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# Contents

# ANALYSIS OF THE PRIVATE CREDIT MARKET IN SPAIN

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## Abstract

The private credit market has grown considerably in recent years, establishing itself as an alternative to traditional bank funding. While still representing only a small fraction of total corporate lending, particularly in Spain, developments in the private credit market reflect a growing sophistication and diversification, prompting supervisors to consider closer monitoring to safeguard the stability of the financial system. In Spain, most of the firms that access private credit operate in the technology, communications, industrial and trade sectors. They also tend to be larger firms, but not more profitable or more leveraged. The prevalence of non-bank lenders and foreign capital – particularly from the United States and France – demonstrates the internationalisation of the Spanish market and its interconnectedness with the global financial system. Private credit deals characteristically have larger amounts, longer maturities and higher interest rates than bank loans, along with a different risk profile and greater contractual flexibility. This article explores these dynamics to describe the current state of Spain's private credit market and its implications for financial stability.

**Keywords:** private markets, private credit, non-bank financial sector, financial stability.

## 1 Introduction

The private credit market – which encompasses finance typically provided through non-bank loans to non-financial corporations via specialised investment funds – has gained increasing prominence as an alternative source of funding. The success of this market owes, first, to its role as a particularly valuable source of funding for firms that struggle to access traditional sources, such as bank credit. According to a survey conducted by Block, Jang, Kaplan and Schulze (2024), US and European investors in the private credit market believe that they finance companies that banks would not fund. Second, these investment funds have the advantage of specialisation, giving them superior screening and monitoring capabilities than banks, and can offer bespoke loan terms that sometimes better those available from banks (Avalos, Doerr and Pinter, 2025).

The market's growth has been fuelled by the protracted low interest rate environment and regulatory reforms that encouraged banks to hold safer assets on their balance sheets and, consequently, adopt tighter credit standards. Indeed, the private credit market is larger in countries with lower interest rates, less efficient banking systems and, to some extent, more stringent banking regulation (Avalos, Doerr and Pinter, 2025).[1]

The growth in funds intermediated in this market pushed the assets managed by private credit funds to over USD 2.2 trillion globally in 2024, compared with USD 1.2 trillion in the syndicated

1 Chernenko, Erel and Prilmeier (2020) conclude that banking regulation is a key factor driving firms' decision to borrow from non-banks.

loan market and USD 1.8 trillion in the high-yield bond market (PitchBook, 2025). This private credit growth has primarily taken place in the United States and Europe (including the United Kingdom), where it accounts for 7% and 1.6%, respectively, of total corporate lending (International Monetary Fund, 2024). Private credit has also expanded in Asia, although in certain jurisdictions, such as Japan, it is less prevalent than in the United States or Europe (Kuroda, Hasebe, Ito and Ikeda, 2024; Wong, Leung, Wong and Lu, 2024). In Spain, private credit remains in a development phase marked by rapid growth in the volume of funding available. Recent trends in the Spanish market reflect both an increase in the number of deals and a growing diversity of sectors and business profiles.

In addition to its growth, the market's deepening interconnectedness with the banking system – and the associated risks for financial stability – are a source of concern. First, banks' exposure to private markets at several points along the funding chain add complexity to risk assessments, which are typically broken down by product type and tend to underestimate risk concentration. Second, reduced transparency in private markets hampers such risk assessments, which rely on information provided directly by private funds, which in many cases is incomplete and insufficient.

This article provides an overview of developments in private markets, followed by a specific analysis of the private credit market, comparing the United States, the euro area and Spain. Lastly, the article presents a study of the characteristics of the agents participating in Spain's private credit market and of the deals conducted. The aim is to provide a comprehensive picture of a market that, while still small in terms of volume, has the potential to become a major component of Spain's financial ecosystem, with implications for financial stability. According to the findings, the firms accessing private credit in Spain primarily operate in the technology, communications, industrial and trade sectors and tend to be larger, although not more profitable or more leveraged, than others. There is a marked presence of non-bank lenders and foreign capital, particularity from the United States and France, which underscores the internationalisation of the Spanish market and its interconnectedness with the global financial system. Private credit deals characteristically involve larger amounts, longer maturities and higher interest rates than bank loans.

Section 2 analyses the general characteristics of private markets, focusing both on developments in volumes raised by fund type and on the distribution of deals completed by asset type and region. Section 3 discusses patterns in the private credit market, comparing the United States, the euro area and Spain, with a particular focus on the capital invested in private credit funds and its changes over time. Section 4 examines the characteristics of firms accessing private credit in Spain, along with the profile of the lenders in such deals. Lastly, Section 5 presents the conclusions drawn.

## 2 Private markets: characteristics and evolution

Private markets are markets where assets not listed on public exchanges are traded. They break down into "capital markets", "credit markets" and "real asset markets", and serve as a

source of funding for firms throughout their life cycle, constituting an alternative to bank credit. In these markets, investors – mainly large non-banks (such as pension funds and insurance companies), but sometimes also individuals – channel funds to firms either directly or indirectly (with the intermediation of specialised investment funds) and provide funding instruments tailored to each stage of business development.

Firms tap private capital markets to raise funding according to their specific needs in each stage of the life cycle (Arnold, Claveres and Frie, 2024). Early-stage start-ups often turn to venture capital (VC) funds, which supply capital to young firms with high growth potential, but that also carry significant risk and uncertainty. These funds tend to be smaller, they operate with shorter investment horizons and focus on innovative sectors. In later stages, firms access financing from private equity (PE) funds, which manage significantly larger volumes of capital and focus on more mature companies. PE funds tend to acquire majority holdings via leveraged buyouts, with a view to restructuring, streamlining and scaling up these firms. Lastly, PEs and VCs typically exit their investments through strategic mergers and acquisitions (M&As) or initial public offerings (IPOs), enabling investors to realise the value created during the investment period.

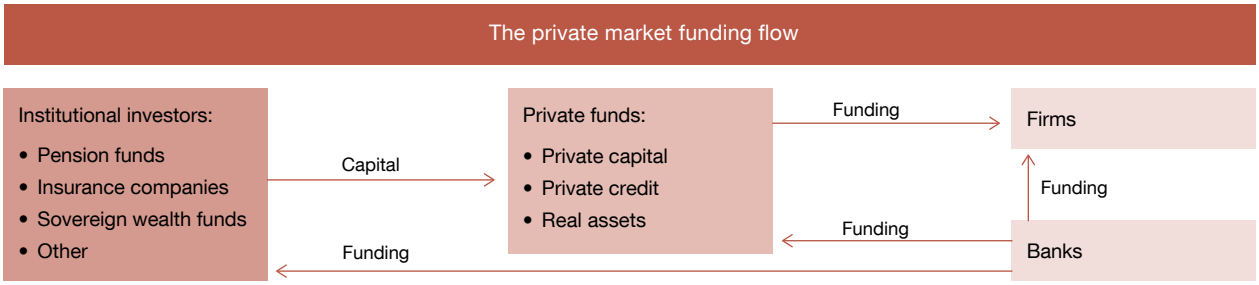
In addition to capital markets, private markets also encompass segments such as private credit and investment in real assets (infrastructure, real estate, commodities and other resources) (Aramonte and Avalos, 2021). Private credit includes loans made directly by non-bank investors, such as specialised funds or insurance companies, to firms seeking funding outside the traditional banking system. Like PE, this type of funding is usually provided to more mature firms. Meanwhile, the real asset segment includes investments in infrastructure, real estate, commodities and natural resources and provides exposure to tangible assets, which typically are less correlated with traditional financial markets.

One of the main distinguishing features of private markets is their regulation, which is lighter than in the banking system. This is because private markets were traditionally viewed as posing less risk to financial stability, largely due to a less pronounced asset-liability liquidity mismatch and more limited retail investor participation. Indeed, most capital in private markets is managed by alternative asset managers through closed-end funds[2] and provided by non-bank institutional investors that are not deposit-taking and do not access central bank funding, meaning they are subject to less regulation. They are often large, highly sophisticated investors, such as pension funds.

Not only have private markets consolidated over the past two decades, they have also seen significant growth. While this growth has broadened firms' funding options across the life cycle, private markets' deeper interconnections with the financial system have amplified the risks they pose to financial stability, creating a need for greater monitoring.

2 Closed-end funds issue a fixed number of shares/units that cannot be redeemed before a specific date, limiting the transformation of liquidity. Some are available only to large institutional investors, while others are listed on public exchanges and open to retail investors.

Figure 1
**Private market funding**




**SOURCE:** Devised by authors.

As Figure 1 shows, banks are exposed to risks from these markets through multiple channels. Banks may be exposed both directly, through loans to PE fund investees, and indirectly, through credit facilities extended to the funds themselves or loans to investors in these funds (Aramonte and Avalos, 2021; González and Pérez-Santamarina, 2025; Haque, Jang and Wang, 2025). In addition, funds operating in private markets may themselves be interconnected. For instance, firms backed by PE funds tend to raise financing on the private credit market.[3] In short, while banks' exposures to private markets may appear limited when considered alone, there could be hidden leverage at several points along the funding chain, meaning banks may underestimate the scale of the risks they are taking on. What might appear as a straightforward asset-backed loan could turn out to be a complex set of related exposures that share underlying risk drivers and vulnerabilities, posing a threat to financial stability (Claudia Buch, 2025). This structural complexity and the poor aggregate visibility of total leverage underscore the need for greater transparency in these markets and further study of their functioning and potential risks.

One feature of private markets is that funding deals can involve multiple actors, such as private credit funds, other types of investment funds and even banks. Therefore, it is important to distinguish between the volume of funds raised by the funds (fundraising) and the number of completed deals, since these are different dimensions of the market. Charts 1 and 2 examine both of these dimensions in the United States, the euro area and Spain.

Chart 1[4] shows the volume of funding provided in private markets, proxied by capital investment flows into the main investment fund categories. As can be seen, funding has increased in both the United States and the euro area. In Spain, however, capital levels remain more volatile, reaching their peak in 2021 before falling again in the following years. As for the distribution of capital by private market segment, in 2024 private credit outstripped VC for the second consecutive year in terms of private market fundraising, with USD 197.1 billion and ranking

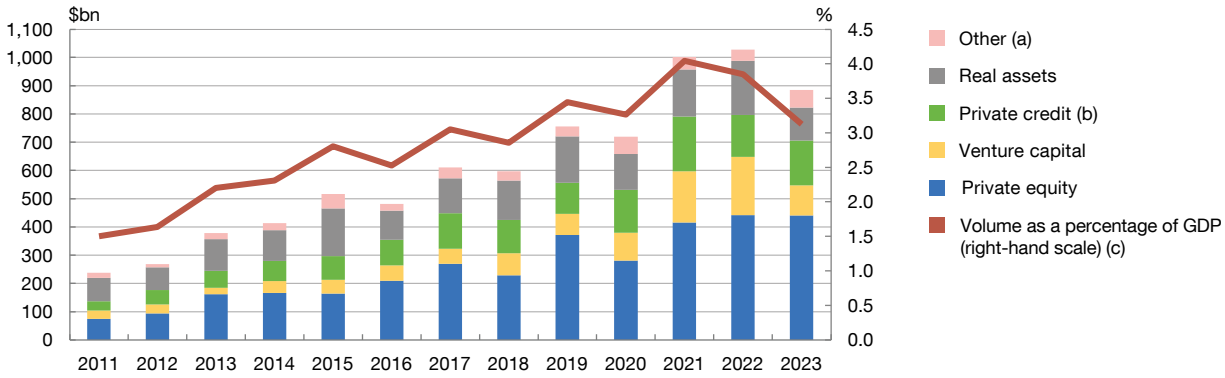
3 In the United Kingdom, nearly 20% of the debt of PE-backed firms is sourced from the private credit market, compared with around 2% for all firms (Bank of England, 2024).

4 In Chart 1 the private credit category excludes PitchBook's "Debt-General" and "CLO securitisations" categories, as these are considered traditional financing (in line with Haque, Mayer and Stefanescu, 2025).

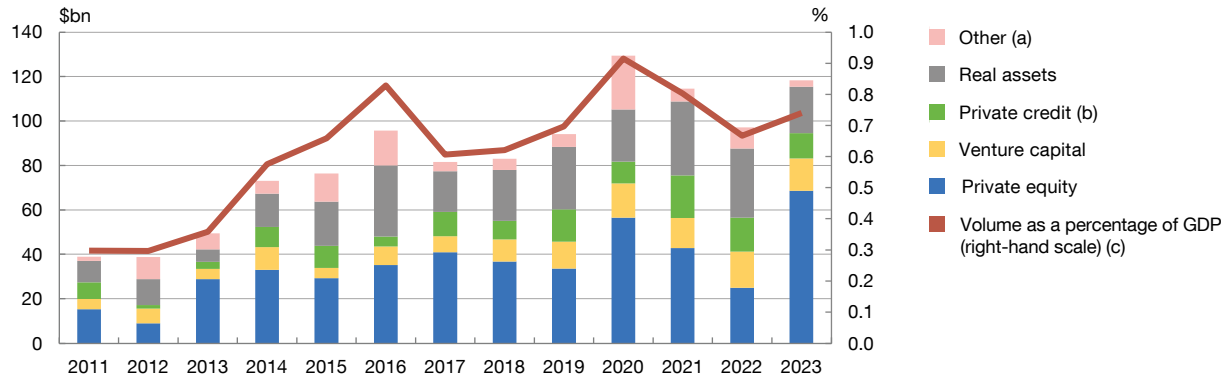
Chart 1

## Capital invested in private funds by market category

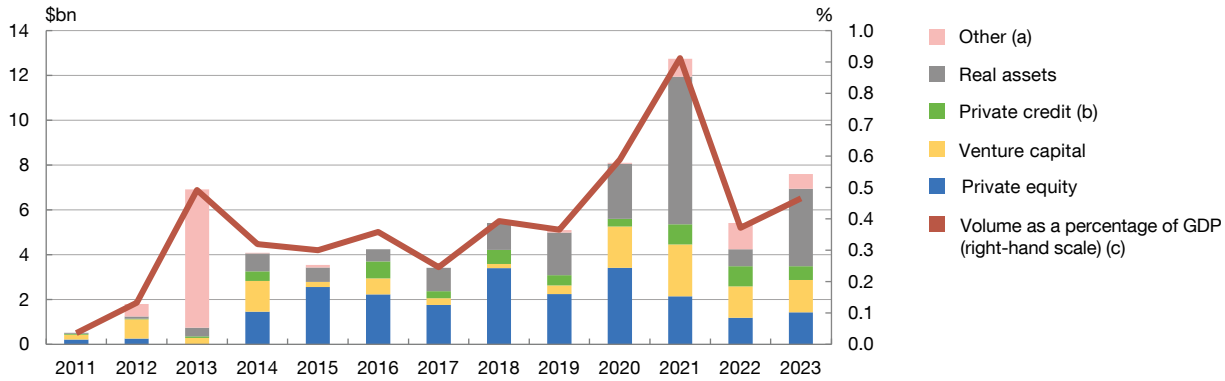
### 1.a United States




### 1.b Euro area




### 1.c Spain

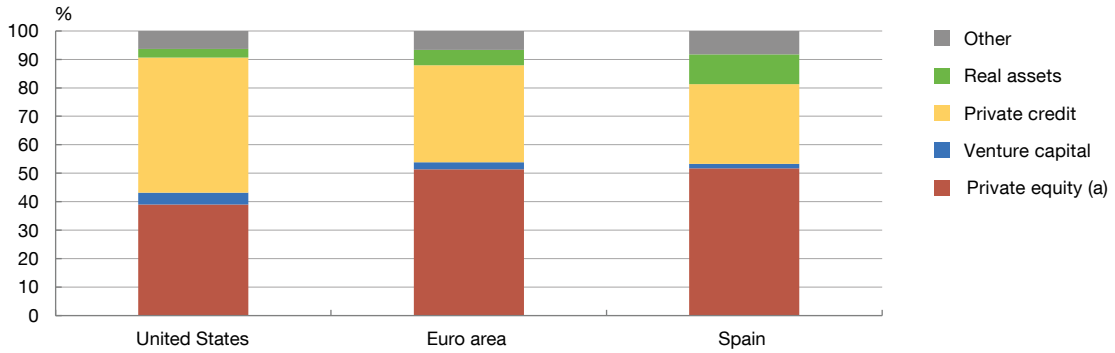



**SOURCES:** PitchBook and Eurostat.

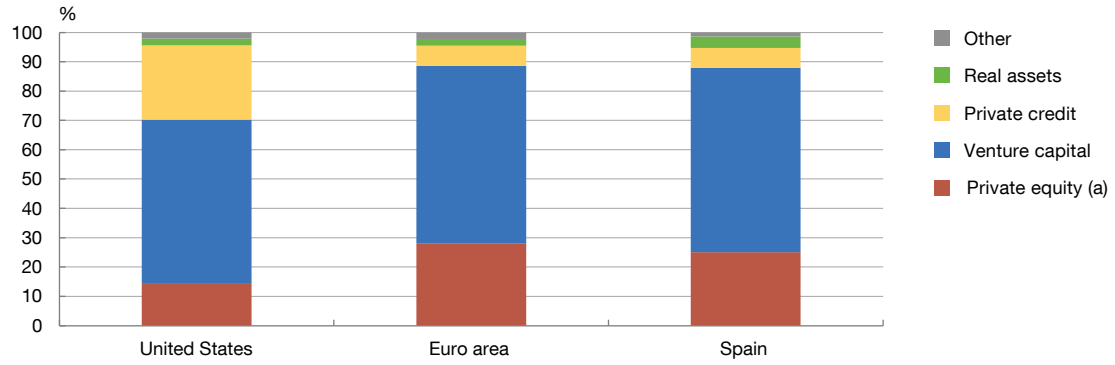
**a** "Other" includes the "Other", "Coinvestment", "Secondary" and "Fund of funds" categories in PitchBook.
**b** "Private credit" is the "Debt" category in PitchBook excluding the subcategories of "Debt-General" and "CLO securitisations", which are considered traditional financing rather than private credit in the strictest sense.
**c** GDP is taken at the end of each year and converted to dollars at the corresponding exchange rate.

