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Designing the ESM—Who Profits, Who Pays?

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Designing the ESM—Who Profits, Who Pays?

Abstract

The European Stability Mechanism (ESM) is the permanent crisis prevention mechanism of the euro area. It was established in 2012 under considerable time pressure in an environment dominated by the financial crisis in the euro area. We analyze the costs of the current (suboptimal) design of the EMS and evaluate an alternative asset-backed securities (ABS) structure under different scenarios. Our simulation results indicate that switching to an ABS structure could lower EMS refunding costs by up to 2% with respect to our benchmark scenario. Moreover, the advantages of an ABS structure are found to be strongest in the mostly likely type of future crisis, namely, medium-sized requests for financial support from EMS members under economic stress accompanied by the unwillingness or inability of other EMS countries to provide new capital to the EMS.

Keywords

European Stability Mechanism (ESM), financial instruments, euro area, ABS

JEL classification

E6, F34, F55, G15

I. Introduction

In the aftermath of the U.S. subprime crisis, a number of European countries faced severe financial stress, with interest spreads on sovereign bonds increasing dramatically in the spring of 2010. Starting with Greece in May 2010, several euro area Member States asked for and received financial help to cope with higher refinancing costs and, in some cases, even the loss of financial market access. At the time, there were no adequate financial backstops in place, so fiscal assistance was organized ad hoc, first on a bilateral basis in the case of Greece, and subsequently via two newly established multilateral vehicles, the European Financial Stability Facility (EFSF) and the European Financial Stabilisation Mechanism (EFSM).

In October 2012, these temporary crisis management mechanisms were replaced with the European Stability Mechanism (ESM) (ESM 2013b). Today, the ESM is the permanent crisis resolution mechanism of the euro area and is viewed by many as necessary for securing the stability of the Economic and Monetary Union (EMU), especially given the evident failure of other instruments intended to ensure sustainable fiscal policies as a means of crisis prevention. The ESM complements several recent initiatives to improve economic governance and crisis prevention, including the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union, the Macroeconomic Imbalance Procedure (MIP), and stricter financial market regulations.

The ESM acts as an intermediary that issues debt instruments to finance loans and other forms of financial assistance at below market interest rates and with long maturities. Its subscribed capital base consists of paid-in capital and “callable” capital, which is requested from the member countries in the event of losses exceeding the paid-in capital. ESM assistance is restricted to situations in which the financial stability of the euro area as a whole is threatened. It is subject to conditionality, and only countries with (temporary) illiquidity problems, not solvency issues, are eligible. The amount and form of support is determined based on a conventional debt sustainability analysis.

The ESM and its predecessors were established under immense time pressure in a political environment that was in “crisis mode.” Not surprisingly, the (limited) public and academic discussion at the time focused on the “700 + x billion euro” question, namely, (1) the appropriate amount of assistance the EMS was to provide and (2) the associated risks for the members that were to guarantee the ESM. Important qualitative aspects of the ESM design

received very little, if any, attention. And yet these crucial decisions on the EMS's organizational structure, the type of financial assistance it can provide, and its refinancing instruments have a major impact on the workings and the effects of the ESM, namely, the costs of providing financial help as well as the distribution of these costs and risks among the ESM members.

The ESM founders aimed for a AAA rating and restricted the credit volume to 500 bn€ given a subscribed capital base of 700 bn€. In addition, they eschewed structural financing with asset-backed securities (ABS) and opted for conventional bonds as a means of refinancing. Both decisions imply considerable opportunity costs. Below, we quantify the effects if the ESM had opted for the issuance of structured bonds with tranches of different credit risk and rating.¹

Asset-backed securities (ABS) can improve the refinancing of a set of risky assets. Income streams are pooled to profit from diversification and portioned risk is sold in tranches. The nonlinear pricing of risk in markets due to risk aversion can reduce refinancing costs, that is, the weighted average of the interest rate of the different tranches lies below the market price of the underlying assets, an effect comparable to inverse insurance. The lower the correlation between the assets, the stronger the diversification effect and the more efficient the structuring. Additionally, pooling and structuring allow a better match between the refinancing and investor preferences (e.g., yielding investment grade tranches) and provide information on the risk of the tranches. The accompanying costs of structuring, of course, somewhat reduce its efficiency.

To date, there is not much research on the ESM. Proposals for a fiscal union with instruments like the ESM to complement the monetary union are made and discussed by Italianer and Vanheukelen (1993), Gros and Micossi (2008), and Menguy (2010). Introduction of the EFSF reawakened the debate over such instruments—both at the technical (e.g., Huizinga and Horváth (2011) and policy levels (e.g., Gros and Mayer 2011). Most contributions on the ESM take a policy perspective on whether it is a useful and adequate financial backstop (e.g.,

¹ See, in this context, the structured Eurobonds scheme by Hild et al. (2014), which can be read as a proposal to optimise ESM financing. Obviously, structured financial instruments have been at the center of the subprime crisis and are even considered by some observers to have caused the financial market turmoil. Although we, too, are critical of the highly leveraged and extremely nontransparent structuring of subprime assets, we find it important not to ignore the potential of securitization to improve financing conditions. In our view, it would be counterproductive to abstain from financial structuring just because of the aberrations that led to the subprime crisis. The more Member States that would receive financial assistance, the stronger the diversification effects of a structured ESM bond. See Bauer *et al.* (2008) and Hild *et al.* (2014) for further analysis regarding diversification effects in structured products of sovereign bonds.

Bijlsma and Vallée 2012; Buch 2012; Christova 2011; Gros and Mayer 2012; Klodt 2011; Micossi *et al.* 2011). A smaller strand of literature focuses on the legal aspects of the ESM and whether it is compatible with EU or national (mainly German) law (e.g., Faßbender 2010; Herrmann 2012; Schmidt 2013). More technical approaches assessing the economic implications of the ESM are developed by, among others, Kapp (2012), who uses a core-periphery model to determine the optimal size of the ESM.

