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Safety Without Tranches: Creating a 'real' safe asset for the euro area

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There is a recent resurgence of interest in proposals to create 'safe' euro-area level debt instruments that would help to break the doom-loop between sovereign risk and bank risk. The leading idea is to create 'sovereign bond backed securities' issued in multiple tranches, the most senior of which ('ESBies') could play the role of a safe asset (Brunnermeier et al. 2017, High Level Task Force of the European Systemic Risk Board 2018). This paper explores alternative approaches to creating a euro-wide safe asset that rely neither on tranching nor on joint and several guarantees. They include (1) sovereign bond backed securities that do not rely on tranching but instead on a capital cushion to achieve the desired safety level; (2) plain vanilla debt issued by a leveraged euro area sovereign wealth fund investing internationally; (3) plain vanilla debt issued by a senior official financial intermediary ('E-bonds'). The three proposals are compared to ESBies in terms of the 'safety' of the asset generated, their impact on sovereign borrowing costs, and their redistributive implications. We show that a safe asset issued by an intermediary that is both senior and endowed with a small capital cushion would lead to values at risk that are equal or lower than those of ESBies, even in correlated default events affecting most euro area sovereigns.

Introduction

In a recent paper, entitled 'ESBies: Safety in the tranches', Markus Brunnermeier, Sam Langfield, Marco Pagano, Ricardo Reis, Stijn Van Nieuwerburgh and Dimitri Vayanos (2017) proposed the creation of tranched securities backed by a diversified pool of euro area sovereign bonds. Based on a default simulation model for euro area countries, the authors argued that by choosing a tranching point (i.e. 'thickness' of the subordinated tranches) of around 30%, the senior tranche (called 'European Senior Bond', or 'ESBie') could be rendered as low-risk, in terms of expected loss rate, as a German government bond. They also suggested that with an appropriate regulatory framework, ESBies and their subordinated tranches – collectively referred to as sovereign bond backed securities, or SBBS – could be issued by competitive private intermediaries, with minimal involvement of the official sector.

The appeal of SBBS is that they would require neither member state guarantees nor a fully-fledged euro area budget – for which no political consensus exists, at this time – but still promise to deliver a euro area debt security that is safe, could be issued in large volumes, and hence could contribute to stability and financial integration. Yet, the SBBS approach has been subject to ferocious criticism from both euro area creditor and debtor country perspectives, credit rating agencies, debt managers and some other market participants.[2] Most of these criticisms relate to the fact that SBBS would be structured products akin to the collateralised debt obligations (CDOs) that were the root of the great financial crisis. Two arguments have figured particularly prominently. First, in a crisis in which sovereign risks in the euro area become highly correlated, the supposedly 'safe' senior tranche might end up being much less safe than its proponents claim. Second, issuing SBBS requires the simultaneous issuance of senior and junior tranches, but would anyone want to buy the junior tranches, particularly in a crisis? If not, might this trigger a bailout of the junior market, causing precisely the moral hazard that SBBS seek to avoid?

These criticisms can be largely addressed – and have been addressed, in part in Brunnermeier *et al.* (2017) themselves, and in part by an extensive subsequent study (ESRB HLTF 2018, see also Leandro and Zettelmeyer 2018). Furthermore, it is not obvious that

1 Corresponding author, e-mail: jzettelmeyer@piie.com. The authors thank Olivier Blanchard, Anna Gelpern, Patrick Honohan, Philip Lane, Sam Langfield, and Nicolas Véron for helpful comments and suggestions, without implying agreement. Some sections of this paper draw on a more technical paper issued as CEPR Discussion Paper 12793 (Leandro and Zettelmeyer 2018).
2 See Academic Advisory Council to the German Ministry of Finance (2017), Minenna (2017), Standard and Poor's (2017) and Greive *et al.* (2018). For a less critical view, see Goldman Sachs (2018).

just because CDOs failed in a specific context and for a specific underlying asset class – mortgages generated during a housing bubble – they should be disqualified as a tool for diversifying and tranching sovereign risk in the euro area. Nonetheless, some SBBS critics continue to view the CDO-like nature of the proposal as an irredeemable weakness and would instead like to see a 'real' safe asset.[3]

This paper investigates whether it might be possible to create a safe asset for the euro area that neither resorts to tranching – and in this sense is 'real' (or at least more 'real') than SBBS – nor goes all the way to fiscal federalism (including mutual guarantees and/or a central taxation capability). We describe and analyse three ideas that fit this description. All three share some features of the SBBS proposal: a financial intermediary would purchase a diversified portfolio of assets and issue its own securities, using the income from its portfolio to service these securities. Unlike SBBS, however, these securities would be plain vanilla bonds. To turn the title of Brunnermeier *et al.*'s (2017) contribution on its head, the question is whether and how such bonds can offer safety *without* tranches.

In the first of the three approaches, which, following Monti (2010), we call 'E-bonds', the safe asset would be issued by a senior, publicly owned financial intermediary, backed by a diversified portfolio of sovereign debt purchased at face value. Hence, just like with ESBies, safety would be created through the combination of diversification and seniority, except that seniority would pertain not to a specific tranche of the bonds issued by the intermediary but to the intermediary itself. The second idea, which we refer to as the 'capitalisation approach', dispenses with seniority altogether, and replaces its role with that of publicly provided capital. As in the SBBS approach, an intermediary would purchase a diversified portfolio of euro area government bonds at market prices. Any default would trigger a loss, but this loss would affect only a portion of the intermediary's portfolio and would be absorbed (except in catastrophic crises) by the intermediary's capital cushion. A third idea, which we state but do not analyse in detail, is similar to the capitalisation approach, except that the intermediary would not be required to purchase euro area sovereign bonds in specific proportions. Instead, it would purchase a diversified portfolio of assets worldwide to maximise long-run return subject to low risk – that is, it would operate as a (leveraged) sovereign wealth fund (SWF), investing internationally, jointly owned by euro-area countries. We refer to this idea as the 'Euro-SWF'.

These three approaches turn out to have very different implications. The capitalisation and leveraged wealth fund approaches could reproduce some of the key properties of ESBies – no redistribution, no impact on national bond markets except possibly through a liquidity effect, and no losses except possibly in a generalised debt crisis where most euro area countries are in default. All this is achieved without tranching, but at a cost: a large capital cushion. In contrast, E-bonds would have a much bigger impact on national bond markets than both SBBS and the other two approaches. Because private bond holders would be subordinated to the E-bond issuer, who holds debt of the same sovereigns, the cost of issuing sovereign bonds in the market would rise – although, as we shall see below, this would not necessarily raise the *average* cost of borrowing. Furthermore, because in the E-bond approach all sovereign borrowers would be charged the same interest rate, regardless of their creditworthiness – namely, the average funding cost of the intermediary – E-bond issuance would have a redistributive effect (from more creditworthy to less creditworthy). As we shall show, however, the magnitude of this effect is modest because the preferred creditor status of the intermediary implies that it would be taking – and redistributing – limited amounts of risk. At the same time, the E-bonds proposal would also have a disciplining effect, as the marginal cost of borrowing would rise more quickly for high debt borrowers.

Although the E-bond and capitalisation approaches could be calibrated to have the same expected loss rates, their performance in a crisis could be dramatically different. Bonds issued by a capitalised intermediary would continue to perform normally even in a situation with several defaulting countries. Like the holders of ESBies, bondholders would suffer a loss only in a catastrophic crisis involving default by many Euro area countries. In contrast, in the E-bond approach, even a crisis in a single country could lead to impairment, provided it is deep enough to wipe out all debt other than the (senior) debt held by the E-bond intermediary. This could be avoided by giving the E-bond intermediary a capital cushion – a hybrid of the two approaches.