Chart 2
**Distribution of deals by market type (average 2011-23)**

2.a Deal size




2.b Deal numbers




**SOURCES:** PitchBook and Eurostat.

**a** Includes M&A deals.

second only to PE (PitchBook, 2025). In the United States, the distribution of financing across fund types has held relatively stable (Chart 1.a), with PE, private credit and real asset funds accounting for the bulk of the total. Developments in the euro area have been more volatile, with other fund categories playing a larger role (Chart 1.b). In Spain, significant market concentration in PE is evident in the early years of the sample, while real asset funds have grown over time (Chart 1.c). Although there has been some increase in investment in the private credit market, it still fluctuates significantly from year to year, suggesting that Spain's private market is less consolidated than that of the United States or the euro area.

The distribution of deals originated in these markets – in terms of deal numbers and deal size – differs across the regions. As Chart 2 shows,[5] in the United States, where private markets are more mature, most of the overall deal size is accounted for by the private credit market, followed by PE. This suggests that the majority of funding is provided to more established or

5 In Chart 2 private credit deals include bonds and credit transactions with banks. PitchBook classifies such deals as private credit when there is an intermediary between the recipient firm and the lending credit institution.

mature firms. Indeed, VC, which engages in funding provided to start-ups, is the least significant market in terms of deal size.

However, looking at the number of deals we find the opposite is true: the number of VC deals is far higher than that of private credit and PE deals combined. This is further evidence that VC funds finance start-ups, which are generally smaller than more mature firms.

In the euro area and Spain, the private credit market has a smaller footprint than in the United States. In both geographical areas the PE deal size is larger, showing very similar levels. In addition, deals involving real assets are more prominent in Spain, representing 10% of the total deal size on average.

As for deal numbers by market type, the VC segment is characterised by a high number of small transactions, which is consistent with its focus on start-ups. By contrast, PE markets present a significantly lower number of deals, but a far higher deal size. Similarly, although the private credit segment represents less than 10% of the total number of deals, it accounts for 28% of deal size, indicating that it typically involves larger deals.

## 3 The private credit market in the United States, the euro area and Spain

Broadly speaking, the private credit market includes non-bank loans extended by specialised investment vehicles to non-financial corporations.[6] These are usually variable rate loans and can be direct, subordinated,[7] collateralised or special situations credit[8] and are negotiated directly between borrower and lender. Flexibility in the terms of these loans allows firms to access funding tailored to their specific needs.

In the United States, most vehicles providing such funding are closed-ended investment funds (Haque, Mayer and Stefanescu, 2025; Cai and Haque, 2024) that lock in capital for their life cycle, which typically aligns with their average loan portfolio maturity. This helps mitigate liquidity and maturity transformation risks, meaning lower risk to financial stability. As a result, they are subject to lighter regulation than traditional credit institutions. Moreover, these funds are not listed on public exchanges and are not open to retail investors. However, the market's success has led to the emergence of new investment vehicles, some of which offer more frequent redemption windows or retail investor access.

Private credit funds provide financing to an increasingly varied range of industries. Traditionally, manufacturing, technology and telecommunications accounted for the bulk of firms financed

6 In Spain, private credit deals typically involve collaborations with banks.

7 Such as mezzanine debt, a form of hybrid financing that combines features of both debt and equity. It ranks below senior debt in the capital structure and offers higher returns to compensate for the higher risk. Such financing can include convertible instruments and share rights (such as warrants), allowing the lender to profit from the firm's growth. It is often used to fund growth or acquisitions when the aim is to avoid immediate shareholder dilution.

8 Special situations credit refers to loans extended to firms facing unusual or complex circumstances, such as restructuring, financial distress, litigation or extraordinary corporate events.

in this market, but in recent years other sectors, such as health, energy and consumer goods, have become increasingly prominent (Avalos, Doerr and Pinter, 2025). Nevertheless, private credit funds tend to specialise in specific industries, giving them a deeper understanding of borrower needs and characteristics and allowing them to offer more favourable loan terms. This specialisation also enables them to conduct more accurate risk assessments and provide strategic consultancy to the borrower firms.

Chart 3 presents an approximation of private credit volumes based on the flow of capital investment into private credit funds. The chart compares private credit developments, measured in US dollars and as a percentage of GDP, in the United States, the euro area and Spain. In the United States, the sustained growth in total capital raised, which peaked at USD 200 billion in 2021, is consistent with a consolidated market. Conversely, in the euro area, where fundraising also peaked in 2021 (USD 20 billion), there have been no clear trends in terms of total capital raised. Meanwhile, Spain has posted very marked growth, reaching USD 900 million in 2021 and 2022, followed by USD 600 million in 2023. These figures are for capital invested in private credit funds and do not necessarily reflect the total amount of private credit extended to firms. By comparison, new lending to firms by Spanish banks amounted to €376 billion in 2023. Although these figures are not directly comparable, the developments in capital invested in private credit funds indicate a clear growth and consolidation trend in this market in Spain.

The main sources of capital for private credit funds are institutional investors, which typically have long-term investment horizons and highly predictable liquidity needs. These include pension funds, insurance companies and sovereign wealth funds. Retail investors make up a small but growing share of total fundraising. For instance, business development companies (BDCs) are publicly listed and open to retail investors, and therefore subject to greater disclosure requirements, similar to those applicable to traditional investment funds. In the United States, BDCs are experiencing rapid growth and now account for 20% of the private credit market. Should this trend continue and retail investors – who are typically less sophisticated – gain further prominence, funds may be compelled to broaden their portfolio diversification to reduce idiosyncratic risks, which could erode the competitive advantage of specialisation (Avalos, Doerr and Pinter, 2025).

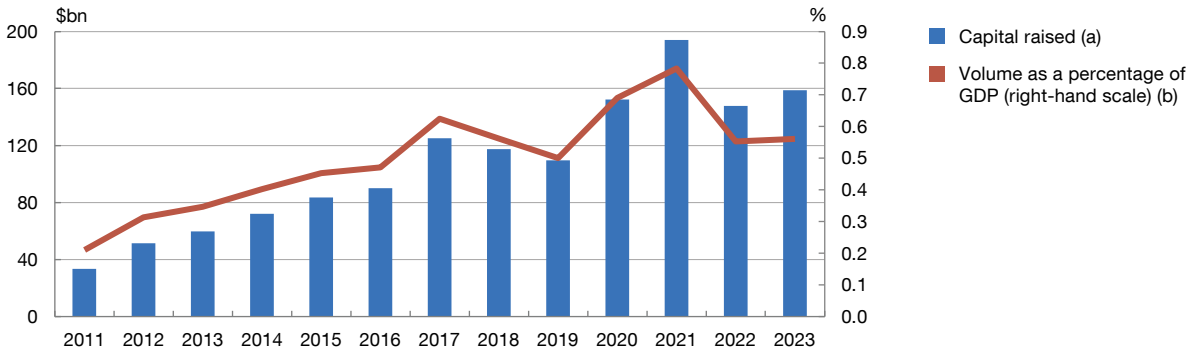
In addition to their links with institutional investors, private credit funds also have ties to both bank and non-bank financial institutions. For instance, private credit and PE markets are closely interconnected, since many private credit fund managers also manage PE funds.[9] This interconnection makes for greater flexibility in asset management and means firms can be offered integrated financing solutions, combining both credit and equity. Indeed, Block, Jang, Kaplan and Schulze (2024) state that private credit market investors welcome sponsorship by PE funds, which helps with deal quality and deal sourcing and with reducing information costs, allowing private credit lenders to lend more.

9 In approximately 70% of private credit deals, the borrower firm is backed by a PE fund (International Monetary Fund, 2024).

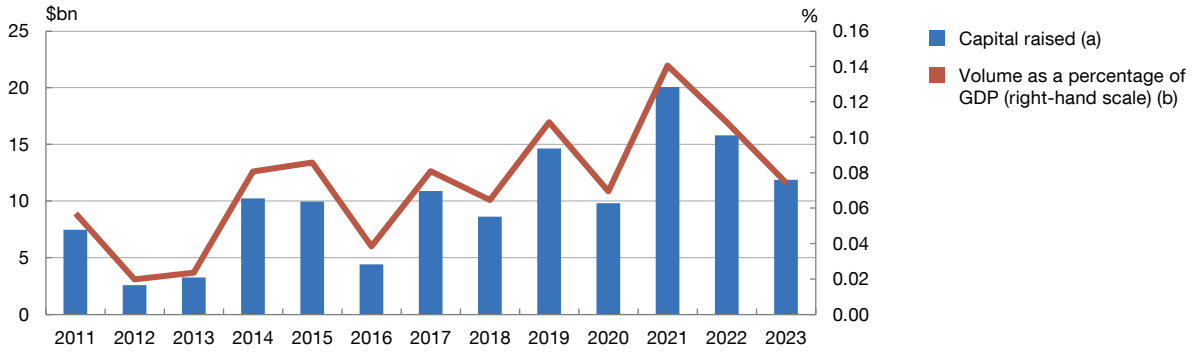
Chart 3

**Capital invested in the private credit market**

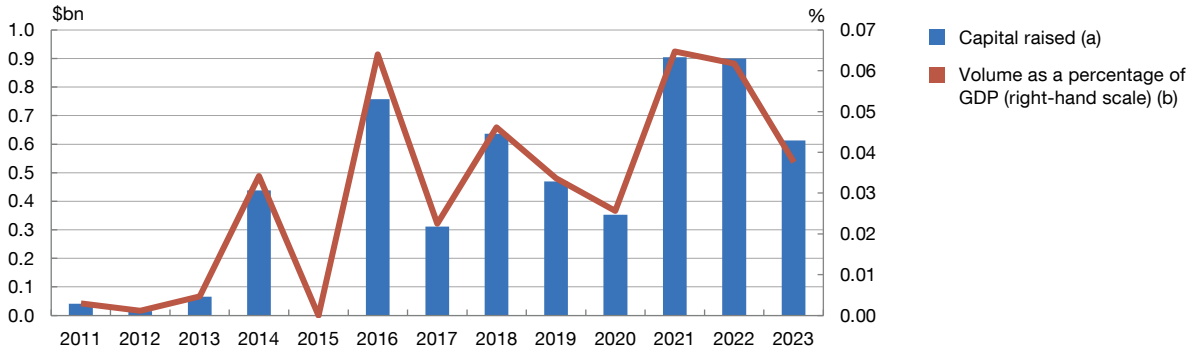
3.a United States




3.b Euro area




3.c Spain




**SOURCE:** PitchBook.

**a** Capital invested in funds categorised as "Debt" in PitchBook excluding the subcategories of "Debt-General" and "CLO securitisations", which we consider traditional funding rather than private credit in the strictest sense.
**b** GDP is taken at the end of each year and converted to dollars at the corresponding exchange rate.

Despite the growth in size of the private credit market and its deepening interconnectedness with the financial sector, the risks it poses to financial stability appear contained. Banks' aggregate direct exposure to private credit is low, while that of pension funds and insurers remains relatively small compared with their total assets (International Monetary Fund, 2024;

Federal Reserve Board, 2023). However, it is important to continue monitoring these interconnections and their potential impact on the stability of the financial system.

# 4 The private credit market in Spain

This section analyses the characteristics of firms that obtain financing in Spain's private credit market and explores the dynamics of these firms in the years immediately before and after loan origination. In addition, the main lenders in this segment are classified by lender type and country of origin. Lastly, the key characteristics of private credit market deals are described.

## 4.1 Characteristics of firms financed in the Spanish private credit market

Chart 4 compares the sectoral distribution of bank credit and private credit transactions. Private credit-financed firms are identified based on PitchBook data, while bank credit-financed firms are identified using the Banco de España's Central Credit Register (CCR).

In Spain, firms from a range of sectors use the private credit market, but four – technology, communications, industry and trade – account for around 77% of deals (Chart 4.a). Meanwhile, the main recipient sectors of bank credit are industry, trade and construction, suggesting different patterns of sectoral specialisation between the two financing channels.

These results suggest that traditional banks tend to primarily finance sectors with tangible assets and more stable cash flows, whereas private credit focuses on sectors with higher fixed and intangible costs. This underscores private credit's role as a complementary – and in some cases substitute – source of funding, one that is potentially more appealing to firms with more ambitious growth profiles or more complex financing needs.

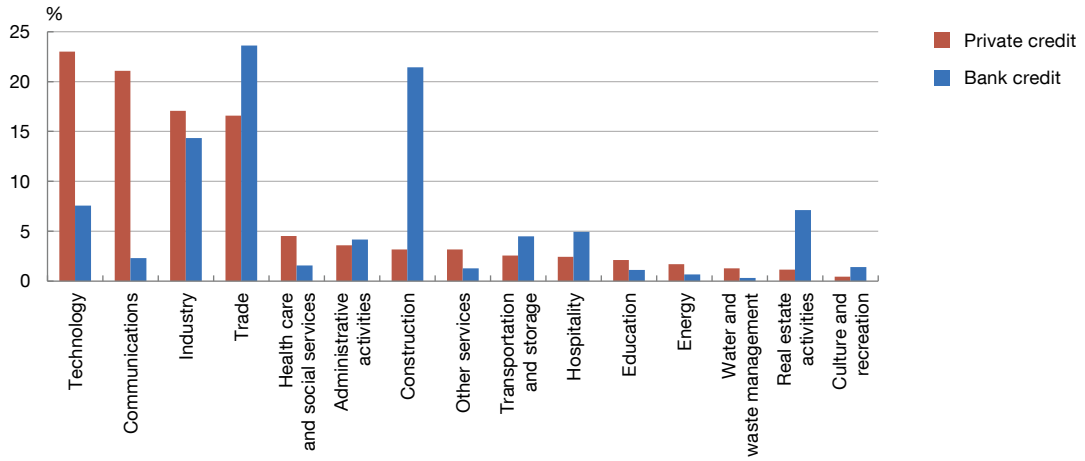
Given the differences observed in the sectoral distribution of firms accessing private credit and bank credit, we also examine whether these firms differ in other relevant characteristics. Table 1 presents the characteristics of the firms included in the Banco de España's Central Balance Sheet Data Office integrated database (CBI), distinguishing three groups: (1) private credit recipients; (2) bank credit recipients; and (3) all CBI firms.[10] As with the sectoral distribution analysis, firms financed through private credit are identified using PitchBook data, while bank-financed firms are identified based on CCR data. In Spain, a total of 528 firms secured private credit funding at some point between 2019 and 2023. By comparison, during that same period 955,893 firms obtained bank funding.

10 The CBI holds balance sheet information for the quasi-universe of Spanish firms and provides an accurate representation of Spain's economic structure.

Chart 4

**Sectoral distribution of private credit and bank credit in Spain**

4.a Sectors of firms funded by bank credit and by private credit (a)




**SOURCES:** PitchBook, CCR and DIBE.

**a** The data represent the average of new deals registered between January 2011 and December 2023. The sectoral distribution is based on new private credit deals identified in PitchBook and new bank credit transactions registered in the CCR. The sectoral classification is based on 2-digit CNAE (Spanish National Classification of Economic Activities) codes and each firm's sector is matched with data from the Banco de España Integrated Directory (DIBE, by its Spanish acronym). The sample excludes deals involving financial sector firms as the lender.

Table 1

**Characteristics of CBI firms by type of funding received**

| | Private credit (a) | | Bank credit (b) | | CBI (c) | |
|---|---|---|---|---|---|---|
| Characteristics (d) | Average | Standard deviation | Average | Standard deviation | Average | Standard deviation |
| Asset size | 8.34 | 1.96 | 5.91 | 1.72 | 5.34 | 2.01 |
| Age | 14.87 | 14.87 | 15.98 | 11.10 | 14.84 | 11.21 |
| Profitability | -0.10 | 0.32 | 0.01 | 0.24 | -0.01 | 0.31 |
| Leverage | 0.66 | 0.54 | 0.71 | 0.82 | 0.73 | 1.10 |
| Investment rate | 0.04 | 0.09 | 0.04 | 0.12 | 0.04 | 0.13 |
| Liquidity | 0.18 | 0.22 | 0.19 | 0.22 | 0.24 | 0.28 |
| Observations | 1,614 | | 2,675,367 | | 4,629,532 | |

**SOURCES:** PitchBook, CCR and CBI.

**a** The sample includes annual data for all firms included in the CBI in the period 2019-23 and that obtained private credit funding on at least one occasion during that period. Firms without a tax identification number in PitchBook are not included in the sample. However, the sample includes around 60% of the principal observed in PitchBook and can therefore be considered representative.
**b** The sample includes annual data for all firms included in the CBI in the period 2019-23 and that appear in the CCR as recipients of bank funding on at least one occasion during that period.
**c** The sample includes annual data for all firms included in the CBI in the period 2019-23 irrespective of the type of funding received.
**d** Asset size is the log of assets, profitability is ROA, leverage is the debt-to-total assets ratio and liquidity is the liquid assets-to-total assets ratio.

A comparison between private credit-financed and bank-financed firms shows that the former are, on average, larger in terms of assets. In addition, private credit recipients are generally younger, less profitable and less leveraged firms. However, their investment and liquidity levels are similar to those of bank-financed firms. Relative to all CBI firms, on average private credit

recipients are larger and of a similar age and have comparable investment rates. However, they have lower profitability, leverage and liquidity levels.[11]

Overall, the findings show that although firms accessing private credit tend to be larger than bank-financed firms, they are not necessarily more profitable. One possible interpretation is that the use of private credit is determined more by structural and sectoral characteristics than by firms' greater ability to generate value or by higher risk tolerance on the part of lenders.

## 4.2 Business dynamics in the years before and after receiving private credit

To analyse the dynamics of firms' key characteristics when they receive private credit funding, Chart 5 shows how firms' assets, profitability and leverage evolve before and after the year they access the private credit market.

