Facility (EFSF), was a predecessor to the European Stability Mechanism (ESM). EFSM-related debt is issued, managed, and guaranteed by the EU, while the EFSF and ESM are separate issuers with independent credit ratings The EFSM debt is actively refinanced, with new bonds replacing older bonds. The currently outstanding EFSM bonds are associated with financial stability support extended to Ireland and Portugal during the fallout of the global financial crisis, and the commencing euro area sovereign debt crisis, around 2010. Each country was granted approximately two decades for paying back its respective loans.

3. Credit risk

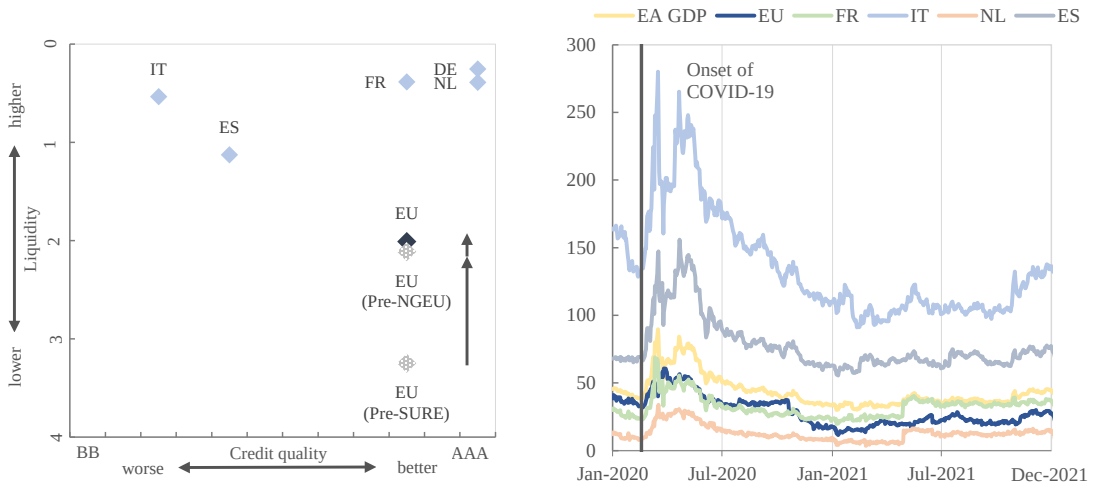
In bond markets, investors demand additional compensation relative to the safest assets for a range of risks, with default risk (i.e. the risk that the issuer does not repay its obligations) often being the most important.[6] Several institutional layers of debt-service protection render EU-issued bonds, including SURE and NGEU-related bonds, low in default risk. Legally, EU borrowings are direct and unconditional obligations of the EU. The EU is bound by the "Treaty on the Functioning of the EU" to service EU debt. The EU's debt service is ensured based on multiple layers of debt-service protection. First, for traditional back-to-back lending, the EU services its own debt with the payments it receives from the loan beneficiaries. These beneficiaries are EU member states, which have historically always serviced their debts to the EU. Second, in the event of a non-payment of a loan beneficiary, the EU budget helps ensure that the EU can honor its obligations. Finally, member states have provided additional guarantees to cover any shortfalls from member states' loan repayments. Guarantees worth €25 bn were made available for the €100 bn worth of SURE loans. NGEU bonds are backed by specific budget commitments by member states to the EU. There is no direct recourse to national treasuries beyond these guarantees (and beyond the above-mentioned "EU budget" route).

