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2026

BANCO DE ESPAÑA
Eurosistema

Documentos Ocasionales
N.º 2607

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(*) The authors would like to thank Lucía Ibáñez Lahoz for her valuable contributions during the initial phases of the analysis presented in this paper and are also grateful to Alicia Aguilar Fargas for her insightful comments. This paper is the sole responsibility of the authors and does not necessarily reflect the opinion of the Banco de España or of the Eurosystem.

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Documentos Ocasionales. N.º 2607

March 2026

https://doi.org/10.53479/42805

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ISSN: 1696-2230 (online edition)

Abstract

This paper develops a benchmarking framework to assess the cost of issuing MREL-eligible debt, enabling structured comparisons across banks, instruments and jurisdictions. Using data on 12,075 securities issued by 206 banks in the banking union from 2019 Q3 to 2024 Q3, we quantify how bank characteristics, macroeconomic conditions and instrument features affect issuance costs. Compared with banks with assets below €100 billion, global systemically important institutions benefit from significantly lower costs, down by 92 basis points, while other systemically important institutions and top-tier banks benefit by 88 basis points. Higher credit ratings are associated with up to an 86 basis point reduction in issuance spreads; greater efficiency, proxied by a lower cost-to-income ratio, also narrows spreads. The overnight index swap rate is the most influential macroeconomic factor, with each percentage point increase associated with a 97 basis point rise in costs. Longer maturities and greater subordination significantly increase funding costs. Lastly, we apply the model to decompose issuance costs for seven Spanish banks, identifying key cost drivers across institutions, and to simulate the impact of issuing senior non-preferred versus senior debt for four European banks near the €100 billion size threshold, documenting the implications of subordination requirements for banks' net income.

Keywords: bank resolution, bank debt, issuance cost, subordination, MREL.

JEL classification: F65, G21, G23, E43, E47.

Resumen

En este documento se desarrolla un marco para evaluar el coste de emitir deuda elegible para MREL, permitiendo comparaciones entre bancos, instrumentos y jurisdicciones. Utilizando los datos de 12.075 instrumentos emitidos por 206 bancos de la unión bancaria entre el tercer trimestre de 2019 y el tercer trimestre de 2024, cuantificamos cómo las características de los bancos, las condiciones macroeconómicas y las de los instrumentos afectan a los costes de emisión. En relación con bancos con activos inferiores a 100.000 millones de euros (100 mm de euros), las entidades de importancia sistémica mundial se benefician de menores costes —unos 92 puntos básicos (pb)—, mientras que otras instituciones de importancia sistémica y bancos *Top-tier,* lo hacen en 88 pb. Mejores calificaciones crediticias reducen los diferenciales hasta 86 pb; y una mayor eficiencia —aproximada por una menor ratio de costes sobre ingresos— también contribuye a reducirlos. El tipo *Overnight Index Swaps* es el factor macroeconómico más influyente: cada punto porcentual adicional eleva los costes en 97 pb. Mayores vencimientos y subordinación incrementan de forma significativa los costes. Finalmente, aplicamos el modelo para descomponer los costes de siete bancos españoles, identificando sus principales determinantes, y para simular el impacto de emitir deuda sénior no preferente frente a deuda sénior para cuatro bancos europeos cercanos a los 100 mm de euros, documentando las implicaciones de los requisitos de subordinación sobre su resultado neto.

Palabras clave: resolución bancaria, deuda bancaria, coste de emisión, subordinación, MREL.

Códigos JEL: F65, G21, G23, E43, E47.

Contents

1 Introduction

The Minimum Requirement for own funds and Eligible Liabilities (MREL) was introduced in the EU by the Bank Recovery and Resolution Directive (BRRD), adopted in 2014 and applicable from 2016, to ensure that in the event of bank failure, resolution authorities can use these resources from the bank's shareholders and creditors to absorb losses and recapitalize the continuing business.[1] This framework reduces the likelihood of governments using public funds to rescue failing banks, mitigates negative effects on credit supply linked to undercapitalized banks, and helps contain contagion to other financial institutions and the broader financial system by providing ex-ante loss-absorbing capacity (EBA, 2016). Beyond its role in bank resolution, the increase in unsecured bank liabilities associated with MREL may also enhance market discipline and, therefore, strengthen financial stability preemptively (Walther and White, 2020; Berger et al., 2022; Bernard et al., 2022; Keister and Mitkov, 2023; Restoy, 2023).

Banks can meet MREL requirements with capital and certain eligible liabilities, including fixed-income instruments that are unsecured and have a residual maturity of more than one year.[2] Therefore, understanding the cost of MREL-eligible instruments, the factors driving this cost, and the implications of their issuance for banks' income statements is crucial. The cost is likely to vary depending on instrument characteristics, bank-specific fundamentals, and country-level conditions. Knowing the impact of each of these determinants on the cost of MREL issuances is essential to identify and explain pricing differentials across banks and instruments. Against this backdrop, this paper develops a benchmarking framework to assess banks' cost of issuing MREL instruments, providing a structured approach to quantify and compare issuance costs across banks, instruments, and countries.

To develop this tool, we analyze debt issuances by European banks between 2019Q3 and 2024Q3, a period during which credit institutions were required to build up their MREL capacity. This is particularly relevant, as the BRRD may have reshaped investor pricing behavior and altered the balance between potential determinants of the cost of bank funding compared to the pre-BRRD period (Schäfer et al., 2016; Crespi et al., 2019; Giuliana, 2022). The dataset includes 12,075 securities issued by 206 banks from 11 Banking Union jurisdictions, denominated in euros. It includes both MREL-eligible instruments—Additional Tier 1 (AT1), Tier 2, senior non-preferred (SNP), and senior unsecured debt—and secured debt. The analysis incorporates a comprehensive set of cost determinants. These include bank-specific fundamentals (such as size, profitability, solvency, and cost efficiency); macroeconomic and country-level variables (including GDP growth, term and sovereign debt spreads, financial market development, and the risk-free rate); and security-specific characteristics (such as maturity and subordination level). We rely exclusively on observable explanatory variables to decompose the cost of bank debt into identifiable components.

We estimate alternative Ordinary Least Squares (OLS) regressions and apply Heckman's (1979) two-step procedure to address potential selection bias in the bond issuance decision. The Heckman approach accounts for the endogeneity arising from banks' self-selection into issuing debt, which depends on both bank characteristics

1 The MREL framework was revised in 2019 as part of the EU banking reform package (the "Banking Package"), which amended the BRRD, SRMR, CRR, and CRD. These reforms aligned external MREL requirements for resolution entities with the international TLAC standard. The framework described here refers specifically to external MREL, excluding internal MREL requirements for subsidiaries under Article 12g of the SRMR.

2 These instruments must also meet additional criteria to ensure their effectiveness as loss absorbing and recapitalization tools in resolution events. Eligibility ultimately depends on verification that the instrument in question meets all the eligibility criteria. Liabilities that can be used to meet MREL requirements are defined in the Capital Requirements Regulation (CRR), the SRMR and the BRRD. The conditions in Article 72b (2) CRR are cumulative for all instruments, while the SRMR provides additional conditions for specific liabilities. The EBA (2023) Quantitative Report provides a description of MREL resources and shortfalls for banks in the European Union and analyzes the impact of the MREL requirement on banks' balance sheets and profitability over the 2014–2021 period.

and market conditions. For example, institutions with weaker financial profiles choose to issue debt when they can secure more favorable pricing. Likewise, issuance activity may rise in low-interest-rate environments and decline as interest rates increase. Also, we use weighted regressions to account for differences in issuance size and avoid overrepresenting smaller issuances, for instance, issuances below the 25th percentile in size account for only 1.2% of the total issuance volume in our sample. Weighting is particularly important when benchmarking issuance costs for Spanish banks, as they are underrepresented in terms of the number of deals, accounting for only 1.8% of the total.

We define the set of explanatory variables with particular attention to minimizing potential multicollinearity, which could otherwise bias the estimated coefficients. A parsimonious specification strategy is employed to identify and address correlation issues among regressors. Additionally, as a robustness check, we verify that our results are not biased by omitted variable concerns, as they remain unchanged when including bank or country and year fixed effects.

Our Heckman estimations suggest that larger and better-rated banks are significantly more likely to issue debt, while issuance is less likely for banks with higher capital and profitability, and more likely when financial market development, the risk-free rate, and the term spread are higher.

The results indicate that bank size is a key driving factor of bank debt funding costs: global systemically important institutions (G-SIIs) face on average 92 bp of lower cost than banks with assets below €100 billion. This cost advantage in the issuance of MREL instruments is on average 88 bp for other systemically important institutions (O-SIIs) and Top-tier banks relative to banks with assets below €100 billion. Credit quality is also an important determinant: banks with the highest investment-grade ratings have on average a lower cost for MREL liabilities of 86 bp compared to banks that are rated as high yield or have no rating. Once selection bias is controlled for, high CET1 and ROA ratios are associated with slightly higher issuance yields. This reflects that better capitalized and more profitable banks tend to tap the market less frequently, and suggests they do it in less favorable windows.

Regarding country-level and macroeconomic variables, the risk-free rate is the most important factor explaining the cost of MREL instruments: a one percentage point reduction in the three-month OIS is associated with a 97 bp decrease in the average cost of MREL instruments. A one percentage point reduction in the term and sovereign spreads is associated with decreases in issuance costs of 99 bp and 97 bp, respectively. Moreover, GDP growth is also statistically significant, with a one percentage point increase in annual GDP growth associated with a 1.4 bp increase in issuance yields. Finally, a one percentage point increase in financial market development is associated with a 9.3 bp decrease in issuance costs.

Instrument-specific variables also have the expected type of influence on the cost of issuance. Specifically, for each additional year of original maturity, there is an increase in the average cost of more than 2 bp. As expected, the degree of subordination of the instrument matters, and those bearing higher bail-in risk are costlier. Specifically, after controlling for each security's maturity, bank-level characteristics of the issuing institution, and macroeconomic and country factors, the cost of AT1, Tier 2, SNP, and senior unsecured debt instruments is 363, 164, 60, and 29 basis points, respectively, higher than the cost of secured debt. Moreover, interactions between bank ratings and the degree of instrument subordination indicate that a higher credit rating reduces the issuance cost of all instruments, with the reduction being more pronounced for instruments with higher subordination.

To illustrate the practical relevance of our benchmarking model, we present two applications.

First, we decompose the estimated issuance cost of MREL-eligible instruments for seven Spanish banks over the period 2024Q1–2024Q3. Using the coefficients from our Heckman model, we assess the relative importance of different cost drivers. The results show a good fit between estimated and observed costs and highlight the dominant role of the OIS rate. On average, the OIS accounts for 41% of the estimated yields, followed by bank-specific characteristics and the degree of bond subordination.

Second, we use the model to estimate the incremental funding cost that a mid-sized bank would face should authorities decide to impose subordination requirements on it. Subordination requirements compel banks to meet their MREL targets with subordinated liabilities or capital instruments instead of senior debt, and apply to banks with assets above €100 billion. In addition, authorities can set subordination requirements on entities under this threshold if they consider that may pose systemic risk upon failure. We therefore compute the extra coupon expense that institutions with total assets of €90-99 billion would incur if they were to roll over maturing senior preferred (SP) debt into senior non-preferred (the cheapest subordinated instrument eligible for MREL). Using recent issuance sizes for four Banking Union banks in this range and the model-implied SNP-SP spread for low investment-grade issuers, the average incremental cost is about €0.8 million, or 0.12% of average net income. We estimate a cost ranging from approximately €0.5 million (under a 20 bp benign scenario) to €2.36 million (under a 100 bp adverse scenario). This corresponds to a depletion of 0.07%-0.36% in each bank's average net income balance. These figures should be interpreted with caution, as the estimation window coincides with a period of low risk premia in Europe and does not span a full credit cycle; issuance costs could be materially higher during episodes of market stress.

The rest of the paper is structured as follows: Section 2 reviews the potential determinants of bank debt funding costs and their expected effects. Section 3 describes the sample and data sources. Section 4 outlines the empirical identification strategy. Section 5 presents the results of the weighted and Heckman regressions explaining the issuance cost of MREL instruments. Section 6 uses the model's results to decompose issuance costs for a sample of Spanish banks and to simulate the impact of issuing senior non-preferred versus senior debt on the financial performance of banks near the €100 billion threshold. Finally, Section 7 concludes by summarizing the main findings and discussing their implications.

2 Determinants of bank debt cost

A growing body of literature has analyzed the determinants of the cost of bank-issued debt, particularly unsecured liabilities with varying degrees of subordination. Empirical research typically identifies three broad groups of factors that influence debt spreads at issuance: bank-specific fundamentals, country-level macroeconomic conditions, and instrument-level characteristics.

Bank-specific variables are central in explaining variation in funding costs. Higher credit ratings, stronger capital buffers, greater profitability, and stronger operational efficiency are generally associated with lower spreads, as they signal improved creditworthiness and reduced default risk (Sironi, 2003; Berger and Bouwman, 2009; Babihuga and Spaltro, 2014; Evanoff et al., 2011; Crespi et al., 2019). Return on assets, for instance, has been found to negatively affect spreads, although some studies suggest a positive association in cases where high profitability reflects excessive risk-taking (Flannery and Sorescu, 1996). Capital adequacy, typically measured through Tier 1 or total capital ratios, also tends to reduce spreads, reflecting market confidence in well-capitalized institutions (Sironi, 2003; Crespi et al., 2019). Operational efficiency, proxied by lower cost-to-income ratios, has similarly been shown to favorably influence funding costs, as investors reward banks that are more effective at generating profits relative to their operating expenses (Babihuga and Spaltro, 2014).