In the years prior to receiving the loan, asset levels decline. Conversely, following the injection of funds, asset levels increase steadily, consistent with the use of the funds to finance growth. Meanwhile, firms' profitability remains broadly stable, with average return on assets (ROA) negative throughout the period analysed, with a slight drop in the year the funds are received followed by a moderate recovery. However, the wide interquartile range observed indicates a high degree of heterogeneity across firms accessing private credit. Even more interesting is the case of leverage,[12] which remains virtually unchanged after the funding is received. This is consistent with the levels observed in the CBI sample and with the figures reported in Table 1. Most notably, the interquartile range of leverage narrows in the year following the injection of funds, driven mainly by an increase in leverage among firms in the bottom quartile. However, both the mean and the median show similar patterns and, as total assets grow steadily over the same period (Chart 5.a), this increase in indebtedness does not necessarily translate into higher relative financial risk.

## 4.3 Typology and residence of private credit lenders in Spain

To assess the potential risks that may arise in the private credit market, it is crucial to know what types of firms provide private credit and to compare the possible differences between private credit lenders in Spain and the United States. Table 2 analyses the typology of these firms and presents, in annual average terms over the period 2011-23, the share of total deal size and deal numbers for each type of lender and country of origin, for all private credit deals where the funding was not exclusively provided by banks.

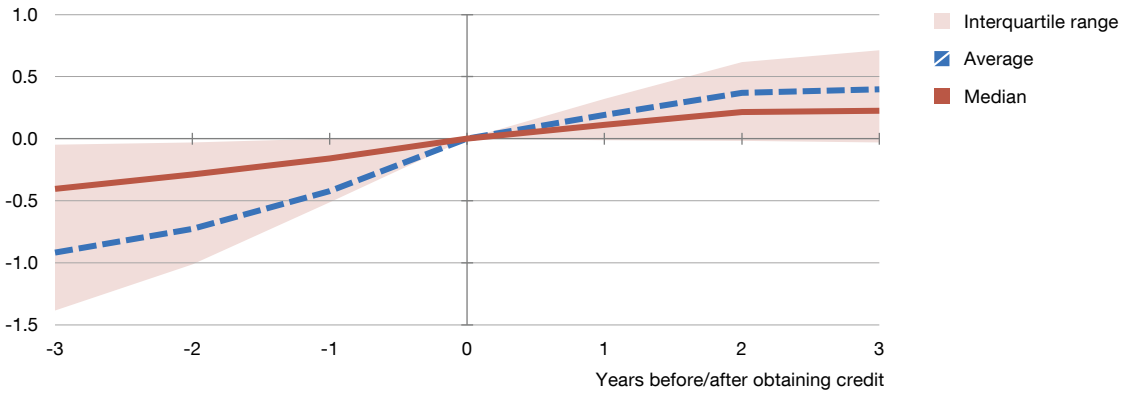
11 These findings are consistent with Chernenko, Erel and Prilmeier (2020), except in terms of leverage. The authors conclude that, compared with borrowers in the traditional banking market, private debt borrowers are less profitable and have higher leverage and higher stock return volatility. Moreover, profitability is typically lower prior to loan origination and their assets experience larger changes around loan origination. In Spain, the lower leverage of firms using private credit may reflect their larger size, which is often negatively correlated with leverage.

12 The level of a firms' indebtedness as a proportion of its total assets.

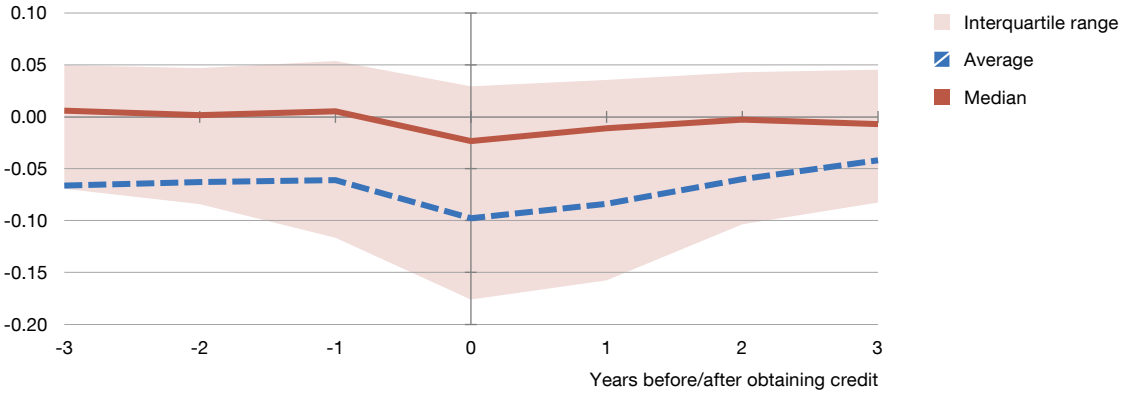
Chart 5

**Developments in the characteristics of firms receiving private credit funding (a)**

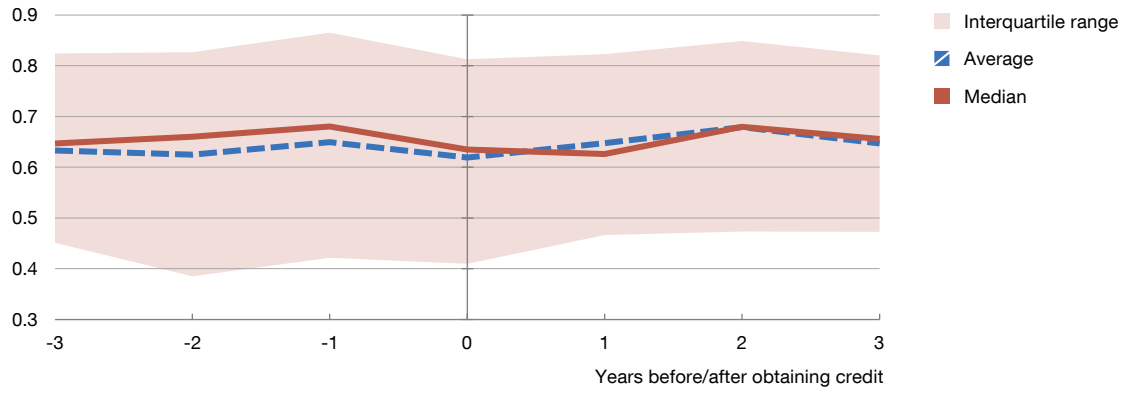
5.a Asset growth




5.b Profitability




5.c Leverage




**SOURCES:** PitchBook and CBI.

**a** The charts show developments in the descriptive statistics of the variables in the periods before and after obtaining private credit.

Table 2
**Lender type and country of origin in Spain's private credit market (a)**

%

| | Deal size | | | | | |
|---|---|---|---|---|---|---|
| Lender type | Total | Spain | United States | United Kingdom | France | Other |
| Banks | 44.53 | 14.30 | 4.47 | 4.71 | 7.61 | 14.75 |
| Investment banks and other financial services institutions | 27.44 | 0.36 | 12.99 | 1.27 | 5.72 | 8.39 |
| Direct lenders and investment funds | 26.31 | 2.29 | 11.19 | 3.06 | 2.18 | 8.08 |
| Advisors and service providers | 1.71 | 0.20 | 0.59 | 0.24 | 0.37 | 1.38 |
| Other | 0.06 | 0.07 | 0.00 | 0.00 | 0.03 | 0.00 |
| Contribution | | 17.21 | 29.24 | 9.28 | 15.91 | 32.60 |

%

| | Deal numbers | | | | | |
|---|---|---|---|---|---|---|
| Lender type | Total | Spain | United States | United Kingdom | France | Other |
| Banks | 41.08 | 16.14 | 3.58 | 3.75 | 5.77 | 12.85 |
| Investment banks and other financial services institutions | 16.06 | 1.12 | 7.26 | 1.63 | 4.69 | 3.11 |
| Direct lenders and investment funds | 38.68 | 19.48 | 7.94 | 2.39 | 3.71 | 3.71 |
| Advisors and service providers | 4.08 | 2.01 | 0.56 | 0.51 | 1.26 | 1.26 |
| Other | 0.41 | 0.43 | 0.00 | 0.00 | 0.41 | 0.37 |
| Contribution | | 39.18 | 19.35 | 8.29 | 15.83 | 21.30 |

**SOURCES:** PitchBook, CBI and authors calculations.

**a** The data show the average shares, in terms of deal size and deal numbers, of private credit deals involving non-financial corporations from January 2011 to December 2023. All deals involving a credit agreement are included, regardless of whether they are formally categorised as private credit. Deals consisting solely of bond issuances or involving only commercial bank lenders are excluded.

The first column shows that, both in terms of deal size and numbers, throughout the period the majority of loans are granted by entities other than commercial banks. Within this group, investment banks and other financial services institutions, together with direct lenders and investment funds, account for most of the business (53.74% and 54.74% in terms of deal size and numbers, respectively). This shows that private credit is largely intermediated by players outside the traditional banking system. Commercial banks are the second largest group, which evidences the significant degree of interconnectedness between the Spanish banking system and the private credit market.[13] This contrasts with the United States, where most private credit lenders are investment funds (Haque, Mayer and Stefanescu, 2025; Cai and Haque, 2024).

The analysis highlights the complexity of these deals, where different types of financial intermediaries coexist, and reinforces the idea that private credit is not completely separate from – but rather complementary to – the traditional financial system.

13 Loans granted by banks may be direct funding to firms owned by PE funds or part of a syndicated loan involving several lenders.

Table 2 also presents the geographical breakdown of private credit lenders in Spain by type of institution, expressed as the average annual share of deal size and numbers.[14] The data show that 39.18% of deals were arranged with entities domiciled in Spain, although in terms of total volume the figure is lower (17.21%). Within this group of institutions, traditional banks stand out as the main providers of funds. Yet the majority of the funds borrowed come from abroad, especially from the United States[15] (29.24%) and France (15.91%). There is considerable cross-country heterogeneity, but among US lenders the predominant groups are investment banks and other financial services institutions and direct lenders. However, among Spanish and French lenders, traditional banks play a leading role, although investment banks and other financial services institutions also play a significant part.

This high level of foreign involvement reinforces the idea that private credit deals in Spain are complex and sophisticated, entailing collaborations with credit institutions and credit intermediation both by players outside the traditional banking system and by commercial banks in an increasingly globalised environment.

Moreover, although banks account for more than 40% of private credit deal volume and numbers in Spain, Spanish banks' exposure to non-banks – measured as the share of loans, debt securities and other equity instruments vis-à-vis non-bank financial intermediaries (NBFIs)[16] as a proportion of total assets – has remained relatively stable at around 7% since 2017 (7.9% at June 2025). This suggests that, despite the growth in the private credit market, Spanish banks have not significantly increased their aggregate exposure to non-banks. This supports the view that private credit in Spain is complementary to the traditional financial system and does not necessarily entail greater dependence on or vulnerability to non-bank players.

## 4.4 Private credit deals in Spain

This section compares the characteristics of private credit deals and bank loans in Spain.

As Table 3 shows, on average, private credit deals involve much larger amounts than bank loans; specifically, approximately €104 million for private credit deals compared with around €80,000 for bank loans.[17] If median values are compared the difference narrows significantly, which shows that the average values are strongly influenced by outliers.

Moreover, in line with the findings of Haque, Mayer and Stefanescu (2025), the average maturity of private credit deals (6.67 years) is longer than that of bank loans (1.47 years). In addition,

14 Since these shares are calculated in terms of the aggregate size and total number of deals, they add up to 100 not within each country but considering the set of countries overall.

15 The fact that US lenders have a higher share of volume than of deals suggests that they invest higher volumes in larger firms.

16 NBFIs include money market funds (MMFs), investment funds other than MMFs, insurance companies, pension funds and other financial institutions that are not monetary financial institutions (MFIs). For a more in-depth analysis of how interconnections between the NBFI sector and banks have evolved over time, see Banco de España (2025).

17 These figures are consistent with the findings of other authors, such as Haque, Mayer and Stefanescu (2025) and Cai and Haque (2024).

Table 3
**Characteristics of private credit deals in Spain**

| | CCR (a) | | | | PitchBook (b) | | | |
|---|---|---|---|---|---|---|---|---|
| | Observations ('000s) | Average | Median | Standard deviation | Observations | Average | Median | Standard deviation |
| Credit (€m) | 18,555 | 0.08 | 0.01 | 3.11 | 899 | 103.75 | 2.61 | 317.13 |
| Term (years) | 15,949 | 1.47 | 0.25 | 3.28 | 186 | 6.67 | 6.12 | 3.56 |
| Interest rate (%) | 13,671 | 3.11 | 2.50 | 3.34 | 94 | 5.31 | 4.49 | 2.71 |

**SOURCES:** CBI and PitchBook.

**a** The sample includes new bank credit deals observed in the CCR in the period 2019-23 (interest rate data available from 2019). The original sample is filtered to include only credit deals with Spanish for-profit firms. In addition, observations where credit is not strictly positive or the term and interest rate data are consistent with measurement errors are discarded.
**b** The sample includes new private credit deals observed in PitchBook in the period 2019-23. The original sample is filtered to include only credit deals with Spanish firms.

and also in line with the literature, the average interest rate on private credit funding (5.31%) is higher than the average bank lending rate (3.11%).[18]

The marked differences in the characteristics of these transactions could be explained, at least in part, by the differences in the type of firms that access each source of funding and by the fact that they use funding for different purposes.

## 5 Conclusions

This article reviews developments in private markets, which have expanded across the globe in recent years, focusing on the private credit market. This market has grown considerably and has consolidated its position as an alternative source of funding, especially for firms which, owing to their specific characteristics or needs, struggle to obtain funding from traditional channels. Although the private credit market still accounts for a small proportion of total corporate lending, it has shown positive momentum in recent years, with increased deal numbers, greater sectoral diversification and growing sophistication on the part of the agents involved. All this in an international setting in which private markets have gained in prominence, especially in the United States and, to a lesser extent, in the euro area.

In Spain, the firms accessing private credit funding are mainly in the technology, communications, industry and trade sectors. Moreover, they tend to be larger and less leveraged – although not necessarily more profitable – than those that turn to bank lending. This suggests that private credit is not only geared towards firms with greater capacity to generate value; rather, it is more a question of sectoral and structural specialisation, oriented towards sectors with fewer tangible assets and more complex financing needs. In addition, the high level of participation of foreign investors, especially from the United States and France, underlines both the growing internationalisation of the Spanish market and the

18 Cai and Haque (2024) find a higher spread over a benchmark interest rate for private credit deals than for syndicated loans.

important role played by non-banks in credit intermediation, although in the case of Spanish lenders there is a significant proportion of credit institutions.

Private credit deals characteristically have considerably larger volumes, longer maturities and higher interest rates than bank loans, possibly reflecting both the risk profile and the contractual flexibility that this type of funding offers. Despite its growing interconnectedness with the traditional financial system, risks to financial stability appear to be contained, thanks to the closed structure of the funding, the specialisation of the lenders and the limited direct exposure of banks. Nevertheless, the market momentum and the shift towards greater retail investor participation and more liquid vehicles call for continuous monitoring – and thus increased market transparency – to anticipate potential vulnerabilities.

Overall, the private credit market in Spain represents an opportunity to diversify corporate funding sources, boost the efficiency of the financial system and promote growth in strategic sectors. Although it is still an emerging market, it has the potential to become a key pillar of Spain's financial ecosystem, with significant implications for macroprudential policy and economic stability.

## REFERENCES


Aramonte, Sirio, and Fernando Avalos. (2021). "The rise of private markets". BIS *Quarterly Review.* Bank of International Settlements. https://www.bis.org/publ/qtrpdf/r_qt2112e.pdf

Arnold, Nathaniel, Guillaume Claveres and Jan Frie. (2024). "Stepping Up Venture Capital to Finance Innovation in Europe". IMF Working Papers, 146, International Monetary Fund. https://doi.org/10.5089/9798400280771.001

Avalos, Fernando, Sebastian Doerr and Gabor Pinter. (2025). "The global drivers of private credit". BIS *Quarterly Review.* Bank of International Settlements. https://www.bis.org/publ/qtrpdf/r_qt2503b.pdf

Banco de España. (2025). *Financial Stability Report. Autumn 2025.* https://repositorio.bde.es/handle/123456789/41430

Bank of England. (2024). *Financial Stability Report,* June. https://www.bankofengland.co.uk/financial-stability-report/2024/june-2024

Block, Joern, Young Soo Jang, Steven N. Kaplan and Anna Schulze. (2024). "A Survey of Private Debt Funds". *The Review of Corporate Finance Studies,* 13, pp. 335-383. https://doi.org/10.1093/rcfs/cfae001

Buch, Claudia. (2025). "Hidden leverage and blind spots: addressing banks' exposures to private market funds". *The Supervision Blog - European Central Bank,* 3 June. https://www.bankingsupervision.europa.eu/press/blog/2025/html/ssm.blog20250603%7E7af4ffc2d7.en.html

Cai, Fang, and Sharjil Haque. (2024). "Private Credit: Characteristics and Risks". FEDS Notes, Federal Reserve Board. https://doi.org/10.17016/2380-7172.3462

Chernenko, Sergey, Isil Erel and Robert Prilmeier. (2020). "Why do firms borrow directly from nonbanks?". NBER Working Paper Series, 26458. National Bureau of Economic Research. https://doi.org/10.3386/w26458

Federal Reserve Board. (2023). *Financial Stability Report. May.* https://www.federalreserve.gov/publications/files/financial-stability-report-20230508.pdf

González, Javier, and María José Pérez-Santamarina. (2025). "Private Finance Markets". CNMV Working Paper, 88. Comisión Nacional del Mercado de Valores. http://dx.doi.org/10.2139/ssrn.5391717

Haque, Sharjil, Young Jang and Jessie Wang. (2025). "Indirect Credit Supply: How Bank Lending to Private Credit Shapes Monetary Policy Transmission". *S&P Global Market Intelligence.* http://dx.doi.org/10.2139/ssrn.5125733

Haque, Sharjil, Simon Mayer and Irina Stefanescu. (2025). "Private Debt vs Bank Debt in Corporate Borrowing". Proceedings of the EUROFIDAI-ESSEC Paris December Finance Meeting 2024. http://dx.doi.org/10.2139/ssrn.4821158

International Monetary Fund. (2024). *Global Financial Stability Report. April.* https://www.imf.org/en/Publications/GFSR/Issues/2024/04/16/global-financial-stability-report-april-2024

Kuroda, Koichi, Akira Hasebe, Satoshi Ito and Daisuke Ikeda. (2024). "Private Debt Funds: What They Are and Trends under Interest Rate Hikes". *Bank of Japan Review.* https://www.boj.or.jp/en/research/wps_rev/rev_2024/rev24e01.htm

PitchBook. (2025). *Global Private Debt Report.* https://pitchbook.com/news/reports/2024-annual-global-private-debt-report

Wong, Eric, Victor Leung, Joe Wong and Thera Lu. (2024). "The financial stability implications of the private credit sector in Asia-Pacific". *Research Memorandum,* 05/2024, Hong Kong Monetary Authority. https://www.hkma.gov.hk/media/eng/publication-and-research/research/research-memorandums/2024/RM05-2024.pdf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# FIRMS' RECOURSE TO TRADE CREDIT AND THE RELATIONSHIP WITH BANK CREDIT IN SPAIN

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# FIRMS' RECOURSE TO TRADE CREDIT AND THE RELATIONSHIP WITH BANK CREDIT IN SPAIN


## Abstract

This article examines the main characteristics of trade credit in Spain and the changes therein in the period from 2008 to 2023. In 2023, commercial borrowing represented 21% of Spanish firms' total liabilities. In the same year, the average payment period (APP) was slightly above 60 days, sharply down from the nearly 90 days recorded in 2009, partly as the result of regulatory changes. These figures vary significantly across production sectors. The findings show that one way in which some firms fund themselves in response to problems in gaining access to bank credit is by lengthening their APP. This strategy is particularly prevalent among firms with worse credit quality, which generally face greater constraints in accessing this type of financing. Nevertheless, lags in paying suppliers could also indicate a deterioration in credit quality, as reflected in defaults on bank loans. Hence, the correlation between probability of default on bank loans and APP is not linear and also depends on credit quality. Specifically, financing through trade credit with comfortable but not excessive repayment periods helps all kinds of firms reduce defaults on banking sector loans inasmuch as it acts as a liquidity buffer. By contrast, when there are severe payment delays, the correlation between probability of default and APP turns positive and increases in the case of firms with worse credit quality, probably because firms that fall behind in paying their suppliers are also often late in paying their bank creditors.