Rating agencies, however, are not in complete agreement on the extent to which EU bonds are entirely free of default risk. The initial rating commentaries date back to September 2020, when SURE bonds were about to be issued for the first time. Moody's then confirmed its best long-term issuer rating (Aaa) for the EU, noting "the very high commitment of EU members to ensuring the continued soundness of the EU's finances and their very high capacity to do so given the significant credit strength of the EU's most highly rated members." Moody's further explained that, in their view, "the multiple layers of debt service protection, including explicit recourse to extraordinary support [through EU member states' guarantees] … creates the equivalent of a joint and several undertaking and [an] obligation on the part of EU member

[6] Sovereign bonds denominated in domestic currency are often, but probably wrongly, considered to be free of default risk on the basis that sovereigns can rely on liquidity support from their central bank. This view is problematic for EU sovereigns for which central banks are expressly prohibited from sovereign debt monetization, and for euro area sovereigns that have surrendered their control over the "printing press" to the Eurosystem.

states to provide financial support to the EU." By contrast, Standard and Poor's (2020) only provided a long-term issuer rating from its second-best rating bracket (AA), two notches below its top rating. They effectively acknowledged the presence of political risks in the EU by explaining that their long-term rating for the EU relies on "the capacity and willingness" of "only the wealthiest" EU members that are net contributors to the EU budget. Those contributors exclude the U.K. from 2021 onwards. The horizontal axis of Figure 2a plots the minimal rating across four rating agencies, suggesting that rating agencies collectively consider EU bonds' credit quality as close but not (yet) equal to those of e.g. German Bunds.

Figure 2: Credit risk indicators for EU bonds



Left panel: Scatterplot of market liquidity (average bid-ask spreads in basis points) vs. credit quality (minimum rating). Arrow origins refer to September 2020 ("Pre-SURE") and May 2021 ("Pre-NGEU"). Arrow end points and all other diamonds refer to October 2021 (Post-NGEU's first auction). Higher liquidity corresponds to tighter bid-ask spreads. The rating score on the horizontal axis is calculated from minimum issuer ratings across S&P, Moody's, Fitch, and DBRS. Right panel: Ten-year yield spreads over German Bunds, in bps, between January 2020 and December 2021.

Figure 2b presents ten-year yield spreads for the EU, the 2019 GDP-weighted euro area, and for four large euro area countries, all relative to Bund yields. The figure suggests that the high credit quality of EU bonds is well-understood by market participants. EU bonds trade at tight spreads to German Bunds, and below 2019 GDP-weighted average euro area yields. EU bond yields were closest to those of France between January 2020 and December 2021. This similarity is not only true at the ten-year maturity, but for other maturities as well (not shown).

Figure 2b further suggests EU yield spreads over the Bund rose only slightly during the onset of the Covid-19 pandemic recession in early 2020, and by considerably less than Italian and Spanish spreads. The association of EU yields with French yields remained visibly close during the Covid-19 pandemic recession. This stability of EU yield spreads does not mean that EU bonds will automatically become a supranational euro-denominated safe asset. Like a good friend, however, EU bonds have shown to retain their value during these demanding times.

4. Liquidity risk

A safe asset is traded in liquid markets. Market liquidity ensures that investors can sell their asset at any time without greatly moving the market price. Liquidity risk is a second key risk (beyond default risk) for which investors demand compensation. This section studies EU bonds' bid-ask spreads before discussing liquidity risk premia and the impact of Eurosystem purchases and holdings.

4.1 Market liquidity

The spread between bid and ask quotes is, arguably, the most straightforward indicator of market liquidity, providing information on how costly a (round-trip) transaction in a bond can be expected to be on any given day. Bid-ask spreads are computed from bonds' yields-to-maturities (in bps). Average bid-ask spreads vary between approximately 2 and 6 bps during our sample, see Figure 3a.[7]