Bank size decreases funding costs, which can reflect benefits from diversification and operational efficiencies, stronger investor appetite as these entities are better known franchises, or higher bond liquidity. Moreover, banks with better liquidity positions may also enjoy more favorable pricing. Still, the literature identifies conflicting effects of liquidity: while higher ratios of liquid assets can reduce perceived risk, they may also be interpreted as inefficient capital use or induce agency problems (Myers and Rajan, 1998; Jensen, 1986). Non-performing loan (NPL) ratios, used to capture asset quality, are positively related to spreads, consistent with the higher credit risk and uncertainty they entail (Flannery and Sorescu, 1996; Crespi et al., 2019).

When examining the impact of bank-specific characteristics, careful consideration must be given to the potential multicollinearity among explanatory variables, as high correlations may distort individual coefficient estimates and lead to misleading inferences. Collectively, these findings support the hypothesis that stronger bank fundamentals, measured through size, credit ratings, capitalization, profitability, efficiency, and asset quality, are associated with lower spreads at issuance.

Country-level and macroeconomic variables are also crucial determinants. Interest rate environments shape overall funding conditions, with lower rates generally compressing spreads (Duffee, 1998). The business cycle affects spreads by altering investor risk perception: in expansions, spreads tend to narrow, whereas recessions raise default risk and borrowing costs, particularly for weaker issuers (Crouhy et al., 2000; Santos, 2006). Several studies highlight the impact of systemic shocks, such as the US subprime crisis or the European sovereign debt crisis, on bank funding costs (Babihuga and Spaltro, 2014; Van Rixtel et al., 2016). Country-specific fiscal conditions also matter: Rancan et al. (2023) show that high public debt levels depressed bank bond issuance in Europe between 1990 and 2008, particularly for smaller or more traditional banks. Sironi (2003) finds that issuance currency and broader macro conditions influence subordinated debt pricing, and Van Rixtel et al. (2016) document how low interest rates prior to the 2008–2009 global financial crisis encouraged long-term issuance, whereas post-crisis funding conditions were dominated by country-risk considerations. These findings motivate the hypothesis that favorable macroeconomic and fiscal conditions (low interest rates, economic expansion, and reduced sovereign risk) are associated with lower bank debt spreads.

Instrument-specific characteristics further contribute to the variation in bank funding costs. Maturity is often found to increase spreads, reflecting the higher uncertainty and risk over longer horizons (Landschoot, 2004; Bonfim and Santos, 2004; Zaghini, 2014; Giuliana, 2022), though some studies, such as Crespi et al. (2019), identify negative or non-linear effects. Subordination strongly increases spreads due to the higher expected loss given default (Evanoff and Wall, 2000; Sironi, 2003), and empirical research has used the pricing of subordinated debt to test for market discipline. Other features, including whether a bond is listed, the presence of step-up clauses, and the use of collateral, may also influence pricing. Listed securities are expected to carry lower spreads due to greater liquidity, although this effect may be muted if market transparency is low (Crespi et al., 2019). Step-up bonds, offering increasing issuance yields over time, may lower initial funding costs if investors misprice their risk (Sironi, 2003). Altogether, this supports the hypothesis that instrument-level characteristics, such as longer maturity and more subordination, contribute to higher spreads due to increased risk.

While the existing literature offers extensive insights into the determinants of bank funding costs, most empirical analyses focus on periods prior to the implementation of the Bank Recovery and Resolution Directive (BRRD), particularly the introduction of the bail-in framework and Minimum Requirement for own funds and Eligible Liabilities (MREL). These regulatory changes have potentially altered the pricing of bank debt by increasing the salience of investor risk perception.

Recent studies provide evidence that the eligibility of instruments for bail-in under the BRRD framework has strengthened market discipline and increased the sensitivity of funding costs to bank-specific risk and to the instrument's ranking in the creditor hierarchy (Schäfer et al., 2016; Crespi et al., 2019; Lewrick et al., 2019; Pablos Nuevo, 2020; Cutura, 2021; Giuliana, 2022; Cerasi and Galfrascoli, 2023; Monjas et al., 2023). For example, where the bail-in tool is perceived as credible, the funding advantage historically enjoyed by large, systemically important banks due to implicit guarantees may have diminished, particularly for riskier institutions (Giuliana, 2022).

Previous studies highlighting the enhancement of market discipline under the BRRD underscore the need to reassess the determinants of bank debt costs in the current regulatory environment. Our contribution consists in decomposing the cost of various types of bank-issued debt, including both MREL instruments (AT1, Tier 2, senior non-preferred, and senior unsecured debt) and secured debt, to estimate the relative importance of their drivers under MREL requirements.

While Ibañez et al. (2024) document the evolution of MREL-eligible debt issuance between 2008 and 2023, emphasizing the growing role of mid-sized banks since 2018 in response to regulatory pressure, their analysis focuses primarily on issuance volumes and general cost patterns. In contrast, our study specifically examines the pricing of different categories of bank debt, identifying how individual bank characteristics and instrument features influence issuance spreads in the post-BRRD period.

3 Data and sample selection

Our analysis combines several databases. We focus primarily on primary bond market data retrieved from the Centralised Securities Database (CSDB) maintained by the European Central Bank (ECB). CSDB provides a monthly panel dataset with security-by-security information on debt instruments, equity, and investment fund shares issued worldwide by a broad range of entities, including private and public institutions, financial intermediaries, banks, insurance companies, and pension funds. Data is collected and updated on a monthly basis. For each month, we extract the corresponding CSDB file and retain only newly issued bonds during that month, thereby focusing exclusively on primary market activity. This procedure allows us to maximize the number of instruments captured, as securities are typically removed from the database six months after their maturity.

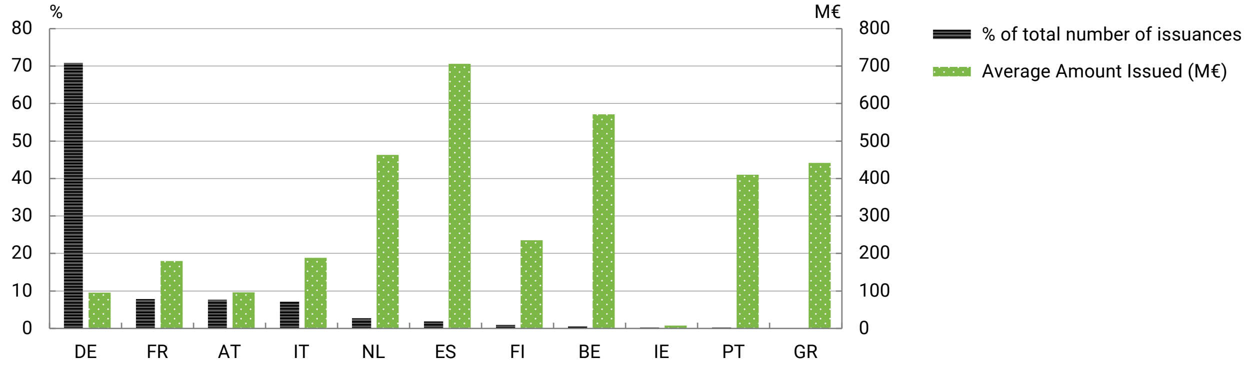
The data are filtered as follows: since our primary focus is on the MREL regulation, which applies exclusively to the European banking sector, we narrow our scope to include only banks belonging to the Banking Union in our sample. Additionally, to ensure MREL eligibility, we filter the data to include only instruments with a maturity of at least two years, as MREL eligible instruments must have a minimum maturity of one year. Furthermore, we only extract instruments that provide information on the amount of debt raised and we drop duplicates (observations with the same ISIN identifier). These filtering criteria yield a cross-sectional dataset comprising 27,350 instruments issued by 287 banks.

We then merge this dataset with bank-specific information from Standard & Poor's Capital IQ, which includes information such as the bank size (proxied by total assets), common equity Tier 1 ratio (CET1), return on average assets (ROA), commercial deposits, and the cost-to-income ratio. We also add the bank's credit rating at the time of the bond issuance, obtained from LSEG Workspace and S&P Capital IQ. Additionally, we incorporate macro-financial variables, such as the Overnight Index Swap (OIS) or GDP growth sourced from Datastream and the ECB. After merging the datasets and due to data availability, we are left with information for 12,075 issues of MREL instruments and 206 banks over the 2019Q3-2024Q3 period from 11 member countries of the Banking Union. These countries are Austria, Belgium, France, Finland, Germany, Greece, Ireland, Italy, the Netherlands, Spain and Portugal. Among these countries, Italy has the largest number of unique bank issuers with 87 banks, followed by Germany with 34 banks and Austria with 27 banks.

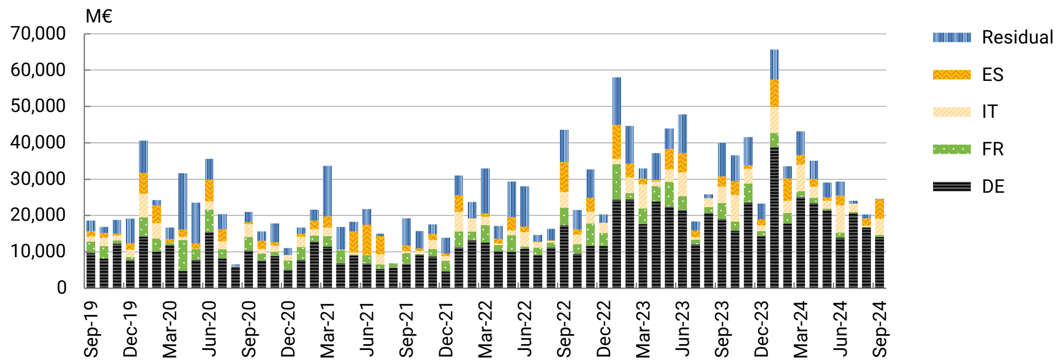
Chart 1.a shows the distribution of bond issuances across countries. Germany is the largest contributor, accounting for 70% of total bond issuances, followed by France with 7.8%, while Greece has the lowest number of issuances, representing just 0.1% of the total in our sample. Germany accounts for the largest number of bond issuances in the sample but records the lowest average issuance size per bond. In contrast, Spain accounts for a relatively small share of total issuances yet exhibits the highest average issuance size, at €700 million. These figures suggest that the composition of our sample is skewed towards smaller-sized German bonds. This potential bias in issuance size distribution will be explicitly addressed in the regression analysis. Chart 1.b illustrates the time evolution of the volume of MREL-eligible instruments issued by each country. Despite the COVID-19 pandemic, bank bond issuance remained robust during the spring of 2020. This resilience partly reflects the extraordinary monetary policy measures and stimulus programs implemented by the ECB, which boosted the overall volume of issuances and allowed banks to issue debt at comparatively lower costs. A similar pattern was observed in the United States, where bond issuance surged during the COVID period, as documented by Halling et al. (2020) and Becker and Benmelech (2021). In the post-COVID period, a notable increase in total issuances is observed, reaching a peak of €72 billion in January 2024.

Chart 1
Distribution of issuances by country

1.a Issuances by country



1.b Bond issuance volumes by country (EUR Millions)



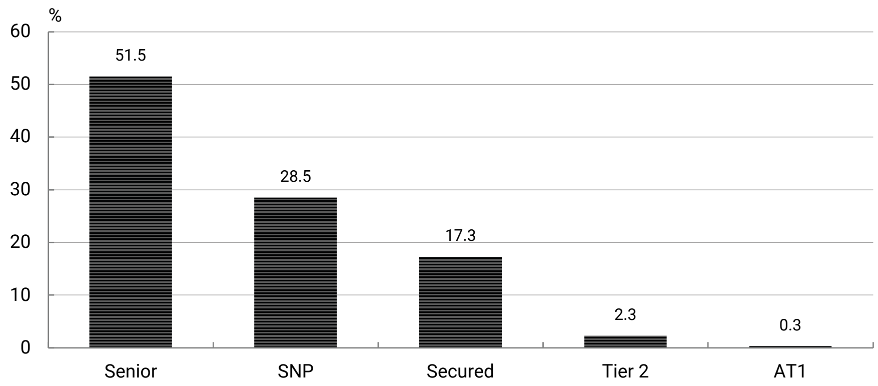
SOURCE: CSDB. Residual contains AT, BE, FI, GR, IE, NL and PT.

Chart 2.a presents the distribution of bank bond issuances by subordination level, measured as the percentage of the total number of issuances. Chart 2.b shows the time evolution of the volume of MREL-eligible instruments issued, broken down by subordination level. Senior unsecured debt accounts for 51.5% of instruments, senior non-preferred (SNP) debt represents 28.5%, secured instruments 17.3%, Tier 2 or subordinated bonds 2.3%, and Additional Tier 1 (AT1) instruments only 0.3%. Chart 2.b indicates that less subordinated instruments (i.e., senior unsecured and secured debt) became increasingly attractive during the period of rising interest rates. Due to their lower subordination rank, these instruments typically involve lower funding costs, making them preferable for issuance during the period of monetary tightening that began in July 2022 and continued until September 2023, when interest rates peaked at 4.5% in Europe. During this period, issuances of AT1 instruments were almost non-existent. Given that AT1 instruments are among the most expensive forms of debt issuance, banks likely opted for lower-cost alternatives, focusing on less subordinated bonds and shorter maturities.