**Keywords:** trade credit, average payment period, probability of default, liquidity.


## 1 Introduction

Trade credit is a form of financing in which non-financial corporations defer payment on purchases or collection on sales in order to, in net terms, raise funds from, or grant financing to, other firms or sectors. In 2023, trade finance accounted for 21% of non-financial corporations' total liabilities, nearly 2 percentage points (pp) higher than in 2008.[1] Accounting information can be used to calculate two indicators that approximate the average payment period (APP) to suppliers and average collection period (ACP) from customers, and thus to estimate the average number of days that a firm takes to pay its suppliers or collect from its customers.[2] Still, the values obtained with the indicators are mere approximations. Although they are useful for analysing changes, they should not be taken as a benchmark to verify to what extent the legal limits on payment periods are being complied with.

1 Central Balance Sheet Data Office integrated database (CBI).

2 Specifically, the APP to suppliers, expressed in days, is calculated as the ratio of the supplier balance (net of advances) to annual purchases (plus work performed by other firms and VAT borne by suppliers for domestic transactions), multiplied by 365. The ACP from customers is calculated in a similar manner [ratio of the customer balance (net of advances) to annual sales (plus VAT charged to customers for domestic transactions), multiplied by 365].

This article analyses some characteristics of trade credit in Spain, and in particular the APP to suppliers, given that this is the indicator on which firms, in principle, have decision-making capacity and, in addition, on which there are legal limits. These limits have been progressively reduced since 2000 when Directive 2000/35/EC on combating late payment in commercial transactions was enacted. Since then, payment periods have gradually been reduced in Spain, leading to the establishment of a maximum period of 60 days for payments between enterprises and 30 days for transactions with government agencies. In addition, rules have been issued to strengthen creditors' rights and combat late payment.[3] In line with these regulatory changes and the gradual economic rebound following the global financial crisis, the estimated APP has gradually decreased, with the number of days peaking in 2009 (nearly 90 days) to slightly more than 60 days in 2023. In recent years, the APP has fallen in other euro area countries as well, such as France and Portugal, but not across the board.[4] In the case of Spanish firms, the decrease was accompanied by a drop in the ACP. This trend, largely resulting from the stimulus to trade finance from regulatory changes, is also believed to have had the positive effect of giving suppliers greater certainty that they will be paid on time.[5]

In addition, there is evidence that one way some firms fund themselves in response to problems in gaining access to other financial resources, such as bank credit, is by lengthening their APP. This is especially prevalent among firms with worse credit quality, which generally face greater constraints on accessing this type of financing. This finding is in line with various studies showing that enterprises replace bank credit with trade credit especially during periods of crisis, which has been seen among both Spanish firms (Carbó-Valverde, Rodríguez-Fernández and Udell, 2016) and among European firms (Casey and O'Toole, 2014, and Palacín-Sánchez, Canto-Cuevas and di-Pietro, 2019, among others). In addition, such authors as McGuinness and Hogan (2014) have found that during the global financial crisis, trade credit played an even more important role as a source of financing for vulnerable small and medium-sized enterprises (SMEs). According to Garcia-Appendini and Montoriol-Garriga (2013), firms that had high levels of liquidity before the global financial crisis increased the amount of trade credit they offered to other corporations facing constraints on access to bank credit. All of this evidence, confirmed for Spain in this article, suggests that the firms with the most liquidity build up cash reserves out of precaution. Moreover, this allows them to provide trade finance to their customers, for whom it is particularly useful when they have difficulties accessing bank credit.

In terms of methodology, this article adds to the existing literature on restrictions on accessing credit and the recourse to trade credit through the use of credit application data to identify restricted firms (that is, those whose bank credit balance decreases even though they apply for new loans). This also enables a better identification of the effect that we intend to analyse over an extended period (2008-23), including phases of both contraction and expansion of bank lending.

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3 See the annex for more details on these rules.

4 Micro Bank for the Accounts of Companies Harmonized (iBACH).

5 In addition to these regulatory changes, we should stress the role played by credit insurance in protecting and validating trade credit, and thus serving as an incentive for suppliers to provide more such credit. This is possible thanks to greater information on customers' payment behaviour and the more extensive experience and analytical capabilities of credit insurers compared with the suppliers that contract their services. For more details, see Crédito y Caución (2025).

Although by delaying supplier payments firms can mitigate the adverse effects of restrictions on their access to bank credit, this can also lay bare a deterioration in their credit quality, which would translate into defaults on their bank loans and, possibly, their non-bank debts. The findings of this article point to a positive, significant correlation between the APP and the probability of default on bank loans only when the firms with worse credit quality fall far behind in their supplier payments. The little empirical evidence that there is on these effects in general shows only that trade credit has a positive impact on firms' likelihood of survival (McGuinness, Hogan and Powell, 2018). Nevertheless, corporate restructurings through a formal mechanism such as insolvency proceedings are an extreme, infrequent event in Spain (García-Posada and Mora-Sanguinetti, 2014; García-Posada Gómez, 2020) and generally are not seen by researchers when they are carried out through private debt renegotiations. For this reason, this article analyses the correlation between APPs and the existence of some type of difficulty in the repayment of bank loans.

For these analyses, we used the CBI's annual database, consisting of a broad sampling of some 900,000 firms, although it is released with a certain lag (about 11 months) after the end of each year. The period analysed is from 2008 (year of entry into force of the Spanish General Chart of Accounts, which requires firms to provide detailed information that previously did not exist and with which the variables of interest for this article can be calculated) until 2023, which is the last year for which complete information is available. By including a large number of firms in this database we are able to analyse in depth various sources of heterogeneity, differentiating by firm characteristics such as sector of activity, size and credit quality.

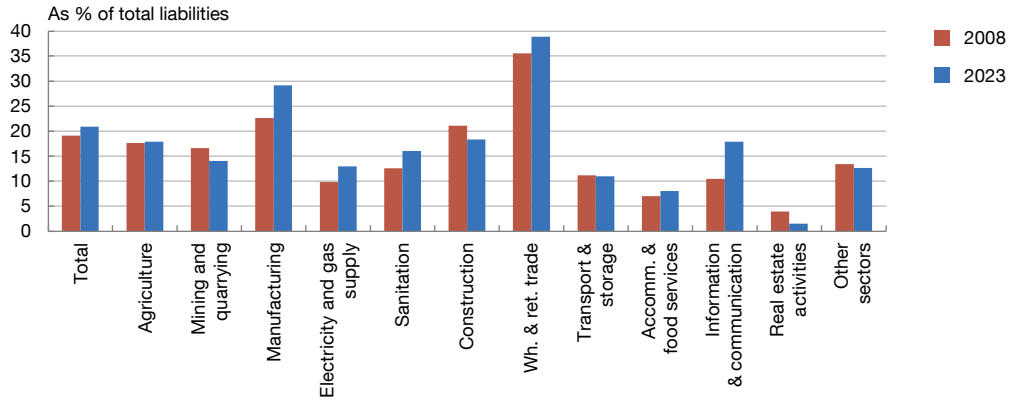
The rest of this article is structured as follows: The second section analyses changes in trade credit and the APP from 2008 to 2023 and studies in depth the aforementioned sources of heterogeneity; the third section gives the findings from econometric analyses of the characteristics of firms with high and low APPs, examines the correlation between increases in APP and growth of bank credit and analyses the correlation between risk of default on bank loans and the APP, taking into account heterogeneity at the productive sector level and credit rating; and lastly the appendix describes regulations on trade credit in Spain, with a special emphasis on recent regulatory changes.

## 2 Commercial borrowing and average payment periods in Spain

As indicated in the introduction, trade borrowing (also called "supplier balance") on firms' balance sheets increased by nearly 2 pp from 2008 to 2023, to 21% (see Chart 1). The sectoral breakdown shows that the weight of supplier balance has increased in most sectors, in particular in information and communication and in manufacturing (by 7.4 pp and 6.6 pp, respectively). This greater relative importance of trade credit resulted from the increase in such credit (associated with firms' higher output) and a decrease in other sources of external financing (especially financial debt).[6]

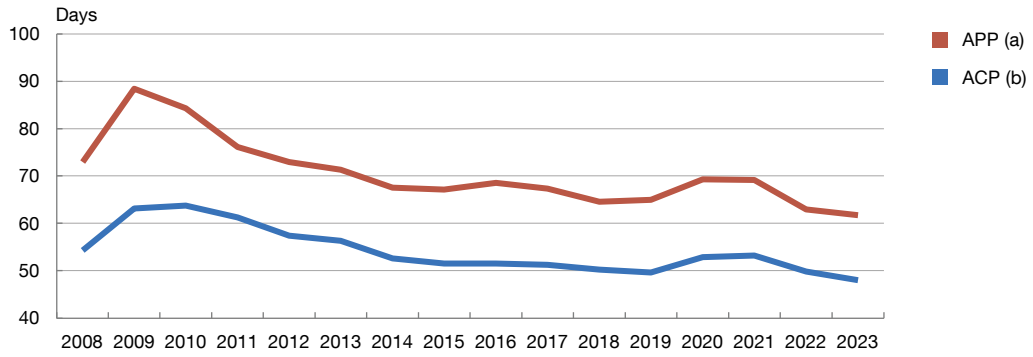
6 Mainly, bank loans, credit lines and, in the case of firms of a certain size, fixed-income securities.

Chart 1
**Trade credit**




**SOURCE:** Banco de España.

Chart 2
**APP and ACP. Aggregate ratios**



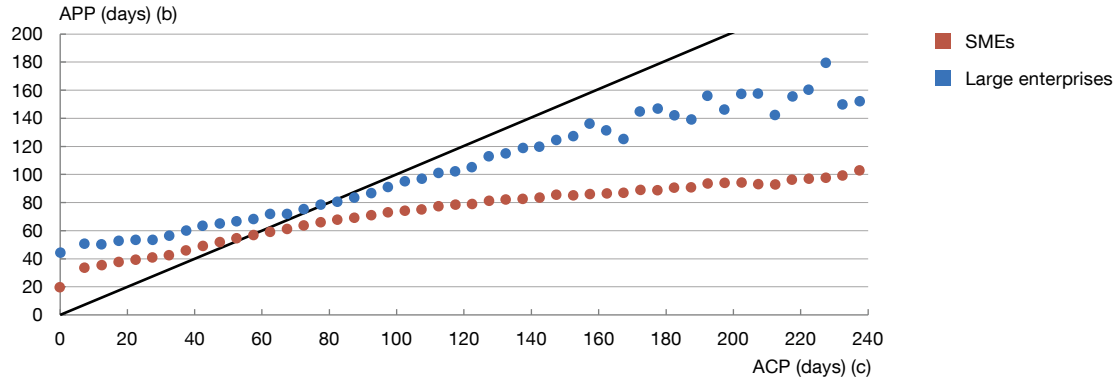

**SOURCE:** Banco de España.

**a** Calculated as [(Year-end balance non-current trade payables + Supplier balance, net of advances to suppliers, for firms for which this item is available) / (Amount of purchases + Work performed by other firms + VAT borne by suppliers for domestic transactions)] x 365.
**b** Calculated as [(Year-end balance non-current trade receivables + Customer balance, net of customer advances, for firms for which this item is available) / (Net revenue + VAT charged to customers for domestic transactions)] x 365.

The increased weight of trade credit in proportion to total liabilities in recent years is believed to be compatible with a progressive reduction in the number of days that, on average, firms were taking to pay their suppliers. Hence, after peaking in 2009 at nearly 90 days, it stood at slightly above 60 days in 2023 (see Chart 2). This downward trend was driven both by regulatory changes establishing maximum deadlines for commercial transactions, as explained in the introduction, and by the economic rebound since the end of the global financial crisis and the sovereign debt crisis. This appears to have had a positive impact on the supply of such financing by giving suppliers greater certainty that they would be paid on time. In addition, this increased speed in trade payments has logically translated into a shortening of the collection periods. Hence, Chart 3 confirms the positive correlation between firms' APPs and ACPs, as they rise or decline in tandem. The breakdown by size also shows that large enterprises have

Chart 3

**APP compared with ACP. Breakdown by firm size (a)**

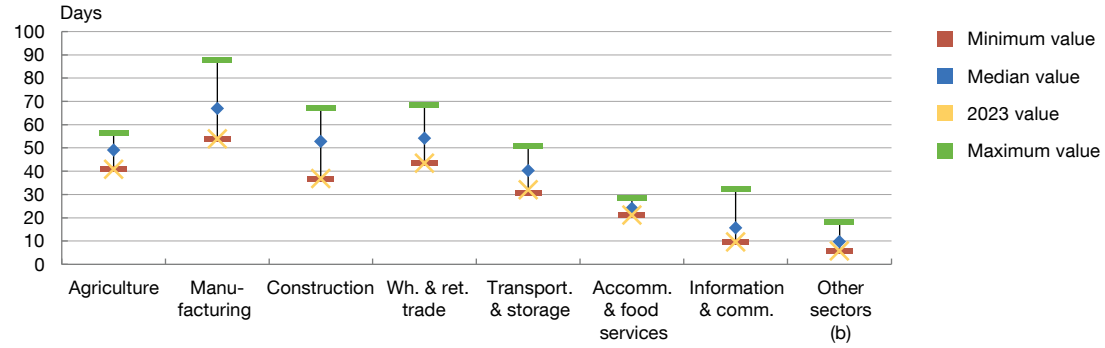



**SOURCE:** Banco de España.

**a** The dots represent the average of the median APPs and ACPs for 2008 until 2023, calculated for five-day segments of the ACPs.
**b** Calculated as [(Year-end balance non-current trade payables + Supplier balance, net of advances to suppliers, for firms for which this item is available) / (Amount of purchases + Work performed by other firms + VAT borne by suppliers for domestic transactions)] x 365.
**c** Calculated as [(Year-end balance non-current trade receivables + Customer balance, net of customer advances, for firms for which this items is available) / (Net revenue + VAT charged to customers for domestic transactions)] x 365.

Chart 4

**Distribution of median APPs by sector, between 2008 and 2023 (a)**




**SOURCE:** Banco de España.

**a** APP calculated as [(Year-end balance non-current trade payables + Supplier balance, net of advances to suppliers, for firms for which this item is available) / (Amount of purchases + Work performed by other firms + VAT borne by suppliers for domestic transactions)] x 365.
**b** Includes mining and quarrying; electricity and gas supply; sanitation; real-estate activities; professional, scientific and technical activities; and administrative and support service activities; education; health and social work activities; arts, amusement and recreation; and other services.

higher APPs than do SMEs for a given collection period, possibly because large firms have greater negotiating power than the latter. In addition, according to Love, Preve and Sarria-Allende (2007) and McGuinness and Hogan (2014), firms with a sounder financial situation are the ones that offer more trade credit to their customers, especially during periods of crisis.