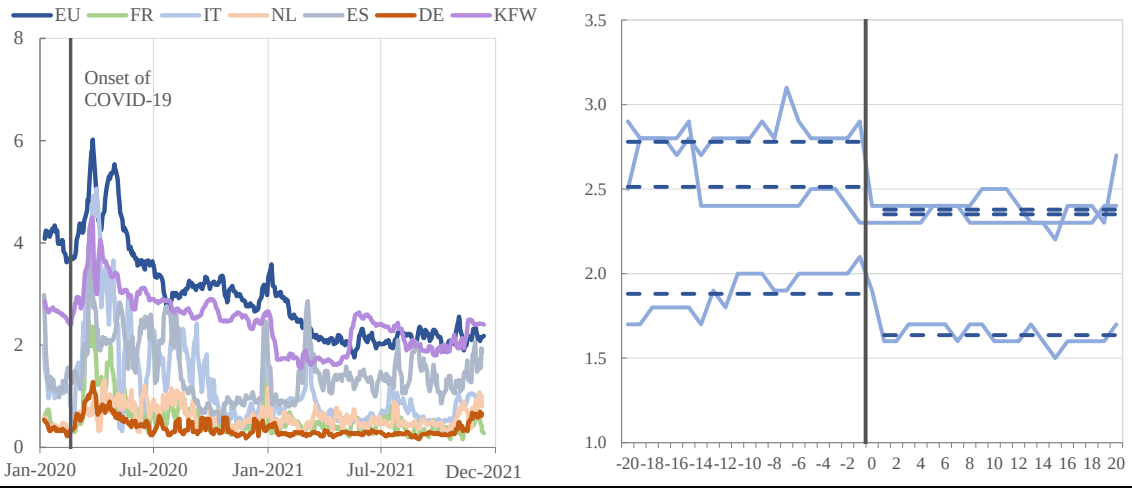
Before the first issuance of SURE bonds in October 2020, EU bonds were subject to a considerably lower market liquidity (i.e., wider bid-ask spread) than large euro area member states' sovereign bonds, including those of Germany, France, and Italy. This lower liquidity was probably related to their small outstanding volumes; see Figure 1a. Figure 3a suggests that

[7] Bid-ask spreads depend, in principle, on all aspects of a transaction, i.e. the contracting counterparties, the trade size, trading venue, etc. The data studied here reflects indicative quotes for standard trade sizes posted on multilateral trading platforms.

EU bonds' bid-ask spreads decreased substantially over time, from initially high levels between 4 and 6 bps in early 2020, to approximately 2 bps by December 2021, approximately to the level of Spanish sovereign bonds' and German KfW agency bonds' bid-ask spreads.[8]

In addition to new bond issuances, the practice of "tapping" already-issued EU bonds probably contributed to improving the market liquidity of the tapped bonds. To explain, the EU, like many other issuers, can raise funds in two complementary ways: by issuing a new bond, or by adding to the outstanding volume of an already existing bond. In a bond tap, an existing bond issue is "re-opened." Tapped bonds are issued at the existing bond's face value, maturity, and coupon rate, and are sold at their current market price. For the issuer, this practice avoids expensive transaction and legal costs. For investors, bond taps create opportunities to adjust portfolio holdings and learn about the market-clearing price for larger transactions.

Figure 3: Bid-ask spreads over time, and around tapping events



Left panel: Five-day trailing moving average of bid-ask spreads for ten-year benchmark bonds (in bps) between January 2020 and December 2021. Right panel: Bid-ask spreads for the first three taps following the first issuance of SURE bonds (horizontal axis in bps, vertical axis -/+ 20 days from tap event). The vertical line indicates the respective tap day.

Figure 3b plots bid-ask-spreads for the first three EU SURE bonds that have been tapped since October 2020. The chart suggests that each bond has become more liquid following the tapping

[8] This assessment is broadly in line with the European Council (p.3, 2022)'s own view that "… the liquidity of [EU] bonds approaches levels for core euro area sovereigns as measured by standard metrics."

date, in line with the behavior observed for other issuers using taps. This pattern is encouraging as it suggests that EU bonds' market liquidity could improve further with time and new taps.