In our analysis we focus on a number of ESM elements that have important implications for the scope and distribution of financing costs for the participating member countries and the investors. What are the relative costs to recipients and financial assistance providers of different forms of financial support such as loans or secondary market purchases? How do market expectations about the guarantees made by ESM members affect the refinancing costs and their distribution between the participating parties? What are the effects of aiming for an AAA rating instead of using structured financing and issuing bonds with different ratings?

We evaluate the various features of the ESM against the following criteria: (1) losses for the fund, (2) distribution of losses among ESM members, and (3) robustness to deteriorating market expectations about the callable capital, that is, the guarantees by ESM members to compensate for ESM losses.

The main contribution of our analysis is to quantify the effects of important institutional ESM features, particularly the specific instruments of financial support and their refinancing. A qualitative analysis of such ESM elements yields mostly unsurprising results. Only by quantifying ESM costs and their distribution can the implications of alternative institutional EMS features be evaluated and the workings of the ESM be improved. In organizing our empirical results we identify and quantify three effects that are particularly important for the scope and distribution of ESM-related costs.

1. *“Instrument” effect*: If support is provided under the loan scheme, the beneficiary country profits from the lower ESM refinancing interest rates directly, while in the case of secondary market interventions, the interest spread is retained by the ESM. The choice of instrument is therefore central for the distribution of gains between, on the one hand, the ESM and its members and, on the other hand, the beneficiary countries.
2. *“Callable-capital” effect*: The lower the amount of callable capital that markets expect to be paid in if initial ESM funds are insufficient, the higher interest investors demand and thus the higher the refinancing interest rate.

3. “*Composition*” effect: The more the volume of credits exceeds expected ESM equity (i.e., paid-in capital, retained profits, and expected callable capital), the higher the risk for investors and the higher the interest they demand.

Both the callable-capital and the composition effect are central for the potential gains of an ABS approach for the ESM

The paper is organized as follows. Section II describes the overall structure and main components of the ESM. Section III presents our empirical analysis. Section IV discusses the results of the simulation study. Section V. concludes.

II. The Structure of the ESM

General Structure

The ESM, an intergovernmental institution established under public international law, was created in order to mobilize temporary financial support for euro area Member States² facing liquidity problems that threaten the financial stability of the euro area. The ESM’s total subscribed capital of 700 bn€ consists of 80 bn€ of paid-in capital³ and 620 bn€ of callable capital that ESM members are expected to supply in the event of losses.⁴ These funds are provided by all euro area countries according to the ESM contribution key. The ESM issues securities with short and longer maturities to fund its financial support. Paid-in capital serves as collateral only. The lending capacity is limited to 500 bn€. This overcollateralized capital structure⁵ was chosen so as to achieve a AAA rating (European Central Bank 2011, p. 82).⁶

² We base our empirical analysis on the euro area of the 17, that is, before the accession of Latvia in 2014. However, our empirical results hold for the euro area of the 18 as well.

³ In April 2014, the entire paid-in capital was provided by the original 17 Member States (ESM 2013a, p. 2). Latvia will provide its share of paid-in capital by 2018, resulting in total paid-in capital of 80.22 bn€ (ESM 2014, p. 1).

⁴ There is no “stepping-out-guarantor” scheme as under the EFSF. Even Member States that are receiving financial assistance via the ESM are obliged to make their contribution to the paid-in capital and to the callable capital in the event the paid-in capital is reduced due to losses. If an ESM member fails to pay its contribution, it loses its voting rights within the ESM (ESM 2012b). If a Member State does not contribute its share during a capital call, a revised capital call will be made, increasing the contribution rate of the remaining ESM members (pro-rata basis). A Member State that receives ESM assistance and cannot contribute its share will be obliged to increase its credit from the ESM to comply with its payments. Some Member States that were already under a macroeconomic adjustment program when the ESM was established financed their paid-in capital with financial assistance (e.g., Greece) (European Commission 2012, p. 60).

⁵ Only the callable capital of AAA- and AA-rated Member States is counted.

⁶ In mid-2015, the ESM was assigned a top AAA rating by Fitch, and the second highest Aa1 rating by Moody’s. No rating was available from S&P.

Financial assistance to a beneficiary Member State is subject to IMF-type conditionality detailed in a Memorandum of Understanding (General Secretariat of the Council 2011, p. 25). The ESM has five types of instruments at its disposal: (1) precautionary financial assistance in the form of a credit line, (2) loans to governments to recapitalize banks only, (3) loans to governments, (4) purchases of government bonds on the primary markets, and (5) purchases of government bonds on the secondary markets.

We focus our analysis on ESM's two most important instruments: loans and secondary market purchases. These instruments differ mainly with respect to the distribution of the spread between the ESM refinancing rate r_{ESM} and the beneficiaries' market interest rate r_{ben} .