As for sectoral information, Chart 4 points, first, to an across-the board decline in the APP from 2008 to 2023. The median value for this indicator in 2023 fell to its minimum in all sectors,

Table 1
**Firm characteristics according to their APP**

| | Firms with a high or low APP (a) | | | Firms with an APP of more or less than 60 days | | |
|---|---|---|---|---|---|---|
| | High | Low | Difference (b) | More than 60 days | Less than or equal to 60 days | Difference (b) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Indicators in t-1. Averages | | | | | | |
| Finance expense / Sales | 0.021 | 0.013 | 0.008*** | 0.021 | 0.013 | 0.008*** |
| Own funds / Total assets | 0.179 | 0.312 | -0.134*** | 0.194 | 0.303 | -0.109*** |
| Cash and cash equivalents / Total assets | 0.143 | 0.194 | -0.051*** | 0.142 | 0.199 | -0.057*** |
| Net profit / Total assets | -0.023 | 0.007 | -0.030*** | -0.020 | 0.006 | -0.027*** |
| Gross value added / Total assets | 0.453 | 0.596 | -0.143*** | 0.438 | 0.621 | -0.183*** |
| Sales / Total assets | 1.390 | 2.028 | -0.638*** | 1.361 | 2.097 | -0.737*** |
| Logarithm of total assets | 5.942 | 5.716 | 0.226*** | 5.997 | 5.642 | 0.355*** |
| Logarithm of ACP, in t. Averages | 3.328 | 2.837 | 0.492*** | 3.446 | 2.679 | 0.767*** |

**SOURCE:** Banco de España.

**a** A firm's APP is considered high (low) if it is higher than (less than or equal to) the median APP for its sector corresponding to the NACE Rev.2 two-digit classification.
**b** Difference between the average for firms with a higher APP less the average for firms with a lower APP. Statistical significance is calculated through a mean difference test in which the null hypothesis is that there are no differences in the averages of the respective populations and the variances of the two are not assumed to be equal. * p-value < 0.10; ** p-value < 0.05; *** p-value < 0.01

except for transportation and storage, where it rebounded slightly that year. However, the chart also shows that median APPs varied greatly depending on the sector in which a firm operates, ranging from 16 days in information and communication to 67 in manufacturing.

# 3 Econometric analysis

## 3.1 Firm characteristics according to average payment period

This section examines the correlation between the APP, growth of bank credit and probability of default on bank loans using statistical techniques and firm-level data. We begin with a descriptive analysis in order to examine the main differences between firms with high APPs and those with low APPs. Table 1 gives the averages for the various characteristics[7] of these two types of firms, as well as the differences between them, with an indication of whether these differences are statistically significant. Columns (1)-(3) relate to firms with high or low APPs (above or below the median for their sector, in accordance with the Spanish National Classification of Economic Activities (NACE Rev.2) two-digit classification).[8]

7 All of these variables, other than those expressed in logarithms, are winsorised to 1% to reduce the impact of outliers on the calculation of averages and on the estimate of subsequent regressions.

8 Very similar results are obtained when a firm's APP is considered high (low) if it is greater than (lesser than or equal to) the median APP for its sector in a given year.

As shown, firms with a high APP have less financial strength, given that on average their ratio of finance expense to sales is higher, they are less capitalised (own funds to total assets), less profitable (net profit to total assets) and have less activity (approximated with the ratios of gross value added and sales to total assets) than firms with a low APP. Likewise, firms with a high APP have a lower current ratio (cash and cash equivalents to total assets), which could be associated with a longer lag in paying suppliers, given that this strategy might help them meet their liquidity needs. In addition, they are allowed to delay their supply payments more because their negotiating power is probably greater as they are larger (in terms of total assets) and have a higher ACP. This is consistent with the positive correlation between the two indicators shown above. As indicated in columns (4)-(6), the findings are similar when comparisons are made of firms with an APP above 60 days and those with an APP less than or equal to 60 days.

### 3.2 The role of trade credit in restrictions on access to bank credit

The evidence presented in sub-section 3.1 shows that the firms with higher APPs have less financial strength. This suggests that the lag in paying their suppliers could be associated with constraints on their access to bank finance owing to their lower credit quality. Consequently, these firms could be using trade credit to mitigate their financing problems.

To assess the validity of this hypothesis, we conduct a regression analysis in which the dependent variable is binary and takes a value of 1 if the APP increases in a given year relative to the previous year, and a value of 0 if it does not change or it decreases. The explanatory variable of interest is the ratio of the change in the firm's bank debt between those two years to its total assets for the previous year.[9] Several additional explanatory variables are taken into consideration to control for other factors that might influence the change in the APP.

Specifically, the controls, one-year lagged, include the ratio of finance expense to sales, own funds to total assets, cash and cash equivalents to total assets, net profit to total assets, gross value added to total assets, sales to total assets and the logarithm of total assets, as well as binary variables that denote the firm's legal form. In addition, to take into account the effect of the change in debt arising from the firm's commercial activity, and given the high correlation between APP and ACP shown above, the logarithm of ACP plus 1 is used, given that greater (smaller) lags in collecting are linked to greater (smaller) lags in paying suppliers and therefore to changes in trade payables. Also included is the contemporaneous performance of the firm's sales (the change therein between the current and the previous year), as this could trigger changes both in the APP and in bank debt. Lastly, sector-province-size-year fixed effects are included, where size refers to microenterprises and small, medium and large enterprises, and sector refers to the NACE Rev.2 two-digit classification. The sample used for the estimate is limited to firms that had bank debt the previous year, since the analysis is intended to determine whether firms deal with a reduction in their bank lending by increasing their APP (that is, by delaying payments to their suppliers).

9 This variable was also winsorised to 1%.

Table 2

**Correlation between an increase in APP and access to bank finance among more or less creditworthy firms** (a)

| | Firms that have increased their APP | | | Firms that request bank loans and have increased their APP | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Sector-province-size-year fixed effects | | | Year and firm fixed effects | | |
| | All (1) | More creditworthy (2) | Less creditworthy (3) | All (4) | More creditworthy (5) | Less creditworthy (6) | All (7) | More creditworthy (8) | Less creditworthy (9) |
| Bank credit | -0.041*** | -0.007*** | -0.063*** | -0.064*** | -0.017*** | -0.095*** | -0.172*** | -0.144*** | -0.210*** |
| Standard error | (0.002) | (0.003) | (0.002) | (0.003) | (0.005) | (0.004) | (0.004) | (0.008) | (0.005) |
| Observations (thousands) | 4,053.622 | 1,375.348 | 2,645.915 | 1,160.217 | 325.283 | 806.167 | 994.865 | 235.625 | 677.647 |
| $R^2$ | 0.059 | 0.087 | 0.066 | 0.091 | 0.151 | 0.102 | 0.278 | 0.351 | 0.285 |

**SOURCE:** Banco de España.

**a** Effects estimated through regressions of ordinary least squares in which the dependent variable is the increase in a firm's APP and the explanatory variable of interest is the annual variation in bank credit divided by total assets for the previous year. The sample period is 2009-23. The controls, one-year lagged, are the ratio of finance expense to sales, own funds to total assets, cash and cash equivalents, net profit to total assets, gross value added to total assets, sales to total assets and the logarithms of total assets and the ACP plus 1 (the latter, unlagged) as well as binary variables that denote the firm's legal form. Also included are fixed effects of sector-province-size-year, in which size refers to microenterprises and small, medium and large enterprises, and sector refers to the two-digit NACE Rev. 2 classification. Standard errors are clustered at firm level. The sample includes only firms with bank debt the previous year. The most creditworthy firms are those whose probability of default on their credit obligations is no higher than 0.4%. The less creditworthy are the remaining firms. * p-value < 0.10; ** p-value < 0.05; *** pvalue < 0.01.

The results, which are presented in Table 2, suggest a substitution effect between bank finance and trade credit. In column (1), which shows the results based on the total for the sample, we see that the likelihood of a firm's APP increasing rises by 4.1 pp for each percentage point reduction in its bank debt relative to its total assets. Columns (2) and (3) give the results for the same regression model, but the sample of firms is divided into two sub-samples depending on whether their probability of default is below or above 0.4% (more or less creditworthy, respectively), a threshold that determines whether a loan may be used as collateral at the European Central Bank (ECB).[10] This likelihood is calculated following the methodology of Blanco, Fernández-Ortiz, García-Posada and Mayordomo (2024).[11] These estimates indicate that the APP of less creditworthy firms is nine times more likely to increase when bank credit contracts. This could reflect a substitution arising not only from firms' voluntary decision to delay their payments to their suppliers in order to rely less on bank credit (demand effect), but fundamentally to the decreased supply of credit from banks to less creditworthy firms, given that the latter normally face greater constraints on accessing bank finance owing to their lower credit quality.

10 Specifically, a loan may be used as collateral at the ECB if its credit quality step (CQS) is less than or equal to 3, which is equivalent to a probability of default within a one-year horizon of up to 0.4%. Even though this limit was relaxed to 1% following the 2020 health crisis, 0.4% was considered because the sample period used in the analysis of this article primarily covers years prior to that event.

11 Based on the definition of default as a firm having doubtful loans for at least three months in a year, the event is modelled in six manners for different combinations of size-firm, which are estimated through logistic regressions. The explanatory variables are various accounting ratios that summarise a firm's financial conditions and the rate of growth of aggregate lending to non-financial corporations.

To corroborate the existence of the second effect, the previous regressions are estimated, albeit limiting the respective samples to firms seeking bank credit.[12] Hence, a decline in these firms' bank debt is more likely to reflect a restriction on the supply of credit, rather than firms' voluntary decision to reduce their reliance on bank credit. The results of these new regressions reported in columns (4)-(6) show that the economic effects are even stronger in the sub-set of firms seeking credit, especially among the least creditworthy of them, underscoring the mitigating effect of trade credit on firms subject to such restrictions. Lastly, as a robustness test, these same sub-samples are used to estimate a regression model in which the sector-province-size-year fixed effects are replaced with firm and year fixed effects in order to control for all firm characteristics that are constant over time and for shocks that are common to all firms (business cycle, monetary policy, etc.). The findings, shown in columns (7)-(9), point to even stronger effects which, in line with the previous evidence, are more pronounced in less creditworthy firms than in more creditworthy ones.

### 3.3 Correlation between average payment periods and difficulties repaying bank debt

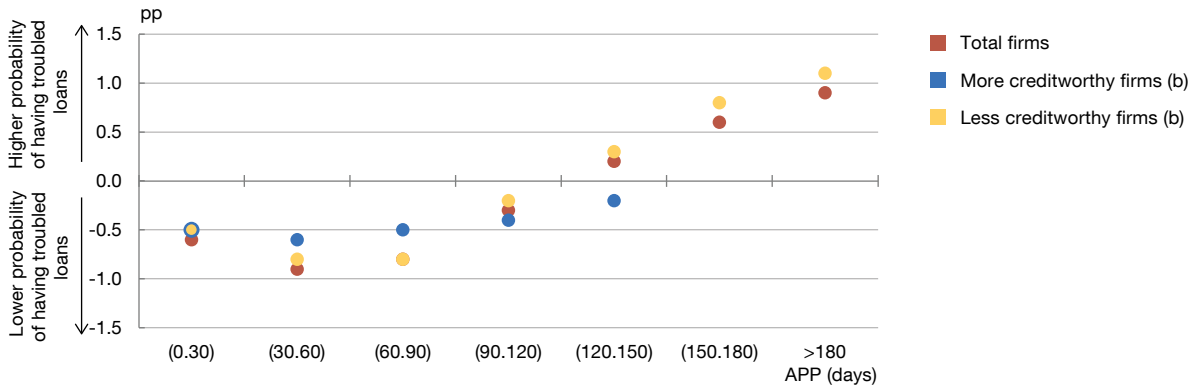
Although by delaying supplier payments some firms can mitigate restrictions on their access to bank finance, this could also indicate a deterioration in their financial situation that, in some cases, might lead to defaults on their bank loans and, possibly, their non-bank debts. We have devised a linear probability model to analyse the link between delays in paying suppliers and defaults on bank debt. The dependent variable is a binary variable that takes the value of 1 if the firm has a troubled loan in a given year (non-performing due to arrears, doubtful or written-off),[13] and the explanatory variables of interest are a set of binary variables that indicate the range, in days, in which that firm's APP is situated in the same year (between 0 and 30 days, between 30 and 60 days, etc.), with the APP reference category being equal to 0 (that is, firms that pay cash). The controls and fixed effects are the same as in the previous analysis. The sample for the estimate includes only firms with bank debt and without troubled loans the previous year, given that the exercise aims to determine the duration of the delay in paying suppliers that is associated with a greater probability of having troubled bank loans. We have therefore excluded firms that have defaulted on their loan obligations before having a high APP. This regression model is estimated for all firms and for more and less creditworthy firms, defined in the same manner as in the analysis in the previous sub-section.

Chart 5 shows, for each binary variable that indicates the range of days in which the APP is situated, the regression coefficient for all firms (red dots), for the most creditworthy firms (blue

12 To identify the firms that require bank credit, we have used information requests made by the banks to the Banco de España's Central Credit Register (CCR) on potential customers. These requests can be considered loan applications, at least for firms that have no previous relationship with a given bank, since credit institutions receive monthly information from the CCR on their current customers with no need to make new requests.

13 Doubtful loan means the amount of a loan on which, although it is not past-due, there are reasonable doubts regarding its total repayment in the agreed terms, as well as the amount overdue for up to three months whose recovery is considered doubtful. Non-performing due to arrears refers to the amount overdue for more than three months. Lastly, a written-off loan is the amount whose recovery is considered unlikely, for which reason the asset has been derecognised from the balance sheet of the bank that granted it.

Chart 5
Probability of having troubled loans according to the APP (a)




**SOURCE:** Banco de España.

**a** Effects estimated through a linear probability model in which the dependent variable is a binary variable that takes the value of 1 if a firm has a troubled loan on its balance sheet (non-performing due to arrears, doubtful or written-off), and the explanatory variables of interest are binary variables that take the value of 1 if the firm's APP is within one of the ranges indicated in the chart, and otherwise 0. The controls, one-year lagged, are the ratio of finance expense to sales, own funds to total assets, cash and cash equivalents, net profit to total assets, gross value added to total assets, sales to total assets, the logarithm of total assets and the logarithm of the ACP plus 1 (the latter, unlagged) as well as binary variables that denote the firm's legal form. Also included are fixed effects of sector-province-size-year, in which size refers to microenterprises and small, medium and large enterprises, and sector refers to the two-digit NACE Rev.2 classification. The sample period is 2009-23. Standard errors are clustered at firm level. The sample includes only firms with bank debt, purchases and no troubled loans the previous year. Only coefficients significant to 5% or less are shown.
**b** The firms that are more (less) creditworthy are those whose probability of default on their credit obligations is less than or equal to (greater than) 0.4%.

dots) and for the least creditworthy firms (yellow dots). Only coefficients that are significant to at least 5% are shown in order to simplify the chart and make it easier to understand. The findings indicate that the correlation between the probability of having troubled loans and the APP level is not linear:

- Specifically, for an APP that is positive but less than or equal to 120 days, the correlation is negative and significant for all types of firms, which suggests that financing through trade credit with comfortable but not excessive repayment periods is associated with a lower probability of having troubled loans because it acts as a liquidity buffer, helping firms reduce their defaults in the banking sector. For APP values of up to 90 days, the correlation is fairly constant, without losing strength as the APP increases. This appears to indicate that funding through trade credit is a positive and stable sign of credit quality up until that threshold is reached. This could be because 90 days is the legal limit,[14] for which reason having an APP of up to 90 days means being a "reliable payer". For above 90 and up to 120 days, the correlation is still negative and significant, but less so in absolute value, probably because the legal limit is exceeded, although not inordinately so.

14 Although the law establishes that the maximum repayment period in private-sector commercial transactions of 60 calendar days and 30 days in transactions between firms and government agencies, it allows for up to 90 days provided that the payment is in the form of a document that entails legal action for collection (a legal mechanism that allows the holder of a credit instrument, such as a bill of exchange or a promissory note, to demand payment in court when the payment due date has been missed). For further details, see the following link of the Ministry of Economy, Trade and Business.

- For an APP of between 120 and 180 days, the correlation continues to be negative in the sub-sample of more creditworthy firms, but it turns positive in that of less creditworthy firms and in the total sample. This means that, for this APP range, the "liquidity buffer" effect continues to prevail at firms with a very good credit rating (more creditworthy), while at firms with worse credit ratings (less creditworthy) high APP levels are associated with a greater probability of having troubled bank loans. This may be because firms that are in arrears are habitually late in paying both their suppliers and their bank lenders. It also implies that, in less creditworthy firms and in the total sample, an APP above 120 days is a sign of worse credit quality than not having trade credit (that is, APP equal to 0).

- Lastly, for an APP of more than 180 days, the correlation between the probability of having troubled loans and the level of APP is positive and significant at less creditworthy firms and at all firms, whereas the coefficients are not statistically different from 0 at the firms with higher creditworthiness. Therefore, although from Table 1 suggests that firms with a higher APP are more likely to have troubled bank loans because they are in a less favourable financial position, the second analysis concludes that there is only one positive, significant correlation between these two variables in the case less creditworthy firms that are very late in paying suppliers.

An alternative way to depict the non-linearity of the correlation between the probability of having troubled loans and the APP is through a quadratic specification, in which the regressors of interest are the natural logarithm of the APP and this variable's square. The logarithm of the APP is taken to correct the strong right-skewed asymmetry of this variable, the inclusion of which in levels could generate inconsistent estimates owing to the presence of outliers.[15] In addition, the same controls as in the previous analysis and firm and year fixed effects are included. The results, shown in Table 3, relate to the estimate for the total sample and for the sub-samples of more and less creditworthy firms. Given that the coefficient of the APP logarithm is negative, the coefficient of the square of this variable is positive and both are significant to 1%, this model captures a convex relationship similar to that shown in Chart 5. This is so both for all firms and for more and less creditworthy ones, and the coefficients are higher (in absolute values) for less creditworthy firms, which is also consistent with Chart 5. Therefore, this alternative analysis leads to a similar conclusion: although financing through trade credit with comfortable but not excessive repayment periods is associated with a lower probability of having troubled loans because it acts as a liquidity buffer, high APP values correlate to a higher probability of having troubled bank loans. This may be the result of the fact that firms that fall behind in paying their suppliers habitually do the same with their bank creditors.

Likewise, Chart 6 gives the results of the estimate of the previous regression model, but in sub-samples of firms within the same productive sector. The results are in line with the previous

15 Specifically, the logarithm of APP plus 1 is taken so as to avoid eliminating observations in which APP is equal to 0, which relate to firms that pay their suppliers in cash.