The visual impression from Figure 3b is corroborated in a panel regression of tapped EU bonds' bid-ask spreads (ba_{it}^{tapped}) on bond/tap fixed effects (μ_i) and a post-tap dummy variable ($1_{\{post-tap\}}$), using the panel regression specification

$$ba_{it}^{tapped} = \mu_i + \beta \times 1_{\{post-tap\}} + u_{it} \, ,$$

where the bond fixed effects control for heterogeneity across N=17 tapped EU bonds issued between January 2017 and December 2021, β is the impact coefficient of interest, u_{it} is an appropriate error term, and time *t* refers to a [-20, +20] day event window centered around each tap date (T=41). To allow for a control group, we also match each tapped bond to a corresponding non-tapped (i.e., not tapped in the same event window) but otherwise comparable EU bond (closest in terms of maturity, and thus similar in yield). This results in the panel regression specification

$$ba_{it}^{tapped} - ba_{it}^{matched} = \mu_i + \beta \times 1_{\{post-tap\}} + u_{it},$$

where $ba_{it}^{matched}$ denotes the bid-ask spreads of the matched bonds.

Table 1's column (1) suggest that tapping a previously issued EU bond increases its secondary market liquidity on average. The average bond tap in our sample is associated with a 0.16 bps decrease in its bid-ask spread, from 2.78 bps on average pre-tap to 2.62 bps on average post-tap. Using log bid-ask spreads as a dependent variable instead suggests an average reduction of about 4% (column (2)).

The regression results associated to our matched regression specification suggest a slightly smaller average effect of a tap, of approximately -0.14 bps (column (3)), or of, again, approximately -4% (column (4)). The regression results are robust to reasonable variations in the event window (using, say, ten trading days instead of 20). We conclude that tapping existing EU-bonds appears to be an expedient way to raise EU funding in the future, in line with the EU's announced plans to make regular use of tapping.

Table 1 : Impact of taps on an EU bond's bid-ask spread

Panel regression results for N=17 tapped bonds over a [-20, +20] day event window (T=41). Each column uses a different left-hand-side variable: (1) bid-ask spreads of tapped bonds, (2) log bid-ask spreads of tapped bonds, (3) bid-ask spreads of tapped bonds minus the bid-ask spreads of matched non-tapped bonds, and (4) log bid-ask spreads of tapped bonds minus the log bid-ask spreads of matched non-tapped bonds. Standard errors are in brackets below and not clustered at the bond level (owing to the low number of observations). Each panel regression contains bond/tap fixed effects.

Dependent variable	(1) Bid-ask spreads of tapped bonds (bps)	(2) log(bid-ask spreads of tapped bonds)	(3) Bid-ask spreads - matched spreads (bps)	(4) log(spreads) - log(matched) (bps)
Post-tap dummy	-0.164***	-0.0370***	-0.137***	-0.0385***
	(-9.41)	(-5.09)	(-8.90)	(-6.56)
Constant	2.788***	0.884***	-0.0498***	-0.0279***
	(221.72)	(168.63)	(-4.51)	(-6.59)
Bond fixed effects	✓	✓	✓	✓
Number of observations	684	684	684	684
Adjusted R-squared	0.971	0.967	0.704	0.697

4.2 Liquidity risk premia

Given our previous discussion of market liquidity, we expect EU bonds' liquidity risk premia to be like those of other high-quality but less liquid bonds, and to decline following SURE and NGEU-related issuances and taps.