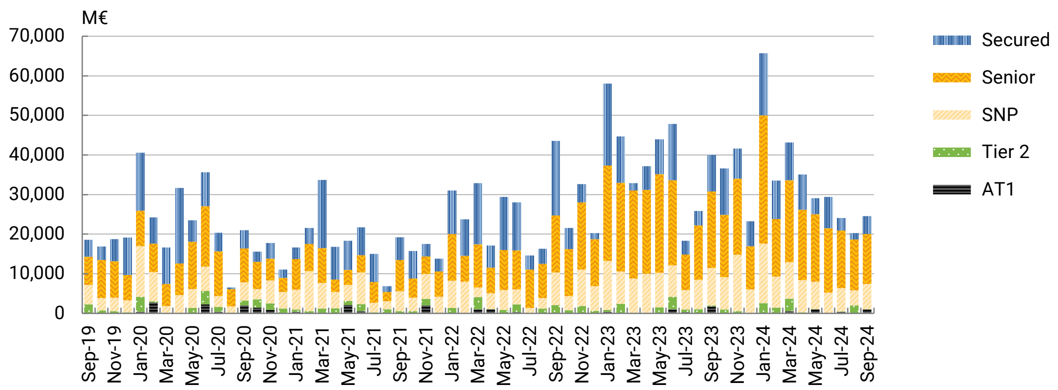
Charts 3.a and 3.b show MREL instrument issuance by bank credit rating, in terms of number of issuances and issuance volume over time, respectively. We classify banks into four groups: (1) High investment-grade banks

Chart 2
Distribution of issuances subordination rank

2.a Percentage of bank bond issuances by subordination rank (Number of issuances)



2.b Bank bond issuance volumes by subordination rank (EUR Millions)



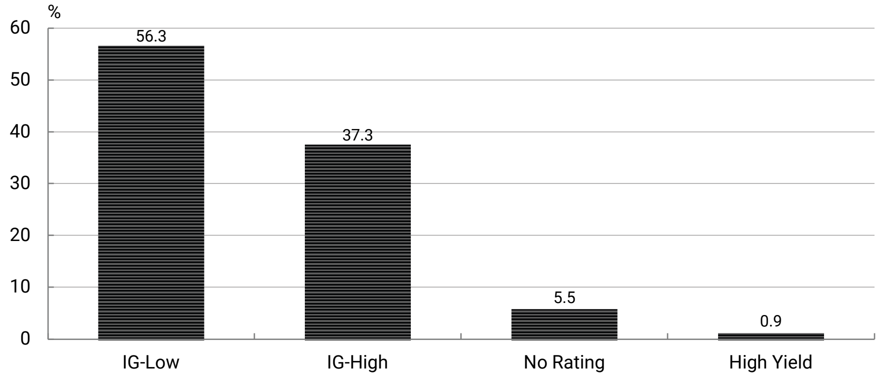
SOURCES: CSDB and Eikon Refinitiv.

(IG-High), rated AA– or higher; (2) Low investment-grade banks (IG-Low), rated between A+ and BBB–; (3) High-yield banks, rated BB+ or lower; and (4) banks without a credit rating. Both charts indicate that MREL issuance is primarily concentrated among investment-grade banks, while high-yield and unrated banks issue significantly less. This disparity reflects the limited market access of lower-rated banks, often due to their perceived financial fragility or reduced loss-absorbing capacity. As noted by Berger and Bouwman (2009), banks with lower credit ratings face greater difficulty accessing funding under favorable conditions, which in turn constrains their ability to issue debt.

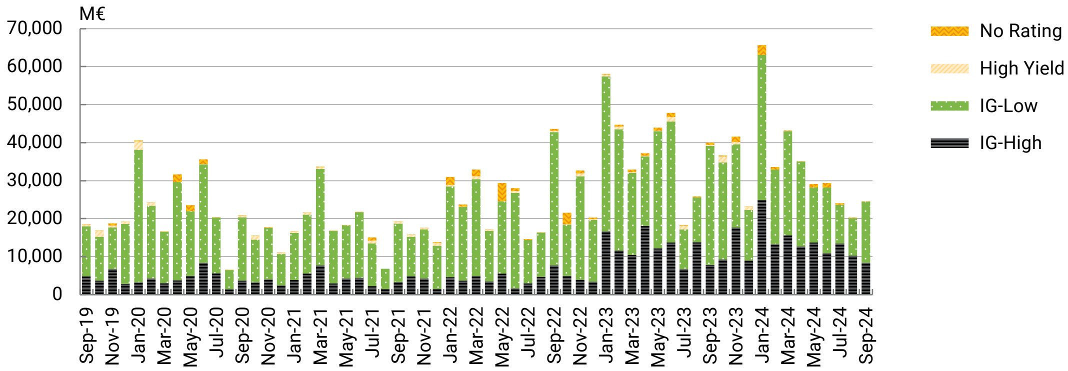
Charts 4.a and 4.b plot the distribution of MREL issuances by credit rating against, respectively, bank size and instrument subordination. In Chart 4.a, most G-SII issuers are in the low investment-grade segment, while O-SIIs and other Top-tier banks contain the highest-rated issuers. By contrast, banks with assets below €100 billion account for the majority of high-yield and unrated issuances.

Chart 3
Distribution of issuances by bank rating

3.a Percentage of bank bond issuances by bank rating (Number of issuances)



3.b Bank bond issuance volumes by bank rating (EUR Millions)



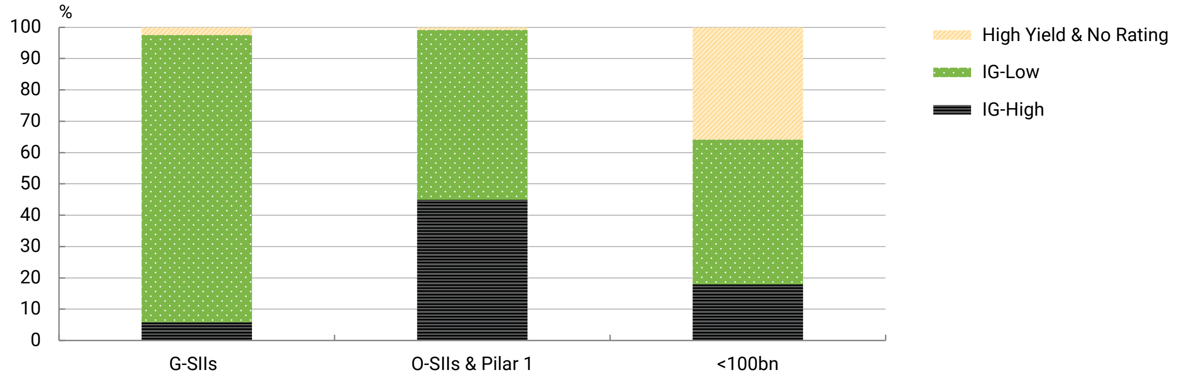
SOURCES: CSDB, Eikon Refinitiv and S&P Capital IQ.

Chart 4.b shows that banks rated as high investment-grade tend to issue a larger share of senior non-preferred (SNP) and collateralized debt instruments, with no issuances of Additional Tier 1 (AT1) instruments recorded for this group in our sample. Issuers rated as low investment-grade show a relative preference for senior unsecured and AT1 instruments. Meanwhile, high-yield and unrated banks together account for 35% of all Tier 2 issuances, showing almost no activity in the SNP and secured debt segments. These patterns indicate that larger issuers, typically in the low investment-grade segment, concentrate a significant share of AT1 and Tier 2 issuance activity.

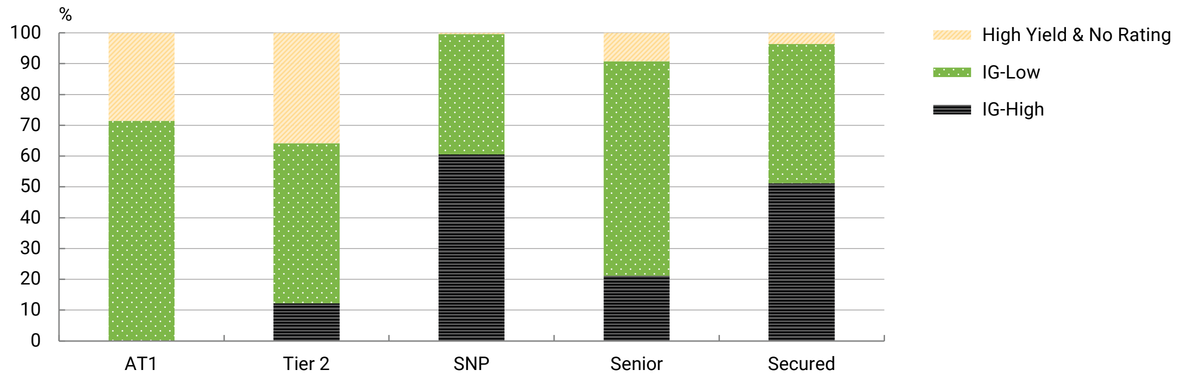
Finally, Chart 5 plots the average maturity of MREL bond issuances in our sample. In response to rising interest rates, banks shifted towards issuing shorter-term bonds. This adjustment was feasible because many banks had previously issued longer-term debt at lower rates. As documented by Graham and Harvey (2001), borrowers often prefer to issue long-term debt under favorable conditions to avoid the risk of refinancing during adverse periods. When financing conditions worsened, as observed in Europe during our analysis period, banks increasingly relied on lower-cost alternatives, such as short-term deposits, and reduced their issuances of long-term debt.

Chart 4
Distribution of bank credit ratings in bond issuances

4.a Distribution of bank credit ratings by bank size (% of total number of issuances)

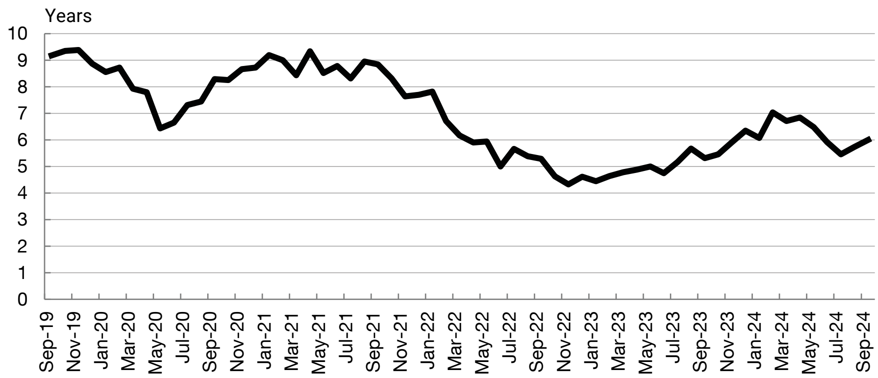


4.b Distribution of bank credit ratings by instrument



SOURCES: CSDB, Eikon Refinitiv and S&P Capital IQ.

Chart 5
Average original maturity of bond issuances



SOURCE: CSDB.

4 Empirical model and variables

We conduct a cross-sectional analysis to examine the determinants of the cost of issuing eligible liabilities by European banks under the MREL requirement. We apply alternative OLS regressions and also a Heckman's (1979) two-step procedure to control for endogeneity in the bond issuance decision. Below, we detail our empirical methodology.

4.1 An OLS model

We begin with a baseline OLS specification that considers bank-level, country-level, macroeconomic, and instrument-specific variables as potential determinants of the cost of issuing MREL-eligible liabilities. Our baseline model includes only observable explanatory variables because our primary goal is to develop a benchmark framework to assess the cost of issuing MREL eligible debt based on identifiable components. In any case, we check that our results are not biased by the omission of unobserved variables because the results do not change when we include country or year fixed effects. The model is as follows:

$$\text{Issuance yield}_{b,i,c,t} = \alpha_0 + \alpha\ \text{Bank}_{i,t-1} + \beta\ \text{Country\_Macro}_{c,t-1} + \gamma\ \text{Instrument}_b + \varepsilon_{b,i,c,t} \tag{1}$$

Where Issuance yield$_{b,i,c,t}$ represents the cost of issuing a bond b, by the bank i of country c at month t. Bank$_{i,t-1}$ represents the set of bank-specific variables. Country_Macro$_{c,t-1}$ represents the vector of country and macroeconomic variables. Instrument$_b$ is the set of bond characteristics of a particular issuance (maturity and degree of subordination). Both bank and country and macroeconomic-level variables are lagged one period to mitigate endogeneity concerns. $\varepsilon_{b,i,c,t}$ is the bond-bank-year specific error term.

We estimate both weighted and unweighted OLS regressions. The weighted regressions account for differences in issuance size. In our sample, small debt issuances (defined as those below the 25th percentile in size) account for only 1.2% of the total value of issuances. Therefore, our weighted OLS aims to avoid overweighting small issuances and capture the greater relative importance of larger bond issuances in our estimates. This is important given our purposes, as we want to use the model to benchmark the issuance costs of Spanish entities, which tend to issue bonds with relatively large issuance sizes. Unweighted regressions would therefore fail to adjust well the expected cost of funding of Spanish banks. The weight for bond b is computed by dividing the amount issued for each particular bond b by the total amount issued for all bonds in the sample, that is:

$$w_b = \frac{\text{Amount Issued}_b}{\sum_{b=1}^{B} \text{Amount Issued}_b} \tag{2}$$

4.2 Correcting for selection bias: a Heckman model

We additionally apply a two-stage Heckman procedure to control for the potential endogeneity of bank debt issuances. Banks self-select into issuing debt based on their characteristics and prevailing market conditions. For instance, banks may choose to issue debt when their financial profile enables them to obtain lower funding costs. Similarly, issuance activity may increase in low-interest-rate environments and decrease when rates rise, consistent with market timing theories (Baker and Wurgler, 2002).[3]

3 Tobit and double-hurdle models can be alternative approaches when estimating the determinants of the amount banks issue, as a zero-euro amount reflects the decision not to issue. However, these alternative models are less suitable for modeling issuance costs, since non-issuance does not correspond to a cost of zero.

