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Essays on the Credibility of Bail-in

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Abstract

This thesis groups three empirical papers on the topic of the bail-in regime. The leitmotiv that links all three papers is bail-in credibility, namely the perception of market participants about the effectiveness of the bail-in regime. Bail-in credibility is crucial for the bail-in regime to take hold as puzzling rules may both provide ample discretion to involved authorities, which casts some shadows regarding the an and quantum of the application of the bail-in tool, and also hamper investor's predictability of the outcome. Uncertainty would, thus, cause turbulence on the debt market as some debtholders may overprice risk, causing higher funding costs which may undermine growth as a result of decreased lending capacity, whereas others may underprize risk, therefore, incentivizing moral hazard. The mispricing of debt instruments may, in the case of unexpected bail-in application, cause an overreactive price correction that may result in a liquidity freeze and consequent collapse of the interbank market. A credible bail-in regime is thus required as a pre-condition for its effective implementation.

The first paper investigates the impact of the entry into force of directive 2017/2399, namely a crucial amendment to bail-in regulation, on the yields of subordinated bonds. This empirical analysis aims to assess bail-in credibility while simultaneously taking on the research question posed by Resti (2017) about the evolution of subordinated bondholders' risk profile following the change of paradigm from bailout to bail-in as a preferable crisis management technique. The analysis consists of a difference-in-differences (hereafter diff-in-diff) methodology that compares the subordinated bond yields' reaction of a set of EU Global Systemically Important Institutions (G-SIIs), which are strictly concerned by the directive provisions, to that of a control group of less significant institutions which do not follow a bail-in strategy. The results underline a positive repricing of subordinated bonds of EU G-SIIs with respect to that of the control group which suggests increased expectations of bail-in following its enhancement. The results hold after controlling for the impact of the proposal of the directive and even for a sub-sample obtained after performing a propensity score matching to make the treatment and the control group more homogenous along crucial bank variables. The higher risk-premium required by subordinated investors indicates the enhanced credibility of bail-in rules and suggests the efficacy of the policy measures deployed to strengthen the bail-in regime in resuming an active monitoring function of investors and restoring market discipline.

The second paper adopts a wider policy perspective considering also all national and supranational amendments which pre-empted the directive 2017/2399 and focuses on investors in senior unsecured debt. A wider overview of the entire legislative process that culminated with the implementation of the directive 2017/2399 and the specific focus on senior unsecured investors allow for an accurate assessment of bail-in credibility. Senior unsecured investors are indeed more sensitive

to bail-in risk compared to other subordinated investor's categories which instead have always been meant to bear losses in case of bankruptcy. The empirical analysis consists of a diff-in-diff, employed to gauge bail-in credibility, which compares the yield-spread reaction between senior and non-bailinable bonds around the days after the entry into force of each event, and a triple differencing model, employed to gauge the implications of each event for market discipline, which compares the yield-risk sensitivity between senior and non-bailinable bonds. A placebo test is also performed to link the results to the legal specificities of the bail-in instead of generic risk. According to our results, no event considered has modified senior unsecured investors' expectations of bail-in nor their monitoring activity. Policymakers should therefore account for the investors' uncertainty regarding the legislative framework that surrounds the bail-in tool when drafting the new amendments.

Finally, the third paper investigates bail-in credibility in emerging countries thereby addressing the research question posed by the latest Global Financial Development Report (GFDR) about how appropriate is to apply regulation designed for advanced economies to developing countries. Recent controversial cases of bail-in in emerging countries provided indeed the motivation to adapt the research question to bail-in regulation and deploy an empirical analysis to test for bail-in credibility as a pre-condition for its regime to be smoothly implemented also in emerging countries. The analysis consists of a fixed-effects panel data regression that compares the yield spread between bailinable and non-bailinable bonds of banks located in emerging countries that have adopted a regulation for bail-in and that of banks located in emerging countries without such framework. The results point out a higher yield spread for the former which suggests that, in the emerging countries where enforced, bail-in regulation has taken hold among investors, therefore, laying down the basis for its smooth application.

The implications of harmonized rules on the insolvency ranking of unsecured debt for bail-in credibility. A perspective from subordinated bondholders

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Abstract

Using a diff-in-diff analysis, we compare the subordinated bonds yields' reaction to the implementation of the directive (EU) 2017/2399 between EU G-SIBs and smaller banks. We find an increase of subordinated bonds' yields of EU G-SIBs relative to smaller banks between .24 and .31 basis points. We claim that the directives' provisions enhance the bail-in regime, therefore, increasing the subordinated bondholders' expectations of bail-in who, accordingly, reprice bonds' yield. Moreover, we draw conclusions on the higher risk profile of subordinated bondholders following the implementation of the European bank resolution framework and suggest the effectiveness of its measures in restoring market discipline.

Keywords: non-preferred senior debt, subordinated debt, bail-in, creditors hierarchy, resolution.

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Introduction

The Directive 2017/2399 (hereafter Directive) entered into force on 28/12/2017 amending the Bank Recovery and Resolution Directive (BRRD) as regards the ranking of unsecured senior debt instruments in the insolvency hierarchy. The objective of the Directive is to provide the Member States with common rules on the insolvency ranking of unsecured senior instruments with the purpose of improving the effectiveness of the bail-in regime.

The Member States are, therefore, required to create the new class of non-preferred senior debt that ranks in insolvency above own funds instruments and subordinated liabilities but below other senior liabilities. Differently from unsecured senior instruments with a higher insolvency ranking (i.e., preferred), the Directive permits banks to use only senior non-preferred instruments to comply with the Minimum Requirement of own funds and Eligible Liabilities (MREL) subordination requirement that demands banks to pile up the bail-in buffer (i.e., the MREL) with subordinated instruments that rank in insolvency below liabilities excluded from MREL. Senior non-preferred debt would therefore be used to pile up efficiently a clear buffer of bailinable liabilities whereas senior preferred debt, although bailinable, would predominantly be used for ordinary funding needs as it can only count towards the MREL under strict conditions for a limited amount.

The overhaul and harmonization of the unsecured senior debt class and its insolvency ranking permit thus to address several shortcomings caused by the misalignment of the Member States' insolvency laws. The Directive indeed tackles the uncertainty among banks and investors regarding the actual stock of bailinable liabilities available in case of resolution, especially for cross-border banks, as it provides for a clear distinction between instruments that are likely to be bailed-in and relatively safer senior bonds. In addition, the directives' provisions further mitigate the different costs faced by the Member States' banks and investors as regards the creation of the bail-in buffer and the purchase of the related instruments. Finally, the creation of the class of non-preferred senior debt permits banks to pile up the bail-in buffer rapidly and efficiently, therefore, granting the prompt availability of adequate bailinable resources.

As the Directive emphasizes the role played by subordinated debt in the enhancement of the bail-in regime, this paper aims to assess the impact of the Directive on subordinated bonds' yields in order to infer regarding both the credibility of the bail-in regime and the evolving risk profile of subordinated bondholders.

Regarding bail-in credibility, the directive represents a crucial breakthrough for the improvement of the bail-in regime that a branch of literature deems not credible due to its embeddedness within a complex regulatory framework for resolution (Tröger, 2018, 2020) which provides ample discretion to the authorities involved as regards the application and scope of the bail-

in (Philippon and Salord, 2017; Walther and White, 2020) and also does not consistently save national politicians from political pressures for bail-outs (Hadjiemmanuil, 2015). As a result, we first contribute to the literature on bail-in credibility with the impact assessment of an unnoticed but fundamental directive and by assessing the bail-in expectations of a specific class of investors not directly addressed by the existing empirical studies.

The rationale behind the aim to draw conclusions about the evolving risk profile of subordinated bondholders lies, instead, in the research question posed by Resti (2016) who asked whether the BRRD, by easing resolution, would have increased risk for subordinated bondholders. Our study of the subordinated bondholders' expectations before and after a crucial amendment to the bail-in regime helps, therefore, to infer regarding the evolution of the risk profile of a specific class of investors and represents our second contribution.

Finally, as the evolution of the subordinated bondholders' risk-profile affects their creditor inertia, namely their scarce risk-sensitivity caused by the too-big-too-fail (TBTF) subsidies provided by governments to save ailing banks in the afterwards of the great financial crisis (GFC), our results have also implications as regards market discipline literature as well as regards the branch of the TBTF literature investigating the G-SIBs' funding advantage. Regarding market discipline, indeed, depending on the impact of the Directive on creditors' expectations of bail-in, the latter would be prompt or discouraged to monitor the bank risk profile. Regarding the G-SIBs' funding advantage, instead, depending on a positive or negative repricing of bonds' yields, the yield-spread between large and small banks could be mitigated or exacerbated, respectively.

The empirical approach designed to assess the impact of the directive on subordinated bonds' yields consists in a difference-in-differences analysis that compares the subordinated bonds yield's reaction of banks eligible for bail-in to those of banks not eligible for bail-in. In detail, the treatment group consists of subordinated issuances of large banks, specifically EU Global Systemically Important Banks (G-SIBs), that are able to tap the non-preferred senior bonds market and pile up efficiently a buffer of bailinable liabilities to facilitate the application of the bail-in in case of resolution. Conversely, the control group consists of subordinated bonds of small and medium banks whose access to the non-preferred senior market is economically unfeasible (EBA, 2016) and, therefore, may further lack the sufficient loss-absorbency capacity making the bail-in not a credible option in case of resolution (Baudino et al., 2018; Restoy, 2019). A positive (negative) repricing of subordinated bonds indicates that the Directive led investors to ask for a higher (lower) risk premium as they discount higher (lower) expectations of bail-in.

The rest of the paper is organized as follows: Section 1 discusses the related literature and provides the hypothesis; Section 2 provides the definition and some descriptive statistics relative to

non-preferred senior bonds; Section 3 describes the sampling criteria; Section 4 describes the development and results of the diff-in-diff analysis; Section 5 provides the robustness check; Section 6 discusses the results; Section 7 concludes and calls for future research on the topic.

1 Literature review

This study grounds its roots in the literature investigating the interplay between resolution regulation and market quotes. More precisely, we review three branches that investigate the impact of the absence, the introduction, and the objective of resolution regulation on market quotes. Understanding market quotes fluctuations over these three stages of the resolution regulation enables us to disentangle and interpret the impact of the Directive on subordinated bond yields.

First, we investigate the literature that explores the TBTF bias on market quotes in order to study their trend before the introduction of resolution regulation. Then, we review the branch investigating the credibility of the bail-in under both a theoretical and empirical perspective to disentangle the implications of bail-in events for market quotes. Finally, we explore the literature studying the interlink between resolution regulation and market discipline in order to understand the implications of the former for the monitoring activity of market participants.

1.1 How the TBTF bias affects market quotes

During the GFC European governments addressed the many bank stresses and failures with expensive bail-outs. The ECB (2015) states that in the euro area, between 2008 and 2014, the gross financial sector assistance by governments amounted to 8% of the area's GDP. The expectation of government support in case of failure led unsecured investors of TBTF institutions into the creditor inertia, which indicates their poor effort towards embedding bank risk into securities prices. This phenomenon finds empirical support in literature in the results of the study conducted by Acharya et al. (2016) who show that credit spreads of unsecured bonds are not sensitive to risk for TBTF institutions. As a result, the spread in the cost of funding between large and small financial institutions widened resulting in a funding advantage for the former (Völz and Wedow, 2011).

Studying the implications of the TBTF issue on pricing, Li et al. (2011) provide evidence of a higher impact of the implicit subsidies on credit spreads compared to equity prices, therefore, corroborating the focus of our study on unsecured debt, in particular, subordinated debt. Regarding the magnitude of the implicit subsidies, the literature provides mixed results. Ueda and Weder (2013) quantify the value of structural state guarantees on a large worldwide sample of banks using the expectations of government support embedded in credit ratings as of end-2007 and end-2009. They show a credit rating bonus of 1.8-3.4 notches at the end of 2007 and 2.5-4.2 at the end of 2009 which correspond to a funding cost spread of 60bps and 80bps, respectively. Conversely, Baker & McArthur

(2009) point out a limited increase of 0.09 percentage points, that is equivalent to an annual subsidy of $6.3 billion, in the funding cost advantage of large banks following the adoption of the Troubled Asset Relief Program (TARP), which formalizes the establishment of a TBTF policy in the US. In line with these results, Araten & Turner (2012) find a funding cost advantage of 9 bps for G-SIBs compared to non-G-SIBs into account all funding sources of a sample of US bank holding companies over the credit cycle 2002-2011. Finally, Cabrera et al. (2016) examine the impact of news concerning governments' finances on banks' stock returns and find that they are independent of bank size which suggests that no bank is actually too small to be bailed out, therefore, questioning the relevance of the funding advantage of TBTF institutions.

Independently from the magnitude of the funding cost advantage, Acharya et al. (2016) cast some shadows on the development of policies able to tackle the TBTF bias as they show that the introduction of the US Dodd-Frank Act, which is designed to address issues related to the TBTF institutions, has not substantially modified investors' expectations of government support in case of failure. However, Babihuga and Spaltro (2014) indicate the level and quality of capital as two main drivers of bank cost of funding, therefore, suggesting policymakers tasked with finding a solution to the TBTF issue to focus on these two drivers in order to deploy effective policies.

1.2 How bail-in events affect market quotes

The EU finds a solution in 2014 when adopting the BRRD that marked a turning point in the investors' perception of being bailed out in case of bank failure (Gleeson, 2012; Goodhart and Avgouleas, 2014, Caporin et al., 2019). The BRRD framework indeed aims to reduce taxpayers' cost of bank resolution and improve market discipline constraining any possibility of public support to failing banks. It disciplines the bail-in mechanism which requires bank shareholders and creditors to bear losses in case of resolution according to their ranking in the insolvency hierarchy and further sets a minimum bail-in of 8% of total liabilities as a precondition to tap funds of the Single Resolution Fund. Moreover, the BRRD introduces the MREL which requires banks to pile up a minimum buffer of bailinable liabilities to enhance the application of the bail-in tool. In short, the bail-in regime, transferring risk from taxpayers to bailinable creditors, has warned the latter about the possibility of an orderly resolution that might jeopardize their investment. It is likely therefore that unsecured investors discount into securities' prices a lower probability of being bailed out which would lead them out of creditor inertia and further resume their market monitoring function required for market discipline to be effective (Gleeson, 2012; Goodhart and Avgouleas, 2014).

However, several studies on the bail-in tool have called into question its credibility pointing out the regulatory and political discretion as the main weaknesses that hamper its application.

Regarding regulators, Walter and White (2014) developed a model in which regulators decide upon resolution actions with discretion after analyzing private information regarding the bank's viability. The authors claim that bail-in regulation has severe credibility issues since regulators with bad news and discretion have incentives to conduct excessively weak bail-in policies due to the costly consequences that the signal of a bail-in may trigger, such as bank runs. Regarding politics, Hadjiemmanuil (2015) admonishes the betrayal of the objective of mutualizing bailout costs as envisaged by the Banking Union and identifies in the political discretion underlying the application of the bail-in tool its main concern about whether the approach pursued by the BRRD actually exempts state finances from bearing the costs of bank bailouts. Other concerns about bail-in credibility stem from the BRRD confounding provisions regarding the stock of liabilities that might fall under the scope of the bail-in which jeopardizes also senior creditors whose losses may trigger reputational as well as political backlashes. As a result, the transfer of risk envisaged by the BRRD from taxpayers to bailinable creditors might not be so obvious.

The literature's main stand is that only a strong commitment towards a well-functioning bail-in tool and its prompt and resolute application in case of bank distress could make investors perceive it as a credible threat to their savings. Crespi et al. 2018 suggest that the question should be addressed empirically by assessing the impact of bail-in events on the risk premium required by bank creditors. Among those, subordinated bondholders have piqued the interest of scholars like Resti (2016) and Martino (2017) who called for research on their evolving risk profile and functions under the BRRD framework. These instances motivated us, therefore, to study the implications of a crucial amendment to the bail-in regime for the controversial class of subordinated bondholders.

The empirical literature on the impact of bail-in events, being them related to the legislative process or its application, on the debt market is scarce and focuses either on wide asset classes, distinguishing between bailinable and non-bailinable instruments, or specific asset classes, but never addresses strictly subordinated debt. Giuliana (2018) studies the bail-in events, being them related to the legislative process or the application of the bail-in tool, employing a difference-in-differences analysis to assess whether the credibility of authorities' commitment towards the enhancement of such tool causes a repricing of securities in the bond market. His results show an increase in the spread between bailinable and non-bailinable bonds following a bail-in event. He further provides evidence that the yield spread does not necessarily increase just because of events that raise the bank's risk but may also be due to events like the legislative process of the BRRD which do not significantly affect the bank's risk. Consistently, Crespi et al. (2018) state that the question as to whether investors will require higher returns on bank bonds due to bail-in rules is empirical and depends on whether they consider the bail-in a plausible threat. They contribute to the literature on the credibility of the bail-

in regime showing an increase of the spread at issuance between bailinable and non-bailinable bonds after the introduction of the bail-in tool on a sample of Italian banks.

Other studies, instead focus on specific asset classes but still provide evidence of an increase of bail-in expectations among market participants following the introduction of bail-in regulation. Lewrick et al. (2019) use a sample of 2,164 bail-in bonds of 68 international banks to match senior unsecured bonds with comparable senior bonds that are issued by the same banking group but are not subject to bail-in risk pointing out that the bail-in premium is higher for riskier banks consistently with the monitoring role which unsecured creditors are tasked with according to the bai-in regulation. Gai et al. (2020) investigate the impact of the entry into force of bail-in regulation on bank bond secondary markets using a sample of 4,855 bonds issued by 45 significant supervised European banks from January 2006 to December 2016. Their results indicate an increase in the risk premium for unsecured bonds among which senior unsecured bonds emerge as the most impacted. In a similar vein, Cucinelli et al. (2020) study the impact of the introduction of bail-in regulation on bond yields in secondary markets by using a sample of 4,065 bonds issued by 63 banks from 12 euro area countries over the period 2013–2017. Their results indicate that the impact on the spread between unsecured senior and non-bailinable bonds is much higher than that on the spread between subordinated bonds and non-bailinable bonds.

Conversely, some studies do not report a significant reaction of debt yields to the introduction of bail-in regulation. Pablos (2019) examines the impact of the introduction and implementation of the EU bail-in framework on the subordinated spread, namely the difference between subordinated bonds' yields and senior unsecured bond's yields, using a sample of 41 EU credit institutions over the period 2014Q4-2018Q2. Their results do not detect a relevant increase in the spread. However, further analyses indicate that the funding cost advantage of G-SIBs with respect to smaller banks has narrowed since the introduction of the bail-in framework. Similarly, Chan-Lau & Oura (2016) show that asset encumbrance and the introduction of new bank resolution tools have a limited impact on senior unsecured debt yields for existing banks under distressed market conditions in 2013.

Overall, these empirical studies support the thesis of a credible bail-in regime pointing out an increase in the spread between bailinable and non-bailinable bonds which, however, results fragmented and inconsistent across different debt classes. In addition, as regards creditor inertia, the results above mentioned indicate the efficacy of the bail-in regime in restoring market discipline among market participants as bail-in expectations have resumed their monitoring function. As a result, also the funding cost advantage that benefits G-SIBs with respect to smaller banks appears to be mitigated.

1.3 The implications of resolution regulation for the monitoring activity of market participants

One of the key policy objectives of the bank resolution framework is to enhance market discipline. In particular, the resolution framework should tackle the creditor inertia suffered by market participants and encourage them to actively monitor the risk profile of the bank in which they aim to invest and embed it into securities' prices (Bliss and Flannery, 2002; Bliss, 2001). The latter process is known in the literature as market monitoring and represents a configuration of market discipline (Millera et al., 2015; Zhang et al., 2014; Evanoff et al., 2011).

According to Cœuré (2013), market discipline plays a crucial role in contributing to creating an efficient resolution mechanism. He claims that a good resolution framework cannot be substitutive but only complementary to market discipline and supervisory vigilance. Therefore, he points out the crucial contribution of bail-in rules in restoring the monitoring function of creditors that would culminate in an enhanced banking system that fulfills its economic role without creating excessive risk for society.

Gleeson (2012) claims that past bail-outs have led to creditor inertia since bank's subordinated bondholders have been bailing out alongside senior creditors by taxpayers. He further observes that the credibility of the bail-in tool is crucial to make bondholders aware of the possibility of its implementation in case of resolution thereby making a significant step towards the interruption of the creditor inertia in favor of an active market monitoring.

Finally, Goodhart and Avgouleas (2014) further point out that turning unsecured liabilities into bailinable should provide creditors with incentives to restore an active market monitoring function thereby helping to achieve the bail-in's primary objective of increasing market discipline.

These considerations support our study on the implications of a crucial amendment to the bail-in regime for subordinated bondholders as they permit us to draw conclusions on the evolution of their risk profile in the aftermath of the implementation of the resolution framework.

Based on the literature examined, we test the following hypotheses. The null hypothesis is:

H_0= Subordinated investors do not reprice bond yields after the implementation of the directive

If this hypothesis is verified, then the directive does not cause a bond repricing as subordinated investors do not perceive it as an improvement of the bail-in. As a result, the creditor inertia is likely to persist jeopardizing the objective of the resolution framework of restoring the market monitoring function of creditors.

If the null hypothesis is rejected, we test the following further hypotheses:

H_1= The Directive causes subordinated investors to positively reprice bond yields.

If this hypothesis is verified, then subordinated bonds' yields reflect increased expectations of bail-in. In detail, subordinated investors perceive the Directive as a crucial commitment towards a well-designed and consistent bail-in tool that if triggered may jeopardize their investment. The actual threat of a bail-in in case of failure is likely to prompt creditors to better monitor the bank's risk profile, therefore, interrupting the creditor inertia.

H_2= The Directive caused subordinated investors to negatively reprice bond yields.

If this hypothesis is verified, then subordinated bonds' yields reflect a decreased expectation of bail-in. Therefore, subordinated investors expect the Directive to jeopardize the well-functioning of the bail-in tool and further lower its credibility. This scenario could worsen the funding advantage enjoyed by large financial institutions and the creditor inertia as well, thereby jeopardizing the objective of the resolution framework of restoring the market monitoring function of creditors.

2 Non-preferred senior bonds

In this section, we provide the definition and some descriptive statistics regarding non-preferred senior debt. With the purpose of improving the effectiveness of the bail-in regime, the Directive requires the Member States to create the new class of non-preferred senior debt which has the same insolvency ranking across all the Member States and permits banks to efficiently pile up a clear buffer of bailinable liabilities. Non-preferred senior debt represents, indeed, an accessible source of bailinable debt as its compliance with the MREL subordination requirement makes it crucial for the accumulation of the bail-in buffer and its seniority makes it cheaper than other subordinated debt. In addition, non-preferred senior debt also sets a clear distinction between instruments that are likely to be bailed-in and relatively safer senior bonds (i.e. preferred) therefore minimizing the legal risks of a violation of the no-creditor-worse-off (NCWO) principle which requires that creditors should not bear greater losses in resolution than those that they would have incurred under normal insolvency proceedings. According to the main characteristics listed by the directive, non-preferred senior bonds should have an original contractual maturity of at least one year, should not contain embedded derivatives or being derivatives themselves, and their contractual documentation or prospectus should explicitly refer to their ranking.