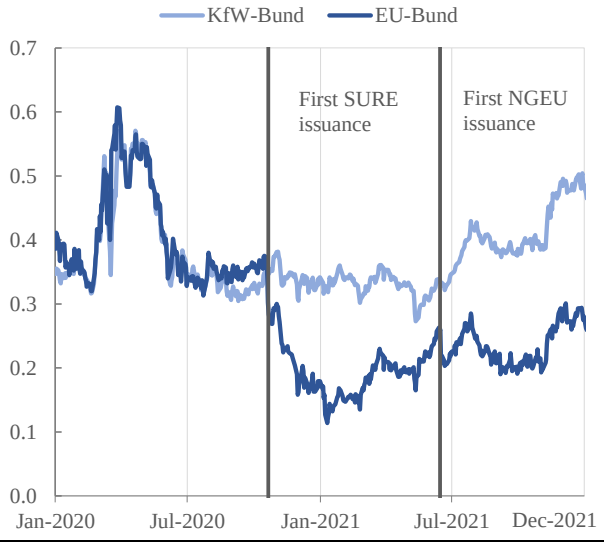
Table 2 presents correlations between changes in sovereign and agency bonds' yields. Two observations stand out. First, yield changes of EU-bonds from different programs are almost perfectly correlated with each other, suggesting that EU-bonds form a coherent market segment no matter which program the bonds are formally associated with. Such coherence is typical for national sovereign bond markets, including existing safe assets. Second, changes in EU bond yields are most closely correlated with those of other highly rated but less liquid assets,

suggesting that liquidity risk is an important pricing factor for EU yields. The highest correlations are observed for highly rated but less liquid agency bonds issued by the German KfW. In fact, changes in EU bond yields correlate with those of KfW bonds to a similar extent as EU bonds correlate with each other (correlation of >0.98). German and, to a lesser extent, Dutch and French yields are also closely correlated. In practice, French OAT sovereign yields are a frequently-used point of comparison; see e.g. EC (2021).

Table 2: Correlations between yield changes

From:	*01/01/2020*	*23/10/2020*	*18/06/2021*
To:	*31/12/2021*	*31/12/2021*	*31/12/2021*
	EFSM	*SURE*	*NGEU*
SURE	0.981		
NGEU	0.981	0.996	
DE	0.946	0.939	0.963
IT	0.312	0.764	0.826
FR	0.847	0.922	0.954
ES	0.642	0.866	0.883
NL	0.935	0.936	0.964
KFW	0.983	0.974	0.982

Figure 4: EU-Bund vs. KfW-Bund spread



Left panel: Spearman correlations between changes in yields-to-maturity of ten-year bonds for selected euro area issuers. Left panel: KfW-Bund and EU-Bund yield spread (in ppt). Sample from January 2020 to December 2021. Vertical lines refer to first issuances of SURE and NGEU bonds.

A clear improvement of EU bonds' market liquidity can be observed in decreasing yield spreads over other reference bonds. Figure 4 compares the ten-year EU-Bund spread to the ten-year KfW-Bund spread over time. (The ten-year rates are obtained as constant-maturity rates from Bloomberg; the KfW-Bund spread is commonly known as being primarily liquidity-driven, see e.g. Monfort and Renne, 2004.) Both time series evolve almost identically, up to the first issuance of EU SURE bonds on 20 October 2020. EU bonds' total market volumes, and therefore also expected trading volumes, increased considerably following each SURE and NGEU issuance date. The divergence between the two yield spreads, particularly following the first SURE bond issuance, suggests that investors well incorporated the improved liquidity conditions into the yields of EU bonds.

4.3 The liquidity impact of central bank bond purchases

A safe asset's market liquidity should be sufficiently high to accommodate central banks' monetary policy operations. Specifically, central bank purchases (flows) and asset holdings (stocks) should not inappropriately dry up a burgeoning market. This section studies EU bonds' market liquidity, measured by bid-ask spreads, in relation to Eurosystem purchases within its Public Sector Purchase Programme (PSPP) and Pandemic Emergency Purchase Programme (PEPP).