The Heckman model corrects for this selection bias by first estimating a probit model to capture the bank's issuance decision (selection equation). For all banks included in our sample, we construct a panel dataset of monthly dummy variables that indicate whether a bank issued new bonds in each particular month *(Issuance)*. The dummy variable takes the value 1 if the bank issued a new bond in a particular month and 0 otherwise. Moreover, we do not impose any restrictions on the number of bonds a bank can issue in a month, allowing for multiple bond issuances within a month. We then estimate an inverse Mills Ratio (IMR) which measures the probability that a bank decides to issue eligible liabilities in a particular month. In the second stage of the Heckman model, we estimate the OLS regression (outcome equation) explaining the cost of issuing debt using only debt issuance data and including the IMR as an additional explanatory variable. The coefficient of the IMR in the second stage captures the importance of the bias in a standard OLS estimation caused by the endogeneity of the issuance decision.

Identification therefore hinges on at least one exclusionrestriction variable that appears in the selection (probit) equation but is omitted from the pricing equation. Such a variable must (i) be observable and relevant for the decision to issue and (ii) exert no direct influence on bond spreads, ensuring that any effect on the cost of debt operates solely through the probability of issuance. Using this instrument prevents the multicollinearity problems noted by Nawata (1993) when identical covariates are included in both stages of the Heckman procedure.

We use the bank's total deposit growth rate, lagged one year, as the instrument (DepositG). A bank's deposit growth rate should be negatively and significantly correlated with the probability of issuing debt. Intuitively, when there are constraints on deposit supply, banks must seek alternative sources of funding, such as issuing debt (Van Rixtel et al., 2016). For the second condition, liquidity needs should not drive funding costs. In this manner, Arnould et al. (2022) find that for a sample of European banks, bank liquidity has no impact on senior bond yields.[4] Other explanatory variables are the same as those included in equation (1). However, the set of dummies that indicate the degree of the subordination of the instrument and the bond's time-to-maturity are excluded, as they cannot be identified in the absence of bond issuances. Therefore, our baseline Heckman model is:

$$\text{First stage: Issuance}_{b,i,c,t} = \delta_0 + \delta\ \text{Bank}_{i,t-1} + \eta\ \text{Country\_Macro}_{c,t-1} + \theta\ \text{DepositG}_{i,t-1} + \varepsilon_{b,i,c,t} \tag{3}$$

$$\text{Second stage: Issuance yield}_{b,i,c,t} = \alpha_0 + \alpha\ \text{Bank}_{i,t-1} + \beta\ \text{Country\_Macro}_{c,t-1} + \gamma\ \text{IMR}_{i,t} + \varepsilon_{b,i,c,t} \tag{4}$$

4.3 Variables

Our empirical analysis uses variables at the bank, country, and instrument levels, along with macroeconomic indicators affecting the European banking sector. Table 1 presents summary statistics for these variables. All the variables have been winsorized at the 2.5th and 97.5th percentiles to reduce the influence of outliers.

4.3.1 Dependent variable

The primary dependent variable is the yield at issuance paid by the bank on newly issued bonds *(Issuance yield)*. Our sample includes bonds with three types of interest rate structures: fixed, zero, and floating rates. For some fixed-rate bonds with missing data, we supplement the dataset with additional information from LSEG Workspace. For

4 We evaluate two alternative instruments: the growth rate of APRs and a proxy for each bank's MREL buffer. While both variables could influence the volume of MREL-eligible issuance, given that banks partly issue these instruments to meet resolution requirements, neither meets the instrument relevance or exogeneity conditions; empirically, both are statistically insignificant in the first-stage and the second-stage equations.

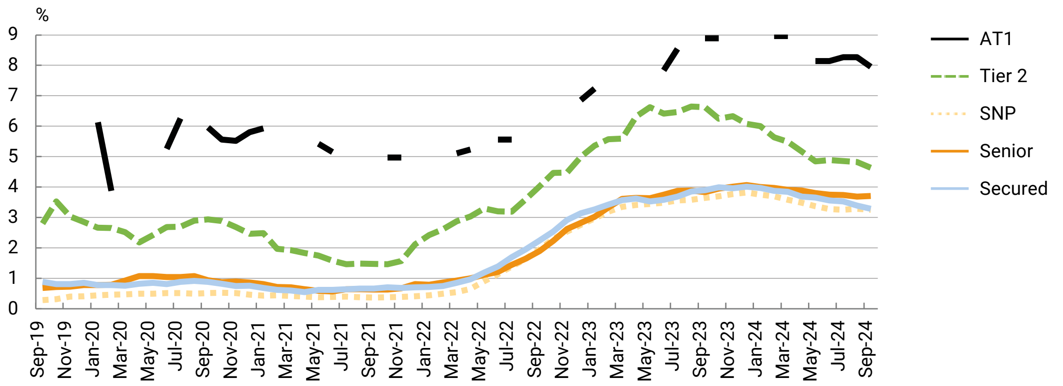
Table 1
Summary Statistics

Variables	Obs.	Mean	S.D.	Min.	P25	Median	P75	Max.
Panel A: Dependent variable								
Issuance yield	12.075	2.24	1.71	0.03	0.57	2.33	3.5	6.5
Panel B: Bank-level variables								
G-SII	12.075	0.09	0.28	0	0	0	0	1
O-SII & Top-tier	12.075	0.76	0.42	0	1	1	1	1
<100bn	12.075	0.15	0.36	0	0	0	0	1
IG-High	12.075	0.37	0.48	0	0	0	1	1
IG-Low	12.075	0.56	0.49	0	0	1	1	1
HY & NR	12.075	0.06	0.24	0	0	0	0	1
CET1	12.075	14.92	2.17	6.63	13.93	14.67	15.26	33.40
ROA	12.075	0.31	0.25	-0.08	0.15	0.23	0.40	1.34
CIR	12.075	64.90	10.34	21.96	58.58	64.90	71.41	91.08
DepositG	12.075	0.05	0.09	-0.14	0.005	0.04	0.09	0.40
Panel C: Country and macroeconomic variables								
OIS	12.075	1.15	1.91	-0.60	-0.57	-0.35	3.46	3.92
Term spread	12.075	0.09	0.81	-1.59	-0.48	0.16	0.49	2.33
Sovereign Spread	12.075	-0.14	0.37	-0.86	-0.39	-0.18	-0.09	1.95
GDP Growth	12.075	0.60	3.77	-10.7	-0.30	0.30	2.10	13.40
FM Dev	12.075	3.91	1.73	0.78	3.05	4.44	4.65	7.37
Panel D: Instrument-level variables								
Maturity	12.075	6.66	3.68	2.00	4.00	6.00	9.00	16.00
AT1	12.075	0.00	0.05	0	0	0	0	1
Tier 2	12.075	0.02	0.15	0	0	0	0	1
SNP	12.075	0.28	0.45	0	0	0	1	1
Senior	12.075	0.51	0.49	0	0	1	1	1
Secured	12.075	0.17	0.37	0	0	0	0	1

SOURCES: Own elaboration based on data from CSDB, S&P Capital IQ, LSEG Workspace.
NOTE: This table presents the summary statistics for the variables used in the analysis. The dependent variable, bank-level, country-level and macroeconomic indicators, and instrument-level variables have been winsorized at the 2.5th and 97.5th percentiles. Issuance yield represents the yield paid by the bank in the primary market. A bank is classified as G-SII based on a public list provided by the FSB, and as an O-SII based on a list provided by the EBA. A bank is considered Top-tier if it is neither G-SII nor O-SII but has more than 100 billion euros in total assets. And <100bn if their total assets are lower than 100 billion euros. IG-High represents banks with an AA- or higher credit rating. IG-Low represents banks with ratings between A+ and BBB, and HY & NR represents BB+ or lower credit rating, or issuances related to banks where no rating information is provided. CET1 is the Common Equity Tier 1 Ratio, ROA is the Return on Average Assets, CIR is the Cost-to-Income ratio, and DepositG is the annual growth rate of deposits. OIS denotes the three-month Overnight Index Swap. The term spread is defined as the difference between the OIS rate with a maturity identical to that of the issuance and the three-month OIS rate. The sovereign spread is the difference between the yield on a sovereign bond with the same maturity as the issuance and the OIS rate of that maturity. GDP Growth refers to the quarterly growth rate of Gross Domestic Product. FM Dev is defined as the ratio of the total stock of debt issued annually in a country to the size of the banking sector, measured as the aggregate total assets of all banks. Maturity is the years-to-maturity of the bond. AT1 is a dummy that represents Additional Tier 1 or CoCos issuances. Tier 2 is a dummy that represents Tier 2 or subordinated issuances. SNP is a dummy that represents senior son-preferred issuances. Senior is a dummy that represents senior unsecured issuances. Secured is a dummy that represents covered bonds or other secured debt.

floating-rate bonds, we use the initial interest rate paid. If this information is unavailable, we approximate it using the OIS term rate corresponding to the bond's maturity, plus a spread to mid-swaps from Datastream. Observations with a reported 0% rate are excluded, as this likely reflects missing data. In our final sample, fixed-rate bonds account for 86% of issuances, floating-rate bonds for 13%, and zero-rate bonds for 1%. Table 1 shows that the average interest rate in our sample is 2.24%, with a standard deviation of 1.71%.

Chart 6
Issuance yield by subordination rank



SOURCES: CSDB and Eikon Refinitiv.

Table 2
Average issuance yield (a)

Panel A: Dependent variable					
	G-SIIs	O-SIIs & Top-tier	<100bn		
	3.38	2.09	2.36		
Panel B: Bank-Rating					
	IG-High	IG-Low	HY & NR		
	1.86	2.37	3.34		
Panel C: Subordination Rank					
	AT1	Tier 2	SNP	Senior	Secured
	6.13	3.99	1.83	2.46	1.97

SOURCE: CSDB.
NOTE: The table shows the average issuance yield for MREL issues unconditional on other characteristics. A bank is classified as G-SII based on a public list provided by the FSB, and as an O-SII based on a list provided by the EBA. A bank is considered Top-tier if it is neither G-SII nor O-SII but has more than 100 billion euros in total assets. And <100bn if their total assets are lower than 100 billion euros. IG-High represents banks with an AA- or higher credit rating. IG-Low represents banks with ratings between A+ and BBB, and HY & NR represents BB+ or lower credit rating, or issuances related to banks where no rating information is provided. AT1 are Additional Tier 1 bonds, Tier 2 are Tier 2 or subordinated bonds, SNP are senior non-preferred bonds, Senior represents senior unsecured debt and Secured represents covered bonds or other secured debt.

a A moving average with a 5-month window has been used to smooth the time series of the monthly issuance yields.

Chart 6 shows the evolution of the yield at issuance paid by European banks on MREL instruments, while Table 2 summarizes the average issuance yield depending on bank size, bank rating and instrument subordination. The average issuance yield for AT1 instruments is 6.13%, while the average issuance yield for Tier 2 instruments is 3.99%. This large difference is as expected, since AT1 instruments should pay a higher cost of debt than Tier 2 instruments. AT1 bonds are designed to protect financial stability in times of crisis by being converted into equity if the bank's capital ratio falls below a certain level, while investors earn above-average interest during times of financial soundness, whereas Tier 2 instruments will absorb losses after AT1 securities. Irrespective of other characteristics, SNP bonds are the ones that pay a lower cost of debt, even less than secured instruments, while senior bonds pay a higher cost of debt than these two categories with an issuance yield of 2.46%. Unconditionally, high investment-grade issuances bear the lowest average yield (1.86%). Low investment-grade issues yield 2.37%, whereas highyield and unrated instruments pay 3.34% on average. By bank category, G-SIIs face the highest mean issuance cost (3.38%) when no other characteristics are controlled for. Small banks pay 2.36%, while O-SIIs and other Top-tier banks record the lowest cost, at 2.09%.

Some of the patterns in the unconditional yields reflect compositional biases in the issuer sample. For example, SNP bonds exhibit the highest share of top-rated issuers, whereas G-SIIs account for the bulk of AT1 issuances, which are costlier due to their high level of subordination.

4.3.2 Bank-level explanatory variables

We employ bank annual data which mainly come from Standard & Poor's Capital IQ. The selected variables capture bank size/systemic importance, credit rating, capital, profitability, and efficiency, and are measured at the end of the year preceding each debt issuance. To measure bank size and systematicity we define three dummy variables to identify: (1) Global Systemically Important Institutions *(G-SII)*; (2) Other Systemically Important Institutions and banks with total assets above €100 billion *(O-SII & Top-tier)*; and (3) banks with total assets below €100 billion *(<€100bn)*. We classify a bank as a G-SII based on the annual list published by the FSB, and as an O-SII based on the list provided by the EBA.[5] Banks that are neither G-SIIs nor O-SIIs but have total assets of at least €100 billion are also included in the O-SII & Top-tier category, reflecting their systemic relevance. Banks with assets below €100 billion and not designated as O-SIIs are classified as small banks. This categorization is consistent with the Banking Package, which establishes different subordination requirements for MREL-eligible liabilities based on systemic relevance and size. G-SIIs are subject to the most stringent subordination requirements, Top-tier banks (i.e., those above the €100 billion threshold) and Other Pillar 1 banks also face subordination requirements (although lower), and smaller, non-systemic Institutions are generally not subject to binding subordination requirements. We omit the dummy for small banks in our regressions.