In addition, it is worth noting that these instruments are not truly new to the market as some jurisdictions like the French one already amended the rules on the insolvency ranking of unsecured senior debt under their national insolvency law introducing non-preferred senior debt with the publication of the Sapin 2 Law in the Official Journal of the Republic of France on 10 December 2016. Indeed, Article 151 of the law on transparency, anti-corruption, and the modernization of the economy, the so-called Sapin 2 Law, already divided senior bondholders into two categories: holders

of senior preferred notes and holders of senior non-preferred notes. As a result, the Directive recognizes to unsecured debt instruments issued in force of national laws adopted earlier to its effectiveness and compliant with its provisions the same insolvency ranking as the non-preferred senior debt instruments issued under the conditions of the Directive.

To sum up, non-preferred senior debt represents the mean through which the Directive aims to reach its purposes of a more efficient bail-in regime by: i) clarifying the stock of bailinable liabilities, ii) allowing banks to be more efficient when piling up the bail-in buffer, and iii) reducing the legal risks which stem from the violation of the NCWO.

The data source we used to collect information on non-preferred senior bond issuances is the Bloomberg Professional Service. Using the Fixed Income Search tool, we downloaded listed and active non-preferred senior bonds on 01/04/2019. The senior non-preferred payment rank field, as defined by Bloomberg, refers to bailinable claims which rank between TLAC-ineligible senior preferred bonds and existing Tier 2 subordinated debt. The field requires securities to fulfill: i) the unsecured obligation, ii) the subordinated indicator, and iii) the bail-in bond designation. Moreover, it requires the country of incorporation of the bank to be among Austria, Belgium, Denmark, Germany, Spain, Finland, France, Italy, or the Netherlands. At this stage, the search provided 3110 issuances and 52 issuers.

We, thus, limited the sample to EU G-SIBs, according to the European Banking Authority (EBA) list, in order to have an MREL minimum requirement to which compare the amount of non-preferred senior debt and infer regarding the contribution of this new asset class to the creation of a sufficient bail-in buffer. EU G-SIBs have, indeed, to comply with a Pillar 1 MREL requirement, according to the amendment to the CRR (EC, 2016a). Small banks, instead, as well as the wide range of intermediate cases that separates them from G-SIBs, are not subjected to a clear MREL requirement which could hamper the readability of their eventual senior non-preferred debt endowment. In detail, small banks do not have access to the non-preferred senior debt market and could be exempted de facto from MREL requirements. The intermediate cases between G-SIBs and small banks have, instead, a different ability to tap the market of MREL-eligible liabilities and are subjected to a Pillar 2 MREL requirement decided by the resolution authority (EC, 2016b). After the implementation of the EU G-SIBs criterium, the sample consists of 1455 issuances and 17 issuers. Given that the Member States have to apply Directives' measures as from the date of their entry into force into national law, we further refine our criteria selecting only the issuances that occurred after the transposition of the Directive into the national law of each issuer's country. The sample results, thus, in 510 issuances and 17 issuers.

Finally, we control for a possible mismatch between the regulatory characteristics of senior non-preferred bonds and those of the instruments included in our sample. As per Directive, senior non-preferred bonds have an original contractual maturity of at least one year, have no derivative features, are no derivatives themselves, and their contractual documentation or prospectus explicitly refers to their ranking. Although our sample complies with the maturity constraint, we need to set further criteria to rule out those issuances that show derivative features. Hence, we control for hybrid, dual currency, convertible, structured, and callable features as we consider derivative. We do not consider other features like linked bonds and sinkable bonds to be derivative. As a result, our final sample consists of 425 issuances for 17 issuers. The issuances included in our sample account for 74.4% of the total 571 issuances completed since the transposition of the Directive into Member State's national law, and for 77.2% of the total issued amount of 174 billion. Tables 1, 2, 3, and 4 provide detailed information about the SNP's sample.

Overall, the total amount issued is 134 billion with an average of 317 million per issuance (Table 1). The average maturity of SNP's issuances is 7.2 years, with a median value of 6.7 years (Table 2). Its value ranges between a minimum of 2 years to a maximum of 20 years in line with the loosening provision of the Directive that only sets a minimum maturity of at least 1 year. Regarding the coupon type, the largest share consists of fixed-rate issuances which account for 61.6% of total issuances (Table 2). Step-coupon issuances account for 28.4% of the total, and the remaining 10% consists of floating-rate (9,8%) and variable bonds (0,2%). Floating and variable rates are allowed as SNP's characteristics since the Directive explicitly rules out variable interests derived from a broadly used reference rate, such as Euribor or Libor, from ineligible derivative features. Finally, regarding the maturity type, most of the issuances will be redeemed at maturity (96,2%) (Table 2). The residual share consists of sinkable bonds (3,7%).

Table 1 breaks down SNP's issuances by issuer. The average ratio between non-preferred senior debt and risk-weighted assets among EU G-SIIs is 2.90%. Summing this ratio with the average total capital ratio, which is defined as the sum of Tier1 and Tier2, leads to an MREL of 20.8% of RWAs that fulfills the minimum 16% set up for 2019 and the following 18% starting from 2022 as per CRD IV and CRR proposed amendments which aim to transpose TLAC rules into BRRD. Table 2 describes SNP's issuances per quarter. The number of issuances steadily increases since Q1 2018 reaching a maximum of 118 in Q1 2019. The amount issued varies a lot reaching a maximum of 28 billion in Q1 2019. These results are consistent with the deferred transposition of the Directive within each member state's national law that reaches in Q1 2019 the highest level of harmonization between the Member States. Table 3 breaks down SNP's data per country. France is the first issuer with 79 billion. This result is in line with the early distinction between senior preferred and non-preferred

notes introduced into French national law by Art. 151 of Sapin II Law, which modifies the hierarchy of creditors in that way as well, on 10 December 2016. Germany shows the highest number of issuances (224) and frequency of the sample, with 44 issuances per issuer. Despite a substantially lower number of issuances, Italy (8) and Spain (51) issued an amount respectively slightly lower and greater compared to that issued in Germany. Table 4 depicts SNP's issuances by currency. Most of the issuances are denominated in euros (72.7%) and dollars (12%). Other 12 currencies account for the remaining 15.3%. Issuances denominated differently from the domestic currency are allowed by the Directive's provisions as long as principal, repayment, and interest are denominated in the same currency.

3 Sample

We employ a diff-in-diff analysis that compares the reaction of mid yields to maturity of subordinated issuances between banks that are the direct objective of the Directive (treatment group) and banks that do not fall under the scope of the Directive (control group).

First, we provide the framework that allows us to discern between banks that are affected by the Directive and banks that are not. Given the objective of improving the effectiveness of the bail-in, the Directive specifically addresses G-SIBs as they have to comply with a Pillar 1 MREL requirement and can easily tap the non-preferred senior debt market which is crucial for harnessing the Directive's provisions. Conversely, small banks do not fall under the scope of this directive as they are likely to be subjected to normal insolvency proceedings in case of crisis and do not have access to the non-preferred senior debt market.

Moreover, between G-SIBs and small banks, there is a wide range of intermediate cases that are subjected to a Pillar 2 MREL requirement and whose capacity to tap the non-preferred senior debt market varies depending on their similarity to G-SIBs or small banks. As a result, if these banks are able to grant the sufficient loss-absorbency capacity that permits the application of the bail-in tool they are involved by the Directive provisions, otherwise not.

Those banks that are closer to small banks are labeled by Fernando Restoy, chairman of the Financial Stability Institute, as the "middle class" (Restoy, 2016; 2018). Restoy includes in this category those banks that are too large to be subjected to liquidation, as that may generate systemic adverse effects, but also too small and too traditional to issue large amounts of MREL-eligible liabilities that would permit the application of the bail-in tool in resolution. These banks are, indeed, unfamiliar with the market of MREL-eligible liabilities and its access could result economically unfeasible (EBA, 2016). As a consequence, the application of the bail-in tool may not be credible as they may lack sufficient loss-absorbency capacity (Baudino et al., 2018; Restoy, 2019).

Our sample selection strategy considers, therefore, G-SIBs for the treatment group and small banks, or banks belonging to the "middle class", for the control group. The former are indeed direct objectives of the directive as they are able to harness its provisions whereas the latter fall out of the scope of the directive as bail-in regulation does not apply to them. For the sake of brevity, we will refer now on to the banks included in the treatment group as bailinable banks and to those included in the control group as non-bailinable banks.

We start by creating the treatment group of bailinable banks' subordinated bonds. From Bloomberg, we select active and listed Tier 2 (T2) subordinated bonds issued by the same G-SIBs that we included in the sample used in Section 2. Then, we create the control group of non-bailinable banks' subordinated bonds by selecting active and listed T2 subordinated bonds that jointly satisfy the following requirements: 1) are issued by banks located in the same country of incorporation of the bailinable banks; 2) issuing banks have not issued non-preferred senior bonds; 3) issuing banks are not G-SIIs. The resulting control group consists of bonds issued by medium-small banks that have average total assets of 30 billion and are unable to tap the market of non-preferred senior bonds which hampers their ability to grant the sufficient loss-absorbency required to apply the bail-in tool. Given these characteristics, we consider the control group substantially unaffected by the provisions of the Directive and a valid counterfactual for the treatment group.

On 01/04/2019, from Bloomberg, we downloaded daily data on mid yields to maturity for each T2 subordinated bond in our sample starting from the issue date. Then, we rule out those issuances whose data did not cover both the period before and after the entry into force of the directive, and restrict the time window to one year, from 1/09/2017 to 28/09/2018. The time window so defined allows us to control for the evolution of the trend of subordinated bond yields before and after the Directive and to assess its impact.

The final sample consists of 59 issuers and 464 issuances divided as follows, 17 issuers and 280 issuances for the treatment group and 42 issuers and 184 issuances for the control group. Table 5 describes the sample. The table shows the bailinable banks included in the treatment group and the non-bailinable banks included in the control group. Descriptive statistics report for each bank: the number of T2 subordinated issuances; the total assets; the total amount of subordinated debt issued; and both the average mid yield to maturity and average original maturity of their issuances. Bailinable banks have a total of 280 subordinated bonds for an amount of 165,915 million. Non-bailinable banks, instead, have 184 subordinated bonds for an amount of 18,588 million. The average total assets of bailinable banks (825 billion) are greater than those of non-bailinable banks (31 billion), consistently with the threshold of 50 Billion which is commonly assumed by literature to distinguish banks that follow a bail-in strategy from those that follow an alternative one (García, J. & Rocamora M., 2019).

The average mid yield to maturity of issuances of bailinable banks (2.68%) is smaller than that of issuances of non-bailinable banks (2.82%). This is consistent with the market distortion, caused by the TBTF issue, which allows large banks to raise funding at cheaper rates (Ueda and Weder Di Mauro, 2013). Finally, the average original maturity of issuances of bailinable banks (13.20) is greater than that of issuances of non-bailinable banks (12.63).

4 Diff-in-diff analysis

Following the recent studies from Giuliana (2018) and Crespi (2018) on the impact of bail-in events on the debt market, we employ a diff-in-diff analysis[1] to study the causal impact of the Directive on subordinated bond's yields by estimating the following equation:

$$y_{ibc,t} = \lambda_i + \vartheta_t + \delta(T_{ibc} \cdot post_t) + \varepsilon_{ibc,t} \quad (1)$$

where $y_{ibc,t}$ is the outcome variable, namely the mid yield to maturity for issuance i of bank b in country c at time t, λ_i captures the issuance fixed effects and ϑ_t captures the time trends. T_i is a dummy variable that equals 1 if the issuance belongs to a bailinable bank, and 0 otherwise. $post_t$ is a dummy variable that equals 1 in the post-directive period and 0 otherwise. The estimator δ is the diff-in-diff estimator which we interpret as the difference between two differences. The first difference is between a mid-yield to maturity of a subordinated issuance belonging to a bailinable bank after the directive entered into force and the respective mid-yield before that time. The second difference is between a mid-yield to maturity of a subordinated issuance belonging to a non-bailinable bank after the directive entered into force and the respective mid-yield before that time. Issuance fixed effects are introduced to check for the heterogeneity of bond features that might affect their pricing thereby biasing our results (Santos, 2014).

Regarding the choice of the time window for this analysis, previous studies show mixed alternatives. Giuliana (2018) employs an event study methodology performing the diff-in-diff on daily secondary market data in a time window of seven days before the treatment and one after. Conversely, Crespi et al. (2018) employ a diff-in-diff using bonds data, collected at the issue date, over a time window of 4 years from January 2013 to December 2016 with the treatment occurring on 1st January 2016.

[1] The diff-in-diff design is a quasi-natural experimental research design that overcomes the limitations of research in finance due to endogeneity issues and isolates causal links (Gippel et al., 2015). Precisely, those experiments refer to naturally occurring events whose setup falls outside the intention of the researcher (Meyer, 1995) and should be convincingly exogenous to capture unbiased causal links. Events often result from social or political situations (Dunning, 2007). A legislative process, therefore, could be regarded as a suitable case for setting up a quasi-natural experimental research design. The entry into force of the Directive is our naturally occurring event.

We, therefore, decide to set a time window coherent with the peculiarities of our case. In detail, we account for two major concerns that may bias our result: i) the anticipation effect, and ii) the poor liquidity of the secondary market for European banks' subordinated issues. Regarding the former, some scholars (e.g. Schäfer et al., 2016) argue that the events related to the procedure of a new legislation might affect the market even before it enters into force. Regarding the legislative process of the Directive, on 23/11/2016 the EU Commission adopted its proposal. Thus, according to the anticipation effect, subordinated investors might have started repricing bonds from this date. Regarding the latter, instead, an eventual repricing of subordinated bonds' yields might take time due to the poor liquidity of the secondary market for European banks' subordinated issues (Sironi, 2003).

To tackle both concerns, we select a time window of one year that goes from September 2017 to September 2018, with the treatment occurring on 28th December 2017. We balance secondary market quotes to obtain a data ratio of one-third before the treatment and two-thirds after. The time window would, therefore, account for both the possible distortions caused by the anticipation effect and the stickiness of subordinated quotes. Moreover, following Crespi et al. (2018), we test for the anticipation effect introducing the dummy "Proposal" in our models that assumes value 1 for bonds issued after the submission of the proposal. Its estimate would indeed disentangle the hypothesis that the market has started repricing bonds even before the entry into force of the Directive.

Another common concern shared by studies that employ a diff-in-diff to assess the impact of a new law regards the sources different from the treatment that might explain the trend followed by treatment and control outputs after the treatment occurred. In particular, the studies conducted by Giuliana (2018) and Crespi et al. (2018) on the impact of bail-in events on the debt market recognize and further address the problem that the differences in trends between treatment and control yields might be due to bank risk instead of bail-in expectations. We address this hypothesis both theoretically and empirically.

As regards theory, subordinated bonds' yields should embed bank risk as subordinated bondholders are enticed to actively monitor a bank's risk profile given their insolvency ranking which exposes them to a substantial amount of losses in case of default (Resti, 2016). However, literature provides mixed results on the relationship between subordinated quotes and the bank's risk profile[2]. On the one hand, the government implicit subsidy deters subordinated investors from actively monitoring a bank's risk, thereby turning subordinated quotes into poor predictors of bank distress (Millera et al., 2015). On the other hand, a strong commitment by policymakers towards a regulation

[2] Early studies conducted on U.S. bank holding companies did not find a statistically significant relationship between subordinated spreads and bank's risk (Avery, Belton, and Goldberg, 1988; Gorton and Santomero, 1990), whereas, more recent papers accounted for a positive relationship (Flannery and Sorescu, 1996, De Young et al., 2001; Covitz et al., 2000).

aimed at mitigating the TBTF issue restores the risk sensitivity of subordinated investors. Although recent studies show that some bail-in events have been effective in mitigating the investors' creditor inertia, the bail-in framework still suffers from severe shortcomings, as outlined in Section 1, that hamper its objective of resuming an active market monitoring. Our theoretical assumption of the poor risk-sensitivity of subordinated bonds yields is thus empirically complemented by using weekly mid yields to maturity of subordinated debt issuances that smoot daily price variations and prevent bank-related sources of risk to drive our results.

We start the analysis by matching the maturity between treated and control issuances to make the latter a valid counterfactual for the former. Hence, we employ a propensity score matching whose purpose is to match each issuance in the control group with the issuance in the treatment group that has the closest score, namely the probability of receiving treatment given its maturity. We, first, compute the scores running the following probit model.

$$D_i = \alpha + \beta_1 Maturity_i + \varepsilon_i$$

where: D_i is a dummy variable which equals 1 if issuance i is treated and 0 otherwise, and $Maturity_i$ is the original maturity of issuance i. Then, we perform the matching using the nearest neighbor approach with a caliper equal to 0.005 and without replacement. The caliper is the distance between treatment and control group scores that cannot be exceeded. The without replacement feature assures that each control observation is used no more than one time as a match for a treated observation. Table 6 shows the summary statistics before and after the matching. The matching restricts the sample from 464 to 334 issuances, of which 150 treated and 184 untreated. Banks restrict from 59 to 58, of which 16 treated and 44 control. The procedure significantly lowers the difference between treated and control issuance's maturities and makes the two groups of issuances more homogeneous and comparable.

We, thus, run the diff-in-diff. Estimates are presented in Table 7. Column (1) shows the diff-in-diff estimate resulting from equation (1) with standard errors clustered at the issuance level. Differently from Column (1), Column (2) includes the dummy Proposal. Due to collinearity, the dummy Proposal rules out the issuance fixed effect that we replace with bank fixed effects in order to control for bank-specific sources of risk that might drive our results (Crespi, 2019). Standard errors are thus clustered at the bank level.

Results show that, following the introduction of the Directive, subordinated bond yields of bailinable banks have increased by .24 basis points compared to non-bailinable banks. This result validates our H_1 hypothesis. Specifically, the positive and statistically significant diff-in-diff estimates indicate that subordinated investors of bailinable banks perceive the Directive as a crucial

commitment towards a well-designed and consistent bail-in tool and consider it as a plausible threat. Regarding the anticipation effect, the magnitude of the coefficient of the dummy Proposal together with its lower degree of significance suggest that the subordinated debt market has started slightly repricing bond yields since the adoption by the EU Commission of its proposal.

The reliability of the diff-in-diff analysis is rooted in the parallel trend assumption which states that the parallel trend between subordinated bond's yields of treatment and control group would have not changed if the Directive had not occurred. Given the complex structure of our sample which consists of multiple treatment and control issuances that, in turn, refer to multiple treatment and control banks and multiple periods as well, it results difficult to provide a simple visual inspection for the identical trend between treatment and control group before the entry into force of the Directive. As a result, we provide a formal test of the parallel trend assumption interacting the treatment variable with time dummies in the following equation (Pischke, 2005):

$$y_{ibc,t} = \lambda_i + \vartheta_t + \sum_{t=sept17}^{oct17} \delta_t \, (\beta_t \cdot T_{ibc}) + \sum_{t=dec17}^{sep18} \delta_t (\beta_t \cdot T_{ibc}) + \varepsilon_{ibc,t} \quad (2)$$

where, differently from equation (1), β_t are dummy variables which assume value 1 for each month of the time window, δ are diff-in-diff estimators which are expressed relative to the omitted period of November 2017, namely the month before the entry into force of the Directive. This test assesses whether the diff-in-diff estimators in the pre-treatment period are not statistically significant which would mean that the subordinated yields trends are the same for both the treatment and the control group. Figure 1 shows graphical results of estimates assessed in equation (2). Results show that there is not a statistically significant difference in trends in subordinated yields in the pre-treatment period (Sep17-Oct17). As the Directive entered into force on 28/12/2017, even the month of December 2017 does not show a statistically significant difference in trends in subordinated bond yields. Starting from January, the treatment effect increases and stabilizes around .2 basis points revealing the effect of the Directive on subordinated bond's yields of bailinable banks. As a result, we confirm the parallel trend assumption granting the reliability of the diff-in-diff analysis.

We further replicate the analysis for different time windows. We progressively subtract a month from the post-period and add it to the pre-period up to considering the time window that goes from June 2017 to June 2018. The models hold for each of the three specifications. Then, considering the original model, we first progressively subtract up to three months from the post-period considering the time window ranging between September 2017 and June 2018, and further add up to three months

to the pre-period considering the time windows ranging between June 2017 and September 2018. The estimates of the three specifications of both time windows still corroborate our main results[3].

5 Robustness check

5.1 Bank propensity score matching

Our sample consists of mid yields to maturity of issuances from banks that differ substantially in size between the treatment and the control group. Such difference reflects our sampling decision to include bailinable banks in the treatment group and non-bailinable banks in the control group, as outlined in Section 3. Differences among banks could lead to biased results making the control banks not a valid counterfactual for treated banks in the absence of the treatment. As a result, we employ the propensity score matching to make the treated and the control banks more homogeneous along crucial bank variables. The procedure matches each bank in the control group with the bank in the treatment group that has the closest score, namely the probability of receiving treatment given some pre-treatment characteristics. We run the matching in the pre-treatment period. Due to the availability of data we restrict the sample from 59 banks and 464 issuances to 35 banks and 346 issuances. According to Gatti and Oliviero (2018), we compute the scores running the following probit model.

$$D_i = \alpha + \beta_1 Tier1_i + \beta_2 NPLS_i + \beta_3 DEP_i + \varepsilon_i$$

where: D_i is a dummy variable which equals 1 if bank i is treated and 0 otherwise, $Tier1_i$ is the ratio of Tier1 on Total Assets of bank i, $NPLS_i$ is the ratio of Non-Performing Loans on Total Assets of bank i, DEP_i is the ratio of Total Deposits on Total Assets of bank i. The pre-treatment characteristics represent key bank variables: the capitalization, measured by the ratio between Tier1 and Total Assets; the risk, measured by the ratio between NPLs and Total Assets; and the business model, proxied by the ratio between Total Deposits and Total Assets. Once computed the scores, we perform the matching using the nearest neighbor approach without replacement and within common support. The without replacement feature assures that each control observation is used no more than one time as a match for a treated observation. The common support restricts the matching on the common range of propensity scores between the treatment and control group. Tables 8 and 9 show the summary statistics of the pre-match and matched samples. The pre-match sample consisted of a total of 35 banks, 17 treated and 18 control. The matching restricts the sample from 35 to 27 banks, 9 treated and 18 control, thereby significantly lowering the differences among key bank variables we have considered in the probit regression and making the two groups more comparable during the pre-treatment period. Although not used in the probit regression, the treatment and the control group do

[3] For brevity, these results are not presented in the text, but they are available from the authors upon request.

not substantially differ in performance, measured by ROA. Moreover, we observe that mid yields to maturity in the treatment group are lower, on average, than those in the control group. This is coherent with the TBTF bias that permits large banks to raise funding at cheaper rates (Ueda and Weder Di Mauro, 2013).

5.2 Refined diff-in-diff analysis

After the bank propensity score matching our sample results of 27 banks, 9 treated and 18 control, and 189 issuances, 123 treated and 66 control. As a robustness test, we run the diff-in-diff analysis on this sample to better account for bank heterogeneity. We follow the same approach outlined in section 4. We, therefore, start matching the maturity between treated and control issuances. After computing the scores, we perform the matching using the nearest neighbor approach without replacement and without caliper. Table 10 shows the summary statistics before and after the matching. The matching restricts the sample from 189 to 132 issuances, 66 treated and 66 control, and significantly lowers the difference between treated and control issuance's maturities thereby making the two groups of issuances more homogeneous and comparable.