The relationship between secondary market liquidity on the one hand, and central bank bond purchases and holdings on the other hand, is a-priori unclear and could in principle go either way. For example, the central bank's purchases could make it harder, or costlier, for private investors to acquire the same bond on the same trading day, increasing their search costs. On the other hand, central bank purchase flows stimulate trading by affecting the overall demand for a bond. Eventually, trade volumes could increase by more, or by less, than what is implied by the central bank's transaction itself, depending on whether private investors are crowded in or out. Regarding lagged holdings (stocks), central banks tend to hold on to their bonds for a long time, effectively retiring them on their balance sheets. This approach reduces the quantity of bonds that are available for trading to other investors, possibly reducing market turnover and thus liquidity. On the other hand, central bank initiatives to lend acquired assets back to the private sector (e.g. via the Eurosystem's securities lending arrangements) are in place and designed to mitigate any undesired effects from withdrawing assets from the market. In addition, central bank actions probably also affect bonds' yields and volatilities (see e.g. Eser and Schwaab (2016), Ghysels et al. (2017), and De Pooter et al. (2018)), and therefore market risks, which could, in turn, affect market liquidity positively. As a result, the impact of central bank bond purchases and bond holdings on market liquidity is theoretically ambiguous, and therefore mainly an empirical question.

We estimate the panel regression

$$\ln(ba_{it}) = \beta_0 + \mu_i + \lambda_t + \beta_1 pur_{it} + \beta_2 pur_{i,t-1:t-4} + \beta_3 hold_{i,t-5} + \beta_4 hold_{i,t-5} \times 1_{\{hold_{i,t-5}>40\%\}} + u_{it},$$

where $\ln(ba_{it})$ is the natural logarithm of bond *i*'s bid-ask spread at time *t* in basis points, μ_i is a bond fixed effect, λ_t is a daily time fixed effect, pur_{it} are Eurosystem purchases of bond *i* on day *t*, $pur_{i,t-1:t-4}$ are lagged purchases of bond *i* on and between days *t-4* and *t-1*, $hold_{i,t-5}$ denotes the Eurosystem's holdings of bond *i* one week earlier, $1_{\{hold_{i,t-5}>40\%\}}$ is a dummy variable indicating bond-level holdings above 40%, and u_{it} is the error term. Bond fixed effects are added to the regression specification to control for bond heterogeneity, for example across maturities and/or coupons. Time fixed effects are added to control for other common dynamics over time that affect all bonds' liquidity equally. We distinguish three different samples: 20 October 2020 to 15 June 2021 ("SURE sample"), 16 June to 31 December 2021 ("NGEU sample"), and the union of the two ("full sample").

The panel regression estimates in Table 3 suggest that contemporaneous purchase flows do not raise bid-ask spreads (see the first coefficient row in Table 3). If anything, they are associated with modestly lower bid-ask spreads in the full sample. Eurosystem purchases almost mechanically increase turnover, which could lower dealer banks' inventory risks and thus bid-ask spreads. Lagged purchases do not have a positive effect on bid-ask spreads either (second coefficient row in Table 3). The coefficients associated to lagged Eurosystem holdings are typically insignificant, except in the full sample, where additional holdings decrease bid-ask spreads (third coefficient row in Table 3). There is no evidence at the 5% significance level for a break in regression slope at high holdings above 40%, suggesting that such a break is absent or too minor to be detected (fourth coefficient row in Table 3).[9] We conclude that central bank purchase flows and asset holdings do not appear to have hindered the trading of EU bonds in economically significant ways.

[9] Grimaldi et al. (2021) find detrimental effects on the market liquidity of Swedish government bonds once the Riksbank's holdings exceed 40% of bonds' outstanding volumes.

Table 3: Impact of Eurosystem purchases and holdings on market liquidity

Panel regression estimates of log bid-ask spreads on Eurosystem purchases and lagged holdings. Different columns indicate different estimation samples: between 20 Oct 2020 and 15 June 2021 ("SURE"), between 16 June 2021 and 31 December 2021 ("NGEU"), and the union of the two ("Full sample"). Standard errors are in brackets below and clustered at the bond level (N=37).