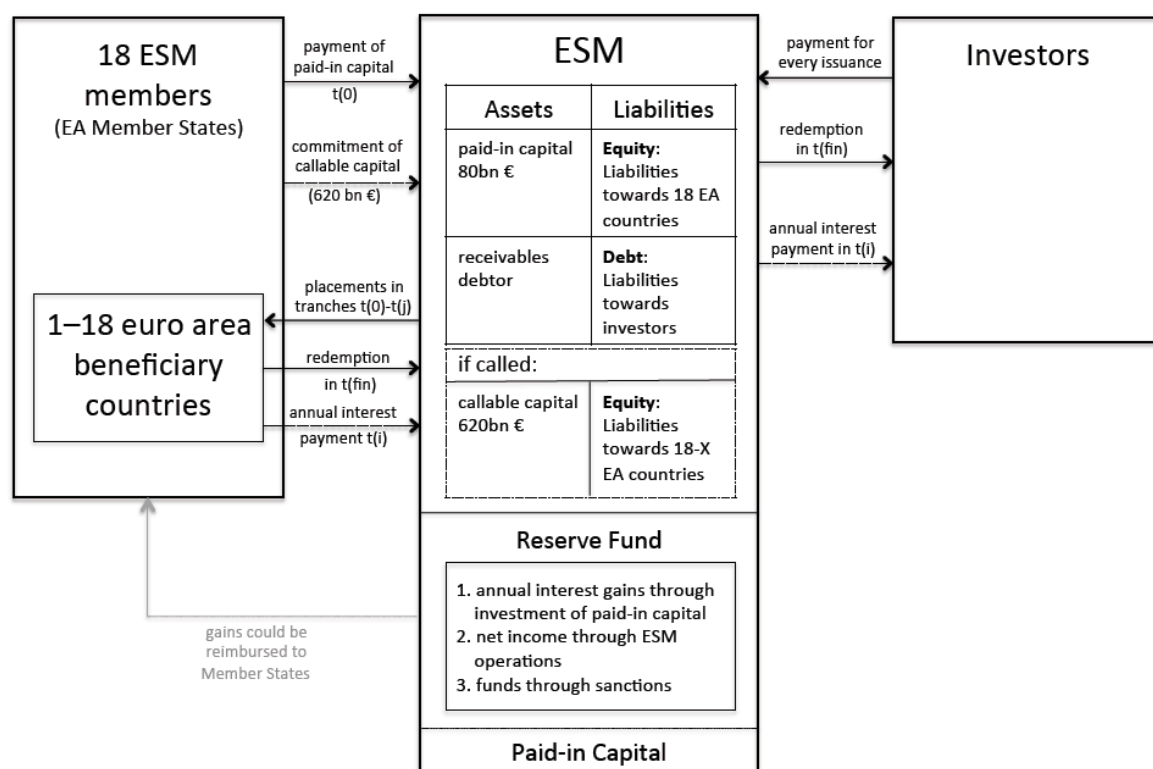
In the case of loans, the ESM charges its refinancing rate r_{ESM} plus an "appropriate margin" r_{margin} (Art. 20 of the Treaty) of currently 0.1% and a one-time service fee of 0.5% ESM (2012a). In the case of precautionary assistance and primary market interventions, the margin increases to 0.35%. In the case of secondary market interventions, the spread or risk premium $risk = r_{ben} - r_{ESM}$ is collected by the fund in full. In times of crises, the risk premium is likely to be higher than the appropriate margin, so that the following situation holds:

$$(0.1) \quad r_{loan} = r_{ESM} + r_{margin} < r_{ESM} + risk = r_{ben}$$

Capital Flows with the ESM

The ESM crisis resolution mechanism is comprised of three types of agents: (1) the euro area countries as ESM owners and, possibly, clients, (2) the ESM itself, and (3) the investors. Euro area Member States are mandatory shareholders of the ESM and have to provide paid-in capital as well as allocate callable capital when requested to do so; they can also become clients by applying for funds from the ESM in case of a financial crisis. The ESM is an intergovernmental institution that issues bonds so as to provide financial support to beneficiary countries. Investors purchase ESM bonds.

Figure 1: The general structure of the ESM



Source: Authors' illustration.

The participants are interlinked via various capital flows that take place on a yearly basis or at the beginning and the end of transactions (see Figure 1). The ESM starts with its members contributing their respective share of paid-in capital and committing to contribute additional capital should such be requested by the ESM. If a Member State is eligible for financial assistance, the ESM disburses the funds in several tranches, depending on the progress made within the agreed-upon adjustment programs. A beneficiary country pays its interest annually and refunds the notional at the end of the program. To fund this financial assistance, the ESM issues bills and bonds. These are bought by investors who receive annual interest payments until the end of the transaction, when they are reimbursed. The paid-in capital is not used for financial assistance directly but put aside to absorb losses only. It is invested in high-quality liquid assets and profits are transferred to the reserve fund. Additionally, the net income generated from ESM operations, as well as monetary sanctions collected from ESM Members

under various European surveillance procedures,⁷ are collected in the reserve fund. Profits exceeding the paid-in capital of 80 bn€ can be reimbursed to the Member States or clients.

III. A Simulation Model

We base our model on the capital flows depicted in Figure 1. For simplicity, we assume that the requested capital is paid to the beneficiary country in one tranche in $t(0)$.

Scenarios

To assess the structure of the ESM we focus on the specific effects of the following three main features.

Instrument: The type of financial support instrument, either loans (Instrument A) or secondary market purchases (Instrument B).⁸

Callable capital: The amount of market-expected callable capital in order to take into account market expectations regarding ESM credibility.⁹

Composition: The composition of the group of beneficiary Member States and the amount of financial assistance provided. (See Table 1.)

In our benchmark scenario, a big and a medium-sized euro area country, named Italy and Spain for expository purposes, request a total sum of 150 bn€ of support in the form of a loan (*Instrument A, Composition 1*). EMS members are assumed to not provide any additional capital when called, that is, market-expected *callable capital* is 0 bn€. *Compositions 2 and 3* increase the number of countries so as to analyze the diversification and timing effect and double the financial assistance to account for the volume effect.

⁷ These procedures are the multilateral surveillance procedure, the excessive deficit procedure, and the macroeconomic imbalance procedure (ESM 2013b, p. 5).

⁸ In the Appendix, we discuss in greater detail the ESM's different instruments and also analyze a linear composition of (A) and (B). We find that the effects are linear in the partitioning on the different instruments.

⁹ The market-expected callable capital is the amount of the committed callable capital that markets expect Member States to pay after a capital call by the ESM.

Table 1: List of compositions

<i>Composition</i>	Member State	Assumed yield on 10-yr government bond	Implied probability of default	Credit requested
<i>Composition 1</i>	Italy	4.54	6.31	100 bn€
	Spain	5.34	7.67	50 bn€
<i>Composition 2</i>	Italy	4.54	6.31	100 bn€
	Spain	5.34	7.67	50 bn€
	Cyprus	5.33	7.65	20 bn€
	Slovenia	7.00	10.37	10 bn€
<i>Composition 3</i>	Italy	4.54	6.31	200 bn€
	Spain	5.34	7.67	100 bn€

Source: Model assumptions on the composition and size of credits and characteristics of beneficiary countries.¹⁰

We evaluate the different scenarios with respect to the efficient tranching of the ESM bonds as well as expected gains and losses for the different participants.