Finally, we run the diff-in-diff. Estimates are presented in Table 11. Column (1) shows the diff-in-diff estimate resulting from equation (1) with standard errors clustered at the issuance level. Differently from Column (1), Column (2) includes the dummy Proposal. Due to the collinearity between the dummy Proposal and the issuance fixed effect, we replace the latter with bank fixed effects in order to account for bank-specific unobservable characteristics that might bias our results. Standard errors are thus clustered at the bank level. Both Columns include the natural logarithm of the bank's total assets as a control variable to account for the substantial difference in total assets between treated and control banks.

Results corroborate the findings outlined in section 4 showing an increase of subordinated bond yields, following the entry into force of the Directive, but a higher magnitude of .31 basis points. Thus, we further validate hypothesis H_1 since the positive and statistically significant diff-in-diff estimate confirms that subordinated investors of bailinable banks perceive the Directive as a credible commitment towards a well-designed and consistent bail-in tool which, ultimately, they consider a plausible threat. The magnitude and significance of the coefficient of the dummy Proposal further corroborate the hypothesis that the subordinated debt market has started slightly repricing bond yields since the adoption by the EU Commission of its proposal. The control variable using the natural logarithm of total assets shows a positive coefficient in line with larger banks perceiving the bail-in as an actual threat.

We also test for the parallel trend assumption estimating equation (2) as described in section 4. A graphical result of estimates is provided in Figure 2. We observe that the difference in mid yields to maturity between treated and control groups before treatment with respect to November 2017 is not significantly different from 0. Starting from January the treatment effect increases and stabilizes around .4 basis points revealing the effect of the Directive on subordinated bond's yields of bailinable banks. As a result, we validate the parallel trend assumption and grant the reliability of the diff-in-diff analysis. We further replicate the analysis as conducted in section 5 in order to test for different time windows and the results are still robust.

6 Discussion

The empirical results show that subordinated bonds' yields of bailinable banks increased between .24 and .31 basis points compared to those of non-bailinable banks. We interpret these results claiming that the Directive's provisions have warned subordinated investors about a more credible bail-in tool thereby enticing them to positively reprice bond yields. In this section we discuss the reasons that led subordinated investors to reprice bond yields, focusing on the implications of the Directive for a well-functioning and effective bail-in regime.

The harmonization of the rules on the insolvency ranking of unsecured senior debt across the EU Member States mitigates the uncertainty of both issuing entities and investors regarding the cross-border banking groups resolution and eases the competitive distortions on the internal market by smoothing differences across member states as regards both the banks' costs to comply with the MREL subordination requirements and the investors' costs to buy debt instruments. More homogeneous prices help, therefore, to enhance the loss-absorbency capacity of the different resolution entities of banking groups characterized by a decentralized structure thereby facilitating their bail-in and making the group also a valid candidate for the implementation of an MPOE approach in case of resolution[4].

The creation of the non-preferred senior debt asset class represents a further step towards a more credible bail-in as it: i) helps to clarify the stock of bailinable liabilities, ii) allows banks to be more efficient when complying with the MREL subordination requirement, and iii) tackles the legal risks which stem from the violation of the NCWO principle.

[4] The resolution of these groups requires, indeed, regulators to decide between two distinct approaches: the single-point-of-entry (SPOE) and the multiple-point-of-entry (MPOE). The former requires resolution to be applied at the parent or ultimate owner level by a single resolution authority involving a single jurisdiction, while the latter requires parts of a banking group to be resolved as separate entities in different jurisdictions by different resolution authorities (Conlon & Cotter, 2019).

The BRRD set out unclear eligibility criteria for bailinable liabilities that posed under the threat of the bail-in even senior bonds hold by retailers and un-guaranteed deposits. The bail-in of such liabilities would have thus caused serious reputational repercussions for the bank and jeopardized its ability to raise funding at reasonable costs (Resti, 2016). In addition, such a generic definition of bailinable liabilities further hindered both investors and banks from properly assessing the actual stock of bailinable liabilities, especially as regards cross-border banking groups. The directive splits, therefore, the class of unsecured senior debt into two categories: preferred and non-preferred senior debt. The former is designed to address funding objectives whereas the latter, being eligible to meet the MREL subordination requirement, is designed to help banks to accumulate a clear buffer of bailinable liabilities efficiently. Preferred senior debt can indeed be counted towards the MREL requirement only under strict conditions and for a limited amount whereas non-preferred senior debt, ranking between subordinated liabilities and preferred debt represents the more convenient source of bailinable liabilities. As a result, the directive provides for a clear distinction between senior debt that is likely to be bailed-in (i.e non-preferred) and relatively safer senior debt (i.e. preferred), therefore, tackling the uncertainty regarding the stock of bailinable liabilities.

Given its seniority, senior non-preferred debt is also a cheaper source of bailinable debt compared to other subordinated debt and equity which helps banks to pile up a clear bail-in buffer efficiently. In addition, complying with the MREL subordination requirement, senior non-preferred debt further helps to reduce the cases of violation of the NCWO principle by ensuring that the bail-in buffer would mostly consist with clear bailinable instruments in accordance with the harmonized insolvency ranking set out by the directive's provisions.

We claim that the aforementioned implications of the Directive substantially enhance the implementation of the bail-in tool making it a credible threat for subordinated investors who have thus repriced bonds' yields between .24 and .31 basis points in accordance with the higher risk of being bailed-in in case of resolution.

7 Conclusion

The bail-in tool as implemented within the European bank resolution framework suffers from severe shortcomings that undermine its credibility and, therefore, prevent it from achieving its objectives. As part of the legislative process aimed to enhance such framework, the Directive (EU) 2017/2399 represents a crucial breakthrough for the improvement of the credibility of the bail-in regime and for the restoration of market discipline. Our aim is to delve into the bail-in expectations of subordinated bondholders to address the research question posed by Resti (2016) who asked whether the risk profile of subordinated bondholders has changed after the implementation of the resolution framework. We,

therefore, investigate the reaction of subordinated bondholders to the implementation of the directive by assessing its impact on subordinated bond yields.

To this purpose, we employ a difference-in-differences methodology which compares the subordinated bonds yield's reaction of banks eligible for bail-in to those of banks not eligible for bail-in. Our results point out a positive repricing from subordinated investors of bailinable banks which we interpret as a response to the increased expectations of being bailed-in in case of resolution. The results hold even for a sub-sample obtained after performing a propensity score matching to make the treatment and the control group more homogenous along crucial bank variables. Our results about an increased credibility of bail-in rules among subordinated investors point out their increased risk profile under the resolution framework and further suggest the efficacy of the BRRD in resuming an active monitoring function among investors thereby restoring market discipline.

This study leaves room for further research on the implications of the Directive in terms of market discipline and resolution strategies. Regarding the former, the higher expectations of subordinated bondholders over a well-functioning bail-in tool suggest, from a theoretical stand, the restoration of an active monitoring of banks' risk profile which might concern also other classes of unsecured investors. We, therefore, call for an empirical assessment of these assumptions. Regarding the latter, instead, the implications of the directive for the enhancement of the loss-absorption capacity of cross-border banking group’s subsidiaries pave the way for the employment of MPOE strategies in cases of resolution. Even though most of the resolution strategies adopted by authorities so far have been oriented towards an SPOE approach, the number of banking groups characterized by a decentralized structure, suited for an MPEO approach, is increasing, therefore, corroborating our call for empirical investigations on the viability of such strategies (Carrascosa, 2019).

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Figure 1

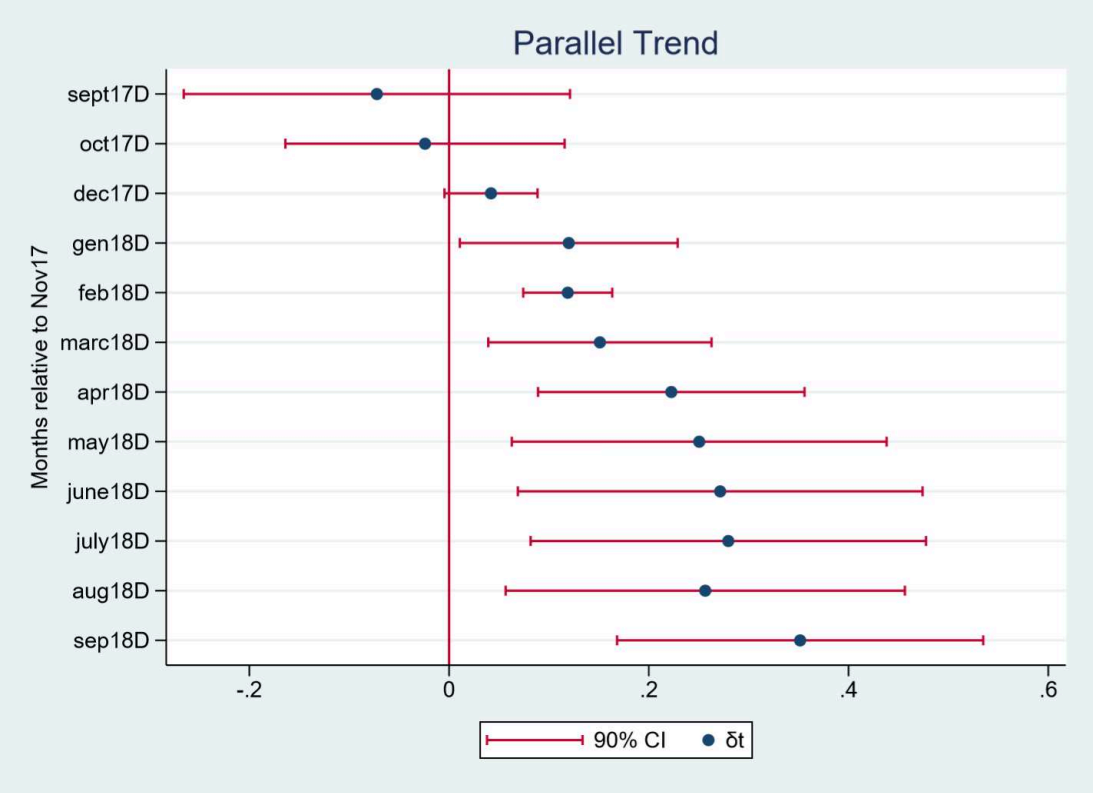

Figure 2

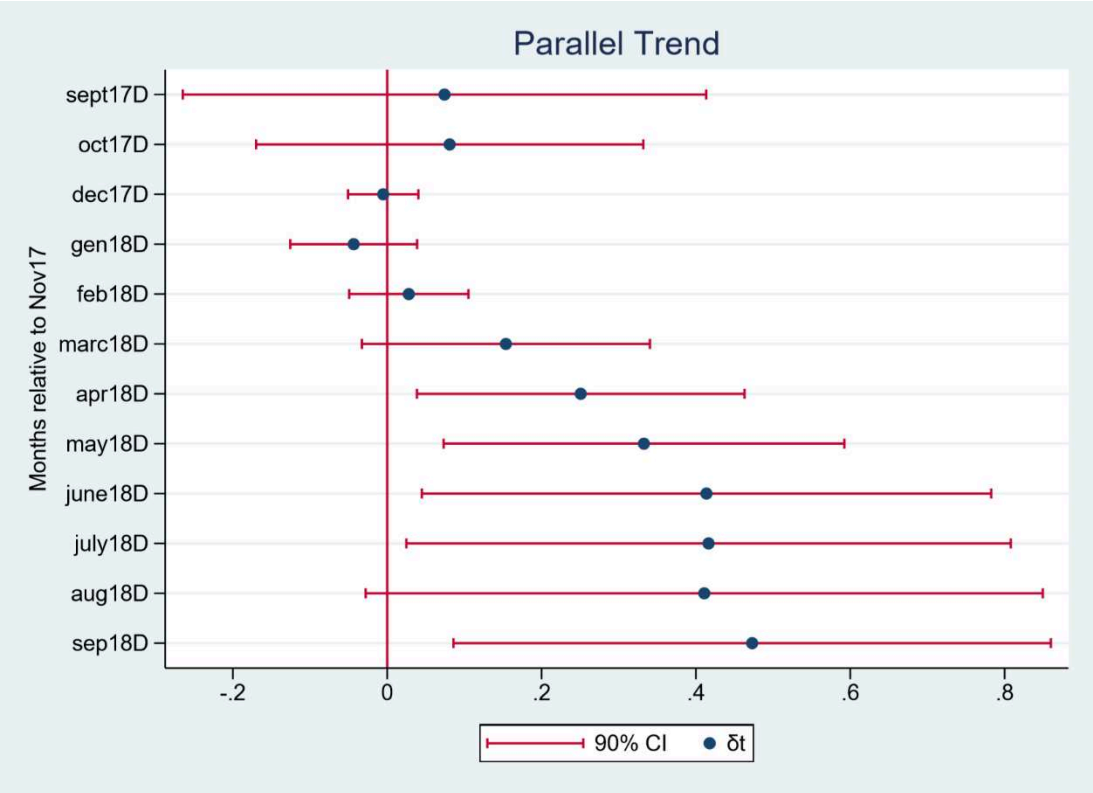

Table 1: SNP's issuances by issuer

		N. of issues	Amount (mln)		Issuing Bank					Capital Ratio		
	Issuer	Total	Total	Avg. Issue	Tot. Assets	Total RWA	Total SNP	SNP/TA	SNP/RWA	TCR	TIER1	CET1
1	BNP Paribas SA	72	36813	511	2040840	648000	35828	1.76%	5.53%	15.0	13.1	11.8
2	BPCE SA	27	16591	614	759621	386331	16591	2.18%	4.29%	19.6	15.9	15.8
3	Banco Bilbao Vizcaya Argentaria SA	6	6321	1053	676689	348255	6321	0.93%	1.82%	15.7	13.2	11.6
4	Banco Santander SA	42	12910	307	1459270	592321	12910	0.88%	2.18%	15.0	13.1	11.5
5	Bayerische Landesbank	70	4851	69	214521	61420	4851	2.26%	7.90%	17.5	15.3	15.3
6	CaixaBank SA	3	3771	1257	386622	146155	3771	0.98%	2.58%	15.6	13.3	11.8
7	Commerzbank AG	2	595	298	462369	180498	595	0.13%	0.33%	16.3	13.4	12.9
8	Cooperatieve Rabobank UA	1	1421	1421	590437	200531	1421	0.24%	0.71%	26.6	19.5	16.0
9	Credit Agricole SA	11	1104	100	1624390	306899	1104	0.07%	0.36%	17.8	13.7	11.5
10	DZ Bank AG Deutsche Zentral-Genossenschaftsbank Frankfurt Am Main	7	165	24	505594	130621	165	0.03%	0.13%	17.4	15.3	14.0
11	Deutsche Bank AG	11	4212	383	1348140	350435	4212	0.31%	1.20%	17.5	15.7	13.6
12	Intesa Sanpaolo SpA	1	-	-	787721	276446	-	-	-	17.7	15.2	13.5
13	La Banque Postale SA	2	1466	733	245201	-	1466	0.60%	-	-	-	-
14	Landesbank Baden-Württemberg	134	6619	49	237713	75728	6619	2.78%	8.74%	22.3	16.9	15.8
15	Nordea Bank Abp	1	170	170	551408	155886	170	0.03%	0.11%	19.9	17.3	15.5
16	Societe Generale SA	28	23676	846	1309430	376646	23676	1.81%	6.29%	16.7	13.7	11.2
17	UniCredit SpA	7	13834	1976	831469	370180	13834	1.66%	3.74%	15.8	13.6	12.1
	Total	**425**	**134518**	**317**	**14031435**	**4606354**	**133533**	**0.95%**	**2.90%**	**17.9**	**14.9**	**13.2**

Notes: the table shows the breakdown of SNP issues by issuer, i.e. the number of issues, the total amount issued, and the average amount per issue. Basic information pertaining to the issuing bank are also reported, i.e. Total Assets, Total Risk-Weighted Assets (RWA), the SNP issued volume scaled by total assets (SNP/TA) and RWAs (SNP/RWA) respectively along with basic capitalization measures (Total Capital Ratio-TCR, TIER1 ration and the Common Equity Tier 1-CET 1). Issuing Bank and Capital Ratio data refer to 2018.

Table 2: SNP's issuances by quarter

		Maturity					Amount (mln)						Coupon Type		Maturity Type	
Quarter	N. of Issues	Mean	Median	Min	Max	St.Dev.	Total	Mean	Median	Min	Max	St.Dev.	No.	% of Total	No.	% of Total
Q4 2016	1	5.3	5.3	5.3	5.3	-	1043	1043	1043	1043	1043	-	1	100.00%	1	100.00%
Q1 2017	24	6.7	5.8	5.0	15.0	2.4	12977	541	167	8	1750	599	17	70.83%	24	100.00%
Q2 2017	14	6.5	5.2	5.0	10.6	2.0	9635	688	924	11	1392	468	10	71.43%	14	100.00%
Q3 2017	12	7.8	5.5	5.0	15.0	3.4	5610	468	179	5	1795	635	10	83.33%	12	100.00%
Q4 2017	26	9.1	10.0	5.0	13.0	2.5	14009	523	328	18	1500	511	23	88.46%	26	100.00%
Q1 2018	24	6.9	7.0	5.0	13.0	2.2	23018	959	1053	5	2000	714	18	75.00%	24	100.00%
Q2 2018	25	7.8	6.0	5.0	15.0	3.2	8107	324	120	12	1250	437	22	88.00%	25	100.00%
Q3 2018	85	7.5	6.5	2.0	20.0	3.9	19684	205	60	6	2000	363	56	65.88%	85	100.00%
Q4 2018	96	7.5	7.0	2.0	20.0	3.5	12248	232	111	6	2000	401	40	41.67%	84	87.50%
Q1 2019	118	6.7	6.0	2.0	15.0	3.1	28186	241	28	2	2500	505	65	55.08%	114	96.61%
Total	**425**	**7.2**	**6.7**	**2.0**	**20.0**	**3.3**	**134518**	**317**	**57**	**2**	**3000**	**532**	**262**	**61.65%**	**409**	**96.24%**

Notes: the table shows the breakdown of SNP issues by quarter. It reports the number of issues per quarter coupled with basic descriptive statistics regarding maturity and amounts issued. Coupon type (i.e., the number and the share of fixed-rate coupons) and maturity type (i.e., the number and the share of bonds which are redeemed at maturity, whit the remaining portion being sinkable bonds) are reported as well.

Table 3: SNP's issuances by country

Country	No. of Issues	No. of Issuers	No. of Issues per Issuer	Maturity					Amount						Coupont Type		Maturity Type	
				Mean	Median	Min	Max	St.Dev.	Total	Mean	Median	Min	Max	St.Dev.	No.	% of Total	No.	% of Total
FINLAND	1	1	1.0	10.0	10.0	10.0	10.0	-	170	170	170	170	170	-	1	100%	1	100%
FRANCE	140	5	28.0	7.3	6.4	4.8	15.0	2.6	79650	569	221	4	2000	594992751	118	84%	140	100%
GERMANY	224	5	44.8	6.9	6.9	2.0	15.0	3.1	16441	73	28	2	1698	152693258	95	42%	208	93%
ITALY	8	2	4.0	3.7	3.0	3.0	5.0	1.0	13834	1976	2500	500	3000	1081938171	6	75%	8	100%
NETHERLANDS	1	1	1.0	5.0	5.0	5.0	5.0	-	1421	1421	1421	1421	1421	-	1	100%	1	100%
SPAIN	51	3	17.0	9.2	7.0	5.0	20.0	4.6	23001	451	159	18	1848	544390005	41	80%	51	100%
Total	**425**	**17**	**25.0**	**7.2**	**6.7**	**2.0**	**20.0**	**3.3**	**134518**	**317**	**57**	**2**	**3000**	**532306291**	**262**	**62%**	**409**	**96%**

Notes: the table shows the breakdown of SNP issues by country. It reports the number of issues per country coupled with basic descriptive statistics regarding maturity and amounts issued. Coupon type (i.e., the share and the number of fixed-rate coupons) and maturity type (i.e., the number and the share of bonds which are redeemed at maturity, whit the remaining portion being sinkable bonds) are reported as well.

Table 4: SNP's issuances by currency

	Number of Issues	Average Maturity	Amount		Coupon Type		Maturity Type	
			Total	Average per Issue	Number	% of Total	Number	% of Total
AUD	9	6.4	1623	180	6	67%	9	100%
CHF	7	6.3	1035	148	7	100%	7	100%
CNY	9	5.0	351	39	9	100%	9	100%
CZK	5	6.2	107	21	1	20%	5	100%
DKK	1	5.0	146	146	0	0%	1	100%
EUR	309	7.5	69743	226	165	53%	293	95%
GBP	3	5.7	2604	868	3	100%	3	100%
JPY	7	8.6	1842	263	7	100%	7	100%
NOK	8	9.4	713	89	8	100%	8	100%
PLN	3	6.0	23	8	3	100%	3	100%
RON	7	5.9	60	9	7	100%	7	100%
SEK	5	5.0	285	57	3	60%	5	100%
SGD	1	7.5	176	176	1	100%	1	100%
USD	51	6.7	55810	1094	42	82%	51	100%
Total	**425**	**7.2**	**134518**	**317**	**262**	**62%**	**409**	**96%**

Notes: the table shows the breakdown of SNP issues by currency. It reports the number of issues per currency and their related average maturity. In addition, it reports also the total amount issued by currency and the average amount per issue. Coupon type (i.e., the share and the number of fixed-rate coupons) and maturity type (i.e., the number and the share of bonds which are redeemed at maturity, whit the remaining portion being sinkable bonds) are reported as well.