Dependent variable	Log bid-ask spread (bps) SURE: 20 Oct 2020 – 15 June 2021	Log bid-ask spread (bps) NGEU: 16 Jun 2021 – 31 Dec 2021	Log bid-ask spread (bps) Full sample: 20 Oct 2020 – 31 Dec 2021
Purchases today (relative to outstanding)	-0.123	-1.861*	-2.809***
	(-0.21)	(-2.55)	(-3.68)
Purchases week (relative to outstanding)	-0.043	-1.171*	-1.144*
	(-0.15)	(-2.61)	(-2.34)
Lagged holdings (relative to outstanding)	0.293	-0.610*	-0.924**
	(1.59)	(-2.26)	(-3.33)
Lagged holdings x 40% Dummy	0.216*	-0.153*	0.185*
	(2.37)	(2.23)	(2.62)
Constant	0.706***	0.828***	1.131***
	(9.37)	(6.69)	(9.33)
Bond and time fixed effects	✓	✓	✓
Number of observations	4135	5018	9153
Adjusted R-squared	0.88	0.91	0.85

5. Concluding discussion

Summarizing and weighing the above findings, EU bonds score relatively high on the quality scale (low perceived default risk), while exhibiting improved but still sub-par market liquidity

relative to German Bunds. Market liquidity will probably be improved, however, to some extent, by new issuances and taps, in line with Figures 1b, 3b, and 4.

EU bonds' prospects for becoming a genuine euro-denominated safe asset could potentially be hampered by the fact that both SURE and NGEU programs are foreseen to be one-off, time-limited Covid-19 emergency responses. After all, safe assets tend to trade in markets without a definite endpoint (think of e.g. U.S. Treasuries or German Bunds), which renders the cost of setting up a dedicated trading infrastructure less important. By contrast, the final EU SURE bond is currently foreseen to mature in 2052 (at the latest, a 30-year bond to be issued in 2022), and the final NGEU bond is currently foreseen to mature in 2058. Once the complete amount in each program has been raised, the EU's debt will start to roll off, with the average maturity foreseen to be shrinking to zero until 2058. This finite maturity may deter investors from establishing a long-term investment strategy in which EU bonds would be considered a permanent part of their portfolios.

At the time of writing, the devastating war of Russia against Ukraine has triggered a discussion among EU heads of state whether to cushion some of the war's detrimental impact by means of an additional bond-financed EU budget. If realized, such a program could improve the safe asset status of EU bonds for two reasons. First, even-higher outstanding volumes would almost mechanically contribute to a further improvement of market liquidity, in line with our assessment above. Second, responding to a new crisis again with additional EU bonds may signal an erosion in the political resistance against a permanently bond-financed EU budget.

The perception of EU bonds as safe assets will eventually also hinge on their regulatory treatment. In that respect, EU bonds already benefit from a zero percent risk weight in capital requirements for banks under Basel III and no capital charge for spread risk in solvency requirements for insurance companies under Solvency II. Furthermore, at the time of writing, EU bonds are eligible for purchase under the Eurosystem's asset purchase programs and face favorable haircuts (yet somewhat higher than for sovereign bonds) when pledged by banks as collateral in refinancing operations.

Finally, while the lifetime and regulatory treatment of SURE and NGEU bonds are to some extent within the ambit of the EU member states, other determinants of secondary market

liquidity depend primarily on private-sector actors. For instance, EU bonds are currently not included in sovereign bond indices. This exclusion restricts demand for them from certain safe-asset funds. In addition, there is currently no direct derivative hedge instrument for EU bonds, as there are for German, French and Italian government bonds in the form of Eurex bond futures contracts. For such an instrument to be viable, a deep and liquid repo market would need to evolve first. Even though it is too early to judge whether private market participants will include EU bonds in sovereign bond indices or introduce futures contracts, both the recent improvement in market liquidity and the overall increasing attention gained by EU bonds offer some support for such steps.

References

Brunnermeier, M. K., L. Garicano, P. Lane, M. Pagano, R. Reis, T. Santos, D. Thesmar, S. van Nieuwerburgh, D. Vayanos (2011): "European Safe Bonds (ESBies)". The Euronomics Group.