This paper starts out by explaining the mechanics of the alternative approaches in some more detail. Subsequently, the E-bond and capitalisation approaches are compared in three respects: their 'safety properties' – that is, their performance in a crisis; their impact on borrowing costs, and their propensity to give rise to redistribution. Despite their design similarities, there are significant differences between the proposals in this regard. While no single proposal is preferable to all others – or indeed the SBBS approach – in every respect, several are likely to improve over the status quo, and hence merit further discussion.

3 See De Grauwe (2018), Giugliano (2018) or Münchau (2018).

Safety without tranches: Alternative approaches

E-bonds

In the E-bond approach, a senior intermediary would purchase a portfolio of debt from euro area members, funded by bond issuance. How the preferred creditor status of the intermediary is established legally would require further analysis, as there may be several approaches, with different implications. One would need to write into future sovereign bond contracts that the bond is subordinated to claims held by the intermediary. Alternatively, a statutory approach could be taken, in the form of an intergovernmental treaty, an EU regulation, or a coordinated set of domestic laws that establish that all future sovereign bonds issued in the euro area would be subordinated to claims held by the E-bond intermediary. [4] A potential advantage of the contractual approach is that it would establish the preferred creditor status of the intermediary regardless of the jurisdiction in which bonds are issued.

Purchases could in principle occur at market prices, or at face value directly from national issuers. In Leandro and Zettelmeyer (2018), we show that because of the intermediary's preferred creditor status, purchases of sovereign debt at market prices would lead to large profits over time. Redistributing these profits to the participating sovereigns in proportion to their borrowing (or alternatively, a capital key proportional to size, such as the ECB capital key) would lead to large net transfers from countries with high borrowing spreads to countries with low spreads, since the market prices of high-spread countries reflect far higher risk than is actually borne by the senior E-bond intermediary. This paper therefore focuses on the second possibility, in which the E-bond intermediary would extend loans at face value, and charge all its borrowers a uniform interest rate that is just high enough to cover its funding and operating costs.

The riskiness of the bonds issued by the intermediary depends on the share of the debt of each sovereign that it purchases. If the share is low, it would be well protected from default since it can lose money only after all other debtholders have lost everything. It is assumed that the intermediary cannot, for political reasons, fine-tune the shares of debt purchased by country according to the characteristics of the borrower (for example, to equalise the risk of its claims on all member states). However, it is also implausible that the intermediary would buy a fixed share of the debt of all countries, since this would imply that a disproportionate increase in the indebtedness of a country would be reflected in a higher portfolio share. This motivates the following purchase rule, which limits both the share of sovereign debt and the share of GDP that the intermediary can hold of each country's sovereign debt:

1) $$P_i^E = \min\{yY_i, cD_i\}$$

where P_i^E denotes the E-bond issuer's total portfolio holdings of country i's debt, Y_i and D_i GDP and debt outstanding, and y and c uniform shares of annual GDP and outstanding debt, respectively. For example, if y and c are both 0.5, then the intermediary would hold 50% of GDP worth of debt of countries whose debt ratio is above 100%, while for countries with debt-to-GDP below 100% the intermediary would hold 50% of the country's debt stock.

How would the intermediary (or the euro area countries sponsoring it) choose y and c? Each choice of y and c will result in a portfolio of a certain volume, country composition, and riskiness. It is assumed that the intermediary would choose y and c to maximise the volume of the portfolio, subject to remaining at or below the five-year expected loss rates equal to that of the German bund, computed using the default simulation model of Brunnermeier *et al.*'s (2017).[5] It is possible to search the space of $\{y, c\}$ combinations that solves this constrained maximisation problem (see Leandro and Zettelmeyer 2018 for details). In the 'adverse' parametrisation of the Brunnermeier *et al.* model, which assumes a high correlation of sovereign defaults in a crisis, the optimal combination of y and c turns out to be $y \approx 0.252$, $c \approx 0.495$. That is, the intermediary would buy up to roughly 50% of a country's debt or up to 25% worth of GDP, whichever is smaller.

Table 1 presents the implications of this purchase rule. The first column describes the volume of general government debt securities outstanding for each euro area country at the end of 2016. Columns (2), (3) and (4) show the portfolio volume for each country in euro terms, as a share of country GDP, and as a share of country debt securities outstanding, respectively. The third and fourth columns indicate which of the two constraints of equation (1) is binding. For example, Germany has relatively little debt to GDP, and so the intermediary purchases debt claims of up

4 To avoid fear of dilution leading to a large risk premium – over and above the direct impact of subordination on the price of sovereign bonds, which is analysed in detail below – there would need to be well-anchored expectations around the maximum volume of claims that the E-bond intermediary will purchase from each country. The intergovernmental treaty or EU regulation establishing the E-bond intermediary could serve as such an anchor.

5 This is a two-level hierarchical simulation model. The first level simulates 2,000 five-year periods, in each of which the economy can be in three states – an expansion, a mild recession, or a severe recession – which differ in terms of default probabilities and loss-given-default rates. The second level determines whether one or several countries default, conditional on the aggregate state determined in the first level of the simulation. Two main calibrations are used: in the benchmark calibration probabilities of default and loss-given-default parameters are calibrated to be consistent with bond yields and CDS spreads at the end of 2015 and historical averages. An 'adverse calibration', which is used here, assumes much higher cross-country correlations in default probabilities. See Brunnermeier *et al.* (2017) and Leandro and Zettelmeyer (2018, box 1) for details.

to 50% of the current stock of Germany's outstanding debt securities. Italy has a relatively high debt ratio, so the GDP constraint is binding: the intermediary purchases up to 25% of Italian debt to GDP. As a result, the volume of German debt in the intermediary's portfolio (€768.4 billion) exceeds that of Italian debt (€420.9 billion). As column (5) shows, German debt ends up with the highest portfolio share (29.2%, just above its share of euro area GDP) followed by French debt (21.3%) and Italian debt (16%).

Table 1. E-Bond purchase portfolio and expected losses (in % unless otherwise stated)

	Debt securities, € billion, 2016	Purchase volume, € billion	Purchase volume in % of			Share of debt held by market	Loss given default		5-year expected loss rate
			Country GDP	Country debt securities	Total portfolio		assumed total	faced by intermediary	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Germany	1553.3	768.4	24.4	49.5	29.2	50.5	40.0	0.0	0.00
Netherlands	340.7	168.6	24.0	49.5	6.4	50.5	40.0	0.0	0.00
Luxembourg	6.3	3.1	5.7	49.5	0.1	50.5	40.0	0.0	0.00
Austria	245.8	87.9	25.2	35.8	3.3	64.2	45.0	0.0	0.00
Finland	104.8	51.8	24.0	49.5	2.0	50.5	45.0	0.0	0.00
France	1817.3	560.9	25.2	30.9	21.3	69.1	60.0	0.0	0.00
Belgium	366.2	106.1	25.2	29.0	4.0	71.0	62.5	0.0	0.00
Estonia	0.2	0.1	0.5	49.5	0.0	50.5	67.5	34.3	0.95
Slovakia	35.9	17.8	21.9	49.5	0.7	50.5	70.0	39.4	1.83
Ireland	124.0	61.4	22.3	49.5	2.3	50.5	75.0	49.5	2.67
Latvia	7.4	3.6	14.5	49.5	0.1	50.5	75.0	49.5	2.94
Lithuania	12.3	6.1	15.7	49.5	0.2	50.5	75.0	49.5	2.94
Malta	5.4	2.5	25.2	46.5	0.1	53.5	78.0	52.7	3.29
Slovenia	26.7	10.2	25.2	38.2	0.4	61.8	80.0	47.6	2.17
Spain	919.6	280.3	25.2	30.5	10.7	69.5	80.0	34.4	1.13
Italy	1872.4	420.9	25.2	22.5	16.0	77.5	80.0	11.0	0.32
Portugal	132.9	46.5	25.2	35.0	1.8	65.0	85.0	57.2	3.20
Cyprus	6.3	3.1	17.4	49.5	0.1	50.5	87.5	74.7	8.23
Greece	57.2	28.3	16.1	49.5	1.1	50.5	95.0	89.9	14.93
Total portfolio		2627.6				62.4		9.34	0.50