Table 5: The sample

Country	Bank Name	No of bonds by bank	Total Assets (Billions)	Amount Issued (Millions)	Avg Mid Yield to Maturity (%)	Original maturity (Years)	Issuance-level Analysis	Robustness check
	Treatment Group							
France	BNP Paribas SA	23	2041	745	3.54	12.18	✓	
France	BPCE SA	30	760	720	3.34	12.75	✓	✓
Spain	Banco Bilbao Vizcaya Argentaria SA	9	677	449	2.53	13.89	✓	✓
Spain	Banco Santander SA	14	1459	492	3.24	10.02	✓	✓
Germany	Bayerische Landesbank	15	215	50	2.76	15.35	✓	
Spain	CaixaBank SA	3	387	792	2.88	15.33	✓	✓
Germany	Commerzbank AG	18	462	376	2.73	15.51	✓	✓
Netherlands	Cooperatieve Rabobank UA	15	590	1349	2.73	13.60	✓	✓
France	Credit Agricole SA	18	1624	1070	1.80	10.53	✓	
Germany	DZ Bank AG Deutsche Zentral-Genossenschafstbank Frankfurt Am Main	28	506	58	1.89	11.00	✓	
Germany	Deutsche Bank AG	8	1348	871	3.72	10.63	✓	
Italy	Intesa Sanpaolo SpA	7	788	1513	2.03	9.43	✓	✓
France	La Banque Postale SA	5	245	733	1.56	11.60		✓
Germany	Landesbank Baden-Wuerttemberg	26	238	116	1.93	23.85	✓	
Finland	Nordea Bank Abp	10	551	927	1.86	10.05	✓	
France	Societe Generale SA	29	1309	613	3.48	12.86	✓	
Italy	Unicredit SpA	22	831	636	2.4	9.55	✓	✓
	Subtotal	280	14031	165915				
	Mean	16.4	825	593	2.68	13.20		
	Control Group							
Austria	Allgemeine Sparkasse Oberoesterreich Bank AG	4	12	30	3.06	9.50	✓	
Belgium	Argenta Spaarbank NV	1	38	558	2.83	10.00	✓	
Austria	BAWAG PSK Bank fuer Arbeit und Wirtschaft und Oesterreichische Postsparkasse	7	45	99	1.84	16.60	✓	
Austria	BKS Bank AG	4	8	12	2.37	9.25	✓	✓

Italy	BPER Banca	2	71	461	4.38	10.00	✓	✓
Italy	Banca Mediocredito del Friuli Venezia Giulia SpA	1	1	68	4.61	10.00	✓	
Italy	Banca Popolare dell'Alto Adige SpA	2	10	62	4.41	11.00	✓	✓
Italy	Banca Popolare di Cividale SCPA	1	4	15	1.85	5.00	✓	
Italy	Banca Popolare di Sondrio SCPA	5	41	192	-3.21	7.00	✓	✓
Italy	Banca Sella SpA	5	14	37	3.92	7.80	✓	✓
Spain	Banco de Credito Social Cooperativo SA	2	44	225	8.31	10.00	✓	
Italy	Banco di Desio e della Brianza SpA	4	14	68	2.75	5.75	✓	✓
Austria	Bank fuer Tirol und Vorarlberg AG	6	10	19	2.85	10.00	✓	
Austria	Bankhaus Krentschker & Co AG	2	15	7	2.75	9.00	✓	
Spain	Bankinter SA	4	77	316	2.22	15.25	✓	✓
Italy	Cassa di Ripsarmio di Saluzzo SpA	1	1	12	4.69	5.00	✓	
Netherlands	Credit Europe Bank NV	1		150	8.03	10.00	✓	
Italy	Credito Emiliano SpA	3	43	126	3.30	10.00	✓	✓
Italy	Credito Valtellinese SpA	2	26	147	9.02	8.50	✓	✓
Germany	Hamburgische Landesbank-Girozentrale	12	70	40	1.91	31.57	✓	
Austria	Hypo Vorarlberg Bank AG	6	13	44	2.72	9.54	✓	
Germany	IKB Deutsche Industriebank AG	9	17	64	3.33	16.61	✓	✓
Spain	Ibercaja Banco SA	2	53	515	3.48	11.00	✓	
Italy	Iccrea Banca SpA	3	38	170	4.50	9.00	✓	✓
Austria	Landes Hypothekenbank Steiermark AG	5	4	10	3.56	16.00	✓	
Gemrnay	Landesbank Schleswig-Holstein Girozentrale	4	70	64	3.45	32.24	✓	
Spain	Liberbank SA	1	39	319	5.50	10.00	✓	✓
Italy	Mediobanca banca di Credito Finanziario SpA	5	72	658	2.13	10.00	✓	✓
Finland	OP Corporate Bank plc	5	67	292	0.71	10.00	✓	✓
Austria	Oberbank AG	8	22	27	2.09	8.50	✓	✓
Austria	Oberoesterreichische Landesbank AG	3	8	14	2.49	28.32	✓	
Germany	Oldenburgische Landesbank AG	2		17	2.22	10.04	✓	
Austria	Raiffeisen-Landesbank Steiermark AG	9	15	39	2.66	10.50	✓	

Austria	Raiffeisen-Landesbank Tirol AG	2	7	24	4.74	10.00	✓	
Austria	Raiffeisenlandesbank Niederoesterreich-Wien AG	15	26	50	4.07	11.00	✓	
Austria	Raiffeisenlandesbank Oberoesterreich AG	25	40	47	2.52	9.39	✓	
Denmark	Spar Nord Bank A/S	1	83	74	2.01	10.00	✓	✓
Austria	Steiermaerkische Bank und Sparkassen AG	5	15	49	2.61	8.80	✓	
Austria	Volksbank Wien AG	2	11	235	2.35	9.00	✓	✓
Germany	Wuestenrot Bausparkasse AG	1	28	67	3.70	10.00	✓	
Netherlands	de Volksbank NV	1	61	543	2.60	10.00	✓	✓
Austria	s Wohnbaubank AG	1	2	26	3.82	15.00	✓	
	Subtotal	184	1235	18588				
	Mean	4.3	31	102	2.82	12.63		
	Total	464	15266	184503				

The table shows the banks included in treatment and control groups. Highlighted banks are those included in the sample for the propensity score matching in Section 5. The checkmark indicates whether the bank participates or not at the issuance level analysis and at the robustness test.

Table 6
Summary Statistics - Original Maturity

Before Matching	(1) Treatment	(2) Control	(3) Difference
Maturity (in Years)	13.20	12.63	-0.57
Issuances	280	184	

After Matching	(1) Treatment	(2) Control	(3) Difference
Maturity (in Years)	12.83	12.63	-0.20
Issuances	150	184	

Note: This table shows average values for treated (column 1) and control (column 2) issuances; column (3) shows the difference between column (2) and column (1). Data on issuance's maturities are from Bloomberg Professional Service.

Table 7
Diff-in-Diff Analysis

	(1)	(2)
	Mid YTM	Mid YTM
T·post	0.2475***	0.2478***
	(0.0496)	(0.0553)
Proposal		0.2982**
		(0.1113)
Time Trends	✓	✓
Issuance Fixed Effects	✓	
Bank Fixed Effects		✓
Observations	92,699	92,699

Note: T is a dummy variable which equals 1 if the issuance belongs to the treatment group and 0 otherwise; post is a time dummy which equals 1 in the post-directive (28/12/2017-28/09/2018) and 0 in the pre-directive period (01/09/2017-27/12/2017). In column 1, standard errors in parenthesis are clustered at the issuance level. In column 2, standard errors in parenthesis are clustered at the bank level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8
Summary Statistics – Pre-Match Sample Pre-Treatment

	(1) Treatment	(2) Control	(3) Difference
Average Mid Yield to Maturity	2.43	3.11	0.68
Total Assets (in Billions)	822.69	38.67	-784.01***
Tier One Capital over Total Assets	0.050	0.068	0.018***
Non-Performing Loans over Total Assets	0.020	0.054	0.034**
Total Deposits over Total Assets	0.41	0.55	0.13**
ROA	0.34	0.38	0.03
Number of Banks	17	18	1

Note: This table shows average values for treated (column 1) and control (column 2) banks; column (3) shows the difference between column (2) and column (1). Bank-level variables are key ratios from Bloomberg Professional Service. Data are yearly (2017).

Table 9
Summary Statistics - Matched Sample Pre-Treatment

	(1) Treatment	(2) Control	(3) Difference
Average Mid Yield to Maturity	2.44	3.11	0.66
Total Assets (in Billions)	688.49	38.67	-649.81***
Tier One Capital over Total Assets	0.058	0.068	0.010
Non-Performing Loans over Total Assets	0.029	0.054	0.025
Total Deposits over Total Assets	0.48	0.55	0.07
ROA	0.43	0.38	-0.05
Number of Banks	9	18	9

Note: This table shows average values for treated (column 1) and control (column 2) banks; column (3) shows the difference between column (2) and column (1). Bank-level variables are key ratios from Bloomberg Professional Service. Data are yearly (2017).

Table 10
Summary Statistics - Original Maturity

Before Matching	(1) Treatment	(2) Control	(3) Difference
Maturity (in Years)	12.28	10.25	-2.03***
Issuances	123	66	

After Matching	(1) Treatment	(2) Control	(3) Difference
Maturity (in Years)	9.49	10.25	0.75
Issuances	66	66	

Note: This table shows average values for treated (column 1) and control (column 2) issuances; column (3) shows the difference between column (2) and column (1). Data on issuance's maturities are from Bloomberg Professional Service.

Table 11
Diff-in-Diff Analysis Matched Sample

	(1)	(2)
	Mid YTM	Mid YTM
T·post	0.3190***	0.2932***
	(0.0861)	(0.0817)
LnTA	2.924	2.9987
	(1.7573)	(1.8025)
Proposal		0.2392*
		(0.1266)
Time Trends	✓	✓
Issuance Fixed Effects	✓	
Bank Fixed Effects		✓
Observations	36,576	36,576

Note: T is a dummy variable which equals 1 if the issuance belongs to the treatment group and 0 otherwise; post is a time dummy which equals 1 in the post-directive (28/12/2017-28/09/2018) and 0 in the pre-directive period (01/09/2017-27/12/2017). In column 1, standard errors in parenthesis are clustered at the issuance level. In column 2, standard errors in parenthesis are clustered at the bank level.*** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Barking dogs seldom bite

Giulio Velliscig♥

Abstract

This paper studies the senior unsecured bondholders' bail-in expectations and market monitoring activity following the events of the bail-in legislative process aimed at introducing new tools for subordination. To measure bail-in expectations, we use a difference in differences approach that compares the reaction to the bail-in events examined of bailinable bonds to the reaction of non-bailinable bonds. In a similar vein, we measure senior unsecured bondholders' monitoring activity by using a triple differencing analysis that compares the yield-risk sensitivity reaction of senior unsecured bonds with respect to that of non-bailinable ones. A placebo test is also performed to link the results to the legal specificities of the bail-in instead of generic risk. Our results point out unaffected bail-in expectations by senior unsecured bondholders who, accordingly, do not enhance their pricing of banks' risk.

Keywords: bail-in, credibility, unsecured senior bonds, market monitoring, bondholder's expectations.

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Introduction

The European bank resolution framework embeds the bail-in tool within a highly complex and technical regulatory framework that jeopardizes its effectiveness (Tröger, 2020). The main shortcomings are related to the different exemptions, counter-exemptions and restrictions which require many discretionary choices that involve several authorities and are also open to political pressure (Hadjiemmanuil, 2015; Tröger, 2018).

The resulting uncertainty concerns the investment community (ICMA, 2017; Skeet, T, 2017) which solicits, in particular, for a regulatory overhaul allowing a clearer quantification of their potential loss exposure in case of bail-in. Banks, on the other hand, require new tools to efficiently abide by the minimum requirement of own funds and eligible liabilities (MREL) as well as the recently mandatory subordination of part of its instruments which are both crucial to ensure the sufficient loss-bearing capacity needed by the bail-in to be effective.

At the EU level, these requests are addressed by the directive 2017/2399/EU which amend the directive 2014/59/EU, also known as Bank Resolution and Recovery Directive (BRRD), as regards the ranking of unsecured debt instruments in insolvency hierarchy. In particular, the directive harmonizes the insolvency ranking of unsecured debt instruments by requiring the Member States to create a new asset class of non-preferred senior debt which ranks in insolvency above subordinated liabilities that do not qualify as Tier 2 capital but below other senior liabilities.

As designed, the asset class of unsecured senior debt is divided into two categories: non-preferred and preferred. The former is eligible to abide by the MREL subordination requirement and also helps the bank to efficiently pile up the MREL buffer as it represents a cheaper source of funding with respect to other subordinated debt. The latter, conversely, is not eligible to meet the MREL subordination requirement but it is bailinable and can count towards the MREL under specific conditions as well.

In addition, such distinction between instruments that are likely to be bailed-in and relatively safer senior bonds allows for i) a better quantification of the amount of bailinable debt available in case of bail-in, especially for cross-border groups (Erzegovesi, 2017) ii) a reduction of litigations related to the violation of the no-creditor-worse-off (NCWO) principle (Binder, 2019), and iii) a better prediction of outcome by investors (Tröger, 2020).

As a result, the directive meets both investors' expectations over a clearer quantification of their potential loss exposure in case of bail-in and the bank's urge to abide by the bail-in buffer requirement. The directive, however, merely provides for a harmonization of the above-mentioned rules across the Member States as some of them pre-empted this legal framework ahead of its entry into force in order to help their banks efficiently complying with the bail-in buffer requirements.

Nevertheless, even if a sufficient MREL may limit the distortions caused to the investors' prediction of outcomes by specific exemptions for liabilities or by the NCWO principle, they would still have to face uncertainty regarding the trigger for bail-in, the specificity of its application in each case, and the difficult evaluation of the resolved entity. In addition, a sufficient loss-bearing capacity in resolution may still be hindered by the high degree of administrative discretion embedded in the resolution framework as well as by political bullying.

As a result, despite the authorities' commitment towards improving the effectiveness of the bail-in regime, the bail-in tool still suffers from severe shortcomings. Our paper, thus, delves into debt market reaction to the events related to the implementation of the directive and its country-specific amendments, focusing on the implications in terms of bail-in credibility and market discipline.

Among debt market asset classes, we specifically focus on senior unsecured debt as it is the objective of the legal actions above mentioned and provides for a better assessment of bail-in law due to its higher risk-exposure to the bail-in tool with respect to other subordinated debt which instead has been always designed to bear the losses in case of bank failure.

In line with Giuliana (2019), we therefore empirically gauge bail-in credibility by employing a difference in differences (diff-in-diff) analysis which compares the yield-spread reaction between senior and non-bailinable bonds around the days after the entry into force of each event. This analysis does not detect any bond repricing by senior unsecured bondholders who do not embed higher bail-in expectations after the implementation of the amendments examined.

Again, following Giuliana (2019), we test for an increase in market discipline by employing a triple differencing model to compare the yield-risk sensitivity between senior and non-bailinable bonds around the days after the entry into force of each event. Consistently with previous analysis' results, senior unsecured bondholders do not improve their monitoring activity as they do not perceive the amendments to the bail-in regime as a significant commitment towards its improvement.

We attribute the reasons underlying the failure in both resuming bail-in credibility and market monitoring to the issues inherent in the overall resolution framework which grant several authorities ample discretion regarding the implementation of bail-in and exposes the same to political bullying, therefore, jeopardizing bail-in effectiveness and its predictability by investors.

Our study significantly contributes to the existing bail-in literature as it refines both the bail-in events and bailinable classes of investors used so far by the empirical branch. In particular, and differently with prior studies, we match events of the bail-in legislative process, so far unnoticed but crucial for bail-in implementation, to the specifically concerned class of investors. As a result, we contribute to sharpening both the identification strategy, as concerns the bail-in events considered,

and the sample selection strategy, as regards the class of investors examined, to derive more accurate results about bail-in credibility and investors' monitoring activity after bail-in events.

Finally, policy implications can be drawn from our results as the inertia detected among investors as regards crucial breakthroughs of the bail-in legislative process urges policymakers to account for the bail-in shortcomings highlighted by both theoretical and legal studies to design a better legislative framework for the bail-in.

The rest of the paper is organized as follows: Section 1 discusses the related literature; Section 2 describes the events under analysis; Section 3 presents the dataset and describes the methodology employed; Section 4 presents the results; Section 5 concludes.

1 Literature review

The research questions we pose regarding debt market reactions to the EU and country-specific amendments to the bail-in regime root into the branch of literature investigating bail-in credibility. This literature consists of theoretical studies bringing out the shortcomings of the bail-in regime and empirical studies gauging the market reaction to bail-in events.

Among theoretical studies, a branch delves into the bail-in decision-making process to derive the optimal strategy and point out the main obstacles. Keister and Mitkov (2017) study a model where banks have control over the timing of bail-in and show that bailout expectations can provide incentives for banks to delay bail-in decisions. Colliard and Gromb (2017) show that loose bail-out rules compromise private restructuring incentives but strict bail-in rules lead to costly delays in the process of debt restructuring negotiations. Walther and White (2019), instead, reconcile bail-out and bail-in policies showing their complementarity and pointing out that if the former are possible then the latter are more effective. They also highlight the regulator's discretion as an obstacle to the smooth implementation of bail-in. In a similar vein, Bolton and Oehmke (2018) study the trade-offs related to the implementation of bail-in by cross-border banking groups across different jurisdictions bringing out the divergent interest that may arise among national regulators. In addition, Hadjiemmanuil (2015) identifies the political discretion in imposing bail-in as a crucial driver of their credibility. National politicians might indeed back down to short-term political pressures for bailouts. Thus, regulators' as well as political discretion emerge both as obstacles to bail-in. This point is further supported by Philippon and Salord (2017) which point out the vast discretion provided by the BRRD to authorities about implementing bail-in as a major shortcoming of its regime.

Legal studies addressing the tangled mass of bail-in rules complement the theoretical aspects of bail-in credibility literature. Tröger (2018, 2020) corroborates the thesis according to which the embeddedness of the bail-in tool in the European bank resolution framework, which grants ample

discretions to authorities about implanting bail-in and is further jeopardized by political interference, undermines its effectiveness. In addition, the author further shows how this framework is threatening the key policy objective of restoring market discipline in the following of the creditor inertia, namely a lower sensitivity of banks' risk, that affected investors before the regulatory overhaul (Gleeson, 2012; Goodhart and Avgouleas, 2014). Authorities' discretion, indeed, hampers the investors' predictability of outcome, therefore, compromising their risk-sensitive pricing of bank debt. In particular, a certain outcome in the case of bail-in would allow investors in bailinable debt to require a risk premium in line with their participation in losses. Actually, instead, unpredictable adjustments of MREL prescriptions by authorities change the risk profile of eligible instruments causing misalignment between the investor's required risk-premium and their actual loss-participation. The resulting mispricing may lead to undesirable consequences: underprizing could indeed cause moral hazard whereas overpricing could increase a bank's funding cost that would ultimately impair growth as a result of reduced lending capacity.

Thus, debt governance implications emerge as a crucial spillover of bail-in credibility issues and are often included into its empirical literature in their dimension of market monitoring, namely the process through which investors assess the bank's risk profile and embed it into securities' prices, in contrast with the market influence dimension of market discipline that investigates the process through which a change in securities' prices causes bank's managers to address the deterioration in the bank's resilience condition.

Empirical studies about bail-in credibility differ according to i) the type of bail-in event and ii) the asset class investigated. Early studies have adopted the yield spread between bailinable and non-bailinable bonds to gauge bail-in credibility among investors. Giuliana (2019) evaluates the impact of several bail-in events, related both to the legislative process of the bail-in and its actual enforcement, over a sample of 23,756 EU bonds between 2012 and 2016. His results show that the events indicating an increased commitment to bail-in increase its credibility by investors as they widen the spread between bailinable (unsecured) and non-bailinable (secured) bonds. Moreover, the results show also a higher yield-risk sensitivity of bailinable bonds after the occurrence of bail-in events, therefore, supporting the thesis of bail-in increasing the market discipline. Consistently, Crespi et al. (2019) find the same results, in terms of credibility and market discipline, analyzing the introduction of the bail-in tool in January 2016 over a sample of 1,798 bonds relative to the Italian bank bonds primary market. Lewrick et al. (2019), instead, refine the analysis only on senior bonds to better catch the impact of the bail-in and avoid biases that stem from the inclusion of other subordinated liabilities that may be influenced in addition by other crisis management measures.

Their result points out a higher bail-in risk premium for riskier issuers, therefore, providing further evidence of an enhanced market discipline among senior debt investors.

Conversely, the study conducted by Pablos Nuevo (2019) to check for the impact of the introduction and implementation of the new EU bail-in framework on a sample of 41 EU credit institutions does not show evidence of a significant and generalized increase in the so-called subordinated spread, namely the difference between subordinated bonds' yields and senior unsecured bond's yields, over the period 2014Q4-2018Q2. These results are further corroborated by Chan-Lau & Oura (2016) who use extensions of simple option price models for pricing various debts and find that asset encumbrance and the introduction of new bank resolution tools only increase senior unsecured debt yields modestly for existing banks under distressed market conditions in 2013.

However, more recent studies, specifically focused on unsecured senior debt, have overturned the results again. In particular, the paper by Cuccinelli et al. (2020) shows that for a sample of 4,065 bonds issued by 63 banks from 12 euro area countries during 2013–2017 bail-in regulation has had a strong effect on the spread between senior unsecured and non-bailinable bonds. Moreover, using a sample of 4,855 bonds issued by 45 banks from January 2006 to December 2016, Gai et al., (2020) find an increase in the risk premium for unsecured bonds, and senior unsecured bonds show the greatest effect on yields and yield spread when bail-in regulation came into force.

The novelty of our paper with respect to previous studies consists of analyzing a series of bail-in events related to its legislative process so far unnoticed by scholars but that represent a crucial step towards a more effective bail-in tool. The events concerned lay down the basis for a thorough overhaul of the bank capital structure that should counter the bail-in shortcomings in terms of uncertainty regarding the actual stock of bailinable liabilities available in case of bail-in and issues related to the violation of the NCWO principle. The amendments further provide investors in bailinable debt with the sufficient loss-bearing capacity needed for the bail-in to work and put them in a position to actually perform the debt governance suggested in the resolution framework and previously undermined by the aforementioned severe shortcomings. Moreover, the events under investigation are expected to ease the application of bail-in beyond the scope of traditional subordinated debt thereby specifically interesting investors in unsecured senior debt.

In short, the commitment expressed by the events under analysis towards the enhancement of the bail-in regime and their focus on a specific assets class are the two main pillars around which this paper develops his analysis of the credibility of bail-in and contributes to a literature whose wider approach has provided mixed results do far. Based on the above, we thus develop the following hypothesis about bail-in credibility.

H_0= Unsecured senior investors do not reprice bond yields following the legislative bail-in events considered in this study.

If this hypothesis is verified, then unsecured senior investors do not modify their bail-in expectations following the enactment of bail-in regime amendments as they are neither perceived as an enhancement nor as a threat. If the null hypothesis is rejected, we test the following further hypotheses:

H_1= Unsecured senior investors positively reprice bond yields following the legislative bail-in events considered in this study.

If this hypothesis is verified, then unsecured senior investors discount higher expectations of bail-in being implemented in case of distress. In detail, investors perceive the amendments as a crucial commitment towards the bail-in and a plausible threat to their investment in case of insolvency.

H_2= Unsecured senior investors negatively reprice bond yields following the legislative bail-in events considered in this study.

If this hypothesis is verified, then unsecured senior investors discount lower expectations of bail-in being implemented in case of distress. In detail, investors perceive the amendments as a step back towards the implementation of an effective bail-in regime. Moreover, we further develop the following hypotheses regarding market discipline.

H_A= Unsecured senior investors do not enhance market monitoring following the legislative events that aim to improve the efficacy of the bail-in tool.

In detail, senior investors do not perceive those acts as an enhancement of the bail-in regime therefore they simply do not intend to better reflect bank's risk into securities prices. If the null hypothesis is rejected, we test the following further hypotheses:

H_B= Unsecured senior investors enhance market monitoring following the legislative events that aim to improve the efficacy of the bail-in tool.

In detail, senior investors perceive those acts as a crucial commitment towards a well-designed and consistent bail-in tool that if triggered may write off their investment. As a result, senior investors start better embedding banks' risk into securities prices.

H_C= Unsecured senior investors reduce market monitoring following the legislative events that aim to improve the efficacy of the bail-in tool.

In detail, senior investors perceive those acts as a step back towards an efficient bail-in and thereby feel confident to reduce their monitoring activity.

2 Regulatory framework

As part of the regulatory overhaul implemented by legislators in the afterward of the Great Financial Crisis, several tools have been deployed to enhance the crisis management of failing banks.

On 9 November 2015, the Financial Stability Board (FSB) establishes international principles and a term sheet (the FSB TLAC Term Sheet) that set out internationally agreed rules regarding the total loss-absorbing capacity (TLAC) for global systemically important banks (G-SIBs). Accordingly, cross-border banking groups of systemic relevance, whose failure may threaten the stability of the entire financial system, have been required to pile up a buffer of securities and other liabilities that should be promptly available in case of distress to bear the losses in place of taxpayers.

Moreover, according to the subordination requirement, G-SIBs are required to comply with the TLAC minimum requirement, with certain exceptions, with subordinated liabilities that rank in insolvency below liabilities excluded from TLAC. The TLAC principles set out by the FSB (2015) discipline three potential methods for subordination: structural, contractual, and statutory subordination.