Table 3

**Correlation between probability of having troubled loans and APP (a)**

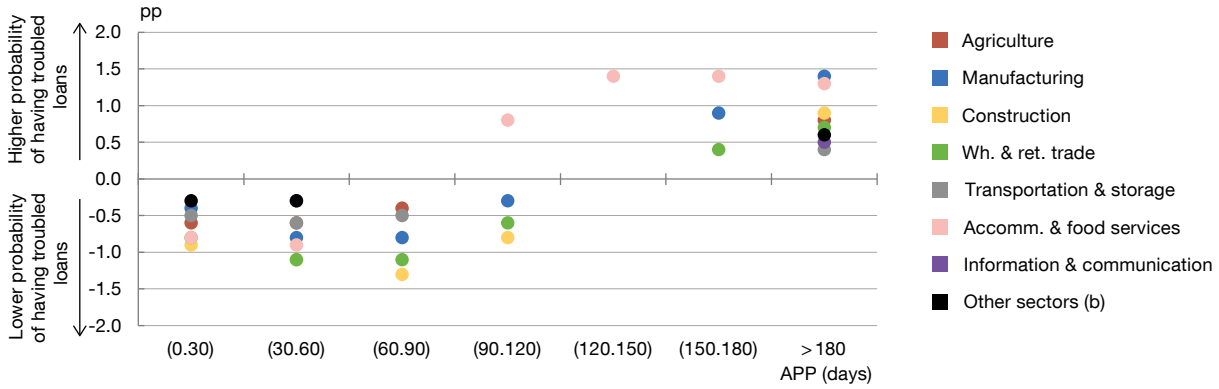
| | Type of firm | | |
|---|---|---|---|
| | All (1) | More creditworthy (2) | Less creditworthy (3) |
| Ln (APP + 1) | -0.003*** | -0.001*** | -0.003*** |
| Standard error | (0.000) | (0.000) | (0.000) |
| Ln (APP + 1)$^2$ | 0.001*** | 0.000*** | 0.001*** |
| Standard error | (0.000) | (0.000) | (0.000) |
| Observations | 2,275,830 | 687,803 | 1,491,865 |
| $R^2$ | 0.306 | 0.356 | 0.316 |

**SOURCE:** Banco de España.

**a** Effects estimated through a linear probability model in which the dependent variable is a binary variable that takes the value of 1 if a firm has a troubled loan o its balance sheet (non-performing due to arrears, doubtful or written-off), and the explanatory variables of interest are the natural logarithm of the APP plus 1 an the square of that variable. The controls, one-year lagged, are the ratio of finance expense to sales, own funds to total assets, cash and cash equivalents, net profit to total assets, gross value added to total assets, sales to total assets, the logarithm of total assets and the logarithm of the ACP plus 1 (the latter, unlagged) as well as binary variables that denote the firm's legal form. Also included are the year and firm fixed effects. The sample period is 2009-23. Standard errors are clustered at firm level. The sample includes only firms with bank debt, purchases and no troubled loans the previous year. The most creditworthy firm are those whose probability of default on their credit obligations is no higher than 0.4%. The less creditworthy are the remaining firms. * p-value < 0.10; ** pvalue < 0.05; *** p-value < 0.01.

Chart 6

**Probability of having troubled loans according to the APP. Breakdown by sector (a)**




**SOURCE:** Banco de España.

**a** Effects estimated through a linear probability model in which the dependent variable is a binary variable that takes the value of 1 if a firm has a troubled loan on its balance sheet (non-performing due to arrears, doubtful or written-off), and the explanatory variables of interest are binary variables that take the value of 1 if the firm's APP is within one of the ranges indicated in the chart, and otherwise 0. The controls, one-year lagged, are the ratio of finance expense to sales, own funds to total assets, cash and cash equivalents, net profit to total assets, gross value added to total assets, sales to total assets, the logarithm of total assets and the logarithm of the ACP plus 1 (the latter, unlagged) as well as binary variables that denote the firm's legal form. Also included are fixed effects of sector-province-size-year, in which size refers to microenterprises and small, medium and large enterprises, and sector refers to the two-digit NACE Rev. 2 classification. The sample period is 2009-23. Standard errors are clustered at firm level. The sample includes only firms with bank debt, purchases and no troubled loans the previous year. Only coefficients significant to 5% are shown.
**b** Includes mining and quarrying; electricity, gas, steam and air conditioning supply; water supply and sanitation activities; real-estate activities; professional, scientific and technical activities; administrative and support service activities; education; arts, amusement and recreation; and other services.

exercise, although the sector coefficients are somewhat heterogeneous. For an APP of up to 90 days, all coefficients are negative or non-significant, which illustrates the "liquidity buffer" effect. For an APP of between 90 and 150 days, the coefficient of the associated variable is

negative or non-significant in all sectors, other than accommodation and food service activities, in which this variable's coefficient is positive and significant. Lastly, for an APP of more than 150 days, all coefficients are positive or non-significant. The latter exercise shows that the correlation between the probability of having a troubled bank loan and the APP has a moderate sectoral heterogeneity and is especially pronounced in the accommodation and food service sector. This suggests that establishing a single legal maximum level of APP for all firms, regardless of sector, is probably not an optimal way of reducing delays in supplier payments.[16]

Lastly, given that the most pronounced changes in the APP and in the probability of having troubled loans arose during the global financial crisis and the sovereign debt crisis, we study whether the mitigating effect on financial difficulties of comfortable, although not excessive, APPs is concentrated in periods of recession, in which a larger proportion of firms often have restrictions on access to credit, or whether this is common to the entire sample period. To this end, we estimate regressions similar to the previous ones[17] in three sub-samples: (i) periods of crisis (2008-13 and 2020); (ii) periods of crisis excluding the pandemic, because ultra-expansionary monetary policy and measures such as State guarantees mitigated the constraints on access to credit (2008-13), and (iii) expansionary periods (2014-19 and 2021-23). The fact that the coefficients of the explanatory variables of interest are much higher in the first case and, especially, in the second than in the third suggests that the mitigating role of trade credit is greater precisely in periods in which the access to bank finance is most difficult. We also study whether this phenomenon is more important in the case of SMEs, which generally find it more difficult to access credit.[18] To this end, the same regression model is estimated in two sub-samples, one composed of SMEs and the other of large enterprises. Given that only in the SME sub-sample is there a significant, negative correlation between relatively low APPs and probability of having troubled loans – whereas in the sample of large firms this correlation is positive and non-significant – this exercise suggests that trade credit plays a mitigating role only in those firms (SMEs) that normally have more constraints on access to bank finance.[19]

## 4 Conclusions

Trade credit is a type of financing that allows firms to postpone payments and collections. The relative importance of trade financing has increased in recent years, because of both the increase in firms' productive activity and the reduction in the outstanding balance on other, alternative sources of financing, particularly bank loans. This was compatible with a progressive

16 In addition, an alternative analysis on the correlation between the probability of having troubled loans and the APP was conducted through a quadratic specification, in which the regressors of interest are the APP logarithm and the square of this variable. The results obtained were consistent with those shown in Chart 6.

17 Nevertheless, to obtain more precise estimates, year and firm fixed effects are included rather than sector-province-size-year fixed effects.

18 For a review of the literature on the causes and effects of constraints on access to credit, see García-Posada (2018).

19 The results of the last two analyses are available for interested readers who request them.

decline in APPs, from nearly 90 days in 2009 to slightly more than 60 in 2023, and in ACPs, largely driven by the legal rules enacted over the years to shorten these periods.

The results of the econometric analyses suggest a substitution effect between bank finance and trade credit. This correlation is stronger among firms with worse credit quality. In particular, the evidence indicates that trade credit helps mitigate the constraints on credit faced by some firms.

It was also found that the correlation between probability of default on bank loans and the APP is not linear and also depends on firms' credit quality. Specifically, financing through trade credit with comfortable but not excessive repayment periods is associated with a lower probability of having troubled loans for all types of firms because it acts as a liquidity buffer, helping reduce firms' defaults in the banking sector. Nevertheless, when there are severe payment delays, the correlation between probability of default and APP turns positive in the case of firms with worse credit quality, probably because firms that fall behind in paying their suppliers are also often late in paying their bank creditors. There is a certain sectoral heterogeneity in this correlation between probability of default and the APP.

As for the implications for economic policy, the link between commercial risk and late payments by firms could have repercussions on financial stability through two mechanisms. First, due to the existence of common factors, given that firms which are very late in paying their suppliers normally have a higher propensity to default on their bank loans. Second, as a consequence of spillover effects, since borrower firms that experience significant delays in collecting from their customers may have less capacity to service their own bank debt. This would impair the quality of the banks' credit portfolios, which implies higher non-performing loan ratios. This situation would also expose banks, indirectly, to firms with which they do not have credit relationships. Nevertheless, no detailed information is available on commercial relationships between firms with which to verify these hypotheses.

## REFERENCES


Blanco, Roberto, Elena Fernández-Ortiz, Miguel García-Posada and Sergio Mayordomo. (2024). "A new estimation of default probabilities based on non-performing loans". *Finance Research Letters,* 62(B). https://doi.org/10.1016/j.frl.2024.105149

Carbó-Valverde, Santiago, Francisco Rodríguez-Fernández and Gregory F. Udell. (2016). "Trade Credit, the Financial Crisis, and SME Access to Finance". *Journal of Money, Credit and Banking,* 48(1), pp. 113-143. https://doi.org/10.1111/jmcb.12292

Casey, Eddie, and Conor M. O'Toole. (2014). "Bank lending constraints, trade credit and alternative financing during the financial crisis: Evidence from European SMEs". *Journal of Corporate Finance,* 27, pp. 173-193. https://doi.org/10.1016/j.jcorpfin.2014.05.001

Crédito y Caución. (2025). "Cómo funciona el seguro de crédito y su impacto en la solvencia empresarial". https://creditoygestion.es/actualidad/como-funciona-el-seguro-de-credito/

Garcia-Appendini, Emilia, and Judit Montoriol-Garriga. (2013). "Firms as liquidity providers: Evidence from the 2007–2008 financial crisis". *Journal of Financial Economics,* 109(1), pp. 272-291. https://doi.org/10.1016/j.jfineco.2013.02.010

García-Posada, Miguel. (2018). "The real effects of credit constraints". *ECB Economic Bulletin,* 2/2018, Articles. https://www.ecb.europa.eu/pub/pdf/other/ebart201802_01.es.pdf?318ee2021af71b6d268e79c50deca8b5

García-Posada, Miguel, and Juan S. Mora-Sanguinetti. (2014). "Are there alternatives to bankruptcy? A study of small business distress in Spain". *SERIEs - Journal of the Spanish Economic Association,* 5(2-3), pp 287-332. https://doi.org/10.1007/s13209-014-0109-7

García-Posada Gómez, Miguel. (2020). "Analysis of insolvency proceedings in Spain against the backdrop of the COVID-19 crisis: insolvency proceedings, pre-insolvency arrangements and the insolvency moratorium". Documentos Ocasionales, 2029, Banco de España. https://repositorio.bde.es/handle/123456789/14184

Love, Inessa, Lorenzo A. Preve and Virginia Sarria-Allende. (2007). "Trade credit and bank credit: Evidence from recent financial crises". *Journal of Financial Economics,* 83(2), pp. 453-469. https://doi.org/10.1016/j.jfineco.2005.11.002

McGuinness, Gerard, and Teresa Hogan. (2014). "Bank credit and trade credit: Evidence from SMEs over the financial crisis". *International Small Business Journal: Researching Entrepreneurship,* 34(4), pp. 412-445. https://doi.org/10.1177/0266242614558314

McGuinness, Gerard, Teresa Hogan and Ronan Powell. (2018). "European trade credit use and SME survival". *Journal of Corporate Finance,* 49, pp. 81-103. https://doi.org/10.1016/j.jcorpfin.2017.12.005

Palacín-Sánchez, María-José, Francisco-Javier Canto-Cuevas and Filippo di-Pietro. (2019). "Trade credit versus bank credit: a simultaneous analysis in European SMEs". *Small Business Economics,* 53, pp. 1079-1096. https://doi.org/10.1007/s11187-018-0101-x

On 29 June 2000, the European Parliament enacted Directive 2000/35/EC on combating late payment in commercial transactions. Spain then embarked on a process to strengthen guarantees to creditor and to shorten payment periods. On 29 December 2004 Law 3/2004 was enacted as the transposition of the above Directive, before being amended by Law 15/2010. These laws aimed to protect suppliers, especially SMEs, ensuring that they received payment for their goods or services within a reasonable timeframe. A maximum period of 60 days was established for payments between firms and 30 days for transactions with government agencies. In principle, these periods could not be lengthened by agreement between the parties[20] so as to avoid possible unfair practices. In addition, a transition period was established, with a progressive reduction in the maximum payment periods, in order to reach the aforementioned limits by 1 January 2013.

In 2013, Royal Decree-Law 4/2013 of 22 February 2013 was enacted, consisting of measures to support entrepreneurs and stimulate growth and job creation, reinforcing the measures against late payments introduced by Law 3/2004 and seeking to improve access to financing for SMEs. This law introduces more severe penalties for firms that fail to abide by the established maximum periods and promotes transparency in commercial contracts.

In addition, in 2017 Law 9/2017 of 8 November 2017 relative to public sector contracts was enacted, transposing into Spanish law the Directives of the European Parliament and of the Council 2014/23/EU and 2014/24/EU of 26 November 2014, so as to promote economic growth and improve business competitiveness through various measures, including the regulation of trade credit. This law buttresses creditor rights and establishes additional mechanisms to ensure that payment deadlines are met.

Lastly, Law 18/2022 of 28 September 2022, on the creation and growth of firms, known as the "Create and Grow Law", established for the first time a regulation for electronic invoicing in private transactions, with the aim of combating late payment and facilitating the creation of SMEs. This is one of the key initiatives of the Recovery, Transformation and Resilience Plan within the Government of Spain's strategic framework for receiving European financing, known as Next Generation EU funds. It simplifies and streamlines the procedures for establishing enterprises and making them grow. This makes it possible to quickly create a firm online without the need for sizeable resources. The law also seeks to combat late payment, reduce red tape and provide financial support for SMEs to grow. For example, firms that fail to pay on time are precluded from receiving government subsidies and placed on a list of delinquent debtors. The law implements electronic invoices as a requirement in the private sector (SMEs and self-

20 For transactions with government agencies, however, the maximum payment period may be lengthened from 30 to 60 days if the parties reach an agreement.

employed). It also strengthens the resources for corporate financing, incentivising the use of alternative methods such as crowdfunding and expanding opportunities within the sphere of venture capital.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# THE IMPACT OF THE 28 APRIL 2025 BLACKOUT ON SPAIN'S PAYMENT SYSTEMS

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BANCO DE ESPAÑA

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## Abstract

This article describes the impact of the 28 April 2025 power blackout in the Iberian Peninsula on both retail and wholesale payment systems, the securities settlement system, the various parties in the payment chain and, in the case of retail payments, the payment instruments and channels used. Retail payment transactions declined sharply, fundamentally as a result of the inability of the underlying commercial or corporate transactions to continue, owing, in turn, to the lack of backup systems. By contrast, Spain's financial infrastructures (especially its payment systems) proved highly resilient and were buttressed by contingency systems that ensured their correct functioning in accordance with the operational continuity requirements set out in the oversight and regulatory frameworks that govern such infrastructures.

**Keywords:** blackout, wholesale payment system, retail payment system, resilience, offline operational backup system, communications, oversight frameworks, payment infrastructures.

## 1 Introduction

On 28 April 2025, the Iberian Peninsula experienced one of the largest power blackouts in its recent history. At 12:33, a sudden drop in electric power automatically cut Spain off from the European power grid, triggering a blackout everywhere in the peninsula, including Portugal, and affecting, albeit to a lesser extent, Andorra and parts of southern France. The power disruption lasted several hours (although its exact duration varied from one geographic area to another) and also affected other essential services such as telecommunications. The outage had an immediate, profound impact on economic activity, testing the resilience of the country's critical infrastructures, including its payment systems, the continuity of which is essential for the economy to perform properly.

In general terms, three key factors account for the blackout's impact on the volume of transactions, especially retail transactions.

The first and most direct was the disruption of the power supply, starting at 12:33 and continuing for several hours, with a gradual, staggered recovery across the country's various territories. In some areas power began to be restored in the late afternoon, whereas in others it was not completely restored until well into the early morning. The outage had an especially strong impact on businesses that depend on equipment requiring a power source. For example, the unavailability of computers, invoicing tools and weighing scales prevented many establishments from remaining open. Activities such as rail transportation, automobile repair, service stations and restaurants were particularly affected, as they could not provide services without electricity.

The second impact was the disruption of communications, the effects of which continued even after power was restored. In numerous areas, connectivity was not re-established until two hours after power had returned, preventing the coordination of production and commercial processes that required an outside connection. The blackout also affected payments, by hindering communication among customers, businesses and financial institutions. Nevertheless, as indicated below, resilience mechanisms were activated, mitigating or eliminating the effect of the outages in some cases.

Lastly, changes were seen in the social habits of retailers and consumers, who reacted to the uncertainty by temporarily closing or by postponing purchases, further reducing the number of transactions during the day.

This article focuses on the blackout's impact on the payments and securities infrastructures supervised by the Banco de España, as well as the underlying transactions processed and settled using those infrastructures.

First we analyse the impact on retail transactions – card payments, cash withdrawals and transfers (ordinary and immediate). We then examine retail transactions, including Iberclear, BME Clearing and TARGET Services, before turning to the regulatory and oversight frameworks applicable to infrastructures in the payments ecosystem. Finally, we conclude with the lessons learned and the next steps to be taken to strengthen the resilience of the payment system overall and thus ensure the continuity of service for users and the smooth operation of the economy.