Brunnermeier, M. K., L. Garicano, P. Lane, M. Pagano, R. Reis, T. Santos, D. Thesmar, S. van Nieuwerburgh, D. Vayanos (2016): "The sovereign-bank diabolic loop and ESBies". American Economic Review Papers and Proceedings, 106 (5), p. 508–512.

Brunnermeier, M. K., L. Huang (2018): "A global safe asset for and from emerging market economies". Working Paper 25373, National Bureau of Economic Research.

Brunnermeier, M. K., S. Langfield, M. Pagano, R. Reis, S. van Nieuwerburgh, D. Vayanos (2017): "ESBies: Safety in the tranches". Economic Policy, 32 (90), p. 175-219.

Brunnermeier, M. K., Y. Sannikov (2016): "The i theory of money". Working Paper 22533, National Bureau of Economic Research.

De Pooter, M., R. F. Martin, and S. Pruitt (2018): "The liquidity effects of official bond market intervention". Journal of Financial and Quantitative Analysis, 53(1), p. 243-268.

Eser, F. and B. Schwaab (2016): "Evaluating the impact of unconventional monetary policy measures: Empirical evidence from the ECB's Securities Markets Programme", Journal of Financial Economics, Vol. 119 (1), p. 147–167.

European Council (2022): “Semi-annual report on the execution of the NextGenerationEU funding operations pursuant to Article 12 of Commission Implementing Decision C(2021)2502”, Brussels, 17.2.2022.

Giovanni, A. (2013): “Risk-free assets in financial markets”, in Bank for International Settlements (ed.), “Sovereign risk: A world without risk-free assets?”, BIS papers No. 72.

Ghysels, E., J. Idier, S. Manganelli, and O. Vergote (2017): “A high frequency assessment of the ECB Securities Markets Programme”, Journal of the European Economic Association, 15, p. 218-243.

Gorton, G. B. (2017): “The history and economics of safe assets”. The Annual Review of Economics, 9, p. 547-586

Gorton, G. B. and G. Ordonez (2022): “The supply and demand for safe assets”. Journal of Monetary Economics, 125, p. 132-147.

Gorton, G. B., S. Lewellen, and A. Metrick (2012): “The safe-asset share”. American Economic Review Papers & Proceedings, 102 (3), p. 101-106.

Gossé, J., A. Mourjane (2021): “A European safe asset: new perspectives”, Bulletin de la Banque de France, 234/6, March-April 2021.

Grimaldi, A. B., A. Crosta and D. Zhang (2021): “The liquidity of the government bond market – what impact does quantitative easing have? Evidence from Sweden”, Sveriges Riksbank working paper Nr. 402.

Juncker, J.-C., D. Tusk, J. Dijsselbloem, M. Draghi, & M. Schulz (2015): “Completing Europe’s economic and monetary union”. Five Presidents’ Report.

Leonello, A. (2018): “Government guarantees and the two-way feedback between banking and sovereign debt crises”. Journal of Financial Economics, 130(3), p. 592-619

Monfort, A., J.-P. Renne (2014): “Decomposing euro area sovereign spreads: Credit and liquidity risks”, Review of Finance, vol. 18(6), p. 2103-2105.

Acknowledgements

We thank Benjamin Böninghausen, Alexander Düring, Peter Hoffmann, Wolfgang Lemke, Simone Manganelli, Fabian Schupp and ECB seminar participants for comments.

Tilman Bletzinger
European Central Bank, Frankfurt am Main, Germany; email: tilman.bletzinger@ecb.europa.eu

William Greif
European Central Bank, Frankfurt am Main, Germany; email: william.greif@ecb.europa.eu

Bernd Schwaab
European Central Bank, Frankfurt am Main, Germany; email: bernd.schwaab@ecb.europa.eu

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

PDF ISBN 978-92-899-5297-2 ISSN 1725-2806 doi:10.2866/84563 QB-AR-22-077-EN-N