The first approach is based on the role of the issuing institutions within the banking group, in particular when the issuer is a non-operative holding or sub-holding that transfers capital to the operating subsidiaries and gets revenue from their dividends. Given that all subsidiaries' claims have to be settled up, in case of insolvency, before capital is upstreamed to the holding company, the creditors of the latter result subordinated in structural terms. Regarding the contractual subordination, the issuing institution and the creditor contractually agree that capital and interest are paid only, in case of insolvency, after all senior claims have been settled up. Statutory subordination, instead, is set up by a legal provision of national insolvency law. The latter envisages that, in the case of insolvency, payments on interests and capital on subordinated liabilities have to be settled up only after those of liabilities that rank senior to them.

The new model of crisis management hinges on the bail-in tool that disciplines the write-off and/or conversion of a bank's liabilities. A bank should therefore ensure that it has enough bailinable liabilities available in case of distress not only to bear the losses but also to recapitalize the institute whose operational continuity must be ensured at any cost.

In parallel, the European Authority introduced in 2014 with the Bank Recovery and Resolution Directive (BRRD) the bail-in tool and the Minimum Requirement of own funds and Eligible Liabilities (MREL), namely the European counterpart of TLAC. The BRRD applies MREL

to all credit institutions in the EU on an individual and consolidated basis, while the TLAC applies to G-SIBs only.

Initially, its provisions did not provide for mandatory subordination of MREL instruments although the competent Resolution Authority or the Single resolution Board could have set a subordination requirement on a case-by-case basis. Moreover, the BRRD loosely defined the eligibility criteria for an instrument to qualify as MREL, provided for specific exemptions of certain liabilities and gave the misleading idea that almost the entire position of the liability side of a bank balance sheet could have been bailed-in.

All these shortcomings in the design of the bail-in tool undermined its efficiency and its credibility by investors. As a response, the European Commission drafted a proposal, included in the 2016 Banking Package and finalized in the Directive 2017/2399 (hereafter Directive) that entered into force on 28/12/2017, that envisages the harmonization of creditor claims for senior unsecured debt for the EU Member States by differentiating the asset class of unsecured senior debt between unsecured senior preferred and non-preferred debt. The latter is eligible to the MREL subordination requirement whereas the former is bailinable only.

Amended as such, provisions allow banks to efficiently cope with the subordination requirement. Indeed, non-preferred senior debt ranks above subordinated liabilities that do not qualify as Tier 2 but below senior preferred debt. As a result, banks can fulfill the subordination requirement by paying a lower spread than that charged on subordinated liabilities whilst they can use the preferred solution for their regular funding.

In short, the overhaul of the bank capital structure as designed clarifies the actual stock of bailinable liabilities, reduces the risk stemming from the violation of the NCWO principle and also helps banks pile up efficiently a sufficient MREL buffer. This, ultimately, provides banks with sufficient loss-absorbing capacity in case of bail-in thereby mitigating doubts about its eventual application in case of bank failure by investors.

As the directive harmonizes the rules on insolvency ranking of unsecured senior debt across the EU Member States, it also eases bail-in applications for cross-border banking groups. This further permits to tackle the existing competitive distortions in the internal market, consisting of different banks' costs to comply with the MREL subordination requirement and investors' costs to buy the relative debt instruments that stem from different national rules on the insolvency ranking of unsecured senior debt.

The process of harmonization further enabled domestic systemically important banks (D-SIBs), whose countries did not autonomously amend the rules on insolvency ranking of unsecured senior debt under their national insolvency law, to comply with the MREL subordination requirement

using non-preferred senior debt. Indeed, given the high issuance requirements posed by the TLAC/MREL frameworks, some Member States pre-empted the EU approach amending their national legal framework to allow their institutions to comply with the MREL requirement more efficiently.

France moved first by implementing the statutory subordination solution. Non-preferred senior debt has been introduced with the publication of the Sapin 2 Law in the Official Journal of the Republic of France on 10 December 2016. Specifically, Article 151 of the law on transparency, anti-corruption and the modernization of the economy, the so-called Sapin 2 Law, differentiates senior bondholders into two categories: holders of senior preferred notes and holders of senior non-preferred notes. Amending article L.613-30-3, the law modifies the creditor hierarchy of credit institutions in order to ease the application of the bail-in tool. It gives preference to outstanding senior debt which will rank as senior preferred in the event of insolvency.

In November 2015, the German legislator passed the Resolution Mechanism Act which introduces Section 46f (5) et seqq. of the German Banking Act. This Section sets up the mandatory subordination of certain unsecured debt instruments with respect to general unsecured senior liabilities. In short, it splits the heterogeneous class of unsecured senior debt and creates a layer that would enhance the loss-absorbing capacity of the issuer. Subordination, so stipulated, ensures that these unsecured debt instruments bear the losses before other unsecured senior liabilities in case of resolution if the bail-in tool is applied. In its opinion, the ECB endorses the German approach recognizing the advantage provided by the law in making certain existing debt instruments eligible to meet the loss-absorbing requirements thereby sparing German credit institutions to take action issuing large volumes of contractually subordinated debt.

Similarly, to the general statutory subordination of senior unsecured bonds set out by the German legislator, Italy introduces with the Legge di Bilancio (2018) a general depositor preference into national insolvency law to protect those depositors not covered by deposit Guarantee Scheme (DGS) and that are not private or small and medium enterprises (SMEs). Specifically, the law amends article 12-bis of Testo Unico Bancario (TUB) introducing non-preferred senior bonds as unsecured instruments of Level 2 that rank above Tier 2 instruments but below other senior debt. The article then aligns bonds' characteristics with those set out in the Directive. The law further amends the Testo Unico della Finanza (TUF) allowing also financial services companies to issue non-preferred senior bonds.

Spain had only partially amended its legislation with the Royal Decree n. 1012/2015 that develops Law 11/2015 about Recovery And Resolution Of Credit Institutions And Investment Service Companies. The provisions set out a category of Level 3 debt called senior subordinated debt

that in case of insolvency ranks above Tier 2 instruments. However, the provisions were so ambiguous that Spanish banks were only able to issue senior non-preferred bonds following the contractual subordination.

Banks in Switzerland, UK and the Netherlands followed the structural subordination approach. This choice is dictated by the legal structure of their banks that are organized according to a holding company structure. In this case, senior debt issued by the holding qualifies as structurally subordinated to that issued by operating subsidiaries.

In the Nordics, Swedish banks faced some uncertainty as the Swedish National Debt Office (SNDO) did not specify the type of subordination it would have recommended as all three solutions had their own shortcomings. In particular, structural subordination would have been difficult to implement as Swedish banks are not organized in a holding company structure. The statutory solution would not be possible to implement under Swedish law. Also, the contractual subordination was not feasible as the contractual terms of some outstanding Tier 2 instruments prevent the issuance of subordinated instruments with a higher priority. However, the SNDO's opinion prefers the structural and statutory approach given the advantages of these two in terms of legal status and market functionality compared to the contractual approach. Nevertheless, the SNDO pledged to follow the proposal of the Directive into its policy position regard the subordinations approach. The same uncertainty has been faced by Danish and Norwegian banks whose respective Countries did not promptly address the subordination question.

3 Data and methodology

From Thomson Reuters Eikon, we first download both active and matured non-bailinable bonds issued by European banks. Non-bailinable bonds include “secured”, “senior secured” and “asset-backed” bonds. We thus select active and matured bailinable bonds issued by banks resulting from the prior stage. Bailinable bonds include “senior unsecured”, “senior preferred”, “senior non-preferred”, “senior subordinated”, “subordinated” and “junior subordinated” bonds. As a result, each bank included in the sample has at least one bailinable bond and one non-bailinable bond.

For each event, the sample selection strategy produced a database with an average of 198 bonds for Austria, 7 for Finland, 1763 for Germany, 215 for Italy, 14 for Luxembourg, 268 for the Netherlands, 43 for Spain, 23 for Sweden, 9 for Switzerland and 516 for the UK.

According to the procedure employed by Giuliana (2019) and in line with bond market event studies (Bessembinder et al. (2009) and Ederington et al. (2015), we create three value-weighted portfolios of bonds for each bank and each date: the “average unsecured senior bonds”; the “average subordinated bonds”; and the “average non-bailinable bonds”.

In particular, the daily yield to maturity of the "average unsecured senior bonds" is the value-weighted average of the yields of all unsecured senior bonds for each bank and each date. The weight of each single unsecured senior bond depends on its value at issuance (where the sum of the weights of all unsecured senior bonds for each bank is equal to one). The "average unsecured senior bonds" summarizes the information about "senior unsecured", "senior preferred", "senior non-preferred" bonds. On average, unsecured senior bonds account for 74% of bonds for each event.

Correspondingly, the daily yield to maturity of the "average subordinated bonds" is the value-weighted average of the yields of all subordinated bonds. The "average subordinated bonds" summarize the information about "senior subordinated", "subordinated" and "junior subordinated" bonds. On average, subordinated bonds account for 11% of bonds for each event.

Finally, the daily yield to maturity of the "average non-bailinable bonds" is the value-weighted average of the yields of all non-bailinable bonds. The average non-bailinable bonds summarize the information about "secured", "senior secured" and "asset-backed" bonds. On average, non-bailinable bonds account for 15% of bonds for each event.

The final sample consists of 13 banks for Austria, 1 for Finland, 19 for Germany, 8 for Italy, 1 for Luxembourg, 6 for the Netherlands, 5 for Spain, 3 for Sweden, 1 for Switzerland and 8 for the UK. Table 1 shows the banks included in the sample. About two-thirds of the sample (66%) consists of banks whose total assets are consistent with the threshold of 50 billion which is commonly assumed to distinguish banks that follow a bail-in strategy from those that follow an alternative one (García, J. & Rocamora M., 2019).

We first empirically address the research question about whether the bail-in amendments, which are objects of this study, have increased bail-in expectations by senior unsecured bondholders. We test for bail-in credibility measuring the reaction of the yield-spread between senior unsecured and secured bonds to the entry into force of the above-mentioned amendments. The yield-spread between bailinable and non-bailinable bonds is indeed recognized by literature as a good proxy of sentiment among investors regarding bail-in credibility. Events that indicate the authorities' commitment towards the bail-in widen the yield-spread between bailinable and non-bailinable bonds while events that question its credibility narrow the spread. According to Chan-Lau and Oura (2016), this is due to the fact that bail-in makes bailinable debt junior with respect to non-bailinable debt thereby increasing the cost difference between the two asset classes.

The empirical analysis consists of a difference-in-differences (diff-in-diff) where the "average unsecured senior bonds" portfolios represent the treatment group and the "average non-bailinable bonds" portfolios represent the control group. We design the regression model 1 as follows:

$$yld_{ijt} = \alpha + \alpha_j + \beta_1 \times uns_{ij} \times post_t + \delta_1 \times uns_{ij} + \delta_2 \times ttm_{it} + day_t + \varepsilon_{ijt} \quad (1)$$

Where: yld_{ijt} is the outcome variable, namely the daily yield to maturity of bailinable status i of bank j at time t. The variable uns_{ij} is a dummy variable assuming value one for the "average unsecured senior bonds" portfolios and zero for the "average non-bailinable bonds" portfolios. The variable $post_t$ is a dummy variable that, consistently with Giuliana (2019) and Schafer et al. (2016), takes value one for the first closing-day yield after the event, and zero for the seven days before. The variable day_t captures the time trends thereby accounting for all time-varying macroeconomics factors. The variable ttm_{it} represents the time to maturity. The variable α_j represents the bank fixed effects and accounts bank-specific and time-invariant (within the event window) components in the unsecured senior and non-bailinable bond yields.

The estimator β_1 (also referred to as the D-D estimate) is the diff-in-diff estimator which we interpret as the difference between two differences. The first difference is between the daily yield to maturity of an "average unsecured senior bonds" portfolio after the event and the respective yield before the event. The second difference is between the daily yield to maturity of an "average non-bailinable bonds" portfolio after the event and the respective yield before that time.

A positive coefficient would indicate that investors' expectations embed into unsecured senior bonds yields a higher probability of bail-in being triggered if resolution kicks in. Conversely, a negative estimator would signal a misalignment between market expectations and authorities' commitment towards bail-in which may result in a disruptive outcome in case of bail-in employment in resolution.

We then complement this analysis with a placebo difference in differences analysis test which gauges the yield-spread reaction between unsecured senior bonds and subordinated bonds. This test aims to ensure that the reaction of the spread between unsecured senior bonds and non-bailinable bonds is due to a change in bail-in expectations among investors instead of generic risk. If our results are driven by the latter, we should observe a significative yield-spread reaction between two bailinable subcategories. Otherwise, the test would corroborate our thesis regarding bail-in regulation being the only driver of our results.

The model employed for the placebo test replicates model 1 but replaces non-bailinable bonds with subordinated bonds. The regression model 2 is as follows:

$$yld_{ijt} = \alpha + \alpha_j + \beta_2 \times sub_{ij} \times post_t + \delta_3 \times sub_{ij} + \delta_4 \times ttm_{it} + day_t + \varepsilon_{ijt} \quad (2)$$

The subscripts i, j and t refer to seniority, the bank and the day, respectively. Model 2 differs from Model 1 only for the dummy variable indicating the bailinable status. uns_{ij}, indeed, takes value one for the "average subordinated bonds" portfolios, and zero for the "average unsecured senior bonds" portfolios.

The estimator β_2 would provide information regarding the yield-spread reaction between subordinated bonds and unsecured senior bonds. In particular, a significative estimator would indicate that the bail-in events have increased or decreased the yield-spread of subordinated bonds compared to senior unsecured bonds. If the estimator is insignificant, it instead indicates that subordinated bonds' yields do not react differently from unsecured senior bonds' yields, therefore, supporting the thesis according to which the bail-in events do not cause a yield reaction between bailinable bonds of different seniority. This result would then corroborate our hypothesis regarding the fact that the estimator β_1 of model 1 is driven by bail-in regulation instead of generic risk.

We then empirically address the research question about whether the bail-in amendments, which are objects of this study, have enhanced market monitoring by disentangling their impact on the risk sensitivity of unsecured senior bonds' yields. Thus, in line with previous studies (Acharya, 2016; Giuliana, 2019) we shape a difference-in-differences regression through a triple differencing model in order to gauge the reaction of the risk-sensitivity of unsecured senior bonds' yields. The treatment group consists of the "average unsecured senior bonds" portfolios whereas the control group consists of the "average non-bailinable bonds" portfolios. The regression model 3 is:

$$yld_{ijt} = \alpha + \alpha_i + \beta_3 \times risk_{jt} \times uns_i \times post_t + \gamma_1 \times risk_{jt} \times uns_i + \gamma_2 \times risk_{jt} \times post_t + \gamma_3 \times uns_i \times post_t + \delta_5 \times risk_{jt} + \delta_6 \times uns_i + \delta_7 \times ttm_{ijt} + day_t + \mu_{ijt} \quad (3)$$

Where: yld_{ijt} is the outcome variable, namely the daily yield to maturity of bailinable status i of bank j at time t. The variable uns_{ij} is a dummy variable assuming value one for the "average unsecured senior bonds" portfolios and zero for the "average non-bailinable bonds" portfolios. The variable $post_t$ is a dummy variable that takes value zero for the seven days before the event and one for the first closing-day yield after the event, in line with Giuliana (2019). The variable $risk$ identifies the measure of bank risk and it is proxied by Bloomberg's 1-year default probability. This measure is a daily proxy of default probability resulting from a model that uses the following nine inputs: CDS spread, the volatility of the stock price, the net income, non-performing loans, market-to-book ratio, total assets, short-term leverage, long-term leverage and loan losses reserves. The variable day_t represents the day fixed effects and captures all the time-varying macroeconomic factors. The variable ttm_{it} represents the time to maturity. The bank fixed effects αj controls for bank-specific and time-invariant (within the event window) components in the unsecured senior and non-bailinable bond yields.

The triple differencing estimate β_3 (also referred to as the D-D-D estimate) provides information regarding the yield-risk sensitivity. In particular, a significantly positive coefficient indicates an improved market monitoring activity by senior unsecured investors. On the contrary, a

significantly negative coefficient indicates that the event has decreased the risk sensitivity of unsecured senior bonds' yields. More specifically, the coefficient β_3 indicates how the time series growth of the risk premium component of unsecured senior bonds, netted of the growth of the risk premium component of secured bond yields that are not exposed to bail-in, react to a specific event. As a result, the coefficient β_3 will accurately represent the effect of the legal specificity of the bail-in on market monitoring. Appendix I provides further details about the interpretation of β_3.

In line with the analysis employed to study bail-in credibility, to ensure that the D-D-D estimates are driven by the bail-in law instead of generic risk, we also perform a placebo test where we compare the yield-risk sensitivity reaction of two bailinable subcategories: unsecured senior bonds and subordinated bonds. The model employed for the placebo test replicates model 3 with the exception that it compares two categories of bailinable bonds. Regression model 4 is as follows:

$$yld_{ijt} = \alpha + \alpha_i + \beta_4 \times risk_{jt} \times sub_i \times post_t + \gamma_4 \times risk_{jt} \times sub_i + \gamma_5 \times risk_{jt} \times post_t + \gamma_6 \times sub_i \times post_t + \delta_8 \times risk_{jt} + \delta_9 \times sub_i + \delta_{10} \times ttm_{ijt} + day_t + \mu_{ijt} \quad (4)$$

The subscripts i, j and t refer to seniority, the bank and the day, respectively. All the variables are equal to those of model 3 except sub. The latter is a dummy variable that takes value one for the "average subordinated bonds" portfolios, and zero for the "average unsecured senior bonds" portfolios. A significantly positive (negative) β_4 indicates that the bail-in event has increased (decreased) the risk-sensitivity of subordinated bonds' yields compared to senior ones. Conversely, an insignificant coefficient indicates that the risk-sensitivities of senior and subordinated bonds do not react differently following the bail-in events. This would support the thesis that changes in the yield-risk sensitivity between bailinable and non-bailinable bonds, described by β_3, are driven by bail-in law instead of generic risk.

Table 2 shows the descriptive statistics of the variables used in this study. It is worth noticing that bailinable bonds represent 65% of the sample. Figure 1 depicts the time series of the daily average yields of the secured, senior, and subordinated portfolios as well as the daily average bank's 1-year probability of default for the 20 days before and 20 days after each event included in our study. The variables are standardized to ensure the comparability of their trends.

Figure 1 provides for a visual inspection of the parallel trend hypothesis which is used to grant the reliability of a diff-in-diff analysis. The hypothesis states that the parallel trend between treated and control yields would not have changed if bail-in events had not occurred. The steady and identical trend of portfolio yields before each event supports the parallel trend hypothesis. However, from a simple visual inspection, this trend continues also after each bail-in event, therefore, suggesting that the bail-in amendments did not affect bail-in credibility among investors.

Moreover, comparing the portfolios' yields with the 1-year probability of default, the steady trend of the former does not match the dynamic trend of the latter. As a preliminary consideration, this could suggest the inefficacy of the bail-in amendments in resuming market monitoring among investors. However, in order to study the effect of the bail-in legislative process on the investors' bail-in credibility and market monitoring, we need to study the yields' trends with the models above described and by differentiating across countries and events.

4 Results

We first perform the regression models 1 and 2 over the aggregate sample to test hypotheses H_0, H_1 and H_ 2 about investors' credibility of the bail-in tool. Table 3 presents the results. Panel A shows the D-D estimates relative to β_1 of model 1. According to our hypothesis, a significantly positive (negative) estimate would indicate an increase (decrease) of unsecured senior bonds' yields with respect to non-bailinable bonds' yields which would suggest a higher (lower) bail-in credibility by unsecured senior bondholders. Insignificant estimates would instead indicate that the bail-in amendments do not modify unsecured senior bondholders' expectations over bail-in as they do not represent a significant enhancement for the bail-in regime. Panel B shows the placebo D-D estimates relative to β_2 of model 2. These estimates are expected to be insignificant in order to support the thesis according to which the eventual repricing by senior unsecured bondholders captured by β_1 is driven by bail-in law instead of generic risk.

The analysis, although conducted on the aggregate sample which provides only for an overview of the results, points out a clear pattern that supports hypothesis H_0 about the ineffectiveness of the bail-in amendments in increasing bail-in expectations among unsecured senior bondholders. In detail, the D-D estimates are statistically insignificant and very close to zero for each bail-in event of analysis. The D-D estimates are coherent with those of the analyses conducted by Giuliana (2019) but significantly lower as the bail-in events examined in this study do not appear to enhance bail-in credibility by unsecured senior bondholders, therefore, causing any bond repricing. Finally, placebo D-D estimates are statistically insignificant and close to zero, therefore, supporting the hypothesis that bail-in law is the only driver of the yield spread reaction to the bail-in events captured by β_1.

Given that this level of aggregation only provides for an overview of the results, we further proceed with disentangling the yield-reaction to the bail-in amendments across each country. We, therefore, perform the regression models 1 and 2 for each country and each event. Table 4 presents the results. Each panel shows the D-D estimates relative to β_1 of model 1 for each country. Depending on whether the authority which mandates the amendment is national or supranational, we should

expect a bond repricing only for domestic banks in the former case whereas a bond repricing also for banks in other countries in the latter case, as multiple countries fall under the remit of supranational authorities.

However, each of the bail-in events examined in this study represents a step of the legislative process aimed at providing banks with new tools to achieve subordination to improve the effectiveness of the bail-in regime. It starts with the international guidelines on how to subordinate instruments within a G-SIBs-level buffer and continues with the European implementation of such provision, further extended to the other categories of banks, that sees initially some Member States taking the lead and finally the European Commission providing EU harmonized rules. Given that each event paves the way for the following one and EU national events influence other Member States' decisions as well as the final agreement on harmonized EU rules, amendments implemented by domestic authorities may therefore generate a bond repricing also for foreign banks.

Consistently with aggregate results, the D-D estimates of the state-level analysis are statistically insignificant and very close to zero. In detail, each event under analysis does not impact the yield spread neither of domestic nor of foreign banks. These results corroborate hypothesis H_0 about steady bail-in expectations among unsecured senior bondholders following the bail-in amendments examined.

We then perform the regression models 2 and 3 over the aggregate sample to test for hypotheses H_A, H_B and H_ C about the sensitivity of unsecured senior bonds' yields to banks' risk. Table 5 presents the results. Panel A shows the D-D-D estimates relative to β_3 of model 3. According to our hypothesis, a significantly positive (negative) estimate would indicate an increase (decrease) of the yield-risk sensitivity of unsecured senior bonds with respect to that of non-bailinable bonds which would suggest a higher (lower) monitoring by unsecured senior bondholders. Insignificant estimates would instead indicate that the bail-in amendments do not modify the unsecured senior bondholders' monitoring as they do not represent a significant enhancement for the bail-in regime. Panel B shows the placebo D-D-D estimates relative to β_4 of model 4. These estimates are expected to be insignificant in order to support the thesis according to which the eventual change in unsecured senior bondholders' monitoring captured by β_3 is driven by bail-in law instead of generic risk.

In line with our results about unaffected bail-in expectations among unsecured senior bondholders, the analysis points out insignificant and close to zero D-D-D estimates for each bail-in event of analysis which supports hypothesis H_A about the ineffectiveness of bail-in amendments in restoring market monitoring. Finally, placebo D-D-D estimates are statistically insignificant and close

to zero, therefore, supporting the hypothesis that bail-in law is the only driver of the yield-risk sensitivity reaction to the bail-in events captured by β_3.