Note: The table shows the purchases volumes and 5-year expected loss rates, from the perspective of the E-bond issuer buying national debt, arising from a purchase rule in which the issuer buys either 49.5% of national general government debt securities or 25.2% of GDP worth of debt, whichever is smaller. For example, for Germany, 49.5 % of national debt is bought, for Italy, 25.2% of GDP. The parameters 49.5 % of national debt and 25.2% of GDP were chosen to maximize the size of the portfolio (and hence the volume of E-bonds backed by the portfolio) subject to keeping the portfolio 5-year expected loss at or below 0.5%. In the last row of the table, the total portfolio purchase volume is computed as the sum of the country purchase volumes, while the total portfolio 5-year expected loss of 0.50% is computed as the weighted average of the country 5-year expected losses shown in the final column, using the portfolio purchase shares as weights. Column 7 shows the loss-given-default parameters assumed in Brunnermeier et al.'s simulation model, and column 8 shows the implied loss-given-default faced by the intermediary.
Sources: Eurostat and authors' calculations based on simulation model of Brunnermeier *et al.* (2017) (adverse calibration, see Leandro and Zettelmeyer 2018, Box 1, for details).

The remaining columns describe the riskiness of the portfolio from the perspective of the E-bond issuer. Column (6) shows the percentage of each country's debt securities that would continue to be held by investors, i.e. outside the intermediary's portfolio (100 minus the values in column 4). Since the E-bond issuer is a preferred creditor, this constitutes a protective 'cushion' in the event of a default. If the loss-given-default is smaller than this cushion, the E-bond issuer will not suffer any losses. Column (7) reproduces the losses-given-default assumed in the Brunnermeier *et al.* (2017) simulation model. The issuer is hence assumed to be fully protected from a default in Germany, the Netherlands, Luxembourg, Austria, Finland and France, because the share of debt held by investors is higher than the loss-given-default assumed for these countries. For the remaining countries, debt issued to the market would not quite cover the loss given default, and as a result, the E-bond issuer would suffer some losses. Column (8) shows the percentage share of its portfolio holdings that the intermediary would lose in case of a default in each country. For example, for Spain, Brunnermeier *et al.* (2017) assume a high loss-given-default, of 80%, which would exceed the market holdings by 80 – 69.5 = 10.5 percentage points. The E-bond issuer would hence suffer a loss equal to 10.5% of the Spanish outstanding debt securities, or 0.105 * 919.6 = €96.4 million, 34.4% of its holdings. For Italy, the purchase rule implies that the E-bond issuer buys a relatively small share of Italian debt securities – only 22.5% – so that all but 2.5 percentage points of the assumed loss-given-default, again 80%, would be absorbed by the market. The E-bond issuer would hence lose only 2.5% of €1.872 trillion in Italian outstanding debt securities, or €46.4 million, which is 11% of its holdings. Column (9), finally, shows the E-bond issuer's five-year expected loss rate, which is the loss-given default shown in column (8) multiplied by five-year probabilities of default implied by the 'adverse calibration' of the Brunnermeier *et al.* (2017) model. This ranges from zero for the countries for which the total loss-given-default is smaller than the share of debt held by the market to almost 15% in the case of Greece.

The last row of the table shows the total portfolio holdings of the E-bond issuer, the maximum share of that portfolio that the E-bond issuer could lose if all countries in the euro area defaulted – namely, 9.34% – as well as its five-year expected loss rate, which is exactly 0.5% by construction. The total portfolio holdings of €2.63 trillion are equal to the volume of E-bonds that could be issued using equation (1) as a purchase rule. The volume of ESBies that could be generated using a similar purchase rule turns out to be roughly the same (see Leandro and Zettelmeyer 2018 for details).

Capitalisation

In the capitalisation approach, the intermediary would not be senior, and hence could purchase bonds at market prices without accumulating extranormal profits. 'Safety' would be created through a combination of diversification and capitalisation. As a result, the question of the previous section – what volume of safe assets could be generated? – has a two-part answer.

- First, there is an upper limit to the size of the asset portfolio that the intermediary could own, which follows from the need to retain liquid national sovereign bond markets. Leandro and Zettelmeyer (2018) consider rules that would limit intermediary purchases both as a share of GDP (for example, with an upper limit of 60%) and as a share of national debt outstanding (for example, no more than 50% except possibly in the four largest markets, Italy, Germany, France and Spain, where more could be purchased as long as the remaining market is large enough to ensure liquidity).[6] As shown in Leandro and Zettelmeyer (2018), a rule of this type would allow SBBS intermediaries to issue ESBies with nominal value between €2.6 - €3.7 trillion, or 24-35% of euro area GDP.
- Below this upper limit, any volume of safe assets could be sustained with a sufficiently high volume of capital, which we assume would be invested in cash. The question then becomes: for a given target volume of safe bonds, how much capital is required to make the bonds safe?

To answer this question, the Brunnermeier *et al.* (2017) default simulation model can be modified to find the capitalisation level consistent with a five-year expected loss rate of the intermediary's bond portfolio of 0.5% (in their 'adverse' calibration).[7] As before, the answer will depend on the portfolio composition of the intermediary. For example, a portfolio that contains a disproportionate amount of bonds with low default probabilities and/or low assumed losses given default will require lower capitalisation.

Table 2 shows the results for three specific sets of portfolio weights: the portfolio weights of Table 1, portfolio weights corresponding to the capital key of the ECB (which in turn closely correspond to GDP weights), and the portfolio weights assumed in ESRB HLTF (2018) for the collateral pool underlying the SBBS. The required capitalisation is given at the bottom of the table. It is 24.4% of assets for the shares of Table 1, 28.1 for the ECB capital key shares, and 27.5 for the SBBS portfolio shares according to ESRB HLTF (2018). Compared to the typical capitalisation of banks, these are very high levels. This is intuitive, as the purpose is to make the debts of the capitalised institution, which we refer to as 'capitalised bonds' for brevity, as safe as a German government bond. Indeed, these capitalisation levels are almost as high as the subordination levels ('thickness' of the junior tranches) required to achieve the same level of safety in the SBBS approach, which would be around 30%. This is because the junior tranches in the SBBS approach serve the same purpose as capital in the capitalisation approach – to protect holders of the senior or safe instrument from the consequence of a default of bonds in the portfolio of the intermediary.[8]

The required capitalisation is also high in absolute amounts. To support the same level of safe assets that can be produced with the E-bond approach – about €2.6 trillion, 24% of euro area GDP – euro area countries would need to supply a capital cushion

6 Specifically, Leandro and Zettelmeyer (2018) assume a floor of €200 billion. Above this floor, it is hard to detect any relationship between market volume and liquidity premiums.