We use the bank credit rating at issuance from two providers: Standard & Poor's ratings are sourced from Capital IQ, while DBRS and Moody's ratings are retrieved from LSEG Workspace. The ratings of the different providers have been converted to ensure they provide the same level of information. We use three dummy variables to identify each one of the following three categories: 1) high investment-grade for ratings of AA- or higher *(IG-High)*; 2) low investment-grade for ratings between A+ and BBB- *(IG-Low)*; and 3) High yield & No rating banks for ratings of BB+ or lower, and for unrated banks *(HY & NR)*. We omit in the regressions the dummy variable corresponding to the category of *HY & NR*.

We use the Common Equity Tier 1 *(CET1)* ratio, defined as the bank's core equity capital, primarily common shares and retained earnings, divided by risk-weighted assets, as an additional measure of bank solvency. Bank profitability is proxied by the return on average assets *(ROA)*, defined as net income as a percentage of average assets. Finally, as a proxy for operational efficiency, we use the cost-to-income ratio *(CIR)*, where higher expenses as a proportion of income would be an indicator of lower bank efficiency.

5 The list of G-SIIs is published in November every year. The last list published can be accessed at: https://www.fsb.org/2025/11/2025-list-of-global-systemically-important-banks-g-sibs/. The list of O-SIIs notified to the EBA every year can be freely accessed at: https://www.eba.europa.eu/risk-and-data-analysis/risk-analysis/risk-monitoring/other-systemically-important-institutions-o-siis.

As indicated in Section 2, we expect that stronger bank fundamentals, measured through large bank size, better credit ratings, higher capitalization and profitability, and greater efficiency, are associated with lower cost of bank debt issuance.[6]

4.3.3 Country and macroeconomic variables

Country and macroeconomic conditions are proxied by five time-varying variables. First, we proxy the overall risk-free rate of the economy by using the three-month overnight index swap (OIS). Since the risk-free rate sets the minimum rate a bank should pay for its cost of debt, we expect the relationship to be positive; an increase in the interest rate should correlate with a greater cost of debt.

Second, we distinguish between the slope of the risk-free yield curve and sovereign credit premia by defining two variables: the Term spread and the Sovereign spread. The term spread is defined as the difference between the OIS rate with the same maturity as the instrument at issuance and the three-month OIS rate; a steeper riskfree curve raises the benchmark component of the coupon, so we expect a positive relationship between this spread and the cost of MREL instruments. The sovereign spread is defined as the yield differential between the issuer's home-country sovereign bond and the OIS rate of identical maturity. A positive coefficient would be consistent with financial fragmentation, that is, bank funding spreads moving in line with country-level sovereign yields. Including both variables allows us to isolate pure termstructure effects from sovereign risk effects and to assess their separate contributions to the pricing of MRELeligible debt.

Third, we include the quarterly growth of GDP to capture real economic activity *(GDP Growth)*. We expect a higher GDP growth to be associated with a lower cost of debt, as during "good" times banks increase their debt issuance, while borrowers experience an improvement in their financial status, improving their ability to repay their debt.

Finally, we construct a proxy for the financial market development in each country. This variable is defined as the ratio of the total amount of bank debt issued each year in a country relative to the banking sector's total size, measured as the sum of all bank's total assets *(FM Dev)*. We expect a negative coefficient for this variable as more developed financial markets tend to have greater experience with debt issuances and a broader investor base.[7]

4.3.4 Instrument-level variables

We include two main instrumentlevel variables. First, we consider the bond's time to maturity, measured in years (Maturity). Second, we define five dummies based on the subordination level of the instrument. Specifically, we define separate dummy variables for AT1 instruments (AT1), also known as Contingent Convertible bonds (CoCos), Tier 2 or subordinated instruments (Tier 2), senior non-preferred (SNP), senior unsecured (Senior), and secured debt

6 Our selection of bank-level variables aims to avoid correlation problems that could prevent their simultaneous inclusion in the model. For this reason, we sequentially introduced the variables and verified that there were no multicollinearity problems leading to sign reversals in any coefficient after the addition of a new variable. Initially, we also considered liquidity ratios, the non-performing loans ratio, and the share of customer deposits as additional explanatory variables at the bank level. However, none of these variables exhibited statistically significant coefficients once the previously mentioned variables were included.

7 This measure aligns closely with the supply side of bank funding and is consistently available across our sample. Because it can co-move with issuance cycles, a complementary set of slower moving market development proxies may be informative in extensions, such as stock market capitalization and value traded relative to GDP, the stock of domestic bonds outstanding relative to GDP, or country-level liquidity measures such as benchmark sovereign bid and ask spreads. These alternatives reflect structural market depth and trading liquidity, and can help sharpen the interpretation of the development channel without altering our baseline specification.

that is guaranteed by collateral (Secured). The secured instruments are the only ones not eligible under the MREL framework. As indicated in Section 2, we expect that longer maturity and more subordination are associated with a higher cost due to increased risk.

5 Empirical results

5.1 Main results

5.1.1 OLS regressions

Table 3 presents the results of OLS regressions for model (1). Columns (1) to (3) show estimates from regressions weighted by the size of the debt issuance, while column (4) reports unweighted estimates for comparison.

The results in column (1) indicate that bank size is negatively associated with the cost of debt. The negative and statistically significant coefficients for the G-SII and O-SII & Top-tier variables suggest that these categories of banks, on average, face a 24 and 22 bp lower cost of debt, respectively, compared to banks with total assets below €100 billion. This finding is consistent with the presence of diversification benefits and operational efficiencies in larger institutions. These results align with previous evidence from the period preceding the 2008–2009 global financial crisis (Sironi, 2003; Babihuga and Spaltro, 2014; Acharya et al., 2016; Baron, 2020).

Banks with a high investment-grade rating consistently benefit from lower debt funding costs compared to high-yield or unrated peers. However, we do not find evidence of a significantly lower cost of debt for banks with low investment-grade ratings relative to those in the high-yield or unrated categories. Specifically, high investment-grade institutions, on average, incur debt costs that are 46 bp lower than those observed in the high-yield or unrated categories. The cost-to-income ratio exhibits a positive and statistically significant coefficient, indicating that, all else equal, more inefficient banks tend to face higher funding costs. The return on assets does not have a statistically significant coefficient at conventional levels.

Regarding macro and countrylevel factors, the riskfree rate (three-month OIS) is positively and statistically related to banks' cost of debt, reflecting the mechanical passthrough of baseline rates. The term spread also enters positively: a steeper curve embeds expectations of higher future short-term rates and a larger inflation risk premium, both of which raise required yields on bank bonds. Likewise, a wider sovereign spread significantly increases funding costs, consistent with financial fragmentation and the alignment between sovereign premia and bank yields. In addition, the significant negative coefficient on the financial development index indicates that banks in more developed markets obtain funding at lower spreads, consistent with deeper investor bases and greater secondary market liquidity. By contrast, GDP growth is not statistically significant at conventional levels.

Instrument-level variables behave largely as expected. Debt maturity is positively associated with funding cost, in line with the notion that longer maturities require higher compensation for credit and liquidity risk (Helwege and Turner, 1999). The dummy variables capturing the degree of subordination of debt instruments are all positive and highly significant. These coefficients increase monotonically with subordination level: AT1 instruments are associated with the highest cost premium, followed by Tier 2, senior non-preferred (SNP), and senior unsecured debt, relative to the omitted category of secured debt. This pattern supports the idea that investors demand higher returns to compensate for greater loss-absorption risk.

Our baseline specification in column (1) includes only observable explanatory variables, as the model is intended to decompose the cost of bank debt into identifiable components. To mitigate potential biases arising from unobserved, time-invariant country characteristics and from macroeconomic shocks common to all banks in a given period, we reestimate the specification shown in column (1) while adding country and year fixed effects

Table 3

Main Results – OLS regressions

	Dependent variable: Issuance yield$_{b,i,c,t}$			
	(1)	(2)	(3)	(4)
G-SII$_{i,t}$	-0.2361***	-0.2395***	-0.2395	0.8296***
	(-3.80)	(-3.62)	(-1.59)	(13.86)
O-SII & Top-tier$_{i,t}$	-0.2171***	- 0.2251***	-0.2251**	0.1952***
	(-3.92)	(-4.09)	(-2.17)	(7.01)
IG-High$_{i,t}$	-0.4604***	-0.2720***	-0.2720*	-0.6187***
	(-4.39)	(-2.63)	(-1.92)	(-10.42)
IG-Low$_{i,t}$	-0.1448	0.0099	0.0099	-0.4370***
	(-1.45)	(0.10)	(0.07)	(-7.60)
CET1$_{it-1}$	-0.0063	-0.0002	-0.0002	0.0020
	(-1.07)	(-0.05)	(-0.03)	(0.53)
ROA$_{it-1}$	0.0693	-0.0994	-0.0994	-0.1197**
	(0.78)	(-1.20)	(-0.60)	(-2.44)
CIR$_{it-1}$	0.0044*	0.0066***	0.0066*	-0.0064***
	(1.71)	(3.34)	(1.89)	(-6.38)
OIS$_{c,t-1}$	1.0168***	0.9810***	0.9810***	0.9603***
	(76.73)	(32.27)	(23.44)	(117.77)
Term spread$_{c,t-1}$	1.0894***	0.8529***	0.8529***	0.8886***
	(33.85)	(19.00)	(10.33)	(44.44)
Sovereign spread$_{c,t-1}$	0.6511***	0.0270	0.0270	0.7081***
	(12.01)	(0.20)	(0.12)	(18.26)
GDP Growth$_{c,t-1}$	0.0057	-0.0007	-0.0007	-0.0016
	(1.16)	(-0.11)	(-0.11)	(-0.69)
FM Dev$_{c,t-1}$	-0.0290***	0.0027	0.0027	-0.0912***
	(-3.27)	(0.15)	(0.08)	(-14.24)
Maturity$_b$	0.0248***	0.0444***	0.0444***	0.0276***
	(4.91)	(9.55)	(3.82)	(12.35)
AT1$_b$	3.5604***	3.4788***	3.4788***	2.8476***
	(15.05)	(15.38)	(10.15)	(15.37)
Tier 2$_b$	1.6035***	1.6177***	1.6177***	1.0965***
	(12.55)	(12.79)	(7.92)	(16.09)
SNP$_b$	0.5619***	0.5357***	0.5357***	-0.1403***
	(11.92)	(9.64)	(3.83)	(-6.86)
Senior$_b$	0.2443***	0.2140***	0.2140**	-0.1416***
	(5.94)	(4.61)	(2.09)	(-6.25)
Constant	0.6889**	0.0430	0.0430	2.0924***
	(2.31)	(0.20)	(0.12)	(17.43)
Weighted	Yes	Yes	Yes	No
Cluster SE	Robust	Robust	Bank	Robust
Country and year FE	No	Yes	Yes	No
Observations	12,075	12,075	12,075	12,075
Adj. R^2	83.25%	84.49%	84.49%	75.49%

SOURCES: Own elaboration based on data from CSDB, S&P Capital IQ, LSEG Workspace.
NOTE: This table reports the determinants of the cost of debt for banks under different specifications: a weighted OLS regression where the weights are given by the size of the debt issued [column (1)], a weighted OLS regression including country and year fixed effects [column (2)], a weighted regression including country and year fixed effects and clustering of the standard errors at bank level [column (3)], and an unweighted OLS regression [column (4)]. G-SII: takes value 1 if the bank is classified as a G-SII based on a public list provided by the FSB. O-SII & Top-tier takes value 1 if it is listed as an O-SII based on a list provided by the EBA or if the bank is neither a G-SII nor an O-SII but has total assets higher than 100 billion euros. The reference group consists of banks with total assets lower than 100 billion euros. IG-High is a dummy that takes the value 1 if the bank has an AA- or higher credit rating. IG-Low is a dummy that takes the value 1 if the bank has a credit rating between A+ and BBB-. The base group is represented by high-yield and no-rating banks, where high-yield represents a BB+ or lower credit rating. CET1 is the Common Equity Tier 1 Ratio. ROA is the Return on Average Assets. CIR is the Cost-to-Income Ratio. OIS denotes the three-month Overnight Index Swap. The term spread is defined as the difference between the OIS rate with a maturity identical to that of the issuance and the three-month OIS rate. The sovereign spread is the difference between the yield on a sovereign bond with the same maturity as the issuance and the OIS rate of that maturity. GDP Growth refers to the quarterly growth rate of Gross Domestic Product. FM Dev is defined as the ratio of the total stock of debt issued annually in a country to the size of the banking sector, measured as the aggregate total assets of all banks. Maturity is the years-to-maturity of the bond. AT1 is a dummy that represents Additional Tier 1 or CoCos issuances. Tier 2 is a dummy that represents Tier 2 or subordinated issuances. SNP is a dummy that represents senior non-preferred issuances. Senior is a dummy that represents senior unsecured issuances. The dummy identifying secured liabilities is omitted in the regression. Significance is reported as follows: *** p<0.01, ** p<0.05, * p<0.1.