In each period t , ESM reserve funds a_t increase via incoming interest payments I_t and recovery payments D_t and decrease via interest expenses O_t :

$$a_t = a_{t-1} + D_t + I_t - O_t.$$

The ESM receives two types of interest income: interest on current ESM funds with the safe interest rate and interest payments by those countries out of the n beneficiaries that have not yet defaulted:

$$I_t = a_{t-1} \cdot r_{safe} + \sum_{i=1}^n C_i \cdot r_i \cdot \mathbb{S}_{t < t_{id}}$$

where C_i is the credit sum of country i . The country's interest rate r_i is either the market interest rate for secondary market interventions or the average ESM refinancing interest rate plus the margin of 0.1%, for the loan instrument.¹¹ \mathbb{S} denotes the indicator function, yielding 1 if t is less than country i 's time of default t_{id} and 0 otherwise. We set $t_{id} = T + 1$ if country i does not default. Using the recovery rate rr , we obtain for the recovery payments:

$$D_t = \sum_{i=1}^n C_i \cdot rr \cdot \mathbb{S}_{t=t_{id}}$$

¹⁰ We use the yields of 10-year government bonds from S&P. The recovery rate of 50% on defaulted 10-year government bonds is based on estimations by Becker (2009) and Moody's (2010) and corresponds to the nominal write-down of private-sector involvement agreed upon in the case of Greece in 2012. To calculate the implied probability of default (IPD) of Member States asking for financial assistance we use the approach of Sturzenegger and Zettelmeyer (2006).

¹¹ In $t = 0$ we also account for the upfront service fee of 0.5% of the credit sum to be paid by the beneficiaries.

We denote by cc the amount of callable capital paid if ESM funds are depleted and have to be replenished. Final ESM funds $a_T + cc - \sum_{i=1}^n C_i$ are risky due to the uncertainty of the default events and the weight of the tranches is chosen to satisfy the risk level of the respective rating.

ESM interest expenses are:

$$O_t = \underbrace{\left(\sum_{i=1}^n C_i \right)}_{\text{total credit}} \underbrace{\sum_{j=1}^k e_j r_j}_{\text{average interest rate}}$$

where e_j is the weight of each tranche, i.e., $e_j \sum_{i=1}^n C_i$ is the amount refinanced in the j -th risk class with interest rate r_j .

Model Assumptions

An important issue in this type of analysis is the potential for contagion between the participating countries. Within our model we allow for contagion effects between the debtor countries. The assumption of positive correlation between defaults is based on the strong interrelations between euro area economies due to similar economic developments, intensive trade relations, deep financial links, and a high probability of similar shocks and policy reactions.¹²

Since high correlations reduce the diversification effect of the debt portfolio and diminish the positive effects of an ABS structure, we devote special attention to the correlation assumptions. In contrast to most other multivariate distributions, the correlation of binary random vectors is mathematically limited and its potential range depends on the event probabilities (for a detailed discussion, see Bauer *et al.* 2008). Therefore, we take a conservative approach and set the correlations to the maximum possible value in each case.¹³

¹² Arghyrou and Kantonikas (2010) show how Portugal, Ireland, and Spain have experienced contagion from Greece. Forbes (2012) differentiates between “interdependence” and “contagion” and shows in a regression analysis the implications for evaluating policies aimed at mitigating contagion.

¹³ Binary random events can be perfectly correlated only if they have identical probability values. Since our country sample has different default probabilities and higher correlations decrease the diversification effect, we use the maximum possible correlation values for a most conservative estimation.

Table 2: Correlation matrix

	Slovenia	Cyprus	Spain	Italy
Slovenia	1	0.64	0.76	0.73
Cyprus	0.64	1	0.77	0.88
Spain	0.76	0.77	1	0.88
Italy	0.73	0.88	0.88	1

Source: Authors' model assumptions.

General Market Characteristics

The market conditions assumed in our simulations are based on the financial and economic situation in early 2013 (see Table 3). The average rating of euro area Member States is A (S&P). The average default probability of the 17 Member States is around 5.6%. These default probabilities are assumed to be exogenous to the existence of the ESM as they are estimated based on non-crisis data from 1999 to 2009, the year before the Greek financial market problems emerged.

ESM borrowing rates are a function of the default probability and the risk appetite in the bond market. In our model, the ESM issues a standard 10-year bond, which is guaranteed by the paid-in capital of the 17 euro area Member States according to the capital key. This paid-in capital is reinvested at the assumed risk-free yield of 1.3%.

Table 3: Market characteristics

Market characteristics	
Maturity	10 years
Number of countries	17
Average rating	A
Average default probability	5.6 %
Assumed recovery rate	50.0 %
Assumed risk-free yield	1.3 %

Source: S&P, ECB, and authors' calculations and assumptions.

Based on the assumptions presented in this section, we run Monte Carlo simulations with $m = 100,000$ loops to generate default behavior scenarios for the euro area countries that receive financial assistance from the ESM. In each simulation we draw yearly default events for a 10-year horizon for each of the participating countries.¹⁴ With these data we derive a probability distribution of all payments (interest and final payments) of the beneficiary countries and the ESM and calculate the expected gains and losses. Furthermore, our simulation allows us to

¹⁴ Early repayments are not considered in the simulation.

discover under what conditions the ESM is able to maintain an overall AAA rating and when different tranches¹⁵ are required.

IV. Empirical Results

Qualitatively, the results of our simulations are as expected with respect to changes in the *instrument*, *expected callable capital*, and *composition*. (1) Secondary market purchases (Instrument B) imply higher interest revenues for the ESM compared to direct lending and thus lower added value to the beneficiary. (2) Better (expected) ESM funding (i.e., more callable capital) implies a better credit rating, lower interest rates, and, subsequently, better capitalization. (3) The financing capacity for other countries is smaller the larger the volume of programs already in place; however, the quantity and quality of this restriction depend on the composition of countries and the total credit amount.