We then proceed also for this analysis disentangling the yield-risk sensitivity reaction to the bail-in amendments across each country. We, therefore, perform the regression models 2 and 3 for each country and each event. Table 6 presents the results. Each panel shows the D-D-D estimates relative to β_3 of model 3 for each country. Consistently with aggregate results, the D-D-D estimates of the state-level analysis are statistically insignificant and very close to zero. In detail, each event under analysis does not impact the yield-risk sensitivity of unsecured senior bondholders neither of domestic nor foreign banks. These results corroborate hypothesis H_A about the unaffected monitoring of unsecured senior bondholders following the bail-in amendments examined.

5 Conclusions

This paper examines the senior unsecured bondholder's reaction to the events of the bail-in legislative process related to the implementation of new tools to achieve subordination. In detail, we focus on both the senior unsecured bondholders' expectations of bail-in and monitoring of the bank's risk. We specifically focus on senior unsecured bondholders as they are strictly concerned by the bail-in events examined and are also more exposed to bail-in risk with respect to other subordinated debt.

To study bail-in credibility, we perform a difference in differences to compare the reaction of senior unsecured bonds' yields with respect to those of non-bailinable bonds. In a similar vein, we investigate senior unsecured bondholders' monitoring employing a triple differencing model that compares the yield-risk sensitivity reaction of senior unsecured bonds with respect to that of non-bailinable ones. A placebo test is also performed to link the results to the legal specificities of the bail-in instead of generic risk.

Our results point out steady senior unsecured bondholders' expectations of bail-in as well as monitoring activity. Despite providing a significant enhancement to the bail-in regime, these events do neither increase bail-in credibility nor restore market monitoring. We attribute the reasons for investor's skepticism about bail-in to the highly complicated resolution framework in which it is embedded that provides multiple authorities with ample discretion about its implementation and further exposes them to political pressure, therefore, hampering both the investors' predictability of outcome in case of bail-in and its own smooth application.

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Appendix I

The triple differencing empirical model is:

$$yld_{ijt} = \alpha + \alpha_i + \beta_3 \times risk_{jt} \times uns_i \times post_t + \gamma_1 \times risk_{jt} \times uns_i + \gamma_2 \times risk_{jt} \times post_t + \gamma_3 \times uns_i \times post_t + \delta_5 \times risk_{jt} + \delta_6 \times uns_i + \delta_7 \times ttm_{ijt} + day_t + \mu_{ijt}$$

We can assume that bank risk can take only two values ($risk = s = safe$ or $rsk = r = risky$), that $post$ can take two values ($post = pre$ = before treatment or $post = post$ = after treatment), that uns can take two values (uns = u = senior unsecured or uns = n =non-bailinable) and that $E(u|\text{uns}, post, risk, X) = 0$ (where X is the set of control variables in the DDD regression model). It can be shown (by calculating the expectations relative to the triple differencing empirical model) that the β_3 is the difference between two time-series changes in sensitivities:

$$\beta_1 = \left[\left(yield_{|r\ u\ post} - yield_{|s\ u\ post}\right) + \left(yield_{|r\ u\ pre} - yield_{|s\ u\ pre}\right)\right] - \left[\left(yield_{|r\ n\ post} - yield_{|s\ n\ post}\right) + \left(yield_{|r\ n\ pre} - yield_{|s\ n\ pre}\right)\right]$$

Where:

($yld|r$ u $post - yld|s$ u $post$) is a difference in expected values describing the sensitivity of the yield of a senior unsecured bond to an increase in risk from s to r, after the bail-in event.

($yld|r$ u $pre - yld|s$ u pre) is a difference in expected values describing the sensitivity of the yield of a senior unsecured bond to an increase in risk from s to r, before the bail-in event.

($yld|r\ n\ post - yld|s\ n\ post$) is a difference in expected values describing the sensitivity of the yield of a non-bailinable bond to an increase in risk from s to r, after the bail-in event.

($yld|r\ n\ pre - yld|s\ n\ pre$) is a difference in expected values describing the sensitivity of the yield of a non-bailinable bond to an increase in risk from s to r, before the bail-in event.

A positive β_3 would signal an increase in the risk premium component of unsecured senior bond yields following the treatment. We interpret such increase as an enhanced monitoring of unsecured senior debt investors who better incorporate bank's risk into securities prices.

Table 1: The sample by banks

Country	Bank	Total Assets (in Millions)	Country	Bank	Total Assets (in Millions)
Austria	Allgemeine Sparkasse Oberoesterreich Bankaktiengesellschaft	12092	Italy	Banca Carige SpA Cassa di Risparmio di Genova e Imperia	27104
Austria	BAWAG PSK Bank fuer Arbeit und Wirtschaft und Oesterreichische Postsparkasse AG	40495	Italy	Banca Monte dei Paschi di Siena SpA	153782
Austria	Erste Group Bank AG	209543	Italy	Banco BPM SpA	166959
Austria	HYPO NOE Landesbank fuer Niederoesterreich und Wien AG	15218	Italy	Bper Banca SpA	65852
Austria	Hypo Vorarlberg Bank AG	13470	Italy	Intesa Sanpaolo SpA	732819
Austria	Kommunalkredit Austria AG	3872	Italy	Mediobanca Banca di Credito Finanziario SpA	70325
Austria	Landes hypothekenbank Steiermark AG	3780	Italy	UniCredit SpA	852252
Austria	Oberoesterreichische Landesbank AG	8482	Italy	Unione di Banche Italiane SpA	118987
Austria	Raiffeisen Bank International AG	120479	Luxembourg	NORD LB Luxembourg Covered Bond Bank SA	15710
Austria	Raiffeisen Landesbank Steiermark AG	14574	Netherlands	ABN Amro Bank NV	398342
Austria	Raiffeisenlandesbank Oberoesterreich AG	39001	Netherlands	Achmea Bank NV	15085
Austria	Raiffeisenverband Salzburg Egen	6904	Netherlands	Cooperatieve Rabobank UA	648137
Austria	UniCredit Bank Austria AG	133854	Netherlands	ING Bank NV	897410
Finland	Aktia Bank Abp	9639	Netherlands	NIBC Bank NV	23006
Germany	Aareal Bank AG	47188	Netherlands	de Volksbank NV	61723
Germany	Bayerische Landesbank	214128	Spain	Banco Bilbao Vizcaya Argentaria SA	723923
Germany	Berlin Hyp AG	27340	Spain	Banco de Sabadell SA	214161
Germany	Commerzbank AG	488103	Spain	Banco Santander SA	1374563
Germany	DVB Bank SE	25889	Spain	Bankia SA	203690
Germany	DZ BANK AG Deutsche Zentral Genossenschaftsbank Frankfurt am Main	474461	Spain	Caixabank SA	358456
Germany	Deutsche Bank AG	1565333	Sweden	Skandiabanken AB (publ)	64538
Germany	Deutsche Kreditbank AG	75758	Sweden	Skandinaviska Enskilda Banken AB	2557839
Germany	Deutsche Pfandbriefbank AG	62461	Sweden	Sparbanken Skane AB (publ)	59334
Germany	Hamburg Commercial Bank AG	83907	Switzerland	St Galler Kantonalbank AG	31996
Germany	Landesbank Baden Wuerttemberg	238449	UK	ANZ New Zealand Intl Ltd (London Branch)	21135
Germany	Landesbank Berlin AG	46061	UK	Bank of Scotland PLC	353363
Germany	Landesbank Hessen Thueringen Girozentrale	165902	UK	Barclays Bank PLC	1154675
Germany	Landesbank Saar	13917	UK	Credit Suisse International	327650
Germany	Muenchener Hypothekenbank eG	38504	UK	Investec Bank PLC	18220
Germany	Norddeutsche Landesbank Girozentrale	173207	UK	Lloyds Bank PLC	823645
Germany	Sparkasse Hannover	14162	UK	Santander Financial Services PLC	92922
Germany	Sparkasse Koelnbonn	26560	UK	Santander UK PLC	299561
Germany	UniCredit Bank AG	299965			

This table displays the banks covered in this study with their relative total assets.

Table 2: Descriptive statistics of the variables used in the regressions models

Variables	Mean	Median	St.Dev.	N
Yield to Maturity	2.203	1.519	2.960	2723
Time to Maturity (days)	8.759	7.034	9.253	2723
1-Year Probability of Deafult	0.007	0.002	0.017	2723
Bailinable Status	0.650	1	0.477	2723

This table shows the summary statistics for the entire sample relative to: the yield to maturity (expressed in percentage), the time to maturity, the Bloomberg's 1-year probability of default, and the bailinable status. Data are the average over all the events.

Table 3: Difference-in-Differences and Placebo Difference-in-Differences for the entire sample.

The D-D coefficient in Panel A is the estimate of β_1 relative to the model $yld_{ijt} = \alpha + \alpha_j + \beta_1 \times uns_{ij} \times post_t + \delta_1 \times uns_{ij} + \delta_2 \times ttm_{it} + day_t + \varepsilon_{ijt}$; N is the number of observations in the (-7;0) window[5]; the Adj.R2 is the adjusted R-squared. The D-D-D coefficient in Panel B is the estimate of β_2 relative to the model $yld_{ijt} = \alpha + \alpha_j + \beta_2 \times sub_{ij} \times post_t + \delta_3 \times sub_{ij} + \delta_4 \times ttm_{it} + day_t + \varepsilon_{ijt}$. Standard errors are adjusted for heteroscedasticity. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

			Panel A **Diff-in-Diff - Entire sample**			Panel B **Placebo - Entire sample**		
Date	**Event**	**Authority**	**D-D**	N	Adj.R2	**D-D**	N	Adj.R2
02/11/2015	The Resolution Mechanism Act (RMA)	National	-0.011	656	0.69	0.002	576	0.57
09/11/2015	Total Loss-Absorbing Capacity (TLAC) Term Sheet	Supranational	-0.004	672	0.69	0.003	592	0.57
23/11/2016	Proposal of Directive 2017/2399	Supranational	0.025	752	0.70	0.006	656	0.70
10/12/2016	Publication of the Sapin 2 Law	National	-0.017	768	0.71	-0.007	688	0.72
01/01/2017	The RMA enters into force	National	0.000	768	0.71	0.000	688	0.70
28/12/2017	Directive 2017/2399 enters into force	Supranational	-0.001	944	0.71	-0.003	720	0.64

[5] We also use windows of (-7;+1) and (-7;+2) and the results are robust.

Table 4: State-level Difference-in-Differences.

The D-D coefficient is the estimate of β_1 relative to the model $yld_{ijt} = \alpha + \alpha_j + \beta_1 \times uns_{ij} \times post_t + \delta_1 \times uns_{ij} + \delta_2 \times ttm_{it} + day_t + \varepsilon_{ijt}$; N is the number of observations in the (-7;0) window; the Adj.R2 is the adjusted R-squared. The variable Authority indicates whether the bail-in event involves the participation of national or supranational authorities. Standard errors are adjusted for heteroscedasticity. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

			Panel A **Austria**			Panel B **Germany**			Panel C **Italy**			Panel D **Netherlands**			Panel E **Spain**			Panel H **U.K.**		
Date	**Event**	**Authority**	**D-D**	N	Adj.R2	**D-D**	N	Adj.R2	**D-D**	N	Adj.R2	**D-D**	N	Adj.R2	**D-D**	N	Adj.R2	**D-D**	N	Adj.R2
02/11/2015	The Resolution Mechanism Act (RMA)	National	-0.022	112	0.79	0.003	224	0.79	-0.053	96	0.93	-0.008	80	0.76	0.014	32	0.99	-0.003	80	0.67
09/11/2015	Total Loss-Absorbing Capacity (TLAC) Term Sheet	Supranational	-0.008	112	0.78	0.015	224	0.80	-0.018	112	0.93	0.030	80	0.76	-0.258	32	0.98	0.033	80	0.66
23/11/2016	Proposal of Directive 2017/2399	Supranational	0.022	128	0.73	0.007	240	0.74	0.080	112	0.93	-0.004	80	0.95	0.007	32	0.99	0.040	96	0.78
10/12/2016	Publication of the Sapin 2 Law	National	-0.036	128	0.73	-0.008	240	0.74	-0.094	112	0.92	0.034	80	0.95	-0.037	32	0.99	0.030	112	0.82
01/01/2017	The RMA enters into force	National	0.009	128	0.77	0.003	256	0.80	-0.006	112	0.91	-0.011	80	0.96	-0.008	32	0.99	0.001	112	0.81
28/12/2017	Directive 2017/2399 enters into force	Supranational	0.008	192	0.60	-0.002	288	0.72	0.001	128	0.92	0.004	80	0.95	0.012	48	0.93	-0.014	112	0.83

Table 5: Triple-differencing and Placebo Triple-differencing for the entire sample.

The D-D-D coefficient in Panel A is the estimate of β_3 relative to the model $yld_{ijt} = \alpha + \alpha_i + \beta_3 \times risk_{jt} \times uns_i \times post_t + \gamma_1 \times risk_{jt} \times uns_i + \gamma_2 \times risk_{jt} \times post_t + \gamma_3 \times uns_i \times post_t + \delta_5 \times risk_{jt} + \delta_6 \times uns_i + \delta_7 \times ttm_{ijt} + day_t + \mu_{ijt}$; N is the number of observations in the (-7;0) window[6]; the Adj.R2 is the adjusted R-squared. The D-D-D coefficient in Panel B is the estimate of β_4 relative to the model $yld_{ijt} = \alpha + \alpha_i + \beta_4 \times risk_{jt} \times sub_i \times post_t + \gamma_4 \times risk_{jt} \times sub_i + \gamma_5 \times risk_{jt} \times post_t + \gamma_6 \times sub_i \times post_t + \delta_8 \times risk_{jt} + \delta_9 \times sub_i + \delta_{10} \times ttm_{ijt} + day_t + \mu_{ijt}$. Standard errors are adjusted for heteroscedasticity. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

			Panel A **Triple-Diff - Entire sample**			Panel B **Placebo - Entire sample**		
Date	**Event**	**Authority**	**D-D-D**	N	Adj.R2	**D-D-D**	N	Adj.R2
02/11/2015	The Resolution Mechanism Act (RMA)	National	0.047	480	0.77	-0.003	464	0.56
09/11/2015	Total Loss-Absorbing Capacity (TLAC) Term Sheet	Supranational	0.019	480	0.77	-0.003	464	0.57
23/11/2016	Proposal of Directive 2017/2399	Supranational	0.026	528	0.78	-0.021	544	0.70
10/12/2016	Publication of the Sapin 2 Law	National	-0.067	528	0.74	0.000	576	0.71
01/01/2017	The RMA enters into force	National	-0.014	544	0.77	-0.007	576	0.70
28/12/2017	Directive 2017/2399 enters into force	Supranational	0.069	656	0.78	0.000	608	0.65

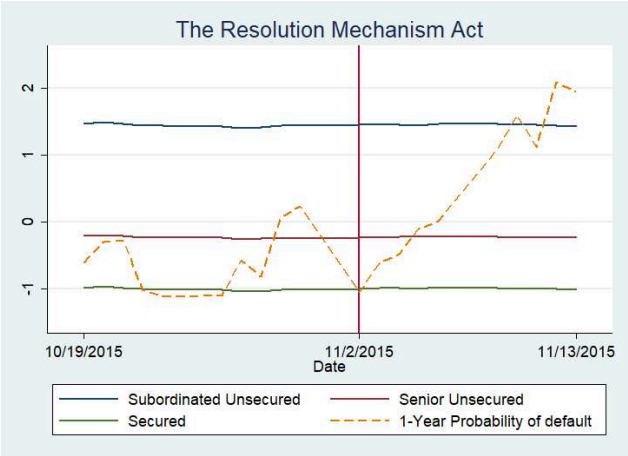
[6] We also use windows of (-7;+1) and (-7;+2) and the results are robust.

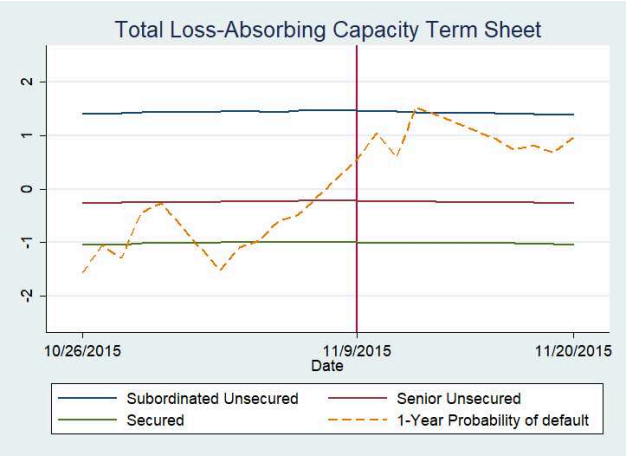
Table 6: State-level Triple-differencing.

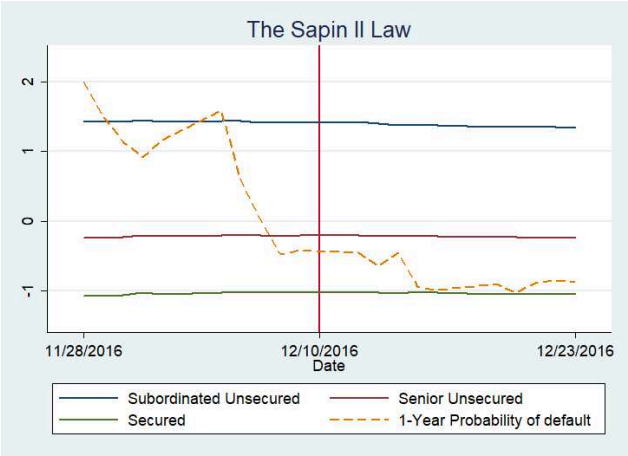
The D-D-D coefficient is the estimate of β_3 relative to the model $yld_{ijt} = \alpha + \alpha_i + \beta_3 \times risk_{jt} \times uns_i \times post_t + \gamma_1 \times risk_{jt} \times uns_i + \gamma_2 \times risk_{jt} \times post_t + \gamma_3 \times uns_i \times post_t + \delta_5 \times risk_{jt} + \delta_6 \times uns_i + \delta_7 \times ttm_{ijt} + day_t + \mu_{ijt}$; N is the number of observations in the (-7;0) window; the Adj.R2 is the adjusted R-squared. The variable Authority indicates whether the bail-in event involves the participation of national or supranational authorities. Standard errors are adjusted for heteroscedasticity. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

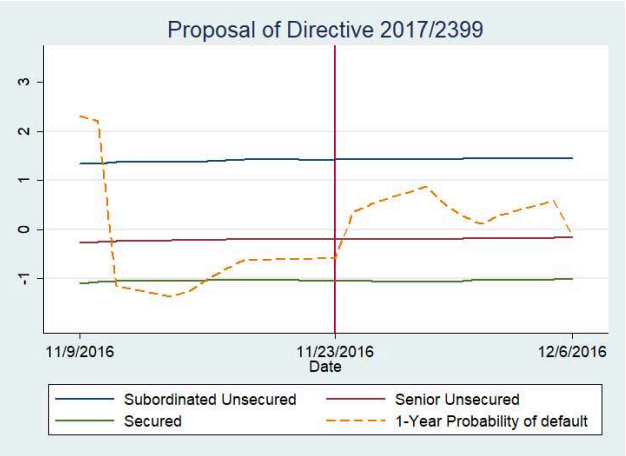
			Panel A **Austria**			Panel B **Germany**			Panel C **Italy**			Panel D **Netherlands**			Panel E **Spain**			Panel H **U.K.**		
Date	**Event**	**Authority**	**D-D-D**	N	Adj.R2	**D-D-D**	N	Adj.R2	**D-D-D**	N	Adj.R2	**D-D-D**	N	Adj.R2	**D-D-D**	N	Adj.R2	**D-D-D**	N	Adj.R2
02/11/2015	The Resolution Mechanism Act (RMA)	National	0.091	32	0.99	0.018	160	0.91	0.026	112	0.93	-0.077	48	0.99	-1.373	32	0.99	-0.047	64	0.97
09/11/2015	Total Loss-Absorbing Capacity (TLAC) Term Sheet	Supranational	-0.147	32	0.99	-0.007	160	0.92	-0.036	112	0.93	-0.081	48	0.99	16.382	32	0.99	0.027	64	0.97
23/11/2016	Proposal of Directive 2017/2399	Supranational	0.076	48	0.99	0.041	160	0.93	0.022	112	0.95	-0.085	64	0.99	-7.608	32	0.99	1.146	64	0.98
10/12/2016	Publication of the Sapin 2 Law	National	0.224	48	0.99	0.009	160	0.91	-0.072	96	0.95	-0.301	64	0.99	1.777	32	0.99	-0.004	80	0.92
01/01/2017	The RMA enters into force	National	-0.014	48	0.99	0.114	176	0.94	-0.011	112	0.94	-0.117	64	0.99	0.004	32	0.99	-0.707	80	0.92
28/12/2017	Directive 2017/2399 enters into force	Supranational	0.022	80	0.84	-0.015	192	0.77	0.189	128	0.96	0.026	64	0.99	0.287	48	0.98	0.079	96	0.94

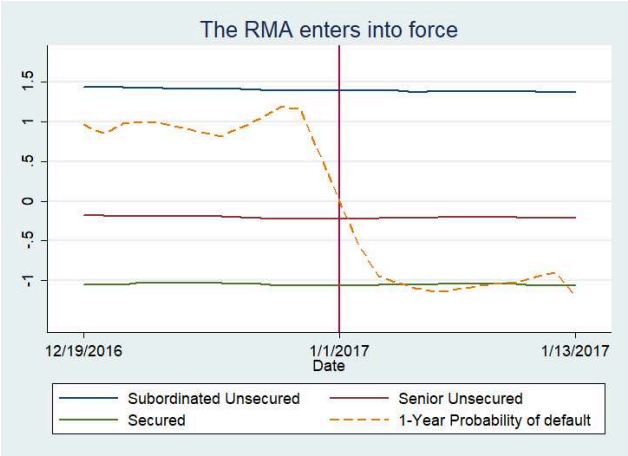
Figure 1:


The Resolution Mechanism Act
10/19/2015
11/2/2015
11/13/2015
Date
Subordinated Unsecured
Senior Unsecured
Secured
1-Year Probability of default


Total Loss-Absorbing Capacity Term Sheet
10/26/2015
11/9/2015
11/20/2015
Date
Subordinated Unsecured
Senior Unsecured
Secured
1-Year Probability of default


The Sapin II Law
11/28/2016
12/10/2016
12/23/2016
Date
Subordinated Unsecured
Senior Unsecured
Secured
1-Year Probability of default


Proposal of Directive 2017/2399
11/9/2016
11/23/2016
12/6/2016
Date
Subordinated Unsecured
Senior Unsecured
Secured
1-Year Probability of default


The RMA enters into force
12/19/2016
1/1/2017
1/13/2017
Date
Subordinated Unsecured
Senior Unsecured
Secured
1-Year Probability of default


Directive 2017/2399 enters into force
12/14/2017
12/28/2017
1/10/2018
Date
Subordinated Unsecured
Senior Unsecured
Secured
1-Year Probability of default

Bail-in credibility
Evidence from the emerging markets

Velliscig Giulio♥, Piserà Stefano♦

Abstract

Some controversial cases of bail-in in the emerging countries have raised the question about whether it is appropriate or not for those countries to have in place a regulation for the bail-in. To assess appropriateness, this paper investigates bail-in credibility among investors, as crucial condition for its smooth implementation, by measuring the yield-spread between bailinable and non bailinable bonds. We then compare the yield-spread of banks located in emerging countries which have in place a framework for the bail-in to the comparable yield-spread measured for banks located in emerging countries without such framework. The comparison permits to detect whether there is a significant difference between the two spreads, which would suggest that bail-in regulation has been deemed credible by market participants where enforced, or not, which in this case would signal a problem of credibility. Our results point out a significantly higher yield-spread for banks located in emerging countries which have adopted a framework for the bail-in of creditors. Bail-in regulation has therefore being deemed credible in the adopting emerging countries, thus, ensuring a crucial condition for its smooth application. We also point out bank size and country's GDP growth as crucial moderators of bail-in expectations of market participants that can guide the implementation of bail-in rules in emerging countries. In detail, investors of smaller banks (i.e. unsuited for bail-in) require a higher risk-premium as they discount the misconduct of the authorities of the countries in which they operate. In a similar vein, investors of banks located in high growth-rate countries require a higher risk-premium due to the lower bail-out expectations of those countries that prefer to channel public finances towards economic growth instead towards ailing banks.