(column (2)). The coefficients on the bank and instrumentlevel controls remain virtually unchanged, confirming the robustness of the baseline results. The dummy that distinguishes low investment-grade banks from their high-yield or unrated peers retains its negative sign but is no longer statistically significant at conventional levels. Among the countrylevel variables, the sovereign spread and the financial-market-development index lose significance once the country dummies are introduced, whereas the OIS rate and the term spread preserve their positive and significant coefficients. This loss of statistical significance is to be expected: country fixed effects absorb much of the cross-sectional variation in country-level variables, especially when those variables exhibit limited within country variation over time, thereby reducing the independent variation available for precise estimation.

Column (3) presents results with standard errors clustered at the bank level while still including country and year fixed effects. Because banks issue multiple bonds over the sample period, clustering at the bank level captures within bank error correlation and yields consistent standard error estimates in the presence of unobserved bankspecific effects (Petersen, 2009). Although this clustering reduces the statistical significance of some coefficients, the main findings remain unchanged. Only the coefficient on the G-SII dummy becomes marginally insignificant relative to that reported in column (2).

Finally, column (4) reports results from the unweighted regression. In several instances, the estimated effects differ markedly from those of the weighted regressions. For instance, bank size is positively associated with the cost of debt, contradicting much of the existing literature. Moreover, the coefficients on the SNP and senior debt dummies are unexpectedly negative and significant, suggesting a lower cost for more subordinated instruments—a result likely stemming from the failure to account for issuance size. Some macroeconomic variables, such as GDP growth and financial market development, appear significant only in the unweighted model. These discrepancies highlight the importance of weighting regressions by issuance size, as this approach gives more influence to larger and potentially more informative observations and yields a more reliable identification of the determinants of bank debt costs.

5.1.2 A Heckman selection model

Our sample of unsecured debt issuances consists of banks issuing different instruments at different points in time, selecting when to issue based on their characteristics and prevailing market conditions. Since not all banks issue with the same probability, and they can strategically time their issuances, OLS estimates may suffer from selection bias. In particular, explanatory variables influencing both the probability of issuance and the cost of debt can introduce correlation with the error term in OLS estimations, leading to biased and inconsistent results. To address this potential endogeneity in banks' issuance decisions, we apply a two-stage Heckman selection model to correct for possible biases in our OLS estimates.

Table 4 reports the results of the Heckman model described in sub-section 4.2. Column (1) reports the results of the probit regression explaining the probability of issuing MREL-eligible liabilities in a given month. We find that larger banks (G-SIIs, and O-SIIs & Top-tier banks) have a higher probability of issuance compared to banks with total assets below €100 billion. Similarly, banks with an investment-grade rating are more likely to issue debt than banks rated as high-yield or those without a credit rating. These results are consistent with larger and better-rated banks, which face fewer information asymmetries, having greater access to financial markets and can obtain funding under more favorable conditions (Covitz and Harrison, 2004; Carbó-Valverde et al., 2011; Van Rixtel et al., 2016).

The negative coefficients for CET1 and ROA, along with the positive coefficient for CIR, indicate that the probability of issuing MREL-eligible securities decreases with higher capital (CET1 ratio) and profitability (ROA), but

Table 4

Main Results – Heckman model

	$\text{Issuance}_{b,i,c,t}$ (Probit)	Dependent variable: $\text{Issuance yield}_{b,i,c,t}$		
	(1)	(2)	(3)	(4)
$\text{G-SII}_{i,t}$	1.2371***	-0.7312***	-0.7678***	-0.9164***
	(21.95)	(-5.29)	(-5.91)	(-8.40)
O-SII & $\text{Top-tier}_{i,t}$	1.1473***	-0.6131***	-0.6538***	-0.8809***
	(38.01)	(-4.98)	(-5.79)	(-7.91)
$\text{IG-High}_{i,t}$	0.5761***	-0.5908***	-0.6012***	-0.8558***
	(11.64)	(-4.08)	(-4.14)	(-7.88)
$\text{IG-Low}_{i,t}$	0.1819***	-0.2851**	-0.2876**	-0.4402***
	(4.47)	(-2.09)	(-2.11)	(-4.29)
CET1_{it-1}	-0.05168***	0.0174*	0.0194**	0.0303***
	(-14.92)	(1.74)	(2.02)	(3.45)
ROA_{it-1}	-0.2158***	0.2297**	0.2306**	0.2303**
	(-4.34)	(1.99)	(2.00)	(2.43)
CIR_{it-1}	0.0086***	0.0108***	0.0103***	0.0031
	(8.08)	(3.30)	(3.12)	(1.24)
$\text{OIS}_{c,t-1}$	0.1242***	0.9742***	0.9763***	0.9680***
	(12.59)	(60.73)	(62.78)	(72.63)
Term $\text{spread}_{c,t-1}$	0.2457***	1.0951***	1.0877***	0.9879***
	(9.9)	(27.67)	(27.43)	(30.66)
Sovereign $\text{spread}_{c,t-1}$	-0.5525***	1.3752***	1.3975***	0.9713***
	(-16.79)	(14.9)	(15.95)	(14.06)
GDP $\text{Growth}_{c,t-1}$	-0.0160***	0.0054	0.0055	0.0140***
	(-5.57)	(0.79)	(0.80)	(2.75)
FM $\text{Dev}_{c,t-1}$	0.1805***	-0.05329***	-0.0566***	-0.0928***
	(18.24)	(-3.62)	(-3.97)	(-8.48)
Maturity_{b}				0.0208***
				(4.22)
AT1_{b}				3.6336***
				(15.43)
Tier 2_{b}				1.6393***
				(12.86)
SNP_{b}				0.5969***
				(12.25)
Senior_{b}				0.2948***
				(6.65)
$\text{IMR}_{i,t}$		-0.9182***	-0.9858***	-1.1775***
		(-4.69)	(-5.46)	(-7.37)
$\text{DepositG}_{i,t-1}$	-0.5117***	-0.2659		
	(-4.00)	(-1.16)		
Constant	-0.6934***	1.4066***	1.4661***	-1.7689***
	(-6.19)	(4.53)	(-5.46)	(6.52)
Weighted	No	Yes	Yes	Yes
Cluster SE	Robust	Robust	Robust	Robust
Country and year FE	No	No	No	No
Observations	17,877	12,075	12,075	12,075
Adj. R^2	40.89%	73.96%	73.95%	83.59%

SOURCES: Own elaboration based on data from CSDB, S&P Capital IQ, LSEG Workspace.
NOTE: This table reports the determinants of the cost of debt for banks applying the Heckman Model described in equations (3) and (4). In the Heckman model, the selection equation is determined by the probability that a bank issues bonds in a particular month. G-SII: takes value 1 if the bank is classified as a G-SII based on a public list provided by the FSB. O-SII & Top-tier takes value 1 if it is listed as an O-SII based on a list provided by the EBA or if the bank is neither a G-SII nor an O-SII but has total assets higher than 100 billion euros. The reference group consists of banks with total assets lower than 100 billion euros. IG-High is a dummy that takes the value 1 if the bank has an AA- or higher credit rating. IG-Low is a dummy that takes the value 1 if the bank has a credit rating between A+ and BBB-. The base group is represented by high-yield and no-rating banks, where high-yield represents a BB+ or lower credit rating. CET1 is the Common Equity Tier 1 Ratio. ROA is the Return on Average Assets. CIR is the Cost-to-Income Ratio. OIS denotes the three-month Overnight Index Swap. The term spread is defined as the difference between the OIS rate with a maturity identical to that of the issuance and the three-month OIS rate. The sovereign spread is the difference between the yield on a sovereign bond with the same maturity as the issuance and the OIS rate of that maturity. GDP Growth refers to the quarterly growth rate of Gross. Significance is reported as follows: *** p<0.01, ** p<0.05, * p<0.1.

increases with bank inefficiency (CIR). These findings are consistent with the idea that banks in our sample primarily issue debt to comply with regulatory requirements: a higher CET1 ratio reduces the need for additional MREL-eligible liabilities, while a higher ROA or a lower CIR improves a bank's ability to meet MREL requirements using internal funds.

Regarding country and macrolevel determinants, the firststage probit estimates show that a more developed financial market significantly increases the likelihood of issuing eligible liabilities. A higher riskfree rate (three-month OIS) likewise raises the probability of issuance, while a steeper term spread has a similar positive effect, consistent with banks' greater propensity to tap markets when the yield curve signals higher expected future rates. By contrast, a wider sovereign spread significantly reduces the likelihood of issuance, indicating that heightened countryrisk premia deter market access. Finally, GDP growth enters with a negative and statistically significant coefficient, suggesting that banks rely less on wholesale funding during economic upswings, when internal resources are typically more abundant.

The results of the outcome equation in the Heckman model are reported in columns (2)-(4). We include the inverse of the Mills ratio (IMR) from the first stage in the outcome equation to analyze the determinants of the cost of unsecured debt after controlling for the endogeneity of the issuance decision. We also employ a weighting scheme in OLS of the second stage.

We begin by verifying that the depositgrowth rate is an appropriate exclusion restriction. The negative and statistically significant coefficient on deposit growth in column (1) indicates that banks enjoying stronger deposit inflows are less likely to issue eligible securities, whereas those facing deposit constraints tend to rely more on alternative funding sources such as wholesale debt. The reason is that banks may issue debt securities for funding reasons, and therefore the speed of deposit growth may impact on the likelihood of issuing debt. Importantly, when included in the cost equation (column 2), deposit growth is not statistically significant, confirming its validity as an exclusion restriction.

Column (3) reports the results for the outcome equation of the Heckman model without including instrument-level variables and column (4) reports the results additionally including these variables (residual maturity and subordination). The significant negative coefficients of the IMR in columns (3) and (4) indicate a significant timing effect of issuance decisions and that the endogeneity of choosing the time of an issue contributes to reduce the cost of eligible liabilities. This result is consistent with Baker and Wurgler (2002), supporting the idea that banks strategically time their debt issuances to minimize funding costs based on bank fundamentals and market conditions.

Including instrument-level characteristics in the outcome equation (column 4) increases explanatory power; apart from GDP growth becoming positively significant and the costtoincome ratio turning marginally insignificant, all other bank, country, and macrolevel coefficients remain virtually unchanged, underscoring the overall stability of the results after the additional controls are introduced.[8] The significant negative coefficient on the IMR indicates the

8 Instrument-level variables cannot be included in the selection equation, as they are only defined for periods in which a bond is issued. However, including such variables in the outcome equation but not in the selection equation may raise concerns regarding model identification and the consistency of the estimated coefficients. In our case, we would need that the issuance decision modelled in the first stage probit is independent of, or at least not taken contemporaneously with, the decision on the bond's subordination level. Otherwise, omitting these subordination dummies from the selection equation could bias the second stage estimates. To verify this condition, we re estimated the selection stage as a multinomial logit with the five subordination categories and added the Inverse Mills ratio (λ) obtained from the original probit (Fang, 2005; Wu and Shen, 2013). A joint test that all λ coefficients equal zero fails to reject the null hypothesis ($\chi^2 = 3.2$, $p = 0.36$), indicating that the choice of bond type is not statistically related to the latent propensity to issue. Moreover, the overall stability of coefficients for bank, macro, and country variables in columns (3) and (4) suggests robustness and no problems associated with the no inclusion of instrument level variables in the selection equation.

presence of selection bias in the issuance sample and confirms the need for the Heckman correction. Compared to weighted OLS regressions (column (1) in Table 3), the Heckman estimates in column (4) indicate larger negative coefficients for bank size (G-SIIs, and O-SIIs & Top-tier banks) relative to smaller banks. Specifically, G-SIIs and O-SIIs & Top-tier banks face, on average, 92 and 88 bp lower issuance costs, respectively, than banks with assets below €100 billion, compared to 24 and 22 bp in the weighted OLS estimations.

Another key difference between the models is the significant negative coefficient of the IG-Low dummy in the Heckman regression, indicating that not only high investment-grade banks but also low investment-grade banks benefit from lower funding costs relative to high-yield or unrated banks. High investment-grade and low investment-grade banks now have on average MREL funding costs that are around 86 and 44 bp lower, respectively, than those of high-yield or unrated banks. This result is more consistent with financial theory, which predicts that banks with stronger credit ratings are perceived as less risky and therefore pay lower interest rates on their debt.

Turning to capitalization and profitability, the Heckman outcome equation shows positive and statistically significant coefficients on both the CET1 ratio and ROA, reversing the negative signs obtained in the weighted-OLS specification. This reversal stems from the firststage selection mechanism: CET1 and ROA enter the issuance probit with negative coefficients, meaning that well-capitalized and profitable banks come to market less often. Once this selection is accounted for, the remaining issues by such banks appear to cluster in less favorable windows, possibly to replenish regulatory buffers or meet episodic liquidity needs, so investors may require a premium despite the institutions' stronger fundamentals. Conversely, banks with lower capital or profitability issue more regularly and seem able to avoid the most adverse market conditions, helping to contain their average yields. The positive Heckman coefficients therefore likely capture these timing effects rather than signaling higher underlying credit risk.

Some divergence arises in the role of the cost-to-income ratio, which becomes only marginally insignificant under the Heckman specification. Among country and macrolevel factors, GDP growth now enters with a statistically significant coefficient: a one-percentage point rise in GDP growth raises issuance costs by 1.4 bp. By contrast, the riskfree rate, the term spread, and the sovereign spread remain the chief drivers of MREL pricing: each additional percentage point in these variables is associated with increases of 97, 99, and 97 bp in average issuance yields, respectively.