The more important and innovative aspect of our analysis is that we can quantify these effects and thus answer key policy questions such as: What are the costs of the ESM's targeted AAA status? and How large is the realizable AAA tranche and how quickly does the interest rate increase for subordinate tranches? Our simulation analysis provides very interesting insights into the workings of these institutional elements and their interaction in different economic scenarios. A summary of some of the core results is given in Tables 4 to 7. Our discussion of these simulation results revolves around how they differ from the benchmark scenario.

Benchmark Scenario

The benchmark scenario simulates the effects of loans (*Instrument A*) to Italy and Spain in the amounts of 100 bn€ and 50 bn, respectively (*Composition 1*). We assume that the market does not expect that any *callable capital* will be paid in if requested by the ESM. Interestingly, the refinancing costs are quite low as the ESM can fund 90% of its financial support with an AAA-rated tranche even though markets do not expect any callable capital to be provided (see Table 4).

¹⁵ The thickness and rating of each tranche is determined according to the tranche's default probability. A tranche is eligible for a specific rating if the tranche's default probability is lower than a predefined idealized default rate.

Table 4: Benchmark scenario: Italy 100 bn€, Spain 50 bn€, Instrument A, expected callable capital 0 bn€

Refinancing tranches			Average surplus 10 years	ESM after	Investors' loss probability	Expected tail loss
1	0.900	AAA	0.0bn€		3.8%	-8.1bn€
2	0.018	AA				
3	0.018	A+				
4	0.018	A-				
5	0.045	BBB+				

The interest markup “margin” of 0.1% that the ESM demands over its refinancing cost is just sufficient to maintain ESM resources on average. The beneficiary countries profit from the lower interest rates offered by the ESM, namely, its refinancing costs plus the fixed margin. In the event of a joint default of both there is a small probability (3.8%) that ESM funds (paid-in capital, interest surplus, callable capital- and recovery) will not suffice to meet interest and repayment obligations. The investors’ loss probability also depends on the time of the default since the ESM receives an interest surplus until the time of the default, which, in some cases, increases its funds just enough to avoid insolvency. The average damage investors face in the event of a loss equals the expected tail loss using the probability of a loss as confidence level:

$$av. loss = \int_{X < 0} X dP = ETL_{\alpha=P(X < 0)}, \text{ where } X \text{ is the investors' payoff with probability distribution } P.$$

In the base scenario, the investors’ expected deficit in the event of a loss amounts to 8 bn€.

Instrument Effect

Table 4: Instrument A vs. B: Italy 100 bn€, Spain 50 bn€, expected callable capital 0 bn€

<i>Instrument</i>	Refinancing tranches			Average surplus in ESM after 10 ys	Investors' loss probability	Expected tail loss
loan (benchmark)	1	0.900	AAA	0.0bn€	3.8%	-8.1bn€
	2	0.018	AA			
	3	0.018	A+			
	4	0.018	A-			
	5	0.045	BBB+			
Secondary market intervention	1	0.911	AAA	43.9€	1.2%	-9.7bn€
	2	0.048	AA			
	3	0.041	A+			

ESM support via secondary market purchases leads to higher interest gains for the ESM compared to when it issues loans (see Table 5). In the benchmark (loan) scenario, the ESM receives only a small service fee above its refinancing rate. In the case of secondary market purchases, the spread between debtors’ market rates and the ESM refinancing rate stays with the ESM. The beneficiaries profit only from a liquidity effect: the additional demand on the

bond market induced by the ESM decreases the beneficiaries' interest rate and helps avoid excessive interest hikes as in the recent financial crisis.

ESM funds available after a period of 10 years increase on average by around 44 bn€ under secondary market interventions.¹⁶ For investors, the moderate loss probability is reduced from 3.8% to 1.2%, whereas the expected tail loss increases slightly to 9.7bn€.

For secondary market purchases, the structuring of the tranches benefits from small positive second-round effects compared to the benchmark scenario. The additional profits from the interest spread increase the ESM's financial buffer, thereby decreasing investors' risk of a default, thus improving the rating of the tranches, and subsequently further reducing refinancing costs.

Composition Effect: Volume and Timing

Table 5: Composition of credits: Increasing the number of debtors and the credit sums, expected callable capital 0 bn€

<i>Composition of credits</i>	Refinancing tranches			Average surplus in ESM after 10 ys	Investors' loss probability	Expected tail loss
(1) Total 150bn€: Italy 100bn€, Spain 50bn€ (benchmark)	1	0.900	AAA	0.0bn€	3.8%	-8.1bn€
	2	0.018	AA			
	3	0.018	A+			
	4	0.018	A-			
	5	0.045	BBB+			
(2) Total 180bn€: Italy 100bn€, Spain 50bn€, Cyprus 20bn€, Slovenia 10bn €	1	0.768	AAA	-1bn€	5.9%	-24bn
	2	0.022	AA			
	3	0.022	A+			
	4	0.042	A-			
	5	0.042	BBB+			
	6	0.062	BBB			
	7	0.040	BBB-			
(3) Total 300bn€: Italy 200bn€, Spain 100bn€	1	0.469	AAA	-6.6bn€	8.0%	-99bn€
	2	0.033	AA			
	3	0.033	A+			
	4	0.066	A-			
	5	0.058	BBB+			
	6	0.087	BBB			
	7	0.255	BBB-			

Additional debtors with a larger credit volume increase the structure's risk. If the larger credit sum is backed by the original amount of 80 bn€ of paid-in capital, tranching worsens and investor risk increases. Doubling the credit sums of the benchmark scenario to 200 bn€ for Italy and 100 bn€ for Spain (*Composition 3*) reduces the AAA tranche to 47% (Table 6). ESM

¹⁶ The second-round effects from the enhanced tranching amount to around 2bn€ and are of a magnitude smaller than the interest spread profits.

refinancing costs increase by 2%, diminishing the positive effects for the recipient country. The rise in ESM income from the margin on the increased credit volume is not sufficient to cover the beneficiaries' default risk: after 10 years the fund loses 6.6 bn€ on average. Investors' default risk also rises considerably as the loss probability jumps to 8% and the expected tail loss to almost 100 bn€. There are two reasons for this deterioration. First, defaults on such a large scale cannot be covered by ESM equity only (in this scenario we still assume that markets expect no callable capital) and lead to a direct loss for the investors. Second, we assume a very high default correlation to account for potential contagion effects, which implies a very high number of simultaneous defaults, which then overburden ESM resources.