7 The Matlab code and a note explaining the modifications undertaken are available for download at https://cepr.org/content/policy-insight-93-additional-files

8 The reason why the required subordination levels in the SBBS approach are slightly higher, for a given set of portfolio weights, than the capitalisation levels necessary to achieve the same expected loss rate, is because we have implicitly assumed that the capital would be held in the form of (riskless) cash, rather than in government bonds. If the intermediary used its capital to purchase additional government bonds using the same portfolio shares, the required capitalisation level would be exactly equal to the required subordination level in the SBBS approach, using the same portfolio weights, i.e. around 30%. If the capital were held in highly rated bonds, the required capitalisation would be above the levels indicated in Table 2 but below the required subordination level in the SBBS approach.

of €634 billion (€2600 billion times 0.244) if the portfolio weights of the E-bond approach are used, €731 billion (€2600 billion times 0.281) if the ECB capital key is used, or €715 billion (€2600 billion times 0.275) if the SBBS shares are used. This is 6-7% of euro area GDP, and nine times higher than ESM's paid in capital of €80 billion. As the ESBies approach can produce roughly the same volume – and the safety characteristics of ESBies and the capitalisation approach are rather similar, as we will show below – these capitalisation requirements can be interpreted as the price of issuing a euro area safe asset that avoids tranching.

Table 2. Purchase portfolios for capitalisation approach and corresponding capitalisation levels

	Portfolio shares (%)		
	As E-bond shares (Table 1)	As ECB capital key	As SBBS shares (ESRB HLTF 2018)
Germany	29.2	25.6	26.2
Netherlands	6.4	5.7	5.9
Luxembourg	0.1	0.3	0.1
Austria	3.3	2.8	2.9
Finland	2.0	1.8	1.8
France	21.3	20.1	20.8
Belgium	4.0	3.5	3.6
Estonia	0.0	0.3	0.0
Slovakia	0.7	1.1	0.8
Ireland	2.3	1.7	1.7
Latvia	0.1	0.4	0.1
Lithuania	0.2	0.6	0.3
Malta	0.1	0.1	0.1
Slovenia	0.4	0.5	0.5
Spain	10.7	12.6	13.0
Italy	16.0	17.5	18.0
Portugal	1.8	2.5	2.6
Cyprus	0.1	0.2	0.1
Greece	1.1	2.9	1.6
Total	100.0	100.0	100.0
Capitalisation level (%)	24.4	28.1	27.5

SSBB = Sovereign Bond Backed Securities.
Note: This table shows the capitalisation level required to make the bonds issued by an intermediary holding a portfolio of euro area sovereign bonds, and ranking equally with other investors, safe in the sense of achieving a five-year expected loss rate of 0.5% according to the adverse calibration of Brunnermeier *et al.*'s (2017) simulation model. It is assumed that the capital is invested in cash or another risk-free asset. Three alternative sets of portfolio shares are considered: those used in Table 1 for E-bonds, the ECB capital key, and the indicative portfolio shares shown in ESRB HLTF (2018).
Sources: European Central Bank, Leandro and Zettelmeyer (2018) and authors' calculations based on simulation model of Brunnermeier *et al.* (2017) (adverse calibration).

A leveraged Euro-SWF

A related approach would be to allow the intermediary to invest in a broad array of international assets, like a sovereign wealth fund, rather than just in euro area bonds. Compared to the previous approach, this has two advantages. First, the fund would earn a higher rate of return, without necessarily incurring higher risk (due to international diversification). Second, it could gradually 'capitalise itself' out of retained earnings, and hence would not require nearly as large an investment from the public purse.

To start off, some public seed capital would be needed, which would be leveraged through borrowing, subject to maintaining a minimum capital ratio. The earnings of the fund would initially be retained and reinvested, growing both its capital and – given constant leverage – its debt. Once the fund reaches its target size, it would begin to disburse its earning to its shareholders in the proportion of its capital key.

How long this would take depends on the initial capital, the assumed return, and the permitted leverage. For example, if the fund starts out with 2% of euro area GDP, keeps capital at 30% of assets, and earns a rate of return of 3% per annum above its funding costs, it would take just under 16 years for the assets of the fund to reach about 30% of euro area GDP, implying a debt stock – the safe asset – of 0.7*30 = 21% of GDP. To reach the same level after about 10 years, the fund would need to start out with 3.3% of euro area GDP of capital, half of the level required in the capitalisation approach in which all assets consist of euro area bonds.

Properties

Safety

ESBies, E-bonds, and capitalised bonds could all be designed to target the same five-year expected loss rate. In the case of ESBies, this is achieved by setting the subordination level ('thickness' of the junior tranche) accordingly; in the case of E-bonds, through the share of the national debt market that the intermediary would buy, which implies a country-specific cushion of subordinated debt; and in the case of a capitalised public intermediary, through the level of capital. In that sense, they can be made equally safe by construction.

However, even with identical expected loss rates, the distribution of losses in the three approaches is quite different. In both ESBies and the capitalisation approach, there is a single, large cushion protecting the safe asset holder from defaults in the underlying bond portfolio. As long as this cushion – that is, either the junior tranche, or the intermediary's capital – has not been depleted, the safe asset holder will not suffer any losses. This means that there can be multiple deep defaults in the euro area – how many exactly depends on the assumed losses-given-default – that would not affect the performance of the safe asset. In contrast, the E-bond holder will suffer losses – albeit in small volumes – if there is a sufficiently deep default in even one country, because the 'cushion' offered by the senior status of the intermediary applies on a country by country basis, rather than across the entire pool of sovereign assets. In the absence of capitalisation, these small losses would be passed on to the holders of E-bonds. In that sense, E-bonds offer a lesser degree of protection for relatively likely default events.

One way to see this is to compare the probabilities of default for the three 'safe' assets, based on the Brunnermeier *et al.* (2017) simulation model (Table 3, first column).[9] The probabilities of default for the German, French and Belgian government bonds are also shown for comparison. As expected, the probabilities of default (PD) for ESBies and in the capitalised approach are low and roughly equal, namely, about 2% in the benchmark calibration, in line with the default probability for a French government bond.[10] In contrast, the probability of the default for the E-bond is much higher – 30% in the benchmark calibration and 31% in the adverse calibration. Based on the last two columns of Table 1, this is a plausible order of magnitude: the implicit probability of suffering a default from Greece and Cyprus alone is about 17% and 11%, respectively, with the joint probability smaller than the sum of the two due to default correlation. To this, one must add smaller default probabilities, in the order of 3-6% in the adverse calibration, for Estonia, Ireland, Italy Latvia, Lithuania, Malta, Portugal, Slovakia, Slovenia and Spain. Hence, there are many states of the world – sufficiently deep debt crises in any of these countries – that can trigger a (partial) default of the E-bond, whereas ESBies and bonds issued by a capitalised intermediary would be impaired only in rare systemic crises.