## 2 Impact of the blackout on retail payments

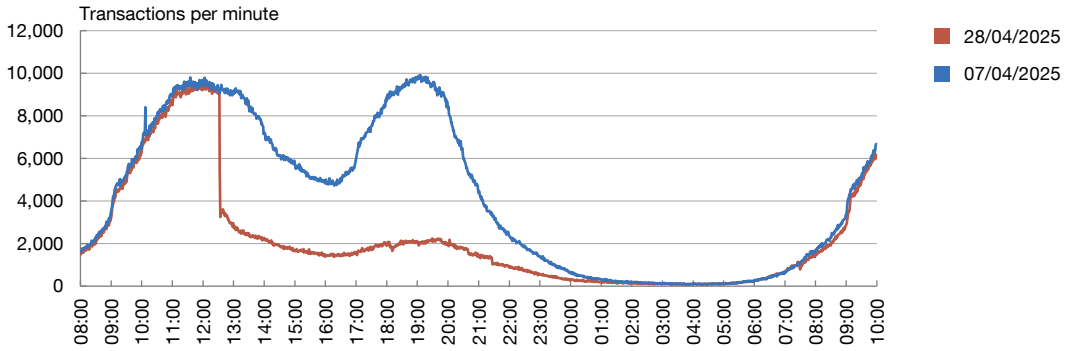
This analysis draws mainly on information from actors and infrastructures under the supervision of Banco de España. It does not include microdata broken down by geographic area or rely on data on the operations of affected sectors (power and telecommunications) not within the remit of the Banco de España. This approach limits the scope of the study.

### 2.1 Card transactions

Sistema de Tarjetas y Medios de Pago (STMP) is responsible for clearing most of the card transactions conducted in Spain, with Redsys and Cecabank as the main processors. The interbank settlement of these transactions takes place the day after the transaction (D+1), mainly through the National Electronic Clearing System (SNCE), which is managed by Iberpay.

Payments and cash withdrawals experienced varying levels of disruption on 28 April. The number of transactions fell by about 55% compared with 7 April (deemed the most comparable

Chart 1
**In-person payment transactions at small retailers (a)**




**SOURCE:** Redsys.

**a** Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

day).[1] The intensity of the decline depended on how the transaction was initiated (in-person purchases, e-commerce transactions and ATM withdrawals) and the type of retailer (the sector of activity and its size and infrastructure). The activity recorded on 7 April is also used as a basis for comparison in this article's charts that analyse card payments – in-person and online – ATM cash withdrawals and Bizum payments[2].

Chart 1 gives the minute-by-minute change in the number of in-person payments at small retailers on 28 April and in the first hours of 29 April. A comparison with the activity recorded on the reference date shows that such stores experienced much lower activity than they otherwise would have, with declines of more than 80% at the most critical moments of the day. This decline was due in part to the fact that many such establishments (for example, a large number of restaurants) closed.

Moreover, the lack of battery power for payment terminals does not appear to have been a major reason for the reduction in card payment transactions, given that they generally have a longer battery life (approximately 72 hours on standby and 24 under average usage conditions) than the length of this blackout[3].

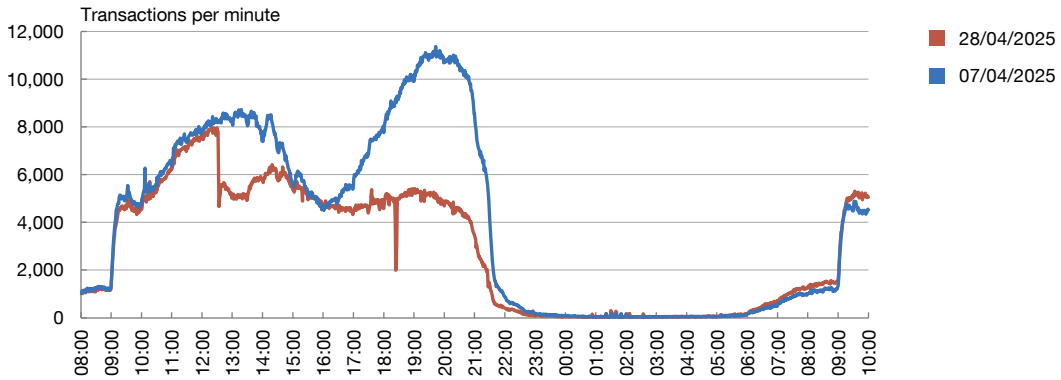
Chart 2 shows the same comparison for transactions at large retailers on the two dates, showing that their activity dropped less sharply. The difference with respect to normal conditions – more pronounced in the late afternoon – likely stemmed more from a contraction in demand or even in supply than from a problem with payment infrastructures, as evidenced by the fact that in the early afternoon there was practically no gap between the number of transactions conducted and the number expected.

1 We selected 7 April 2025 as the reference date because, if not for the blackout, transaction activity on 28 April would likely have been similar to that day – that is, the activity profile observed in the first hours of 28 April, before the blackout, was very similar to that of 7 April. In addition by selecting this date we avoided the distortions associated with Easter Week.

2 The information relating to these transactions – card payments (in-person and online), ATM cash withdrawals and Bizum payments – was provided by Redsys.

3 Source: Redsys.

Chart 2
**In-person payment transactions at large retailers (a)**




**SOURCE:** Redsys.

**a** Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

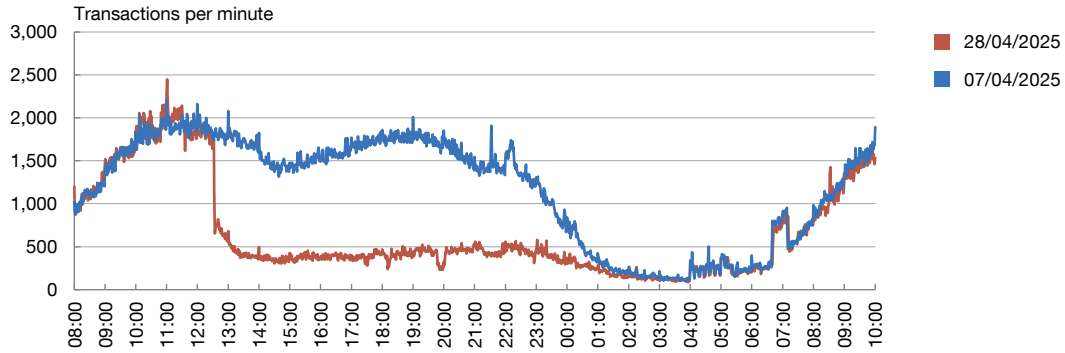
The better performance of payments operations among large establishments was due, first, to that fact that they more frequently have backup power systems. According to a representative sample of retailers surveyed by the Banco de España, larger establishments within a given sector tended to have generators allowing them to continue operations, whereas small local retailers lacking such capacity had to shutter.

Second, the possibility of authorising transactions offline had an influence. This offline functionality, based on the use of the Europay Mastercard Visa (EMV) standard in payment cards containing a chip – and with enhanced security (chip and PIN) – allows card transactions to be authorised even without a network connection enabling communication between the retailer's payment service provider (PSP) and that of the customer (purchaser). This technology allows the retailer's point of sale (POS) terminal to verify the payment instrument's authenticity – that is, that the card is genuine (not cloned) – and that the correct PIN has been entered. This enables the payment to be made with no need for a network connection. To this end, the issuer must have configured operating parameters in the chip authorising this type of transactions and the maximum permitted amount.

In addition, in some cases stand-alone terminals were available, allowing not only for items to be charged but also for invoices to be issued and posted, ensuring the administrative continuity of a sale. The combinations of contingency measures helped large establishments to largely maintain their operations, and in some cases even to absorb part of the demand from other retailers.

Chart 3 compares e-commerce transactions on the two dates. There was a sharp, sustained decline during the hours that the blackout lasted, because communications had been partially severed and retailers' servers also experienced a power outage, preventing goods and services from being properly put up for sale.

Chart 3
**Payment transactions in e-commerce (a)**




**SOURCE:** Redsys.

**a** Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

As noted, the various business sectors were not affected evenly, with the impact on each sector determined by its degree of reliance on the power grid. Consequently, in sectors highly reliant on the power grid, such as rail transport or food services, the decline was more pronounced.

Table 1 gives the differences in the level of activity between the two dates, by sector and retailer size.

The payment systems and the various actors that make up the payment chain have contingency mechanisms for events such as that of 28 April, in order to ensure uninterrupted operations and mitigate negative impacts on payments. In some cases, these mechanisms made up for, or mitigated the effects of, the widespread lack of power.

For their part, the processors[4] have robust redundancy and contingency systems in order to deal with short episodes such as this one (redundant systems of transaction and communications servers as well as alternative power sources).

The availability of alternative power sources enabled the processors' internal systems to continue operating. There were, however, disruptions in the communications (from external suppliers) needed for the normal conducting of business. Most payments at retailers in Spain are made with cards that have an embedded EMV chip in online mode. As such, a request is sent in real time from the purchasing environment (the retailer's PSP that facilitates the acceptance of card payments) to the issuing bank in order for the customer to be authenticated and for the transaction to be authorised, verifying the available balance and analysing the risk of fraud. This requires having a suitable communications system.

4 Providers of critical system services that manage and channel payment operations among retailers, PSPs and other payment chain actors.

Table 1
**Card payment transactions by economic sector**

€m

| | 28/04/2025 | 07/04/2025 | Change (%) |
|---|---|---|---|
| Large distribution firms and food | 147.0 | 225.0 | -35 |
| Retail trade (a) | 45.0 | 148.0 | -69 |
| Other (a) | 35.0 | 129.0 | -73 |
| Travel and entertainment (a) | 28.0 | 64.0 | -56 |
| Restaurants | 26.0 | 69.0 | -62 |
| Supermarkets | 17.0 | 46.0 | -63 |
| Petrol stations | 23.0 | 43.0 | -46 |
| Hotels | 19.0 | 32.0 | -41 |
| Passenger transport by railway | 0.2 | 0.8 | -73 |
| Total (b) | 340.2 | 756.8 | -55 |

**SOURCE:** Redsys.

**a** "Retail trade" includes retail trade, cleaning supplies stores and jewellery shops. "Other" includes hospitals and medical appointments, automotive (sales and repairs), low-cost items, government services, advertising agencies and management companies, State lotteries, tax payments, telephone top-ups and mail and telephone orders. "Travel and entertainment" includes travel agencies, vehicle rentals, casinos and leisure.
**b** Cumulative amount of card payments from 12:00 (noon) until the end of the day.

During the blackout, communications (whether reliant on wired or wireless networks) were affected, although to varying degrees and for different lengths of time. Consequently, in addition to the redundancy of communications providers, some large retailers also resorted to offline functionality, as described above.

Moreover, PSPs that perform acquisition services for retailers and issuance services for card holders also have access to contingency mechanisms and alternative power sources.

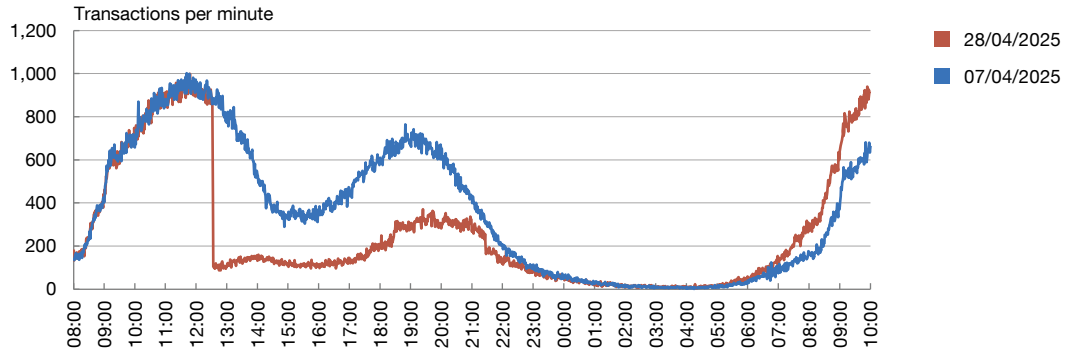
The information analysed leads to various conclusions. First, retailers responded in a variety of ways, depending on their capacity. Some large retailers were able both to maintain their business activity (by having alternative power generation systems, and to successfully initiate their own payment operations), by relying on contingency measures (such as offline operations), in order to overcome a potential communications disruption. Nevertheless, the vast majority of small retailers lack such measures and hence were unable to conduct business operations.

In addition, payments infrastructures and their critical-services providers functioned properly, thanks to their contingency systems, allowing the transactions that took place to be processed, cleared and settled.

## 2.2 ATM cash withdrawals

Cash withdrawals from ATMs are only carried out in online mode, meaning that they cannot take place if communications networks are down. During the blackout, the lack of both power

Chart 4
ATM cash withdrawals (a)




SOURCE: Redsys.

a Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

and connectivity prevented most ATMs from working. Only a small share (less than 4%)[5] have an alternative power source[6] and could still be used (if network connectivity was also maintained). Similarly, early on 29 April, once power and communications had been restored across most of the country, there was a noticeable rebound in cash withdrawals at ATMs, likely because cash became more appealing as a contingency payment method and as a precaution against potential further blackouts. Chart 4 compares cash withdrawals on 28 April 2025 with those on 7 April 2025.

## 2.3 SEPA instruments

The SNCE, which is managed by Iberpay, processes and settles account-to-account payments conducted with SEPA instruments (transfers, instant transfers and direct debits)[7] as well as other types of transactions. The SNCE has robust resilience mechanisms in place to ensure operational continuity in the event of disruptions. During the blackout, the SNCE operated normally without service interruptions. However, there were occasional delays at certain times of the day as a result of external incidents affecting the end users' environments,

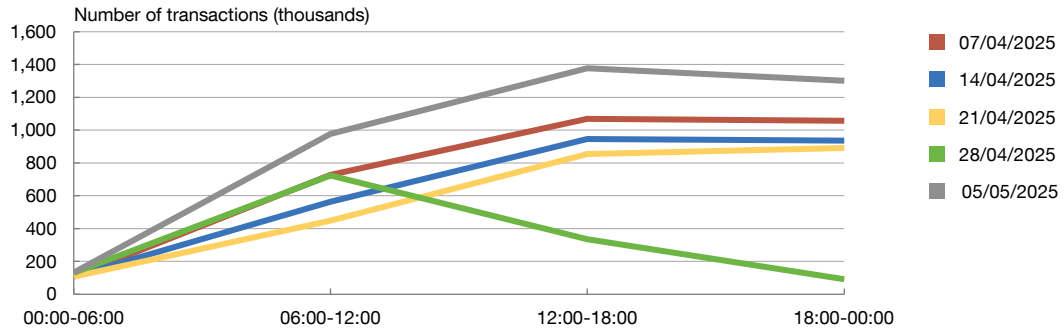
Although the mobile applications of major Spanish banks remained operational thanks to the backup systems in their corporate headquarters, the widespread lack of connectivity

5 The estimated percentage is based on data provided by PSP associations: the Spanish Banking Association, the Spanish Confederation of Savings Banks and the Spanish Association of Credit Cooperatives.

6 According to the information from the main PSP associations, an ATM generally has a limited amount of operating time during an interruption of the external power supply. Most are equipped with an uninterruptible power supply that allows the machine to continue to function for a short time, typically between 10 and 20 minutes. This window is intended to give the ATM time to perform a controlled shutdown, preventing damage from sudden power cuts and protecting it from potential electrical fluctuations. However, there are exceptions: in certain cases, especially at locations with auxiliary generators, ATMs can function without mains power supply for up to 96 hours. Moreover, in very specific scenarios where a continuous fuel supply is guaranteed, some can operate indefinitely.

7 Although not for transactions between customers of the same bank, which are settled internally by that bank.

Chart 5
**Immediate payments settled in the SNCE**




**SOURCE:** Banco de España using SNCE data.

significantly impacted services requiring real-time interaction. Consequently, customers were unable to access their online banking or mobile applications normally owing to communications and internet outages, often preventing them from initiating transactions that would later have been processed by the SNCE.

Among the subsystems, the greatest impact was observed in the instant transfers subsystem, which operates in real time. This was caused by the user environment for payment services being unavailable owing to connectivity and/or power supply issues. However, late in the afternoon, the blackout's impact reached infrastructure on the back of simultaneous problems with communication channels affecting both primary and alternative providers, hindering the complete recovery of connectivity during that period.

Chart 5 illustrates the decline in the number of instant transfers settled by the SNCE in the course of 28 April compared to activity recorded on nearby and comparable dates.

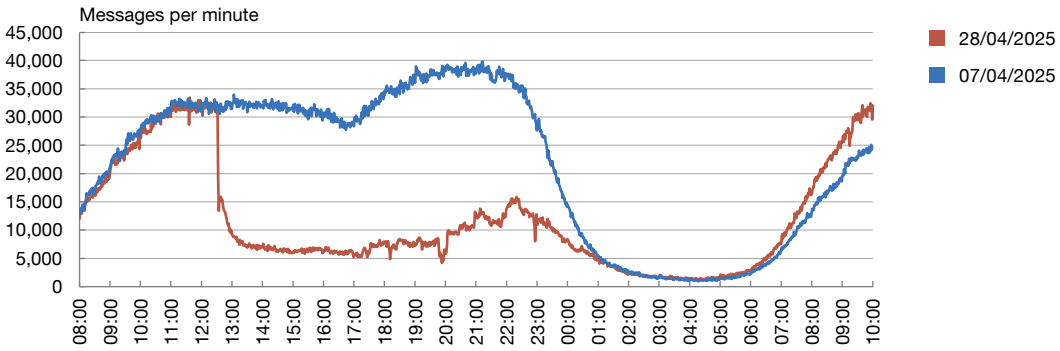
There was no significant drop in the total volume of SEPA ordinary transfers. However, a change in the settlement pattern was noted: on 28 April, 33% of transfers were settled on the same day (D), compared with 20% on average for the month as a whole.

It is important to note that the settlement of SEPA ordinary transfers in the SNCE occurs in six cycles each day: the first three allow for settlement on the same day (D) while the last three settle operations the following day (D+1). Therefore, the greater relative weight of same-day settlement on the day of the blackout could suggest that transactions linked to the later cycles in the day may have experienced some impact, as the blackout began at 12:33, affecting the cycles that settle on D+1, which take place after that time.