Keywords: bail-in, credibility, emerging countries, global financial development report,

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Introduction

The latest Global Financial Development Report (GFDR) reviews the last 10 years of banking supervision and regulation to contribute to the ongoing debate regarding the right blend of regulation, supervision and market discipline required to ensure the safety and efficient functioning of the banking systems (World Bank, 2019). One of the key questions in the report is how appropriate is to apply regulation designed for advanced economies to developing countries?

This question piqued our interest as two controversial cases of bail-in in Poland and India raised some doubts about the appropriateness of bail-in regulation in emerging countries. The complicated application of bail-in in the Polish case of Podkarpackiego Banku Spółdzielczego (PBS) has been regarded as an example of intentionally bending of Bank Recovery and Resolution Directive (BRRD) provisions to an unusual case to camouflage a hidden public bailout necessary to achieve a socially acceptable outcome (Stopczynski, 2020). The bail-in application in the Indian case of Punjab & Maharashtra Co-operative (PMC) Bank has, instead, raised concerns about the depositors' treatment and the implications for the economic fabric (Dugal, 2021).

The difficulties emerged in the two abovementioned cases of bail-in application clash with its smooth implementation in the resolution of the Spanish Banco Popular Español which has been claimed by authorities as a virtuous example and a model for future interventions in terms of speed, efficacy and protection of public finances (Erzegovesi, 2020).

Thus, inspired by the GFDR's research question, this paper questions whether the institutional environment, strength of market discipline, supervisory capacity, and business model of banks in emerging markets actually match the tenets of the bail-in or not.

We delve into this question from the perspective of bail-in credibility as crucial backbone for bail-in regulation to take hold. Transferring risk from taxpayers to bank creditors, bail-in rules worsen the payoffs of the latter in case of failure and this results in higher risk-premia required by investors in bank bonds. Understanding bail-in risk and embedding it into securities' prices is therefore essential for a smooth implementation of the bail-in tool as, otherwise, adverse implications may arise for bank operativity. In detail, a mispricing of debt instruments may cause moral hazard, in case of underpricing, or it may cause an increase in funding costs and a followingly compromise growth as a result of a restricted lending, in case of overpricing (Tröger, 2019). In addition, unanticipated bail-in during a financial crisis could spark an overreactive price correction on bond yields culminating in a liquidity freeze and collapse of the interbank market (Noller, 2019).

Being fundamental for its implementation, bail-in credibility has piqued the interest of numerous scholars which have addressed the question mostly focusing on the shortcomings of its

implementation in the European bank resolution framework (Giuliana, 2019; Crespi, 2019; Pablos, 2019; Cucinelli et al., 2020; Gai et al., 2020).

Our paper contributes to this literature by addressing the instances that emerge from the controversial cases of bail-in in the emerging markets and therefore extending the investigations on the credibility of the bail-in outside the European boundaries.

To this purpose, we design an empirical study that gauges bail-in credibility among bank investors of emerging countries that have adopted such regime. In detail, we identify emerging countries according to their inclusion within the MSCI emerging countries index and, then, we create two groups depending on whether a country has in place a framework for the bail-in of bank creditors or not. We, then, select from Bloomberg all the banks located in our sample of countries with at least a bailinable and a non-bailinable bond. For each bank, we thus create a portfolio of bailinable and non-bailinable bonds expressive of the mean of the yield to maturity of all respective bonds. We, then, compute the yield-spread between the bailinable and non-bailnable portfolios which is regarded by literature as a reliable measure of bail-in credibility. Finally, we employ a fixed effects panel data regression to compare the yield spread between the two groups of emerging countries with a framework for the bail-in and not. The rationale is the following: a positive difference would indicate that, where enforced, bail-in regulation has induced market participants to reprice bonds thereby reflecting higher expectation of bail-in in case of bank distress. Conversely, a negative or close to zero difference between the yield-spreads would instead indicate a misalignment between bail-in regulation and investors' expectations which may cause the abovementioned adverse consequences.

Our results point out a positive difference between the yield-spreads of the two groups which indicates a higher yield-spread for banks located in emerging countries with a framework for the bail-in of bank creditors. This suggests that, where enforced, bail-in rules have been deemed credible by investors who have asked for higher returns compared to holders of liabilities excluded from the bail-in. The repricing caused by bail-in rules results thus in a higher yield-spread between bailinable and non-bailinable bonds with respect to the baseline yield-spread caused by seniority for banks located in emerging countries without a framework for the bail-in.

Drawing from the abovementioned cases of bail-in in emerging countries, we perform additional tests to delve into the role of size as moderator of bail-in expectations. A common threshold assumed by scholars for the suitability of bail-in is 50 billion of total assets whereas both banks involved in the two abovementioned cases of bail-in account for less than 2 billion each (García, J. & Rocamora M., 2019). In addition, the business model oriented towards traditional financial intermediation and the simplified capital structure concur to cast shadows over the applicability of bail-in as crisis management tool. We, therefore, re-estimate the baseline model by differentiating

between above and below the mean of bank size to examine whether bank size could play a role in moderating bail-in expectations among investors in emerging markets. We found that bail-in regulation had a stronger impact on the yield-spread of smaller banks in line with the signals provided to the market by the abovementioned misapplications of bail-in to small banks. Following the same implementation strategy, we also investigate the moderating role of countries' GDP and find that the relationship between bail-in rules and the yield-spread is stronger for countries with a higher GDP growth. Countries with a stronger developing economic framework prefer, indeed, to recur to bail-in and preserve public finances to this purpose instead of channeling them for bailing out ailing banks. Our results have important implications for policymakers as bail-in credibility supports the implementation of bail-in regulation in the emerging countries, and its distortions caused by the uncertainty regarding the crisis management of small banks further help policymakers addressing eventual shortcomings of the bail-in regulation design and implementation.

The paper is organized as follows: Section 1 discusses the related literature; Section 2 presents the dataset and describes the methodology employed; Section 3 presents the results; Section 4 provides some robustness checks; Section 5 concludes.

1 Literature review

The bail-in is a crisis management tool that requires bank shareholders and creditors, instead of taxpayers as in the case of bailouts, to bear the costs of failure of a bank. In particular, it mandates the write-down and/or conversion into equity of debt owed by a bank to creditors in order to recapitalize the bank or to smooth the application of the others crisis management tools.

The bail-in tool suffers from severe shortcomings which stem in the ample discretion granted to several authorities regarding its application (Walther and White, 2015; Philippon and Salord, 2017). In detail, costly delays may be due to i) bailout expectations (Keister and Mitkov, 2017), ii) political pressures (Hadjiemmanuil, 2015), and iii) the interest of national jurisdictions (Bolton and Oehmke, 2018) in case of cross-border bail-in.

The uncertainty that follows from this framework undermines bank investors' predictability of the outcome in case of bail-in. Specifically, bank investors are unable to determine their potential loss-exposure in the event of bank failure. This may result in a mispricing of debt instruments which leads to two different adverse scenarios: underpricing would, indeed, induce moral hazard whereas overpricing could increase bank funding costs, therefore, undermining growth as a result of reduced lending capacity (Tröger, 2019).

Credibility emerges, therefore, as crucial problem that: i) prevents the bail-in tool to be applied smoothly, ii) undermines bank operativity, and iii) further compromises market discipline.

This topic has thus piqued the attention of several scholars who have delved into the investors' expectations over the bail-in to pave the way for the branch of literature investigating the credibility of bail-in.

Empirical studies have been thus conducted over the yield-spread reaction to bail-in events between bailinable and non-bailinable bonds, which is found to be a reliable measure to gauge bail-in expectations among investors as bail-in rules make bailinable debt de facto junior to non-bailinable debt therefore raising the yield-spread (Chan-Lau and Oura, 2016).

Giuliana (2019) measures the yield-spread reaction to bail-in events related both to its legislative process and application over a sample of 23,756 EU bonds between 2012 and 2016. His results show that bail-in events indicating an increased (decresed) commitment of authorities to bail-in widen (narrow) yield-spread between bailinable and non-bailinable bonds. In addition, the results further indicate the higher yield-risk sensitivity of bailinable bonds following bail-in events as higher bail-in expectations have restored market discipline.

Crespi et al. (2019) measures the yield-spread reaction at issuance to the introduction of the bail-in tool in 2016 between bailinable and non-bailinable bonds using a sample of 1,798 fixed-rate bonds issued during the period 2013–2016. Consistently with Giuliana's results, this study provides evidence of higher bail-in expectations among market participants in the aftermath of the introduction of bail-in rules, as well as an enhanced market discipline.

The branch of literature investigating bail-in credibility consists also with other studies which instead of focusing on the yield spread between bailinable and non-bailinbale bonds have gauged the impact of bail-in regulation on different classes of bailinable debt.

Some studies corroborate the abovementioned results as regards senior unsecured debt, Lewrick et al. (2019) find indeed evidence of enhanced market discipline among senior unsecured bondholders whereas Cucinelli et al. (2020) support findings about their higher bail-in expectations. Finally, Gai et al. (2020) find an increase in the risk-premium for unsecured bonds, pointing out senior unsecured bonds as those showing the greatest effect on yields and yield spread.

However, other studies provide opposite evidence. In detail, using a sample of 41 EU credit institutions over the period 2014Q4-2018Q2, Pablos (2019) analyses the yield spread reaction between subordinated and senior unsecured bond's yields but does not find evidence of a significant and generalized increase. These findings are corroborated by Chan-Lau & Oura (2016) who point out that asset encumbrance and the implementation new bank resolution tools only increase senior unsecured debt yields modestly for banks under distressed market conditions in 2013.

As the abovementioned studies strictly focus on the bail-in tool as implemented in the European bank resolution framework, the branch of literature investigating the credibility of bail-in

fails to collect the instances that comes from the emerging countries. Nevertheless, even if not directly related to credibility, few papers already have investigated, under different perspectives, some cases of bail-in the emerging countries.

The polish case mentioned in the introduction has, indeed, piqued the interest of scholars who have scrutinized the case and called for research about the implementation of bail-in in countries unprepared and unequipped to embraced it (Stopczynski, 2020).

A similar case of misuse of bail-in in South Africa has been addressed by Havemann (2019) who pointed out the unintended consequences, in terms of systemic implications, of employing bail-in in small jurisdictions with high interconnectedness between bank and nonbank financial institutions.

Apart from these few cases, literature has not delved into the implementation of bail-in in emerging markets which represent the gap this paper aims to fill.

On the basis of the literature examined, we therefore develop the following hypothesis regarding bail-in credibility:

H_1 = If bail-in regulation is deemed credible, the yield-spread between bailinable and non-bailinable bonds would be higher for banks located in emerging countries with a framework for the bail-in of creditors with respect to that of banks located in emerging countries without such framework.

This hypothesis supports the view according to which bail-in rules, where enforced, are deemed credible by investors who ask for a higher return compared to bondholders excluded from bail-in. The resulting spread is thus higher than that between bailinable and non-bailinable bonds of banks located in emerging countries not subjected to bail-in rules as investors in bailinable debt would not require a higher risk premium than that required for seniority.

H_2 = If bail-in regulation is not deemed credible, the yield-spread of banks located in emerging countries with a framework for the bail-in of creditors is not different from that of banks located in emerging countries which do not abide by bail-in rules.

This hypothesis is in line with the view that bail-in rules are not deemed credible by investors who do not ask for a higher return compared to bondholders excluded from bail-in. The resulting spread, is, therefore, comparable to that between bailinable and non-bailinable bonds of banks located in emerging countries not subjected to bail-in rules as bail-in rules are not a driver of the spread for both cases. Bail-in prescriptions and market participants expectations are, therefore, misaligned and this may result in a disorderly application of the bail-in tool.

The academic debate about bail-in applicability further develops in branches investigating the measures that may encourage or dampen the application of the bail-in tool. Some argue that the

enforcement of bail-in regulation to borderline cases, like the Indian and Polish cases abovementioned, could be the solution to the credibility issues suffered by bail-in. However, as prescribed by the principle of proportionality, the application of the bail-in tool should account for the institutional environment, strength of market discipline, supervisory capacity, and business model of bank in a given country. Otherwise, the application of the bail-in may turn out as inappropriate and may have material consequences to the economic and social fabric of the area where the banks are located.

Bank size, for example, represent a bank-specific key driver for bail-in implementation which regulators should account for before enforcing the bail-in tool. Some scholars believe that the application of the bail-in tool to medium-sized banks could enhance the credibility of the bail-in tool by investors (Philippon and Salord, 2017), however, it could also hide important side-effects.

Fernando Restoy, chairman of the Financial Stability Institute, labels as the "middle class" the set of medium-sized banks that are systematically relevant and operate a retail-oriented business model, mostly funded with capital and deposits. These banks are deemed too large to be liquidated under normal insolvency proceedings, as they will generate severe adverse systemic effects, but also too small to issue large amount of bailinable liabilities that may guarantee the smooth and ordered application of the bail-in tool. These banks are also unfamiliar with bailinable instruments and the access of their market could result economically unfeasible (EBA, 2016). As a result, medium-sized banks might lack the sufficient loss-absorbency capacity required for the bail-in to be applied smoothly. The number of these banks could potentially be relevant as between the largest groups and the smallest banks there is a wide range of intermediate cases which consists with banks that struggle to tap the market of bailinable liabilities and whose capital structure is not coherent with a smooth application of the bail-in tool. Moreover, as regulator's efforts are channeled towards building a bailinable environment and framework for systemically important groups, such banks and their investors suffer great uncertainty regarding their treatment in case of crisis.

Such uncertainty leads, therefore, regulatory authorities to apply suboptimal crisis management techniques, such as in the Indian and Polish cases, and foster the debate about size as crucial determinant of the success or failure of a bail-in strategy, which should, therefore, be accounted when studying the credibility of bail-in rules in a given country.

On the basis of the considerations about how bank size might affect bail-in applicability, we therefore develop the following hypothesis regarding the relationship between bank size and bail-in expectations:

H_3 = If bail-in regulation is deemed credible then the yield-spread between bailinable and non-bailinable bonds would be higher for small rather than large banks.

This hypothesis draws from the abovementioned Polish and Indian cases of misapplication of bail-in to small banks to suggest that their bailinable investors may recognize the uncertainty surrounding the crisis management of small banks and may therefore anticipate the resulting confused action of the regulatory authority by requiring higher risk premia than those required by bailinable investors of larger banks. The risk of an unsuited bail-in would indeed outweight that of a large and equipped bank that may eventually further resort to public support in case of crisis depending on the country-specific governmental attitude. The precautionary view of bailinable investors of small banks is the result of the prudence which is required by market participants when they operate in small jurisdiction where there is a high degree of interconnectedness between bank and non-bank financial institutions (Havemann, 2019) and the misuse of crisis management techniques may expose to potential unintended systemic implications.

H_4 = If bail-in regulation is deemed credible then the yield-spread between bailinable and non-bailinable bonds is higher for large rather than small banks located in emerging countries with a framework for the bail-in of creditors.

This hypothesis is in line with the principle of proportionality that posits the application of bail-in to banks equipped to grant its smooth implementation but contrasts with the abovementioned cases of misapplication of bail-in registered in some emerging countries.

2 Data and Methodology

The purpose of the paper is to empirically address the question about whether it is appropriate or not to implement bail-in regulation in emerging countries. We thus focus on the crucial assumption for bail-in regulation to take hold in a country namely its credibility among investors which is measured in literature using the yield-spread between bailinable and non-bailinable bonds. By comparing the yield-spread between banks located in emerging markets which have adopted a regulation for bail-in and that of banks located in emerging markets without such framework, we are indeed able to provide evidence about investor's bail-in expectations and therefore inferring about its implementation.

A higher yield spread for banks located in emerging countries equipped with bail-in rules would mean that bailinable investors have deemed such rules credible therefore asking for a higher risk premium with respect to investors excluded form bail-in. Such spread would therefore result higher compared to the spread between bailinable and non-bailinable investors of banks located in emerging countries without a framework for the bail-in as their only driver is represented by seniorty. Thus, a correct pricing of bail-in rules would prevent from the adverse repercussions, highlighted in the literature review, in terms of bank operativity, market discipline and bail-in application. Conversely, no difference between the yield spread of banks located in emerging countries with a

framework for the bail-in and the spread of banks located in countries which lack such rules would instead suggest that, where enforced, bail-in rules are not deemed credible by investors who do not reprice bond yields therefore causing an alignment of the yield spread between bailinable and non-bailinable bonds amid countries adopting bail-in regulation and those which do not. Such scenario would thus not play in favour of an implementation of bail-in regulation in emerging countries due to the likelihood of occurrence of the abovementioned adverse implications related to bail-in rules mispricing.

To build up the sample for the empirical analysis we developed the following selection strategy. We first use the Bank Regulation and Supervision Survey (BRSS)[7] to identify the countries which have implemented bail-in regulation and those which did not. Question 18 of Section 11 of the survey required each jurisdiction about whether there is a framework in place to enable the bail-in of creditors. Among all the 160 respondent jurisdictions we selected those classified as emerging markets according to their inclusion in the MSCI Emerging Market Index.

We thus run the Fixed Income Search command on Bloomberg to select the active and matured non-bailinable bonds issued by banks located in the resulting emerging countries. We select bonds with available yield to maturity data in the time window January 2016 - December 2019 in line with the period required by the World Bank survey. Non-bailinable bonds include "secured", "senior secured" and "asset-backed" bonds. We then select the active and matured bailinable bonds issued by the resulting banks. Bailinable bonds include "senior unsecured", "senior preferred", "senior non-preferred", "senior subordinated", "subordinated" and "junior subordinated" bonds.

For those banks that do not display any bailinable bond, we match their non-bailinable bonds with the available balinable bonds issued by a bank comparable in terms of total assets. Bank size is indeed often used to assume a bank's crisis management technique, therefore the expected loss-exposure reflected in the bailinable bonds' yields of the comparable bank should resemble that embedded by the yields of the original bank.

As a result, each bank included in the sample has at least one bailinable bond and one non-bailinable bond. The same procedure is then replicated on Thomson Reuters Eikon to further supplement the database.

The sample selection procedure provided a database of 22 bonds for Chile, 11 for Czech Republic, 3 for Greece, 4 for Hungary, 23 for Poland, 36 for Russia and 3 for Turkey as regards emerging countries that have a framework for the bail-in in force. Concerning emerging countries that do not have a framework for the bail-in in place, the final sample resulted in 2 bonds for China, 95 for India, 3 for Malaysia, 138 for South Africa and 27 for South Korea. Table 1 shows the list of

[7] The documentation about the survey is available at: https://www.worldbank.org/en/research/brief/BRSS.

banks and respective bonds used in this study divided by whether the country in which they are located have a framework in place for the bail-in or not.

Then, the empirical strategy develops as follows. In line with Giuliana (2019), we create two portfolios of bonds: the "average bailinable bonds" and the "average non-bailinable bonds". In particular, the weekly yield to maturity of the "average bailinable bonds" portfolio is the average of the yields of all unsecured bonds for each bank and each date. The "average bailinable bonds" portfolio summarizes the information about "senior unsecured", "unsecured", "senior subordinated", "subordinated" and "junior subordinated" bonds. Correspondingly, the weekly yield to maturity of the "average non-bailinable bonds" portfolio is the average of the yields of all secured bonds. The "average non-bailinable bonds" portfolio summarizes the information about "secured", "senior secured" and "asset-backed" bonds. As a result, we obtain for each bank and each date an average bailinable and non-bailinable bond of which we compute the yield-spread.

Thus, to allow the comparison of the yield-spread between banks located in emerging countries which adopt a framework for the bail-in with that of banks located in emerging countries without such framework, we create a dummy variable that takes value 1 if the yield-spread belongs to a bank located in an emerging country with a framework for the bail-in of creditors, and 0 otherwise. A positive estimate would indicate that, where enforced, bail-in rules have been reflected by market participants into a wider yield spread between bailinable and non-bailinable bonds with respect to the same spread of banks located in emerging countries without a framework for the bail-in whose only driver is represented by seniority. The correct pricing of bail-in rules would therefore support the implementation of the bail-in regulation in emerging countries. Conversely, a negative or close to zero estimate would signal a misalignment between market expectations and bail-in provisions, where enforced. This result would suggest credibility concerns about bail-in rules that would not support for the implementation of such regulation in emerging countries due to the adverse implications that may stem from this situation as highlighted in the literature review section. For the analysis, similarly to Crespi et al. (2019), we employ a fixed effects panel data regression:

$$Spread_{ijt} = \alpha + \alpha_i + \gamma_1 Bailin_{ijt} + \gamma_2 Issuance_{ijt} + \gamma_2 Bank_{ijt} + \gamma_3 GDP_{jt} + \vartheta_t + \mu_{ijt}$$

Where: $Spread_{ijt}$ is the dependent variable, namely the yield-spread between bailinable and non-bailinable bonds of bank i, in country j, at time t. The variable $Bailin_{ijt}$ is a dummy that takes value 1 if the yield spread belongs to a bank located in an emerging country with a framework for the bail-in of creditors, and 0 otherwise. $Issuance_{ijt}$ is a vector of control variables at portfolio level that checks for seniority, currency, amount issued and time to maturity of the issuances used to create the bailinable and non-bailinable portfolios for each bank. $Bank_{ijt}$ is a vector of control variables at bank

level that checks for size, measured by the natural logarithm of total assets; capitalization, measured by the ratio between Tier1 and Total Assets; risk, measured by the ratio between NPLs and Total Assets; business model, proxied by the ratio between Total Deposits and Total Assets; and profitability, measured by the return on assets. GDP_{jt} is the percentage of gross domestic product of each country. ϑ_t captures the time trends in order to control for changing market conditions that could influence the value of the yield spread. α_i captures portfolios fixed effects in order to control for unobservable, time invariant, bonds characteristics that could influence the yield spread. Moreover, in one specification of our model we substitute both portfolio and time fixed effects with the interaction of the two in order to further account for time-varying portfolio unobserved heterogeneity[8]. Standard errors are clustered at bank level. Table 2 shows the definition and descriptive statistics of all the variables used in the model

The expected signs of the issuance-level controls are as follows. Seniority should be negatively related to the yield spread as the lower the seniority the higher the loss absorption capacity, especially on a gone concern, which should therefore increase the concerns about bail-in implementation, namely the yield spread. However, despite traditional subordinated debt is the most exposed in case of bail-in, it is always meant to bear the losses in case of crisis unlike above-ranked debt, i.e. unsecured senior debt or deposits not protected by guarantee, which may face a higher risk as its exposure depends on the severity of the crisis and the following extent of application of the bail-in tool. The expected sign of the currency of denomination should capture investor's currency preferences. The amount issued should be negatively related to the yield spread as banks that place larger issuances can benefit from lower costs of funding, due to better economies of scale (Crespi, 2019), and are probably large enough to expect public bailouts in case of crisis which would eventually reduce bail-in expectations, namely the yield spread. Time to maturity might have a positive effect on the yield spread as higher yields are offered to bonds with longer redemption horizons (Zaghini, 2014), yields that inevitably embed a higher probability to incur into bai-in.