Another way of comparing the characteristics of alternative 'safe' assets is to examine the magnitude of losses arising with a given low probability ('tail events'). Following ESRB HLTF (2018), two measures for such unexpected losses are presented: value at risk (VaR) and expected shortfall (ES). The VaR at probability p measures the maximum loss occurring with probability p or higher, while the ES measures expected losses associated with tail-events of probability p percent or lower. By construction, the ES is always larger than the VaR. Table 3 shows that in the benchmark calibration, both VaRs and ES are significantly higher in the E-bond approach than in ESBie and capitalisation approaches. The only exception is the 1% ES, where ESBies and capitalised-E-bonds have higher expected losses than E-bonds. In the adverse calibration, the VaRs of capitalised bonds and ESBies continue to be smaller than those of E-bonds at probabilities of 5, 4, and 3%. At the 1% level, however, the opposite is true: 18% and 22% of the value of capitalised bonds and ESBies, respectively, would be wiped out, while the VaR of classic E-bonds is 9.3%. Similarly, the ES of capitalised bonds and ESBies are higher than those of E-bonds in the adverse calibration: the extreme losses borne by capitalised bonds and ESBies in the tail of the loss distribution raise the ES, which is an average measure.

The main conclusion is that capitalised bonds and ESBies do a better job of protecting their holders in somewhat more likely, smaller crises than E-bonds, but would suffer bigger losses in rare, systemic crises in which many countries default at the same time. This is because ESBies and capitalised bonds do not suffer any losses until the junior tranches or the capital have been entirely wiped out. Once this has happened, however, any additional default comes fully at the expense of the senior bondholders, and loss rates rise very steeply. In contrast, E-bonds bear a loss as soon as the loss in any one country exceeds the value of the junior bonds of that country. As more countries default, the loss rates associated with E-bonds rise more slowly than in the case of ESBies, since for each new default a portion of the losses (or perhaps even the entire loss, depending on its extent) is absorbed by the junior claim holders. Furthermore, the total loss suffered by E-bond holders can never exceed 9.34%, which is the share of its holdings that the E-bond issuer would lose, based on the loss-given-default assumptions of Brunnermeier *et al.* (2017), if all countries in the euro area defaulted (see column 8 in Table 1).

Several implications can be drawn from these results.

First, credit rating agencies whose methodologies are based on probability of default (pd), rather than expected losses, should give a higher rating to ESBies and capitalised bonds than to uncapitalised E-bonds. Table 3 suggests that, based purely on pd, ESBies should be rated at, or just below, the level of a French government bond.

Second, concerns that a possible failure of supposedly safe assets in a crisis might trigger bailouts by the fiscally stronger member states appear much less plausible in the case of ESBies and capitalised bonds than in the case of uncapitalised E-bonds. The 3% VaR case for E-bonds would be enough to inflict moderately severe losses – more than 7% – on banks and other holders of a supposedly safe asset.

9 The term 'default' is used to refer to a situation in which the safe asset returns less than a contractually indicated reference amount (namely, the payment stream associated with a performing debt portfolio). This situation would not need to be a legal default, however, if the bond contract governing the payment obligations of the intermediary stipulates rules for reducing the payment if there is a default in the underlying bond portfolio.

10 Table 3 shows a slightly lower PD for the ESBies because their expected loss rate, based on the portfolio weights of ESRB HLTF (2018) and a 30% subordination level, is 0.42 in the adverse calibration, slightly lower than in the capitalisation approach, which was calibrated to result in an expected loss rate of exactly 0.5%.

These losses would be due to defaults by Greece, Ireland, Spain, Portugal, and some smaller members. Germany, France, the Netherlands, Austria, Finland, Belgium, and Italy do not default in this scenario, so they may come under pressure to bail out their banks and perhaps other countries. Capitalised bonds and ESBies, however, remain safe until the debt crisis becomes so systemic that even France defaults or is on the brink of defaulting. ESBie losses rise above 10% only after Germany and the Netherlands default. In other words, capitalised bonds and ESBies would be largely safe until there is no fiscally strong country left in the euro area. Hence, the possibility that any euro area country, even Germany, might be called upon to bail out the holders of ESBies or capitalised bonds seems remote.

Third, if the objective is to emulate the risk characteristics of the German bund, then ESBies and capitalised bonds are a lot closer to this benchmark than E-bonds. This is because the German bund would not be at risk of default in any euro area crisis except for a genuinely systemic one, in which many countries default at the same time. ESBies and capitalised bonds have the same property, but not E-bonds. This said, the probability of default of E-bonds could be reduced, and its VaR and ES profile largely aligned with that of ESBies and capitalised bonds, by endowing the E-bond intermediary with a capital cushion. Because this would come on top of the seniority of the intermediary, relatively little capital would be required. Even a cushion of just 2% would suffice to reduce the probability of default of E-bonds from over 30% to less than 5%, about in line with that of a Belgian bond (see Table 3). With a 5% cushion, the probability of default in the adverse scenario would be below that of a capitalised bond and an ESBie, and so would the five-year expected loss rate. This is a consequence of the fact that E-bonds were calibrated to generate a five-year expected loss rate of 0.5% in the adverse scenario, so adding capital would reduce this expected loss rate further.

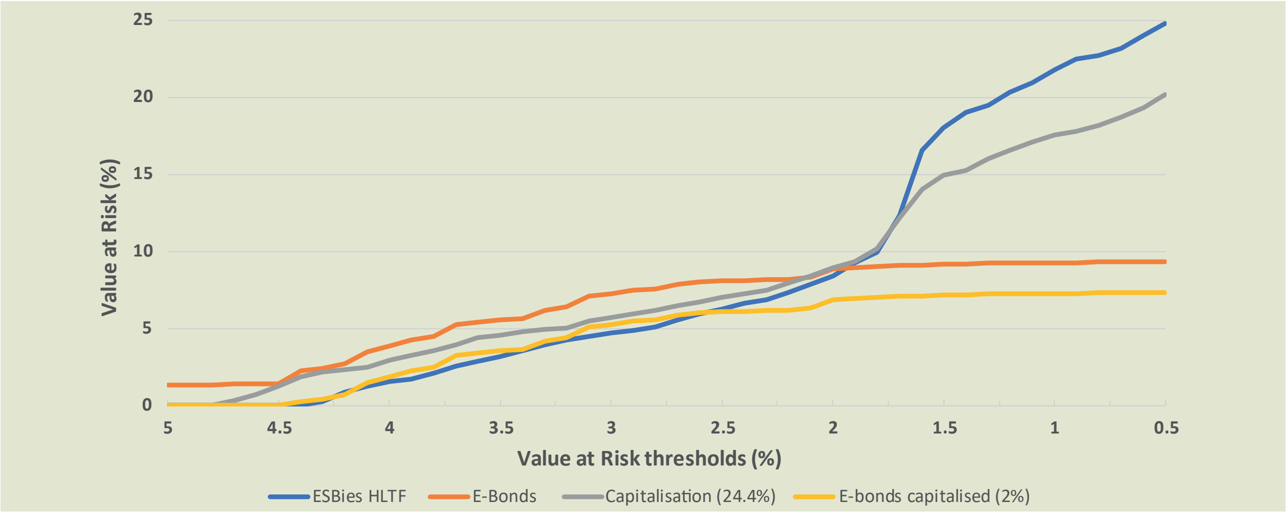
Table 3. Potential losses of alternative safe assets and selected bonds