Alternatively, we simulate a smaller increase of the credit sum by adding two small beneficiary countries (named Cyprus and Slovenia for expository purposes) and find similar but weaker effects (Table 6). In this scenario, however, the negative effects are slightly dampened by the increased diversification of the credit portfolio. Although the total credit volume increases by 20% (as compared to 100% in the scenario before), the expected tail loss rises by 16 bn€ (as compared to 93 bn€) and refinancing costs rise by only 0.5%.

The structure of the ESM is also not neutral with respect to the timing of financial support. Potential debtors have an incentive to make early requests for support when financial assistance is provided via a loan.¹⁷ The later a Member State requests financial support and the more financial assistance the ESM is already providing to other countries, the more likely it is that the costs for the additional recipient country will increase. If market-expected callable capital is low, the ESM's financing costs increase,¹⁸ the credit quality of ESM bonds deteriorates, and credit ratings are downgraded. These higher costs are passed on to the most recent beneficiary country.

ABS refinancing has the advantage of a higher and more flexible lending capacity but is also subject to similar timing effects. While the first beneficiary benefits from the entire expected equity, later applicants profit only partially because they have to share the security buffer provided by ESM collateral and obtain a smaller AAA tranche. In contrast, EMS's current

¹⁷ If support is provided via secondary market purchases this effect does not hold, as the Member States pay the same yields to the ESM as they would on the secondary market.

¹⁸ To gauge this effect we compare the results of the scenarios with 150 bn€ and 180 bn€. In the first case, 135 bn€ out of the 150 bn€ could be financed by the ESM with the issuance of an AAA bond. If at a later time two additional countries request assistance, only 2 bn€ of the additionally requested 30 bn€ could be issued as AAA bonds, and the ESM would have to refinance 28 bn€ at a higher cost.

non-ABS structure strictly limits lending capacity to 500 bn€, which has the advantage that the financial conditions for potential debtors do not depend on the timing of their request as long as the ESM's rating does not change. However, in times of crises, increasing demand for ESM help induces higher investor risk and thus higher interest rates.

Callable Capital Effect

Only about 10% of ESM capital is actually paid in cash; the rest is “callable capital” that Member States are expected to provide in case of a loss of equity. However, Member States cannot be forced to provide this callable capital. As the *raison d'être* of the ESM is to handle crisis situations, it is very likely that capital tends to be called on in states of crisis, precisely the times at which it is far from certain that Member States will be either willing or able to provide it. There is no legal sanction available for ESM members that fail to fulfill their payment liability; indeed, they are not even considered to be in default. Thus, markets' trust in the ability and willingness of ESM members to compensate ESM losses has major implications for the economics of the ESM. To highlight the effects we compare two extreme cases in a scenario of 300 bn€ credit (*Composition 3*) provided as secondary market interventions: complete distrust and full trust, that is, the expectation that necessary callable capital will actually be provided. We compare these scenarios to assess the relevance of market expectations. The ESM refinancing cost under the loan scheme would be of similar size. However, with a loan the difference between the refinance interest rate and the beneficiaries' interest rate remains in the beneficiaries' balance sheet. With secondary market interventions, this difference remains with the ESM (Table 7).

Table 6: Variation of callable capital with larger credit sums and secondary market intervention: Italy 200 bn€, Spain 100 bn€, Instrument B

Expected callable capital	Refinancing tranches			Average profits in ESM after 10 ys	Investors' loss probability before callable capital	Expected tail loss before callable capital	Investors' loss probability after callable capital	Expected tail loss after callable capital
0bn€	1	0.522	AAA	50.5bn€	7.1%	-73.5bn€	7.1%	-73.5bn€
	2	0.048	AA					
	3	0.047	A+					
	4	0.047	A-					
	5	0.140	BBB+					
	6	0.092	BBB					
	6	0.118	BBB-					
620bn€	1	1	AAA	84.5bn€	1.7%	-58.5bn€	0%	0

In the first scenario in Table 7, due to the large credit sum, this spread cumulates over the credit period to an average surplus of 50 bn€. The probability of a need to call additional capital is around 7% and, on average, 73 bn€ are called. Under the assumption that markets expect no capital injection, however, this equals the investors' expected tail loss.

Whenever expectations about callable capital improve, investors' expected risk is reduced, which leads to a better tranching and lower refinancing costs. In the high-trust scenario, the ESM issues a single AAA tranche, implying a refinancing cost of only 1.7%, 1.1% lower than in the previous scenario. This improvement of refinancing costs sums up to an additional increase in ESM funds of around 34 bn€ on average after 10 years, that is, ESM funds would more than double if interventions happen in a positive market environment and the spread is withheld. This improvement of equity reduces the risk of ending up in a situation where fresh capital is called to 1.7% and the average amount to be called to 58.5 bn€. Obviously, if callable capital is provided in full, investors' risk and tail loss are nil because the fresh capital will cover ESM losses.