The coefficients for instrument-level characteristics are consistent with theoretical predictions: both longer maturities and higher subordination levels are associated with higher issuance costs of MREL-eligible liabilities. These patterns are similar across Heckman and OLS regressions. Based on the estimates in column (4) of Table 4, each additional year of residual maturity increases average issuance costs by over 2 basis points. After controlling for residual maturity and for bank, macroeconomic, and country variables, the average cost of AT1, Tier 2, SNP, and senior unsecured instruments is, respectively, 363, 164, 60, and 29 basis points higher than that of secured debt.

Overall, the significant IMR coefficient, along with the observed differences in bank- and country-level estimates between OLS and Heckman models, suggests that the Heckman model provides a more suitable framework for analyzing the determinants of MREL-eligible debt costs. By explicitly accounting for the endogeneity of issuance decisions, the Heckman approach enhances the reliability of our estimates and improves our understanding of how bank- and macroeconomic-level factors influence unsecured debt costs.

5.2 Interactions between instrument subordination and bank rating

We now analyze the interaction between bank ratings and the degree of instrument subordination by incorporating interaction terms for these two groups of dummy variables. This approach allows us to determine the specific cost incurred by a high-yield bank when issuing an AT1 instrument, an effect that cannot be identified in the simpler model. Keeping the degree of subordination constant, we expect the rating hierarchy to persist; that is, within a given subordination group, banks classified as high-yield or unrated, low investment-grade, and high investment-grade should maintain their expected ranking in pricing. Furthermore, this analysis enables us to assess whether the importance of credit ratings varies depending on the instrument's degree of subordination. Table 5 presents the results. Since there are no AT1 issuances from banks rated as high investment-grade, there is no coefficient for the interaction term of AT1 × IG-High.

The coefficients of the interaction terms are consistent across the weighted OLS regressions and the Heckman estimations. However, the unweighted OLS estimation yields coefficients that differ slightly in magnitude. The significant negative coefficients of all interaction terms, along with the larger absolute values for interactions with IG-High compared to those with IG-Low, indicate that a better rating reduces the cost of all instruments when comparing within each instrument type. A better credit rating particularly reduces the cost of AT1 and Tier 2 instruments, and to a lesser extent that of SNP and Senior instruments. For instance, according to the Heckman model estimates in column (3), the spreads of Tier 2 issuances by high and low investment-grade banks are 206 and 131 bp lower, respectively, than those of high-yield and unrated banks. AT1 issuances by low investment-grade banks have spreads 146 bp lower than those of high-yield and unrated banks (there are no AT1 issuances by high investment-grade banks).[9]

Charts 7.a and 7.b plot the predicted issuance costs from the estimated models for each subsample, illustrating the interaction between bank credit ratings and instrument subordination. For banks with the same rating, instruments higher in the liability structure (i.e., less subordinated) are systematically cheaper to issue, confirming the expected subordination hierarchy both on its own and in interaction with credit quality. Within every subordination layer, better rated banks incur lower costs across all instruments. The magnitude of the rating advantage rises with subordination: moving from high-yield to investment-grade lowers the cost of AT1 issues more than that of Tier 2, and the Tier 2 differential exceeds that for senior non-preferred (SNP) debt.

9 We verify that our results hold after excluding unrated banks. This subgroup is less homogeneous, comprising both institutions with weaker credit profiles and solvent, privately held entities that forgo external ratings for reasons unrelated to financial strength, such as strategic considerations or the nature of their investor relationships. The results remain robust: issuance yields rise with bond subordination and fall with the issuing bank's credit quality.

Table 5

Interactions between bank ratings and instrument's subordination

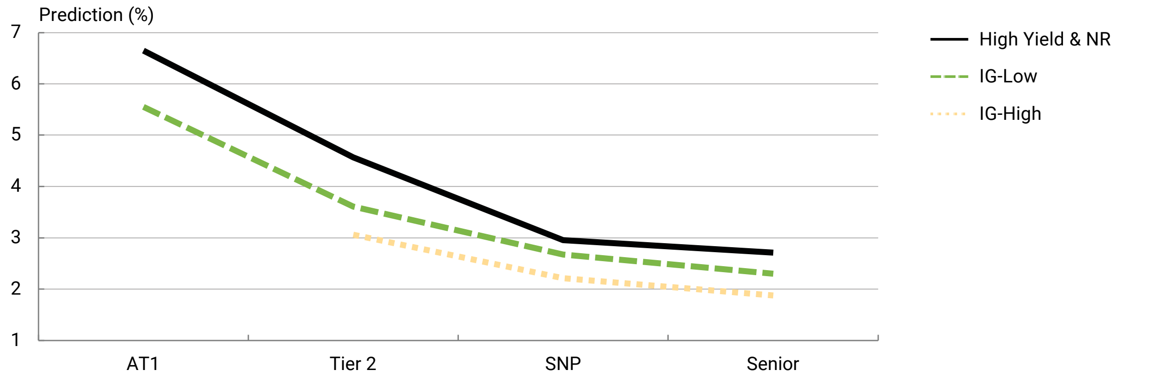
	Dependent variable: Issuance yield$_{b,i,c,t}$		
	OLS regressions		Heckman model
	(1)	(2)	(3)
IG-High$_{i,t}$	0.5288***	0.8443***	0.1656
	(4.55)	(12.63)	(1.44)
IG-Low$_{i,t}$	0.3394***	0.4716***	0.1430
	(3.31)	(7.06)	(1.36)
AT1$_b$	4.9953***	4.2474***	5.0778***
	(18.83)	(16.38)	(15.60)
Tier 2$_b$	2.9132***	2.4577***	2.9596***
	(11.84)	(20.61)	(12.21)
SNP$_b$	1.3032***	0.9154***	1.3531***
	(5.85)	(5.99)	(6.28)
Senior$_b$	1.0627***	1.1545 ***	1.2313***
	(5.62)	(14.34)	(6.88)
AT1$_b$ x IG-High$_{i,t}$	—	—	—
AT1$_b$ x IG-Low$_{i,t}$	-1.4341***	-1.2261***	-1.4640***
	(-4.00)	(-3.52)	(-3.63)
Tier 2$_b$ x IG-High$_{i,t}$	-2.0305***	-2.0505***	-2.0632***
	(-7.14)	(-10.01)	(-7.25)
Tier 2$_b$ x IG-Low$_{i,t}$	-1.2992***	-1.1377***	-1.3157***
	(-4.61)	(-7.70)	(-4.75)
SNP$_b$ x IG-High$_{i,t}$	-1.2741***	-1.3801***	-1.2179***
	(-5.59)	(-8.92)	(-5.59)
SNP$_b$ x IG-Low$_{i,t}$	-0.6236***	-0.7463***	-0.6718***
	(-2.73)	(-4.75)	(-3.05)
Senior$_b$ x IG-High$_{i,t}$	-1.3653***	1.7972***	-1.4204***
	(-7.03)	(-21.24)	(-7.78)
Senior$_b$ x IG-Low$_{i,t}$	-0.7497***	-0.9986***	-0.8955***
	(-3.87)	(-11.45)	(-4.91)
IMR$_{i,t}$			-1.0921***
			(-6.97)
Constant	-0.0531***	0.9155***	0.9102***
	(-0.17)	(7.41)	(3.15)
Weighted	Yes	No	Yes
Cluster SE	Robust	Robust	Robust
All explanatory variables	Yes	Yes	Yes
Country and year FE	No	No	No
Observations	12,075	12,075	12,075
Adj. R^2	83.97%	76.42%	84.25%

SOURCES: Own elaboration based on data from CSDB, S&P Capital IQ, LSEG Workspace.
NOTE: This table reports the determinants of the cost of debt for banks including interactions between bank rating and liability's subordination. We compute three specifications: weighted OLS regression in column (1), where the weights are given by the size of the debt issued, unweighted OLS regression in column (2), and the Heckman (1979) model in column (3). In the Heckman model, the selection equation is determined by the probability that a bank issues a bond in a particular month. Since in our sample we do not have an AT1 issued by an high investment-grade bank, the corresponding interaction effect cannot be identified. IG-High takes the value 1 if the bank has an AA- or higher credit rating. IG-Low is a dummy that takes the value 1 if the bank has a credit rating between A+ and BBB-. The base group is represented by high-yield and no-rating banks, where high-yield represents a BB+ or lower credit rating. AT1 is a dummy that represents Additional Tier 1 or CoCos issuances. Tier 2 is a dummy that represents Tier 2 or subordinated issuances. SNP is a dummy that represents senior non-preferred issuances. Senior is a dummy that represents senior unsecured issuances. The dummy identifying secured liabilities is omitted in the regression. IMR is the Inverse Mills Ratio computed with the Heckman (1979) model. We also apply a weighting scheme in OLS of the second stage in the Heckman estimation. DepositG is a variable that represents the growth rate of deposits of a particular bank. Although not reported to save space, all the estimations include the set of bank, country, and instrument explanatory variables included in estimations in Tables 3 and 4. The standard errors are robust to heteroscedasticity, and t-statistics are reported in brackets. Significance is reported as follows: *** p<0.01, ** p<0.05, * p<0.1

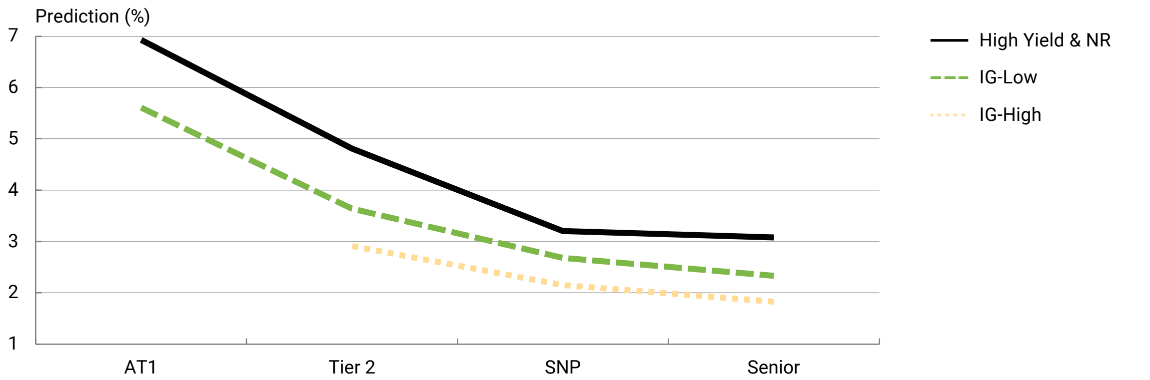
Chart 7

Interactions between credit ratings and subordination structures in bank issuances

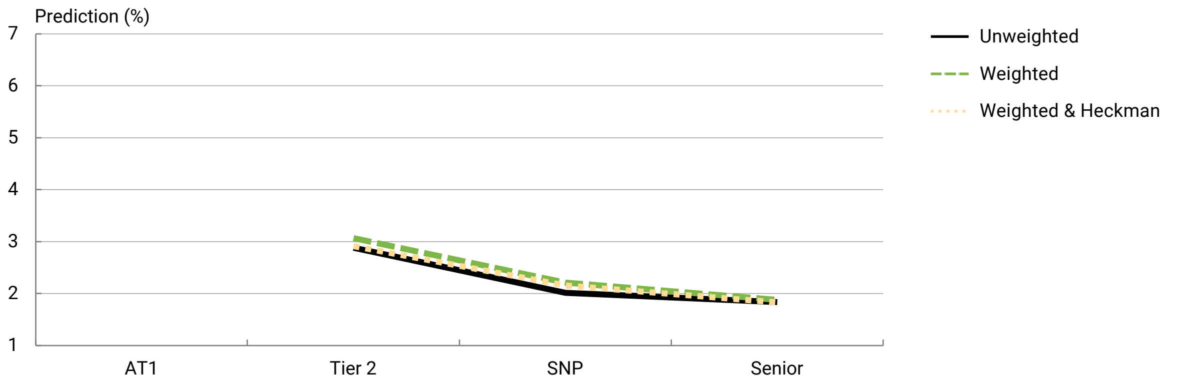
7.a Interactions between bank rating and instrument subordination using the weighted OLS regression



7.b Interactions between bank rating and instrument subordination using the Heckman model



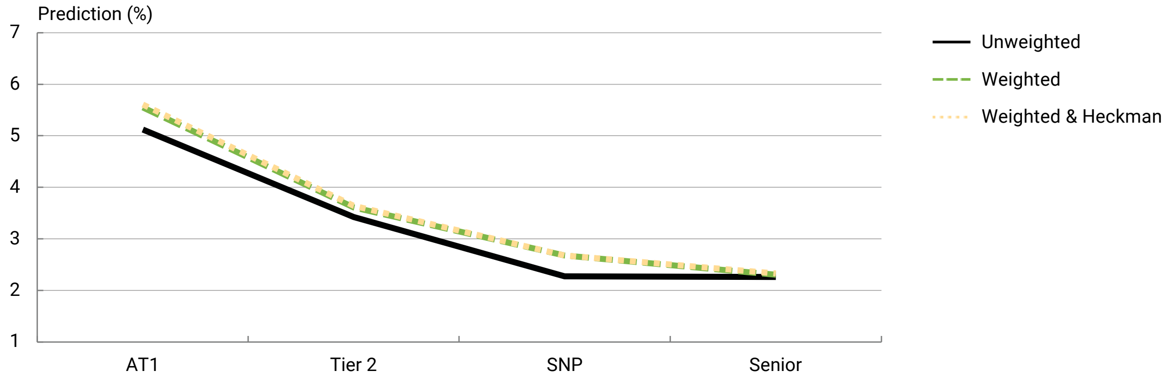
7.c Subordination hierarchy in IG-High Grade banks



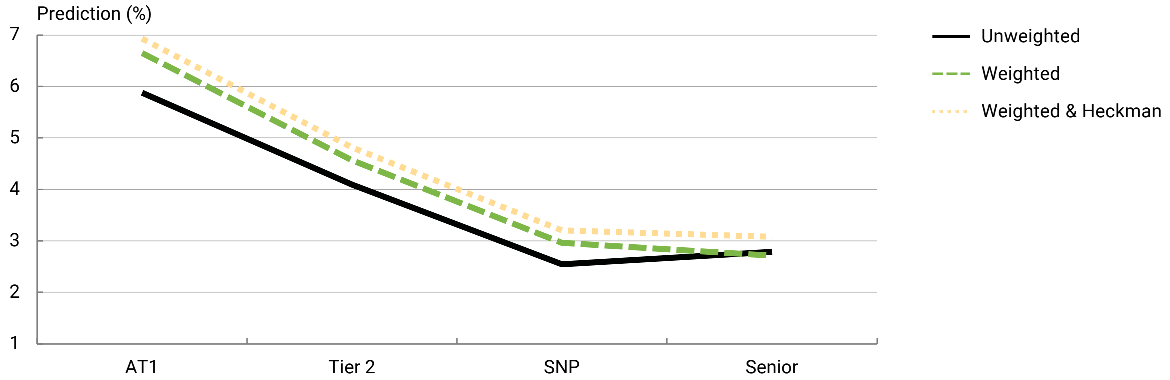
SOURCES: CSDB, Eikon Refinitiv and S&P Capital IQ.