	5-year exp. loss rate	Prob. of default	Value at Risk (VaR)					Expected Shortfall (ES)				
			5	4	3	2	1	5	4	3	2	1
benchmark calibration												
ESBies	0.12	1.5	0.0	0.0	0.0	0.0	2.3	2.5	3.1	4.1	6.2	11.7
Capitalised intermediary	0.13	2.1	0.0	0.0	0.0	0.2	4.1	2.5	3.2	4.2	6.4	10.7
E-bonds	0.41	30.2	1.1	3.0	4.9	6.5	7.8	5.4	6.3	7.1	7.8	8.4
E-bonds + 2% capital	0.18	4.4	0.0	1.0	2.9	4.5	5.8	3.5	4.3	5.1	5.8	6.4
E-bonds + 5% capital	0.06	2.9	0.0	0.0	0.0	1.5	2.8	1.3	1.6	2.1	2.8	3.4
German bund	0.13	0.4	0.0	0.0	0.0	0.0	0.0	2.7	3.4	4.5	6.7	13.5
French bond	1.09	2.0	0.0	0.0	0.0	0.0	60.0	21.7	27.2	36.2	54.3	60.0
Belgian bond	1.42	2.5	0.0	0.0	0.0	50.0	62.5	28.3	35.4	47.2	58.5	62.5
adverse calibration												
ESBies	0.55	4.3	0.0	1.6	4.7	8.4	21.8	10.9	13.6	17.0	22.4	28.7
Capitalised intermediary	0.50	4.8	0.0	3.0	5.7	9.0	17.6	9.9	12.1	14.6	18.4	22.8
E-bonds	0.51	30.7	1.4	3.9	7.3	8.9	9.3	6.8	8.0	8.8	9.2	9.3
E-bonds + 2% capital	0.24	4.5	0.0	1.9	5.3	6.9	7.3	4.9	6.0	6.8	7.2	7.3
E-bonds + 5% capital	0.12	3.7	0.0	0.0	2.3	3.9	4.3	2.4	3.1	3.8	4.2	4.3
German bund	0.50	1.4	0.0	0.0	0.0	0.0	32.0	10.1	12.6	16.8	25.2	37.0
French bond	1.94	3.7	0.0	0.0	48.0	48.0	60.0	38.7	48.4	54.7	58.0	60.0
Belgian bond	2.64	4.8	0.0	50.0	50.0	62.5	62.5	52.7	56.7	58.9	62.5	62.5

Note: The table shows values at risk and expected shortfalls, for various probability levels, associated with safe assets produced using different approaches as well as with German, French and Belgian sovereign bonds, using the simulation model of Brunnermeier *et al.* (2017). The values at risk at p% describe the minimum loss associated with a tail-event occurring with p% probability. The expected shortfall at p% describe the expected loss associated with a tail-event occurring with p% probability. For ESBies, calculations assume the indicative portfolio weights proposed by ESRB HTLF (2018). For E-bonds, the capitalisation approach ('capitalised intermediary'), and E-bonds with capitalisation, portfolio weights of Table 1 are assumed. We assume a 24.4% capitalisation level for the capitalisation approach (see Table 2). VaR and ES values for German, French and Belgian bonds are the result of assumptions on probabilities of default and loss-given-default rates in Brunnermeier *et al.*'s (2017) simulation model.
Sources: ESRB HLTF (2018), Leandro and Zettelmeyer (2018) and authors' calculations based on the simulation model of Brunnermeier *et al.* 2017.

Figure 1 compares the VaRs of ESBies, uncapitalised E-bonds, the pure capitalisation approach (portfolio weights of Table 1, capitalisation of 24.2%) and the capitalised version of E-bonds, with just 2% capitalisation, using Brunnermeier *et al.*'s (2017) 'adverse' calibration. Consistent with Table 3 (lower panel), the VaR of E-bonds exceeds that of both ESBies and the capitalisation approach except for tail events occurring with less than 2% probability, when the losses suffered by ESBies and bonds issued under the capitalisation approach would rise sharply, while E-bond losses converge to 9.34%. The effect of capitalisation is to shift the E-bond VaR curve down by two percentage points, in effect combining the advantages of the capitalisation approach and uncapitalised E-bonds. As a result, the VaR profile now looks much like that of the ESBies in debt crises occurring with probability 2.5% or higher but offer much more protection in lower probability tail events in which a large subset of the euro area defaults.

Figure 1. Value at Risk of alternative 'safe' assets at various percentiles



HLTF = SBBS High Level Task Force (see ESRB HLTF 2018).
Note: The figure shows the Values at Risk (VaRs) of four potential safe assets, at different thresholds ranging from 5 to 0.5%. For the capitalisation approach, we show results for the case corresponding to the first of the columns in table 2 (capitalisation level 24.2%). For the capitalised E-bonds, a capitalisation level of 2% is assumed.
Sources: authors' calculations based on the simulation model of Brunnermeier *et al.* 2017 (adverse calibration).

Impact on borrowing costs

The introduction of safe assets in large volumes through the three approaches discussed could have an effect on borrowing costs through at least five channels.

- First, to the extent that these assets substitute concentrated holdings of sovereign bonds in banks, they could reduce both the likelihood and severity of debt crises in the euro area, lowering the cost of borrowing particularly in countries in which the bank-sovereign 'doom loop' may continue to play a role (Schnabel and Schüwer 2017, Farhi and Tirole forthcoming)

- Second, by lowering systemic risks in the euro area, the presence of a safe asset may lower the probability that bond holders will be bailed out in a debt crisis, which may raise the cost of borrowing of lower-rated borrowers.

- Third, purchases of sovereign bonds by a large intermediary (or in the case of the SBBS approach, many small intermediaries) may affect the liquidity of national sovereign bonds by reducing the volume trading regularly in secondary markets (which would tend to increase borrowing costs) but also by creating hedging opportunities (which would tend to raise liquidity and lower borrowing costs, see ESRB HLFT 2018).

- Fourth, the cost of borrowing *from the market* will rise if issuing the safe asset goes along with the subordination of sovereign bonds. This effect is relevant only for E-bonds emitted by a senior intermediary, since the other two approaches would not lead to subordination of national bonds. At the same time, however, the E-bond intermediary lends to sovereigns at face value, which will tend to lower borrowing costs for all countries whose funding costs in bond markets are higher than those of the E-bond intermediary. The question is which of these effects dominates.

- Fifth, issuing safe assets could change the supply of sovereign debt within specific risk buckets. If investors prefer a particular risk bucket – that is, do not view bonds across buckets as perfect substitutes – this could have a negative or positive impact on bond yields.[11]

11 This is analogous to a 'local supply' or 'preferred habitat' effect (Vayanos and Vila 2009), except that in our case the 'habitat' refers to a risk bucket rather than a maturity segment.

In the remainder of this section, we focus on the last two channels, because they have been discussed the least and lend themselves to quantification. For a broader discussion, see Leandro and Zettelmeyer (2018).

Subordination effect

In the E-bond proposal, debt purchases by a senior intermediary would lead to a subordination of the remaining creditors, raising the cost of borrowing from the private sector. Without subordination, a given loss $l*D$ (where D is the outstanding debt and l is the loss given default rate) would have been distributed among the entire creditor mass D, so that each creditor suffers the same loss rate l. With subordination, however, subordinated debtors would lose everything if losses are larger than the claims that they hold, $s*D$ (where s is the share of subordinated debt), i.e. if $l \geq s$. Even if this is not the case, i.e. $l<s$, claims of private creditors would be written down in the proportion l/s, i.e. each subordinated creditor suffers a loss rate of l/s, which is larger than the share l that he or she would be losing in the absence of subordination. The smaller the share of subordinated creditors, the higher the loss rate.