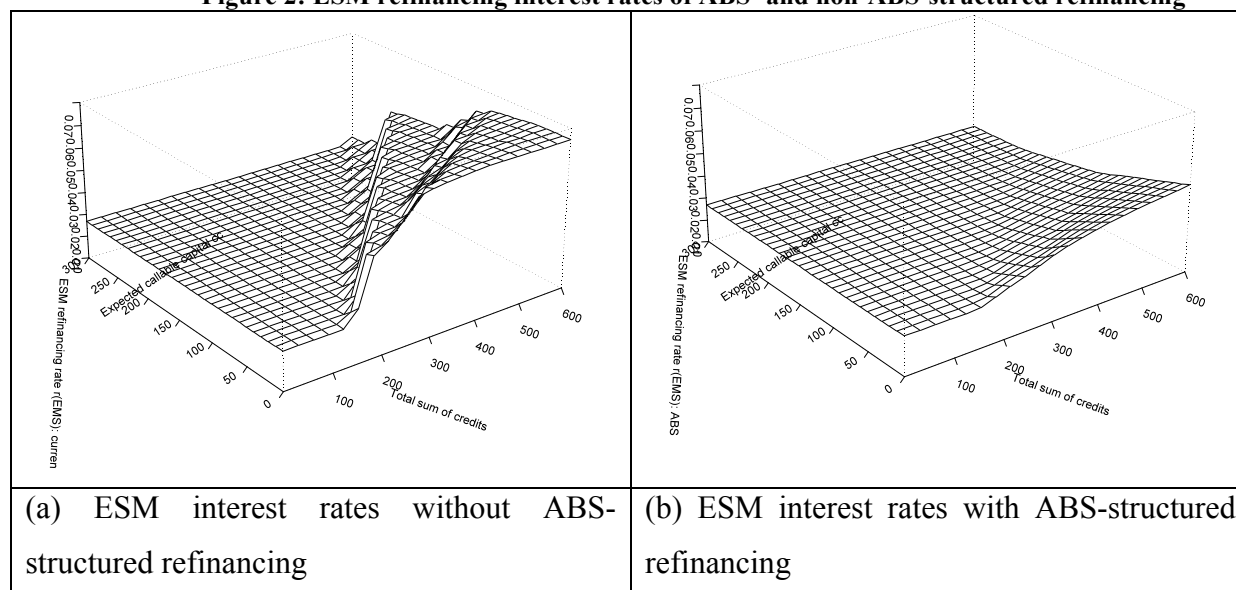
This effect also holds for the other scenarios in a qualitatively similar way and these results underline the obvious: the more financial support that is provided by the ESM, the greater the amount of callable capital that will be needed to ensure a high rating.¹⁹

ABS Versus Non -ABS Refinancing

In designing the EMS, its members made the decision to forego an ABS structure and instead overcollateralize. In the following, we analyze the opportunity costs of this decision. The costs of ABS-type funding depend in a complex way on the amount of total credit relative to market-expected callable capital and paid-in capital. The underlying size and callable capital effects have a strong impact on the EMS funding rate and thus on the ESM's potential to generate profits on behalf of its members and/or beneficiaries. In contrast, the instrument effect is relevant only for the distribution of gains between the beneficiary country and the ESM. Since size and callable capital effects are not linear, we analyze in the following how funding costs depend on the refinancing design.

Figure 2 illustrates how ESM refinancing interest rates (r_{EMS}) are dependent on the total amount of ESM credits (C) and the market expectations of callable capital (cc) for both refinancing designs—the current EMS design without an ABS structure (a) and our ABS refinancing proposal (b). The analysis is based on our benchmark scenario with two beneficiary countries, Italy and Spain, under the loan instrument. We modify the benchmark scenario by varying the total credit sum to up to 600 bn€, with Italy always holding two-thirds of the debt, and by introducing various amounts of expected callable capital of up to 300 bn€. While the analysis in the previous section compares two scenarios at a time in greater detail, we now graphically examine all combinations of total credit and expected callable capital simultaneously with the ESM refinancing rate as a catch-all variable.

¹⁹ The ESM's rating also depends on its shareholders' ratings. For example, if a Member State is downgraded, market participants could expect that this Member State will not fulfill its responsibilities regarding its callable capital.

Figure 2: ESM refinancing interest rates of ABS- and non-ABS-structured refinancing

For the non-ABS case, the refunding has a single rating of AAA as long as the credit volume stays below the sum of realized and expected paid-in capital as well as the recovery. If the credit sum increases further and/or market confidence decreases, non-ABS refinancing costs jump dramatically when the structure does not justify its AAA rating due to the deteriorated credit/confidence ratio. The first increase is to roughly 4.5% and then to as much as 6.5% in the extreme case (see Figure 2(a)). The advantage of ABS structuring stems from maximizing the low-risk/low-cost share of the refinancing. The amount covered by (realized and expected) paid-in capital and recovery is always AAA. Additionally, the amount of callable capital that markets expect will actually be paid by ESM members in case of a margin call is also AAA. Only the remaining part has to be refinanced more expensively. If the credit sum increases or market confidence decreases, ABS refinancing costs increase slowly but continuously (see Figure 2 (a)).

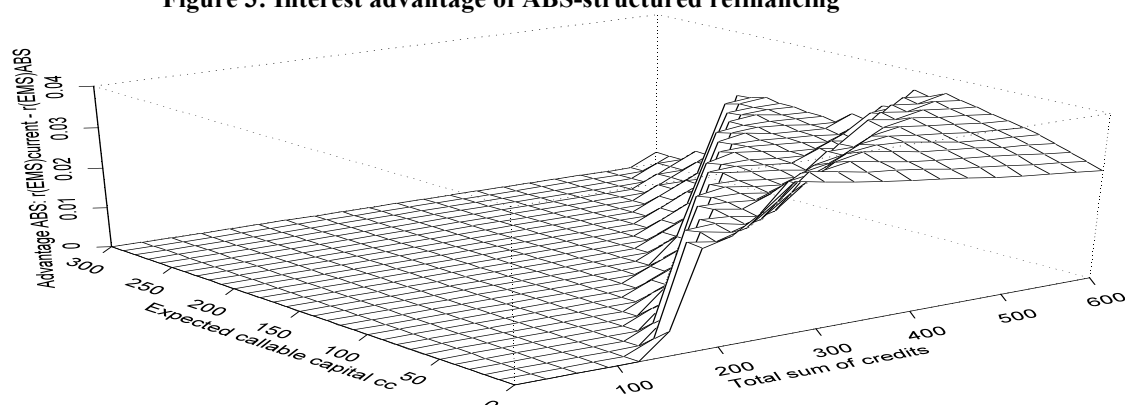
In both cases, refinancing costs increase nonlinearly with the credit sum, that is, the marginal refinancing costs are progressive (“size effect”).