Chart 7
Interactions between credit ratings and subordination structures in bank issuances (cont'd)

7.d Subordination hierarchy in IG-Low Grade banks



7.e Hierarchy ladder controlling by High Yield & No Rating



SOURCES: CSDB, Eikon Refinitiv and S&P Capital IQ.

6 Applications

This section presents two policyoriented applications of the model. The first application examines the decomposition of the cost of MREL-eligible bonds issued by Spanish banks. The second explores the impact of an increase in MREL requirements on a bank's net income.

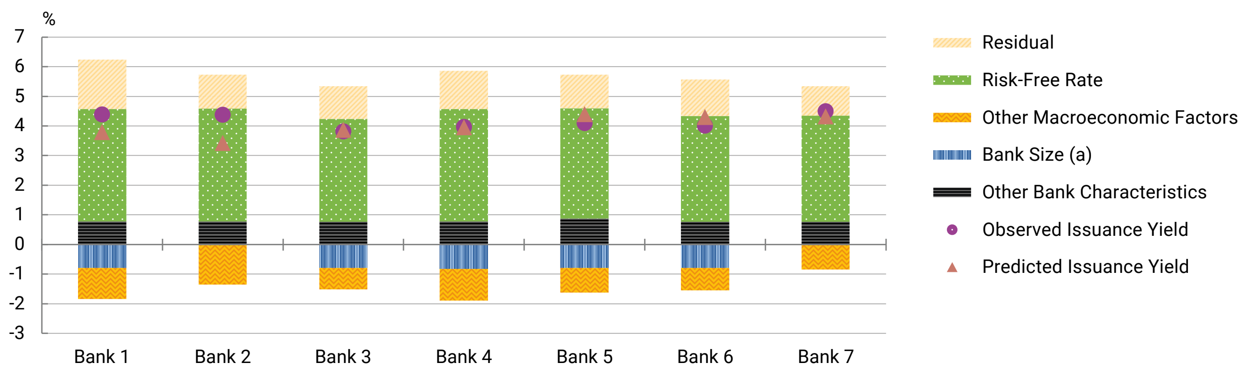
6.1 Application 1: Decomposing the issuance yield for seven Spanish banks

We use the coefficients estimated in column (3) of Table 5 from the Heckman model to decompose the issuance yield of MREL-eligible instruments for seven Spanish banks during the period 2024Q1–2024Q3. In total, 50 MREL-eligible debt instruments were issued in this period: approximately 15% corresponds to Tier 2 instruments, 10% to senior non-preferred instruments, and 75% to senior preferred instruments. Regarding issuer characteristics, 95% of the issuances were made by Pillar 1 Banks,[10] and the remaining 5% by banks with total assets below €100 billion. These figures suggest that the Spanish market for MREL debt is largely concentrated among large institutions, while smaller banks may be able to meet their MREL requirements primarily through internal resources. The average issuance size of unsecured debt in this period is €400 million.

The results are shown in Chart 8. The chart shows that the model fits MREL issuance costs well, as the difference between estimated and observed costs is relatively small on average. The estimated cost is above the observed value for two banks while for five banks, the prediction is close to the observed value. Chart 8 also shows that the OIS rate is the main driver of MREL issuance costs across all banks. On average, 41% of the estimated cost is due to the OIS rate. This is followed by macroeconomic factors (financial markets development, term and sovereign spreads, and GDP growth), bank size and other bank-specific characteristics

Chart 8

Decomposition of the yield at issuance for MREL instruments issued by Spanish banks from 2024Q1 to 2024Q3



SOURCES: CSDB, Eikon Refinitiv and S&P Capital IQ.

a Bank size refers to whether the bank is classified as a G-SII, O-SII, Top tier bank or a bank with less than 100 billion euros in total assets. Other Bank Characteristics includes CET1, ROA and the cost-to-income ratio. Other Macroeconomic Factors includes term and sovereign spreads, GDP growth, and financial market development. The Risk-Free Rate refers to the three-month overnight index swap (OIS). The residual is given by the difference between the yield paid by the entity and the yield predicted by our model at issue date and it also includes analyzed variables (bond maturity, bond subordination, bank rating, selection bias adjustment, and the constant).

10 Pillar 1 Banks – includes: (i) resolution entities of G-SIIs and material subsidiaries of non-EU G-SIIs; (ii) banks with total assets exceeding EUR 100bn, consolidated at the level of the resolution group (Top Tier Banks); and (iii) other banks chosen by the respective national resolution authority (NRA) which are not Top Tier Banks but are assessed as likely to pose a systemic risk in the event of failure (Other Pillar 1 Banks).

(CET1, ROA and the cost-to-income ratio). The relevance of bond subordination varies across the Spanish banks analyzed, depending on the specific type of instrument issued and the bank's credit rating. Although 15% of the issuances come from Tier 2 instruments, the impact of subordination is limited due to the strong credit ratings of the Spanish banks involved. If these institutions had been rated as high-yield or were unrated, the yields would likely have been significantly higher. Selection bias is found to lower estimated issuance yields, although its magnitude varies across banks. This effect is particularly pronounced among smaller banks, where the lower issuance frequency increases the relevance of market timing.

6.2 Application 2: Impact of subordination requirements on bank net income

In this section, we use our model estimates to assess how the eventual set-up of subordination requirements for a mid-sized bank would affect its net income. Subordination requirements typically apply to banks with assets above €100 billion and compel them to meet MREL requirements with subordinated debt or capital. Authorities can, however, set them on banks which they deem may pose systemic risk upon failure, a group that is more likely to include those close to this threshold. We quantify the additional cost that institutions with total assets of €90-99 billion would incur if authorities take this decision, assuming that entities roll over senior debt maturities into senior non-preferred instruments (the cheapest subordinated instrument that counts toward MREL).

Using S&P Capital IQ, we identify four Banking Union banks with total assets between €90 billion and €99 billion at end-2023, just below the threshold at which banks become subject to subordination requirements. These four institutions belong to the low investment-grade issuer category. For illustrative purposes, we estimate the impact on net income if these banks were to refinance maturing senior preferred debt with senior non-preferred debt.

For each bank, we take the average ticket size of recent senior issues—€400 million for Bank 1, €400 million for Bank 2, €350 million for Bank 3 and €200 million for Bank 4—and assume that amount is reissued annually as SNP. The model-implied spread between SNP and SP for low investment-grade issuers, taken from column (3) of Table 5, is 34 bp.[11] The average extra cost incurred in coupon expenses if banks are compelled to issue SNP instruments is €0.8 million. On average, this amounts to 0.12% of the banks' net income (using a five-year average that includes the observed 2022-24 data plus the 2025-26 forecast).

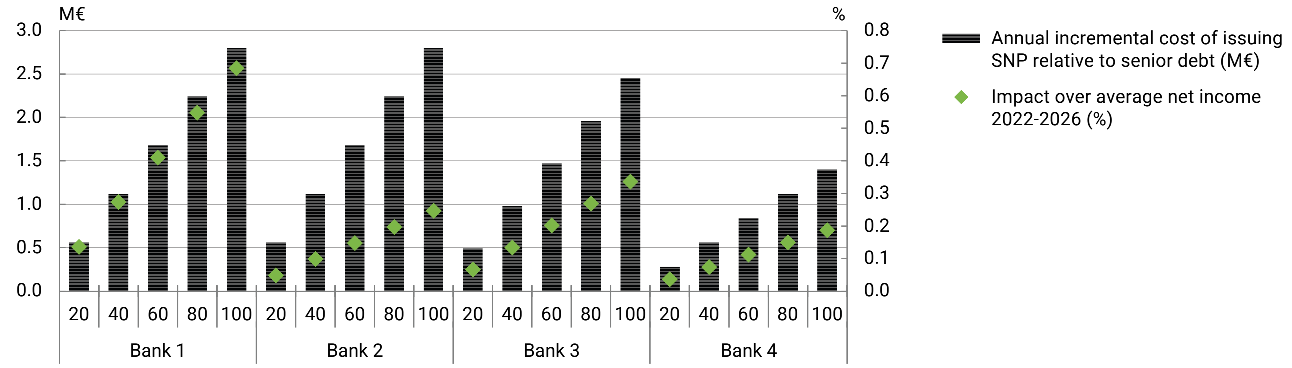
We conduct sensitivity analyses of the cost impact, examining a conservative range of SNP-SP spreads: a 20 bp lower bound (benign scenario) and a 100 bp upper bound (adverse scenario).

Chart 9 shows the simulation results. If the SNP-SP spread compresses to 20 bp, the extra coupon expense of issuing SNP instruments falls to €0.5 million; if it widens to 100 bp, the expense rises to €2.36 million. These extra coupon costs are small relative to average net income, about 0.07% in the benign case and 0.36% in the adverse one. Chart 9 also reveals some dispersion across entities, driven by differences in net income; even so, the drag on profits remains well below 1% of net income for every bank, including in the adverse scenario.

Although these results are based on a sample of low investment-grade issuers, the moderate impact on net income should not be amplified by rating downgrades, according to the model. The estimated cost differential

11 The cost of issuing a SNP bond for a low investment-grade issuer is 68 bp [1.35-0.67], while the cost of issuing a SP for these issuers is 34 bp [1.23-0.89].

Chart 9
Simulation of the impact of subordinated debt issuance on the bank's net income



SOURCES: CSDB, Eikon Refinitiv and S&P Capital IQ.

between issuing senior non-preferred (SNP) debt and senior debt is only 12 bp for high-yield or non-rated banks (135 bp for SNP versus 123 bp for senior debt).[12]

That said, these quantitative findings should be interpreted with caution: the model was estimated on data from a period of generally low risk premia. Consequently, the estimates may not offer an adequate benchmark for assessing the cost of issuing MREL-eligible debt during episodes of market stress or elevated risk premia.

12 The most pronounced increases in issuance yield occur in Tier 2 and AT1 instruments, where a better credit rating contributes more substantially to reducing the spread of these more subordinated instruments.

7 Conclusions

This paper develops a framework to benchmark the cost of issuing MREL-eligible debt by European banks. Using a dataset of 12,075 debt securities issued by 206 banks across the Banking Union between 2019 and 2024, we identify the key drivers of debt funding costs across three broad dimensions: bank-specific characteristics, macroeconomic and country-level conditions, and security features. Based on weighted regressions and a Heckman-selection model, we find that issuance costs are significantly affected by bank size, credit rating, cost efficiency, the risk-free rate, term and sovereign spreads, and instrument subordination.

The model's results reveal that systemic banks, whether global or domestic, benefit from significant cost advantages when issuing MREL instruments, particularly due to their larger size and higher credit quality. We also find that macro-financial variables, such as the OIS rate, term and sovereign spreads, GDP growth, and financial market development, play a substantial role in explaining funding costs. At the instrument level, subordination and maturity drive up yields, with subordinated debt types (AT1, Tier 2, SNP) commanding substantial risk premia over senior unsecured and secured debt. Furthermore, a better bank rating reduces the issuance cost for all types of MREL instruments, but more so for those with higher subordination. These findings contribute to understanding how regulatory classifications and market conditions jointly shape the cost structure faced by banks when complying with resolution requirements.

We use the analysis of the determinants on issuance costs in two applications. First, we apply the estimated coefficients to decompose issuance costs for a set of seven Spanish banks, showing that the model closely tracks observed prices and that the OIS rate, bank size, and credit quality are the dominant drivers of cost differentials. Second, we simulate the potential effect on net income of replacing senior preferred with senior non-preferred debt for banks nearing the €100 billion threshold, above which stricter subordination requirements apply. We find a modest impact on banks' net income, suggesting the financial burden associated with transitioning into the Top-tier bank category is limited.

Last but not least, it is worth noting that we have fitted the model on a sample that broadly corresponds to a period of low risk premia. Therefore, we cannot rule out the possibility that the relevance of some variables, particularly those related to bank fundamentals, could change during periods of market stress.

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