The expected signs of the bank-level controls are as follows. Bank size may have a positive effect on the yield spread as the bail-in tool has been designed for large institution whose disordered resolution could trigger systemic implications (Restoy, 2016). Therefore, higher bail-in expectations should be embedded into securities' prices of investors of larger banks. However, the recent cases of misuse of the bail-in tool to address small banks' crises, especially in the emerging countries, raise some doubts about the sign of the estimated coefficient for bank size. Capitalization should have a negative effect on the yield spread as a higher capital base strengthens bank's resilience therefore

[8] The design of the dataset does not permit to the inclusion of portfolio fixed effects and its interaction with time to affect the estimation of the coefficient of the dummy variable Bail-in.

lowering bail-in expectations. Bank risk is expected to have a positive effect on the yield spread as toxic assets jeopardize bank stability therefore increasing bail-in expectations. Bank business model should have a negative effect on the yield spread as traditional banking does not match the complexity of the capital structure required by bail-in rules to be applied smoothly (Restoy, 2018). Profitability should exert a negative impact on the yield spread as a higher profitability means higher efficiency therefore indicating that the bank is viable and lowering the bail-in expectations (Sironi, 2003). However, a higher profitability can be also associated with a higher bank risk-appetite that may jeopardize bank stability and raising bail-in expectations (Flannery and Sorescu, 1996).

Finally, the impact of the GDP growth on the yield spread is ambiguous. Bail-in, indeed, has proved to work efficiently in developed countries with respect to the Spanish case of Banco Popular Español so, as a result, higher GDP growth should be associated to higher bail-in expectations. However, the recent cases of misapplication of bail-in in some emerging countries may have threaten investors in bailinable debt therefore biasing the relationship as also lower levels of GDP growth may be associated to wider yield spreads.

3 Empirical results

Table 3 reports the results of the regression model. Our findings point out a positive and statistically significant relationship between the dummy (Bail_in), that discerns between emerging countries with and without a framework for the bail-in of creditors, and the spread between bailinable and non-bailinable bonds. This result corroborates hypothesis H_1 that suggests a wider yield spread for banks located in emerging countries that have adopted a framework for the bail-in. The explanation that literature provides for this result is that bail-in rules worsen the payoffs of unsecured bank creditors in case of failure and this lead them asking for higher risk-premia (Conlon and Cotter, 2014). As a result, bail-in regulation would add to seniority as driver of the yield spread between bailinable and non-bailinable bonds therefore making it higher for banks located in emerging markets with a framework for the bail-in of creditors compared to banks located in emerging countries without such framework. The repricing of bailinable bonds that widens the yield spread with respect to bonds excluded from bail-in further points out the credibility raised among investors by bail-in rules which eventually enhances both bank operativity and market discipline and finally ease the application of the bail-in tool. These benefits therefore support the application of bail-in regulation in emerging countries.

Regarding bank-level control variables: size, expressed by total assets, shows a negative and statistically significant relationship with the yield spread. The result corroborates hypothesis H_3 and indicates that bail-in expectations are higher among investors of small banks. The bail-in represents

thus a major threat for bailinable investors of small and unequipped banks rather than for their peers from large banks as the latter may also count on public support in case of crisis and have a capital structure able to sustain this measure anyways. When pricing securities, bailinable investors of small banks account indeed for the potentially confused action by the regulatory authorities which stem in the uncertainty that burdens the crisis management of small banks and that may cause the misapplication of the bail-in tool like in the Polish and Indian cases. As actions speak more than words, the bail-in cases abovementioned are expected to further strengthen this relationship. Actual bail-ins, indeed, induce a stronger market reaction than the legal implementation of bail-in rules (Schäfer et al., 2016).

The coefficients of the return on assets (ROA) are almost equal to zero and do not indicate a statistically significant relationship with the yield spread. In contrast with the relationships suggested by literature, this result points out the minor role played by profitability in explaining the yield spread. Capitalization, measured by the ratio between Tier 1 capital and total assets, shows a negative and not statistically significant relationship with the yield spread. Higher capital buffers, indeed, reduce the probability of breaching the minimum capital requirement thereby lowering market expectations over an imminent bail-in. Reversing the causal effect, instead, another possible interpretation suggests that the lack of bail-in credibility may lead unsecured debt holders not to absorb the unexpected losses thereby requiring banks to increase their capital buffers (Benink 2018). Bank's risk, measured by the ratio between non-performing loans and total assets, shows a positive and statistically significant relationship with the yield spread. This result is easily explained as the pressure of non-performing loans is often burdening the banks' capital position thereby increasing its default probability. Bank's business model, measured by the ratio between deposits and total assets, shows a negative and statistically significant relationship with the yield spread. The bail-in tool is indeed more appropriate for banks whose capital structure allow for the involvement of class of creditors different from depositors. Further support to this interpretation is given by the results provided by the issuance-level control variable seniority. This variable, indeed, shows a negative and statistically significant relationship with the yield spread as the higher the seniority the lower the bondholder's expectations about being affected by the bail-in.

Regarding the other control variables at issuance-level: the principal currency of denomination shows a positive and statistically significant relationship with the yield spread. The average amount issued shows a negative and not statistically significant relationship with the yield spread. This result could be symptomatic of state aid expectations discounted into yield spreads as larger issuances are usually offered by larger banks which are more prone to receive governmental support in case of crisis (Sironi, 2003). Contrarily with the expected sign, the average time to maturity

shows a negative but statistically significant relationship with the yield spread. This result indicates that, as they are approaching maturity, bondholders increasingly consider the threat of the bail-in. Finally, the percentage growth of the GDP shows a positive but statistically not significant relationship with the yield spread. As its coefficient is also close to zero, this result indicates that the economic framework does not represent an obstacle to the implementation of the bail-in regulation.

4 Robustness tests

To test the reliability of our results on the relationship between bail-in regulation and the yield-spread between bailinable and non-bailinable bonds, we first rerun our equation using the GMM approach. Table 4 reports the GMM estimation results of our equation. The results further corroborate those of the baseline model. Specifically, the main variable of interest, namely the dummy Bailin, shows a consistent positive and statistically significant relationship with the yield spread along all specifications of the model. Moreover, the control variables both at bank and issuance level show a relationship coherent with that fund in the baseline model.

It is plausible that differences among covariates at bank level between the treated and the control group may invalidate the results as the latter may not represent a valid counterfactual for the former. To reduce such bias, we run a propensity score matching (PSM) which harmonizes the sample making the treated and the control groups more homogeneous along bank characteristics. It therefore matches each bank in the control group with the bank in the treated group which has the closest score, namely the probability of being treated given its bank specific characteristics. The score is first computed by a probit model and then the matching is performed using the nearest neighbor approach with a caliper equal to 0.02 and without replacement (see e.g Rosenbaum and Rubin, 1983). The caliper is the distance between treatment and control group scores which cannot be exceeded. The without replacement feature assures that each control observation is used no more than one time as a match for a treated observation. We then rerun our equation on the restricted sample. Tables 5 and 6 show the summary statistics of the pre-matched and matched sample of banks. The matching has significantly lowered the differences among key variables between the treated and control group of banks. Table 7 reports the PSM estimation results. Results are in line with those of the OLS and GMM models. As the matching has reduced eventual biases due to samples' heterogeneity, the relationship between bail-in regulation and the yield spread between bailinable and non-bailinable bonds appears even stronger.

In addition, we perform further tests in order to disentangle the moderation effect played by two crucial covariates on the relationship between bail-in regulation and the yield spread. The variables in question are bank's size and country's GDP. Regarding the former, the application of the

bail-in tool to medium and small banks is a very topical and much disputed topic in literature. Our baseline analysis has pointed out a negative and statistically significant relationship between bank size and the yield spread. This relationship unveils stronger bail-in expectations by investors in smaller banks. This result is supported by the recent cases of misuse of the bail-in tool in Poland and India and further points out the necessity of reviewing bail-in rules for middle and small banks (de Haan and Kakes, 2020).

We, therefore, re-estimate the baseline model differentiating between above and below the mean of bank size in order to reduce the heterogeneity in terms of total assets of our sample and to further delve into the role of size as moderator of the relationship between bail-in regulation and the yield spread. Table 8 reports the OLS estimation results of our model split according to the average value of bank size. In line with the negative relationship outlined in the baseline analysis between bank size and the yield spread, these results point out a stronger impact of bail-in regulation on yield spreads for smaller banks. Higher bail-in expectations by investors of smaller banks corroborate our thesis about their higher concern for an imprudent employment of the bail-in tool, due to the uncertainty surrounding the crisis management of small banks, with respect instead to the expectation of bailinable investors of large banks that may count on a stronger capital equipment able to bear with the application of the bail-in or, alternatively, may also resort to public support in case of crisis.

The same analysis is then performed to dig deeper into the moderating role played by country's GDP to the relationship between bail-in rules and the yield spread. Table 9 reports the OLS estimation results of our model split according to the average value of country's GDP. The baseline analysis has pointed out a positive but statistically not significant relationship between country's GDP and the yield spread. This preliminary result suggests that possibly GDP do not play a crucial role for the implementation of bail-in rules in an emerging country. However, our in-depth analysis has shown that the relationship between bail-in rules and the yield spread is stronger for countries with a higher GDP growth. As bailouts increase fiscal impact on government debt and deficit (ECB, 2015), countries with a higher developing economic framework are more likely to apply the bail-in tool if necessary, in order to relief public finances from being used to rescue ailing banks and instead channeling them towards economic growth. Thus, this result provides additional information regarding the implementation of a bail-in framework in an emerging country pointing out the importance of the GDP growth in easing this process.

5 Conclusion

This paper takes on the research question posed by the GFDR about whether it is appropriate to apply regulation designed for advanced economies to developing countries by investigating the

applicability of bail-in regulation in emerging countries as two recent controversial cases of bail-in in Poland and India have casted some doubts about the conditions for its smooth implementations with respect to the virtuous Spanish case of the Banco Popular Español.

We thus focus on bail-in credibility as crucial assumption for a smooth and effective implantation of the bail-in framework. We gauge bail-in credibility by comparing the yield spread between unsecured (bailinable) and secured (non-bailinable) bonds of emerging countries with a framework for the bail-in with that of emerging countries without such framework.

Our results point out that market participants of emerging countries with a framework for the bail-in of creditors positively embraced bail-in rules by reflecting them into the yield spread between unsecured (bailinable) and secured (non-bailinable) bonds. In addition, results indicate bank's size and country's GDP growth as crucial moderators of the relationship between bail-in regulation and the yield spread. Specifically, as regards the former, bail-in rules have been better embedded into the yield spread by investors in smaller banks. On the other hand, as regards country's GDP growth, the relationship between bail-in rules and the yield spread is stronger for countries with a higher GDP growth.

In conclusion, our results draw important insights about bail-in implementation in emerging countries as the detected bail-in credibility among market participants reassures about the adverse implications related to the mispricing of debt instruments whereas the distortions caused by the uncertainty regarding the crisis management of small banks point out a shortcoming that policymakers should account for when designing the bail-in regulation to be implemented.

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Table 1 - List of banks

Countries with a bail-in framework

Country	Total Assets (in Billions of USD)	Bank name	N° Secured	N° Unsecured	Bank name	Total Assets (in Billions of USD)
Chile	59,2	Banco Santander-Chile	2	20		
Czech Republic	12,9	Hypotecni Banka as	5	1	J & T Banka as	6,3
Czech Republic	15,0	Raiffeisenbank as	4	1	Air Bank as	5,0
Greece	70,6	Alpha Bank AE	1	2		
Hungary	4,1	OTP Mortgage Bank Ltd	3	1	MKB Bank Zrt	6,5
Poland	5,0	PKO Bank Hipoteczny SA	11	1	Idea Bank SA	5,5
Poland	3,2	mBank Hipoteczny SA	10	1	Bank Pocztowy SA	1,9
Russia	223,62	Bank VTB PAO	12	2		
Russia	94,0	Gazprombank AO	2	8		
Russia	2,8	KB Del'taKredit AO	4	8		
Turkey	2,7	Aktif Yatirim Bankasi AS	1	2		

Countries without a bail-in framework

Country	Total Assets (in Billions of USD)	Bank name	N° Secured	N° Unsecured	Bank name	Total Assets (in Billions of USD)
China	6,7	Bozhou Yaodu Rural Commercial Bank Co Ltd	1	1		
India	2,5	AU Small Finance Bank Ltd	3	1		
India	18,3	IDFC First Bank Ltd	84	3		
India	1,7	Jana Small Finance Bank Ltd	1	3		
Malaysia	16,6	BIMB Holdings Bhd	1	2	AFFIN Bank Bhd	16,9
South Africa	99,9	Standard Bank of South Africa Ltd/The	3	135		
South Korea	200,0	Kookmin Bank	4	23		

This table displays the number of secured and unsecured bonds for each bank in both emerging countries with and without a bail-in framework. If a bank does not have both secured and unsecured bonds, the missing instruments are replaced by those of a comparable bank in terms of total assets.

Table 2 - List of variables with their definition and summar statistics

Variable	Definition	Obs	Mean	Std. Dev.	Min	Max	Expected sign
Spread	The yield spread between the "average bailinable bonds" and "average non-bailinable bonds" portfolios	3,120	0.022823	0.053576	-0.050425	0.397542	
Bail-in	A dummy valued 1 if the country in which the bank is located has a framework for the bail-in in force, 0 otherwise	3,120	0.628526	0.483276	0	1	
Size	The natural logarithm of bank's total assets	3,120	10.6351	1.274413	7.071828	12.42958	Ambiguous
Roa	Return on assets	3,120	0.820487	1189929	-0.86686	1.7147	Ambiguous
T1_Ta	The ratio of Tier 1 capital to total assets	3,120	0.084494	0.02463	0.004	0.147925	-
Npl/Ta	The ratio of non-permforming loans to total assets	3,120	0.042906	0.067209	0.005604	0.331834	+
Dep/Ta	The ratio of total deposits to total assets	3,120	0.613896	0.116753	0.357811	0.895238	-
Senior	Dummies indicating the principal seniority of the bonds included in the bailinable and non-bailinable portfolios	3,120	4.611859	2.650713	1	9	Ambiguous
Currency	Dummies indicating the principal currency of the bonds included in the bailinable and non-bailinable portfolios	3,120	7.56859	3.963416	1	13	Ambiguous
Amount	Average amount issued by issuances included in the bailinable and non-bailinable portfolios	3,120	19.28429	12.30523	1	39	-
Tenor	Average time to maturity of the issunaces included in the bailinable and non-bailinable portfolios	3,120	11.28033	8.234101	3.132101	33	+
GDP	Percentage of GDP growth	3,120	2.998574	2.203284	0.153	7.471	Ambiguous

Source: Bloomberg & Thomson Reuters Eikon (2016–2019). This table reports the definitions and the descriptive statistics of all variables used in the study.

Table 3 - Baseline model (OLS)

Variables	(1)	(2)	(3)
Bail-in	0.0456**	0.0568**	0.0493**
	(0.0187)	(0.0186)	(0.0181)
Size	-0.0198**	-0.0186**	-0.0188**
	(0.00636)	(0.00606)	(0.00605)
Roa	0.00728	0.00901	0.00718
	(0.00926)	(0.00731)	(0.00752)
T1_Ta	-0.605	-0.581	-0.58
	(0.397)	(0.367)	(0.366)
Npl/Ta	0.394**	0.354**	0.366**
	(0.152)	(0.125)	(0.128)
Dep/Ta	-0.144***	-0.144***	-0.146***
	(0.0447)	(0.0414)	(0.0428)
Senior	-0.00975**	-0.0116**	-0.0103**
	(0.00408)	(0.0043)	(0.00402)
Currency	0.00679***	0.00757***	0.00702***
	(0.00142)	(0.00138)	(0.00132)
Amount	-0.000694	-0.00101	-0.000764
	(0.000468)	(0.000558)	(0.000533)
Tenor	-0.00164*	-0.00210**	-0.00183**
	(0.000803)	(0.000866)	(0.000804)
GDP	0.00298	0.00543	0.00391
	(0.00272)	(0.00342)	(0.00305)
Portfolio fe	Yes	Yes	No
Time fe	No	Yes	No
Portfolio*time fe	No	No	Yes
Cluster S.E Bank	Yes	Yes	Yes
Observations	3,120	3,120	3,120
R-squared	0.557	0.619	0.606

This table shows the FE estimation results of the baseline model. The dependent variable is the yield spread between bailianble and non-bailinable portfolios. See Table 2 for the definition of the explanatory variables. The estimation period is January 2016 - December 2019. Column 1 includes portfolios fixed effects. Column 2 includes portoflios and time fixed effects. Column 3 includes portfolios*time fixed effects. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at bank level and reported in brackets.

Table 4 - Two-step GMM

Variables	(1)	(2)	(3)
Spread (-1)	0.336***	0.358***	0.349***
	(0.0652)	(0.0814)	(0.074)
Bail-in	0.0207***	0.0165***	0.0159***
	(0.0022)	(0.00272)	(0.00526)
Size	-0.0198***	-0.0186***	-0.0184***
	(0.000951)	(0.00221)	(0.00261)
Roa	0.0101***	0.00987***	0.0115***
	(0.00158)	(0.00175)	(0.00358)
T1_Ta	-0.585***	-0.681***	-0.700*
	(0.0946)	(0.188)	(0.371)
Npl/Ta	0.525***	0.536***	0.560***
	(0.0393)	(0.05)	(0.117)
Dep/Ta	-0.150***	-0.159***	-0.161***
	(0.00805)	(0.0153)	(0.0173)
Senior	-5.24E-05	0.000291	0.00038
	(0.00041)	(0.00047)	(0.000681)
Currency	0.00522***	0.00490***	0.00501***
	(0.000271)	(0.000355)	(0.000318)
Amount	-0.000574***	-0.000436***	-0.000471***
	(0.0000532)	(0.00009)	(0.0000908)
Tenor	-0.000587***	-0.000332*	-0.000361
	(0.000157)	(0.000195)	(0.000299)
GDP	0.00238***	0.00179***	0.00189***
	(0.000615)	(0.000452)	(0.000642)
Portfolio fe	Yes	Yes	No
Time fe	No	Yes	No
Portfolio*time fe	No	No	Yes
Cluster S.E Bank	Yes	Yes	Yes
Observations	2,372	2,372	2,372
Hansen	0.101	0.231	0.901

This table shows the GMM estimation results of the baseline model. The dependent variable is the yield spread between bailianble and non-bailinable portfolios. See Table 2 for the definition of the explanatory variables. The estimation period is January 2016 - December 2019. Column 1 includes portfolios fixed effects. Column 2 includes portoflios and time fixed effects. Column 3 includes portfolios*time fixed effects. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at bank level and reported in brackets.

Table 5 - Summary Statistics – Pre-Match Sample

	(1) Treatment	(2) Control	(3) Difference
Total Assets (natural logarithm)	9.569	9.471	-0.090***
Return on Assets	0.2	0.38	-0.180***
Tier One Capital over Total Assets	0.093	0.087	0.050***
Non-Performing Loans over Total Assets	0.057	0.045	0.012***
Total Deposits over Total Assets	0.656	0.511	0.145***

Note: This table shows average values for treated (column 1) and control (column 2) banks; column (3) shows the difference between column (2) and column (1). Bank-level variables are key ratios from Bloomberg Professional Service and Thomson Reuters Eikon.

Table 6 - Summary Statistics – Matched Sample

	(1) Treatment	(2) Control	(3) Difference
Total Assets (natural logarithm)	10.537	10.669	-0.132*
Return on Assets	1	0.963	0.037
Tier One Capital over Total Assets	0.084	0.084	0
Non-Performing Loans over Total Assets	0.02	0.02	0
Total Deposits over Total Assets	0.603	0.625	-0.022

Note: This table shows average values for treated (column 1) and control (column 2) banks; column (3) shows the difference between column (2) and column (1). Bank-level variables are key ratios from Bloomberg Professional Service and Thomson Reuters Eikon.

Table 7 - PSM weighted regression

Variables	(1)	(2)	(3)
Bail-in	0.0473**	0.0582**	0.0580**
	(0.0138)	(0.0175)	(0.0195)
Controls	Yes	Yes	Yes
Portfolio fe	Yes	Yes	No
Time fe	No	Yes	No
Portfolio*time fe	No	No	Yes
Cluster S.E Bank	Yes	Yes	Yes
Observations	1,066	1,066	1,066

This table shows the PSM estimation results of the baseline model. The dependent variable is the yield spread between bailianble and non-bailinable portfolios. See Table 2 for the list and definition of controls. The estimation period is January 2016 - December 2019. Column 1 includes portfolios fixed effects. Column 2 includes portoflios and time fixed effects. Column 3 includes portfolios*time fixed effects. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at bank level and reported in brackets.

Table 8 - Above vs Below the mean of Bank Size

Variables	(1)		(2)		(3)	
	Above	Below	Above	Below	Above	Below
Bail-in	0.0359**	0.202***	0.0444**	0.32	0.0399**	0.182**
	(0.0144)	(0.0001)	(0.015)	(0.196)	(0.0151)	(0.021)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Portfolio fe	Yes	Yes	Yes	Yes	No	No
Time fe	No	No	Yes	Yes	No	No
Portfolio*Time fe	No	No	No	No	Yes	Yes
Cluster SE Bank	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,575	545	2,575	545	2,575	545

This table shows the OLS estimation results of the baseline model performed above and below the mean of bank size. The dependent variable is the yield spread between bailianble and non-bailinable portfolios. See Table 2 for the list and definition of controls. The estimation period is January 2016 - December 2019. Specification (1) includes portfolios fixed effects. Specification (2) includes portoflios and time fixed effects. Specification (3) includes portfolios*time fixed effects. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at bank level and reported in brackets.

Table 9 - Above vs Below the mean of Country GDP

Variables	(1)		(2)		(3)	
	Above	Below	Above	Below	Above	Below
Bail-in	0.0485***	0.00625	0.0680**	-0.00275	0.0446**	0.00465
	(0.0103)	(0.0348)	(0.0232)	(0.0535)	(0.0139)	(0.0404)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Portfolio fe	Yes	Yes	Yes	Yes	No	No
Time fe	No	No	Yes	Yes	No	No
Portfolio*Time fe	No	No	No	No	Yes	Yes
Cluster SE Bank	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,089	2,031	1,089	2,031	1,089	2,031

This table shows the OLS estimation results of the baseline model performed above and below the mean of country GDP. The dependent variable is the yield spread between bailianble and non-bailinable portfolios. See Table 2 for the list and definition of controls. The estimation period is January 2016 - December 2019. Specification (1) includes portfolios fixed effects. Specification (2) includes portoflios and time fixed effects. Specification (3) includes portfolios*time fixed effects. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Standard errors are clustered at bank level and reported in brackets.