Figure 3 shows the interest advantage of ABS-structured refinancing, that is, the difference in ESM refinancing rates with and without ABS as shown in Figure 2. ABS and non-ABS refinancing have the same AAA refinancing rates if the credit sum is below expected capital, that is, paid-in capital plus expected callable capital plus recovery. The advantage of an ABS structure shows up when the credit sum just exceeds this expected total capital. Non-ABS refinancing costs jump to 4.5%, while ABS refinancing costs slowly increase to 2%, yielding an advantage of roughly 2.5%. At the second downgrading line, the ABS advantage jumps to 3.5%. Beyond this jump, the higher the credit sum and the lower the market confidence, the

smaller the advantage of the ABS refinancing as the percentage share of the AAA tranche becomes smaller.

If market confidence is extremely high, that is, markets expect more than 300 bn€ to be paid by ESM members in the event of a loss, credits of 600 bn€ and more can be financed with an AAA rating. However, market confidence is likely to be lower than that since not even at the current proposed credit line of 500 bn€ is the ESM rated AAA by all rating agencies. Thus even in the current situation, new credit lines would significantly profit from the ABS structure.

Figure 3: Interest advantage of ABS-structured refinancing



In short, ABS refinancing minimizes losses for the total system while at the same time being relatively robust against deterioration of market expectations. The difference in refinancing interest rates ranges between 0, if the total credit sum is below total expected ESM capital including recovery, and 3.5%, if this level is largely exceeded. Additionally, ABS refinancing allows higher lending levels than the current maximum of 500 bn€. The decision as to choice of instruments—direct loans or secondary market purchases—especially affects the

distribution of costs and thus political economy considerations of redistribution and risk sharing. Also, from a political economy point of view, direct loans seem to allow putting more pressure on the beneficiary country to enact reforms as the interest advantage is passed through to the debtor. In contrast, secondary market purchases leave the interest gain within the ESM and leave less room for demanding reforms.

Table 7: Summarizing the results

	Refinancing without ABS	Refinancing with ABS: direct loans	Refinancing with ABS: secondary market purchases
minimization of losses		for the ESM member	for the fund
maximum pressure on the beneficiary country	Yes	Yes	No
robustness to lower market expectations on callable capital	No	Yes	Yes

Robustness Check

Our simulation results are generally robust to changes in the model setup, specifically to the assumptions on default correlations or the recovery rate. Typically, these changes give the qualitatively expected results. The effects of lower default correlations, a larger margin for the ESM, and a smaller recovery rate are discussed below in more detail.²⁰

We have halved the assumed correlations of default events between euro area countries in all three *combinations*. Hence, defaults are less likely to appear simultaneously and therefore higher interest spread profits for the ESM are expected, an effect that is confirmed by the simulation. However, this effect is very weak. In our benchmark scenario, the refinancing rate decreases from 1.85% to 1.75%, and risk and expected tail loss differ insignificantly.

Increasing the ESM's margin r_{margin} is a means of distributing the spread between the two extremes: the loan instrument, which puts the advantage of the spread entirely on the beneficiaries side, and the secondary market intervention, where the spread remains at the ESM. Naturally, a higher margin increases ESM funds, leads to a better tranching, and reduces investor risk. A margin of 1% leads to an average ESM surplus of 12bn€ after the

²⁰ Extended simulation results can be obtained from the authors upon request.

credit period, an improvement of the refinancing rate of 0.04%, and a reduction of investor risk from 3.8% to 2.8%.

Changing the recovery rate²¹ also affects interest spread, and in a straightforward way. A lower (higher) recovery rate leads to lower (higher) expected payments in case of a default, which implies higher (lower) expected losses in the ESM structure, making ESM bonds less (more) attractive. Specifically, we decrease the recovery rate from 50% to 30%, so that in the event of a default, only 30% of the notional is received immediately after the default and then reinvested at the risk-free yield. Decreasing the recovery rate makes the model assumptions more conservative in the sense that we expect lower payments in the event of a sovereign default. This leads to a worse tranching and subsequently lower interest gains and higher expected losses if the default is realized, which is again confirmed by the simulation. Applied to our benchmark scenario we obtain an average loss to the ESM of 6 bn€ and the refinancing interest rate increases by 1%. Investor loss risk increases from 3.8% to 7% and expected tail loss from 9 to 39 bn€.

Finally, note that expected callable capital may have a strong impact on the tranching, especially in close cases. For example, in our benchmark scenario an expected callable capital of 13bn€ would lead to a single AAA tranche.

V. Conclusions

The recent financial crisis made it painfully obvious that the euro area still lacks effective methods for crisis prevention and crisis management. During the crisis, several temporary crisis resolution mechanisms were established, but they eventually proved to be insufficient. Since 2012, the European Stability Mechanism (ESM) has been the permanent crisis prevention mechanism for the euro area. The design of the ESM was far from optimal, no doubt to due to the need for extremely quick action in an uncertain environment.

We analyze the costs of the current (suboptimal) design of the EMS and evaluate an alternative ABS structure under different scenarios. We find that moving to an ABS structure could considerably increase the benefits for all participants. Our simulation results indicate that ABS refinancing could lower the EMS refunding interest rate by up to 3.5% with respect to our benchmark scenario. The distribution of this larger “cake” among the participants

²¹ Note: A decrease of the recovery rate also changes the default probabilities of the participating countries and leads to an adjustment of the assumed correlations.

depends critically on the type of financial support the EMS provides. Financial assistance via loans is more advantageous for the borrowers as the EMS charges only a small margin on top of its refinancing costs. In the case of secondary market purchases, the spread between ESM refinancing and the market interest rate of the recipient is retained by the EMS and its members.

A crucial determinant of ESM costs is the relative size of the financial support and the market's expectation in regard to the callable capital that ESM members have committed to provide in case of ESM losses. This additional capital is most likely requested in times of crises, meaning that the market may have rather dim expectations as to the ability and willingness of ESM members to actually fulfill their commitments. Our simulation results indicate that the advantages of the ABS structure are highest in crisis situations. Financial crises are characterized by both requests for financial support on a medium or large scale and economic stress that reduces the likelihood of EMS members being either willing or able to inject fresh capital into the EMS. However, ESM refinancing costs jump if the ratio of total credit to expected callable capital erodes.

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