Using an interest parity condition, one can get a rough sense of how this might affect the cost of borrowing from subordinated creditors, denoted r_s.[12] For example, at end-October 2017, the 10-year Italian benchmark bond yield was 1.82% and the 10-year Portuguese yield was 2.06%. Taking l=0.5 (which is about in line with long-run historic average loss rates), assuming a risk-free interest rate of 0.33% (slightly below the yield of the 10-year German bund at the time) and using the country-specific subordination levels (from Table 1) of s = 0.78 for Italy and s = 0.65 for Portugal, respectively, leads to r_S = 2.24% for Italy and r_S = 2.24% for Portugal (see Leandro and Zettelmeyer 2018 for details). This is an increase of 42 basis points for Italy and 91 basis points for Portugal. The bigger impact on Portugal mainly reflects the smaller subordination level for Portugal (0.65) than for Italy (0.78), which implies that in a Portuguese credit event, a given loss would need to be shared by fewer creditors.

However, this rise in the costs of borrowing from the market does not necessarily translate into a rise in *overall* borrowing costs. The reason is that a share 1-s of the debt, i.e., 22% for Italy and 35% for Portugal, is now being borrowed from the E-bond intermediary at the much lower German cost of borrowing (since the E-bond was designed to exactly match the expected loss rate of the German bund, and the E-bond issuer is assumed to pass on its funding costs to its borrowers). The new average cost of borrowing would hence be 0.22 * 0.36% + 0.78 * 2.24% = 1.82% for Italy and 0.35 * 0.36% + 0.65 * 2.97% = 2.06% for Portugal, unchanged from their previous levels.

In general, the higher cost of borrowing from the market and the lower cost of borrowing do not cancel exactly. However, the two effects always operate in opposite directions (cheaper borrowing from the intermediary, more expensive borrowing from the market), leading to a generally small net effect. Leandro and Zettelmeyer (2018) show that this is positive (i.e. a small rise in average borrowing costs) for the highest rated borrowers such as Germany the Netherlands or France,[13] while it will tend to be negative (a decline in average borrowing costs) for the lowest rated borrowers.

Importantly, however, the E-bond proposal would still have the effect of raising the *marginal* borrowing costs of all countries for whom the 25% of GDP borrowing limit from the E-bond issuer is binding (see Table 1, this includes Austria, France, Belgium, Malta, Slovenia, Spain Italy and Portugal),[14] since additional borrowing in these countries would need to happen at – more expensive – market rates. Hence, although implementation of the E-bond proposal could lower average debt costs for Italy and Portugal, it would increase fiscal discipline, since the decision on retrenching or expanding debt from existing levels depends on marginal borrowing costs – that is, the cost of issuing an *additional* unit of debt.

Local supply effects

Some safe asset proposals could conceivably increase the borrowing costs of lower-rated borrowers by increasing the supply of securities with similar expected loss rates. For example, E-bonds could increase bond supply in the lower rating categories, as the riskiness of previously higher rated bonds increases due to the subordination effect discussed above in the SBBS approach. Similarly, one might worry that in the ESBies approach, the mezzanine tranche would compete with Italian and Spanish bonds, while the junior (equity) tranche might compete with Greek or Cypriot bonds.

12 The condition used is:

$$(1+r_S)(1-\pi)=\begin{cases}(1+r^*) & \text{for } l\geq s\\ (1+r^*)-\pi(1-l/s) & \text{for } l<s'\end{cases}$$

where r_s denotes the interest rate charged by subordinated creditors, r^* denotes the risk-free rate, and π denotes the probability of default.

13 To see the intuition for this, consider the case of Germany. Since the expected loss rate of E-bonds is identical to that of Germany, the interest rate that Germany pays to the E-bond intermediary will be equal to the rate that it previously paid to the market. At the same time, the yield on German bonds sold to the market will rise, because German bonds are now subordinated to the German debt held by the E-bond intermediary. German average borrowing costs should thus rise slightly.

14 Debt is defined here as general government debt securities, i.e. bonds. According to ECB data, the stock of debt securities issued by the remaining countries was less than 25% of GDP at end-2017.

As it turns out, however, these worries are mostly unfounded. Both the SBBS and E-bonds approach are based on purchasing pools of euro area debt and holding them to maturity. As a result, they would 'suck out' some of the debt that is currently issued in the markets, including in the lower rated categories. In general, this more than offsets any increase in the supply of subordinated securities. For example, issuing €100 in SBBS requires €13 in Spanish debt and €18 in Italian debt (Table 2, last column) while producing €20 in mezzanine securities. The 'net' supply in the risk bucket encompassing Spanish, Italian, and mezzanine debt would hence fall by €11. Similarly, the E-bond approach would push some countries into lower risk categories. For example, the 4-8% expected loss category that currently includes Spanish, Italian, and Slovenian debt would also include Latvia, Lithuania and Malta. But this is more than offset by the fact that the E-bond intermediary would buy a substantial proportion of the debt market of these countries (between 22 and 49.5%, see Table 1).

The only exception, with regards to the SBBS proposal, is the category of bonds rated BBB- or lower. Here, the equity tranche of the SBBS proposal would lead to an increase in supply (€10 for every €100 issued) that far outstrips SBBS demand for Greek (€1.1), Cypriot (€0.1) or even Portuguese (€2.6) bonds. To what extent this increase would hit the prices of these bonds is not clear: it depends on exactly how local 'local supply' effects are in this risk category and on whether regulatory changes that might go along with the creation of a market in sovereign bond–backed securities would have an impact on the demand for the subordinated tranches that partly offsets the supply effect.[15]

Redistribution

In both the SBBS and the capitalisation approach, intermediaries would purchase bonds at market prices. No redistribution would be expected under either of these approaches, because the prices at which the bonds are purchased carry risk discounts that offset the losses expected by market participants, and because (in the absence of subordination) the expected losses of the intermediaries and private investors should be the same.

In contrast, the E-bond approach would clearly lead to redistribution, as the issuer would buy debt at face value and pass its funding costs on to its borrowers, charging them all the same interest rate regardless of whether they are a significant source of risk or not. The question is how large this effect might be.

The answer is given in Table 4. The first three columns of the table are reproduced from Table 1, as a reminder of the composition of the portfolio held by the E-bond intermediary. The fourth column states the loss rate expected by the intermediary, using the 'benchmark' calibration of the Brunnermeier *et al.* (2017) model. Column (5), is the product of these expected loss rates and the debt volumes stated in column (1); it states the absolute volume of losses expected from each borrower over five years, which sum to just over €10 billion. To offset these expected losses, the E-bond issuer will be charged a small risk premium (€10 billion for a volume of €2627 billion), which it passes on to its borrowers in proportion of their portfolio share. Germany, for example, would pay 29.2% of the expected loss, which is about €3 billion over five years (column 6), i.e. €0.6 billion per year. Since it does not contribute to the loss, this implies an equivalent transfer from Germany to the other countries in the same amount (column 7) – a modest amount compared to Germany's annual net contributions to the EU budget (around €13 billion in 2016, according to European Commission data).

Interestingly, Italy would also be a net contributor: because of its high subordination level of 78%, its five-year expected loss rate would be very small (0.27%), while its portfolio weight – as a large country – is almost 16%. As such, it shoulders 16% of the expected portfolio loss of €10 billion, which is more than the sovereign risk it would add to the system. In contrast, Greece would receive a subsidy: its borrowing spread implies a high expected loss rate, of over 14%, which multiplied with a debt volume of 28.3 billion leads to an expected loss of just over €4 billion. Since its share in the portfolio is tiny (1.1%) it only pays for a small part of this itself. As a result, it receives a transfer, in expectation, of €3.92 billion.

15 The European Commission has announced a regulatory change that would put SBBS on a par with the current regulatory treatment of sovereign exposures (European Commission 2017). As a result, SBBS may attract demand from new investors that seek a diversified exposure to all European sovereigns at a low cost.

Table 4 Redistributive effects of the E-bond proposal

(based on Table 1 and distribution of expected losses according to portfolio shares, benchmark calibration; in € billion unless otherwise stated)

	Debt volume in portfolio	Portfolio share (percent)	Subordination level (1-share of debt purchased, %)	Expected loss rate, senior intermediary (%)	Expected losses caused	Expected losses absorbed	Expected transfer (>0 means recipient)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Germany	768.4	29.2	50.5	0.00	0.00	3.02	-3.02
Netherlands	168.6	6.4	50.5	0.00	0.00	0.66	-0.66
Luxembourg	3.1	0.1	50.5	0.00	0.00	0.01	-0.01
Austria	87.9	3.3	64.2	0.00	0.00	0.35	-0.35
Finland	51.8	2.0	50.5	0.00	0.00	0.20	-0.20
France	560.9	21.3	69.1	0.00	0.00	2.20	-2.20
Belgium	106.1	4.0	71.0	0.00	0.00	0.42	-0.42
Estonia	0.1	0.0	50.5	0.62	0.00	0.00	0.00
Slovakia	17.8	0.7	50.5	0.78	0.14	0.07	0.07
Ireland	61.4	2.3	50.5	1.19	0.73	0.24	0.49
Latvia	3.6	0.1	50.5	1.62	0.06	0.01	0.04
Lithuania	6.1	0.2	50.5	1.61	0.10	0.02	0.07
Malta	2.5	0.1	53.5	1.93	0.05	0.01	0.04
Slovenia	10.2	0.4	61.8	1.51	0.15	0.04	0.11
Spain	280.3	10.7	69.5	0.91	2.55	1.10	1.45
Italy	420.9	16.0	77.5	0.27	1.13	1.65	-0.52
Portugal	46.5	1.8	65.0	2.52	1.17	0.18	0.99
Cyprus	3.1	0.1	50.5	6.75	0.21	0.01	0.20
Greece	28.3	1.1	50.5	14.26	4.03	0.11	3.92
Total	**2627.6**	**100.0**		**0.39**	**10.33**	**10.33**	**0.00**

Note: All expected loss rates, losses, and transfers refer to a five-year horizon. The first three columns of the table repeat information from Table 1. Column (4) shows five-year expected loss rates of debt held by the E-bond intermediary, taking its seniority into account and assuming the purchase amounts shown in columns (1) and (2). Column (4) multiplies these expected loss rates with the portfolio holdings of the intermediary, and column (5) shows the losses that each participating country would be expected to cover, assuming that total losses are distributed according to the portfolio shares in column (2). Column (6) shows the difference between columns (4) and (5) and represents the expected transfer from or to any given country (positive numbers mean that the country is a net transfer recipient).
Sources: Authors' calculations based on results of Table 1.

What if the E-bond intermediary were to be capitalised, as suggested above, as a way of reducing its vulnerability to large defaults in individual countries? As long as the capital is provided in the same proportion as the portfolio shares shown in column (2), this would make no difference to the redistributive impact of the proposal. Redistribution would merely happen through a slightly different mechanism. Funding costs would fall. However, since the portfolio composition has not changed, total expected losses would remain the same, and if capital shares are identical to the portfolio shares, they would continue to be shared in the same proportion. To reduce the redistributive implications of E-bonds, one could envisage either of two things. First, countries could be required to attain a minimum degree of creditworthiness before they can join the portfolio pool. For example, if Greece were excluded from the pool, this would lower the redistribution implied by the E-bond proposal by almost 40%, from just over €10 billion to just over €6 billion. Second, it may be possible to negotiate a capital key, in the capitalised version of the proposal, that is not identical to the portfolio shares and gives higher-risk countries a larger capital share.

Conclusion

This paper investigated ideas to create a 'real' safe asset for the euro area – without relying on securitisation – which stop short of requiring either a euro area budget or joint and several guarantees. It reaches two main conclusions.

First, creating such a 'real' safe asset is conceptually simple. Some variants might also be practically simple, in the sense that they stay close to existing institutional templates, such as the ESM. A capitalised public financial intermediary could buy euro government bonds in the market and issue its own bonds, backed by its asset portfolio and its capital. This idea is analogous to proposals to create 'Sovereign Bond Backed Securities' (ESRB HLTF 2018) except that the assets issued would be plain vanilla bonds, and 'safety' would be created through capital rather than tranching. A variant of this idea is to allow the intermediary to invest internationally, as a leveraged sovereign wealth fund, which would allow it to build a capital cushion gradually out of retained earnings. Finally, safety could be created both without tranching and without (or with very little) capital, by giving the public intermediary issuing bonds preferred creditor status in euro area sovereign debt markets ('E-bonds').

Second, compared to SBBS, these ideas have both attractive features and disadvantages. Among the attractive features is that they avoid tranching, as well as the need to regulate SBBS intermediaries – in particular, to ensure that these are 'robotic' entities that do not add risk to the system. But the price of this, in the case of a capitalised public institution issuing plain vanilla securities, is a very large volume of capital required to ensure safety, in the order of 25-30% of the volume of bonds issued. Issuing 25% of euro area GDP in safe assets might hence require a capitalisation of around €700 billion, nine times the paid-in capital of the ESM. This upfront capitalisation requirement could be lowered, although not eliminated entirely, in the variant that would allow the intermediary to invest like a sovereign wealth fund. But it is not clear that the idea of a large, leveraged fund undertaking risky investments would necessarily find more sympathy, among Europe's pundits and politicians, than the notion of creating a safe asset through financial engineering.

For these reasons, the most serious competitor to SBBS discussed in this brief may be the E-bond proposal. It is also the one whose implications would differ the most from SBBS. While the SBBS proposal was designed to avoid any redistribution and have as little impact as possible on national bond markets, the E-bond proposal would lead to redistribution (albeit of modest volume), would raise the cost of borrowing in national bond markets (by subordinating debt held by private creditors), and could slightly increase overall borrowing costs in countries where they are currently the lowest while modestly decreasing them elsewhere. These implications are arguably desirable. In particular, the proposal could increase fiscal discipline in high-debt countries without raising their average costs of borrowing. The fact that this comes with a small distributional bonus benefitting the poorer euro area economies might be viewed as an additional benefit, or alternatively (from a German, Dutch or French perspective) as a small price to pay. At the same time, it is clear that the E-bond proposal steps over several red lines in both creditor and debtor countries – as does the SBBS proposal (by resorting to financial engineering), the capitalised alternative that dispenses with financial engineering but requires lots of capital, and the idea of creating a leveraged sovereign wealth fund for the euro area (which would likely be accused of gambling with public money).

There are many feasible approaches to creating a euro area safe asset. There may, in fact, be a proposal to accommodate every political red line. Some of these proposals, such as the E-bond proposal, deserve a more thorough public hearing than has been the case so far. However, not all red lines can be accommodated at once. At some point, euro area politicians will need to step over some of them, as they have in the past, to make room for increased financial stability and integration in the euro area.

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