### 2.3.1 Bizum payments

Bizum transactions (based on instant transfers) were heavily affected. There was a drop in traffic of over 75%, as shown in Chart 6, which compares the traffic recorded during the

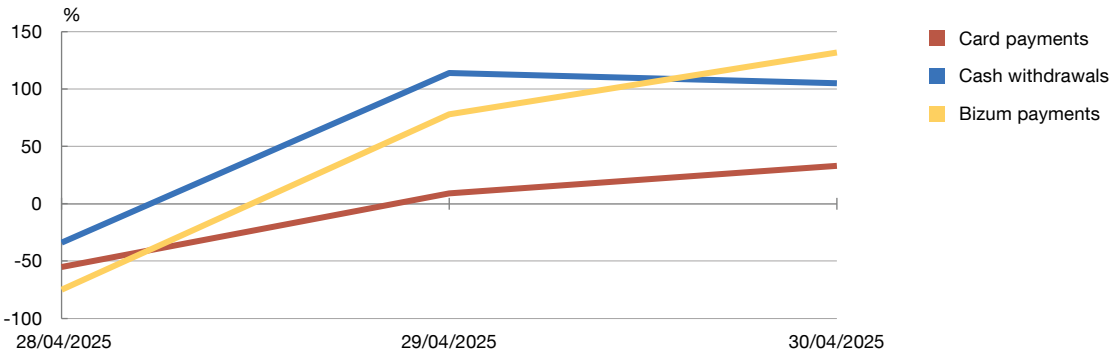
Chart 6
**Bizum payments (a)**




**SOURCE:** Redsys.

**a** Transactions during the day as indicated in the legend (from 8:00) and in the early hours of the next day (until 10:00).

Chart 7
**Rebound by transaction type**




**SOURCE:** Redsys.

blackout with that expected on an equivalent normal day. Such a sharp fall is mainly down to this payment method being highly dependent on customers' devices, with the loss of connectivity caused by the communications failure preventing transactions from being initiated.

## 2.4 Recovery profile in the following days

Chart 7 shows the daily percentage drop and subsequent recovery for card payments, cash withdrawals and Bizum transactions. Activity on 22 and 23 April 2025 was taken as a benchmark to estimate the scale of the rebound on 29 and 30 April. As with the choice of 7 April as the baseline to estimate the change in transaction activity during the blackout, these dates are considered to have a similar activity profile to what would have been expected for the two days after 28 April under normal conditions, that is, absent the blackout.

As can be seen, there was a very significant fall across all three types of transactions: card payments (-55%), cash withdrawals (-34%) and Bizum payments (-75%). In all cases there was a pick-up in the two subsequent days, probably to meet unmet demand on the day of the blackout: card purchases rose by 9% and 33%, cash withdrawals by 114% and 105% and Bizum transactions by 78% and 132%, respectively. This rebound did not fully offset the fall in card payments, but it did in Bizum activity and particularly so in cash withdrawals.

## 3 Wholesale payment systems and securities settlement systems

Eurosystem TARGET Services (T2, TARGET2-Securities and TARGET Instant Payment Settlement)[8] operated normally throughout the day (Chart 8), with no incidents recorded. It should be borne in mind that the technology platform for TARGET Services is located in Italy and Germany and was, therefore, unaffected. The Banco de España, as the operator of TARGET-BE, activated the contingency mechanisms for such situations. In addition, participating institutions had contingency measures in place at their head offices.[9]

As for financial market infrastructures for securities, Iberclear and BME Clearing also operated without incident during the day thanks to activation of their contingency plans. Iberclear, whose operations are settled on the Eurosystem T2S platform, requested a delay in the platform's delivery-versus-payment settlement closing time as a preventive measure, which did not affect the platform's end-of-day closing time.

## 4 Regulatory and oversight frameworks for financial market infrastructures

In general, the sound performance of financial infrastructures within the payments ecosystem during the blackout is in part explained by the oversight and supervisory frameworks applied to them. These are intended to strengthen the security and efficiency of operations and place a strong focus on operational continuity. Among other things, they include provisions aimed at ensuring that infrastructures have a robust operational risk management framework with suitable systems, policies, procedures and controls to identify, control and manage this type of risk.

From the standpoint of the oversight function, standards apply that are developed by the Eurosystem and draw on international principles relevant to financial market infrastructures.[10] For payment systems, the applicable framework depends on their systemic importance, which is determined by size, relative volume of national and euro area transactions, the significance of their cross-border activity and potential relevance as a node used for settling from other infrastructures.

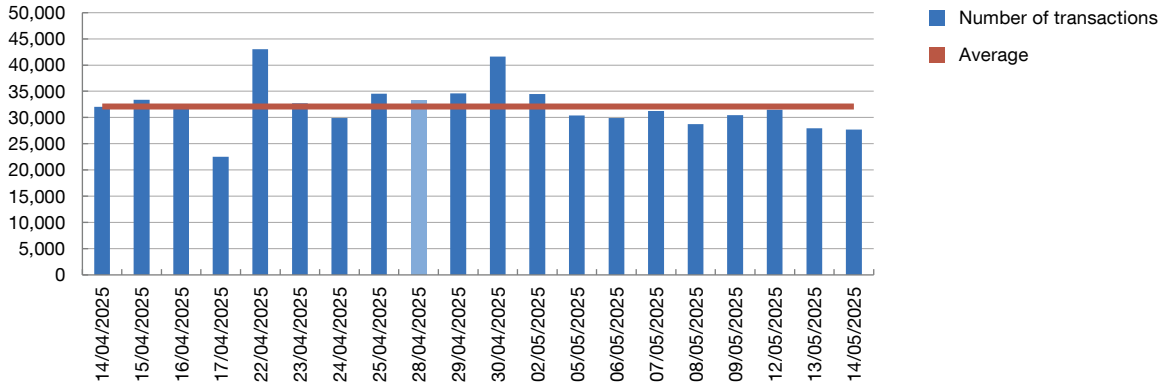
8 T2 is the real-time gross settlement system operated by the Eurosystem. Participants in this service can send and receive payment orders in euro and other currencies, which are processed and settled in central bank money. T2 settles payments related to the Eurosystem's monetary policy operations, as well as interbank and trade transactions. TARGET2-Securities (T2S) is a centralised securities settlement platform. Lastly, TIPS is the platform for settling instant payments in euro and other currencies.

9 Source: Banco de España, TARGET Services.

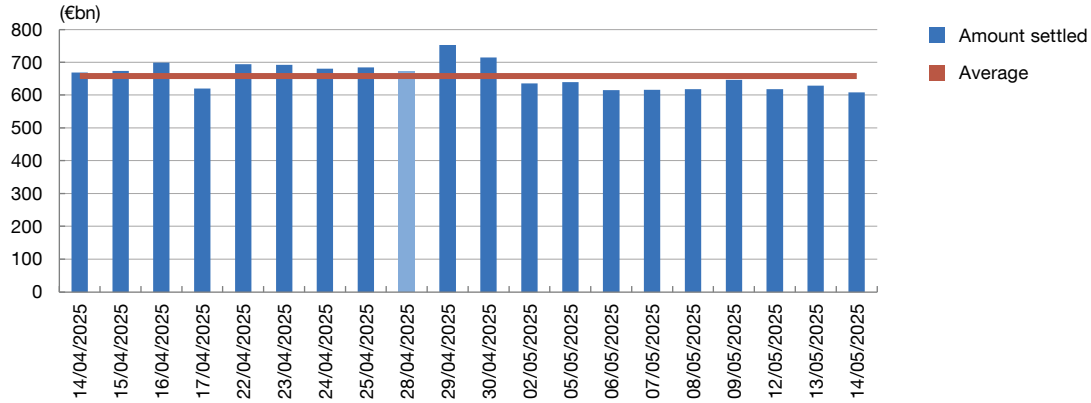
10 See the April 2012 CPSS-IOSCO document "Principles for financial market infrastructures".

Chart 8
**TARGET-BE transfers**

8.a TARGET-BE transfers




8.b Daily transaction amounts settled in TARGET-BE




**SOURCE:** Banco de España and TARGET Services.

For payment systems designated as systemically important, Regulation (EU) 2025/1355 of the European Central Bank (ECB) of 2 July 2025 on oversight requirements for systemically important payment systems[11] applies. It was recently approved and updates previous versions to include, among other things, heightened requirements that bolster cyber resilience and manage outsourcing risk. This framework generally applies to TARGET Services. In other words, for systemically important payment systems a prescriptive approach is used, unlike the oversight frameworks applied to other payment systems.

For non-systemically important retail payment systems at the domestic level, the relevant Eurosystem oversight framework applicable to retail payment system[12] has been established. The framework comprises all the standards that must be met by a payment system as a

11 See Regulation (EU) 2025/1355 of the European Central Bank of 2 July 2025 on oversight requirements for systemically important payment systems (ECB/2025/22).

12 See ECB document "Revised oversight framework for retail payment systems".

function of its relative domestic importance. If its market share is 25% or higher of total euro-denominated payments by volume at Member State level, it is classified as a prominently important retail payment system (PIRPS); otherwise, it is designated an other retail payment system (ORPS). In Spain, the SNCE is classified as an ORPS and the system managed by STMP as a PIRPS.

To establish full oversight of all actors in the payment chain, the Eurosystem has developed a framework applicable to payment instruments, arrangements and schemes known as the PISA framework.[13] At present, this framework applies to Bizum, as it is classified as a payment arrangement.

Separately, in Spain there are also domestic regulations that set requirements for the various actors that comprise the payment chain. From the standpoint of operational resilience, Article 4 of Royal Decree-Law 8/2023 of 27 December 2023 is noteworthy, which lays down obligations on the management of information and communication technology risk for operators of payment systems, payment schemes, electronic payment arrangements, payment processors and other technological or technical service providers that offer services in Spain. In particular, such institutions must comply with the obligations laid down in Chapter II of Regulation (EU) 2022/2554 of the European Parliament and of the Council of 14 December 2022.

## 5 Lessons learned and conclusions

The blackout on 28 April 2025 acted as a stress test for the payments ecosystem in Spain.

In general, payments in large retailers were less affected than in small retailers because the latter lacked contingency measures for power supply and communications failures. Cash withdrawals were severely affected because most ATMs did not have alternative power sources.

Although the impact was significant in terms of consumption and retail operations, the resilience of critical infrastructures, thanks to their redundant architecture and the activation of backup mechanisms, demonstrated their capacity for operational continuity.

However, although infrastructures and PSPs have resilience mechanisms required by oversight and regulatory frameworks, it is worth considering whether there is scope for improvement for similar situations or in even more extreme scenarios.

One measure that could be considered is the extension of offline card payment functionality. Its use in Spain is limited and concentrated mainly in some large retailers that possess this capability and activate it during brief communications outages.

13 See the November 2021 ECB document "Eurosystem oversight framework for electronic payment instruments, schemes and arrangements".

However, extending this solution to the retail sector as a whole would require a coordinated strategy among issuers, acquirers, processors and regulators. Such a strategy would require, among other adjustments, adjusting card parameters and establishing a framework that defines activation scenarios, priority sectors and the applicable liability regime. Other European countries, such as Estonia, have made progress in this direction, deeming such functionality to potentially play a key role in payment continuity in emergencies, especially in essential sectors such as food, fuel and pharmaceuticals. In this regard, moving towards broader availability and standardisation of offline operations could constitute a cornerstone of the national payment system resilience strategy.

For large retailers, the sector could consider adopting a code of good practice based on lessons learned to extend and improve some of the measures already used in some cases, such as offline functionality or use of a dual communications carrier with physically separated routing.

To achieve a comprehensive action plan, the same exercise should be carried out with regard to other instruments used in retail payments.

Turning to cash, installing generators in ATMs appears costly and could entail security and logistical risks in crisis situations according to discussions with stakeholders in the sector. An alternative would be to install ATMs in critical locations to provide minimum services in emergencies. To complement these efforts, awareness campaigns could be considered to encourage households to keep a small cash reserve to cover a minimum of expenses during disruptions and to inform them of the importance of having alternative means of payment on hand.

In addition, it is worth reflecting on the advisability of putting measures in place concerning stakeholders other than infrastructure operators, PSPs and retailers, such as communications or energy providers. The experience of the blackout shows that payment system resilience cannot be addressed in isolation. Operational continuity demands a holistic view that considers interdependencies among different participants in the payment chain and in adjacent sectors, as well as coordination and communication mechanisms that make it possible to trigger joint responses in crisis scenarios.

As a result, the Banco de España, as part of its work on the National Payments Committee, which includes representatives of the various actors relevant to payments on both the supply and demand sides, is coordinating consideration of the possibility of promoting measures that strengthen system-wide resilience in crises like the blackout as part of a possible retail payments strategy in Spain. To this end, public-private cooperation is essential as a means of marshalling the efforts of the major stakeholders in the payments ecosystem.

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# BANKING CONSOLIDATION AND MARGINS ON BANK LOAN AND DEPOSIT TRANSACTIONS OF NON-FINANCIAL CORPORATIONS IN SPAIN

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# BANKING CONSOLIDATION AND MARGINS ON BANK LOAN AND DEPOSIT TRANSACTIONS OF NON-FINANCIAL CORPORATIONS IN SPAIN


## Abstract

This article analyses the effects of the European Central Bank's (ECB) monetary policy and of banking consolidation on the interest rates and margins on monthly new loan and deposit transactions with non-financial corporations (NFCs) in Spain in the period January 2003 to June 2025. The results indicate an increase in market power – as measured by the Lerner index (or relative margin) – in the post-consolidation period, leading to higher (lower) loan (deposit) rates for a given euro interbank offered rate (EURIBOR), although the largest changes in banks' market power over the period are driven by movements in the EURIBOR. The article explains the responsiveness of banks' market power (Lerner index) to changes in the EURIBOR using a theoretical model of bank competition. It also argues that because the EURIBOR is unrelated to bank competition, its demonstrated influence on the Lerner index calls into question the latter's use as a general indicator of market competition.



**Keywords:** banking consolidation in Spain, market power, monetary policy transmission, NFC bank transactions.


## 1 Introduction

This article examines developments in interest margins on new bank loan and deposit transactions with non-financial corporations (NFCs) in Spain in the period 2003-25. Next, drawing on the theoretical predictions of a stylised model of banking competition, the article analyses the possible impact of the banking consolidation that took place in Spain – from the equivalent of 20 equal banks before 2010 to eight equal banks from 2020 onwards – on these developments. A significant original aspect of this study is its analysis of the relationship between banking consolidation and banks' profit margins or market power, as predicted by the theoretical model, controlling both for changes in European Central Bank (ECB) monetary policy during the period under review and its transmission to loan and deposit markets via the interbank rate (EURIBOR).

The theoretical framework considers N banks competing – using a Nash-Cournot approach – in loan and deposit markets. The banks have access to an interbank market where they can lend and borrow at competitive interest rates, meaning independent interest rate formation in both the lending and deposit markets. The stylised model also assumes that banks' operating costs are fixed, making the EURIBOR both their marginal cost per euro lent and their marginal return per euro of customer deposits. Under these assumptions, the relative margin (Lerner index) on loans and deposits, calculated using the interbank rate, serves as an indicator of market power in the respective markets. Nash equilibrium modelling distinguishes between predictions for interest rate and margin formation using functions of loan demand and deposit supply that are log-linear and linear with prices, to subsequently test them against the evidence

available.[1] With the theoretical framework established, the last section of the article analyses the potential effects of banking consolidation on margins and interest rates.

The study is limited to monthly new bank loans and deposits with NFCs in Spain, while the respective average interest rates for each month are those published by the Banco de España. The interbank rate is assumed to be equal to the 12-month EURIBOR. Banking consolidation data are drawn from ECB statistics, namely the Herfindahl Hirschman index (HHI) calculated for the domestic banking market of each euro area Member State. One benefit of using interest rates on new transactions is their greater responsiveness to changes in policy interest rates, compared with average rates from past transactions on banks' balance sheets. In addition, focusing on bank transactions of NFCs in Spain ensures greater market homogeneity than aggregating transactions from all institutional sectors of the economy (firms, households and general government). Moreover, taking aggregated data for all monthly bank transactions precludes the inclusion in the statistical tests of variables that control for bank heterogeneity (specialisation, risk exposure, efficiency, etc.), something that is possible with more granular data (De Graeve, De Jonghe and Vander Vennet, 2007; Wang, Macaluso and Hersbein, 2022).

An analysis of average interest rates on Spanish NFCs' bank loan and deposit transactions shows a 6.2% increase in loan rates and a 60% decrease in sight deposit rates in the post-consolidation period compared with the pre-consolidation period under similar monetary conditions (i.e. a similar EURIBOR). No significant differences are identified in time deposits. The figures are obtained as the difference between the relative margins observed on loans and deposits in the post-consolidation period and those for the same period had the estimated margin formation model based on the pre-consolidation period EURIBOR been maintained. The testing methodology used here cannot demonstrate a causal relationship between market consolidation and margins (market power) or loan and deposit rates; therefore, other explanations for the differences observed cannot be ruled out.

Beyond providing an explanation for the formation of bank margins in transactions with NFCs in Spain during a period of banking sector consolidation, the article is also relevant for broader research into assessing firms' market power and how it affects monetary policy transmission.[2] The article shows theoretically that – with loan demand and deposit supply functions linear with interest rates and under the Nash equilibrium model for competition in an oligopoly – the Lerner index (used as an inverse indicator of market competition) depends on both the number

1 The bank and competition model is based on the Monti-Klein model (Freixas and Rochet, 2008, Chapter 3). The stylised model assumes complete and symmetric information in the loan market and ignores bank solvency and deposit guarantee regulations. Carletti, Leonello and Marquez (2024) and Choi and Rocheteau (2023) extend the basic model to factor in these banking market imperfections. Martínez-Miera and Repullo (2021) analyse the implications of market power for banks' risk-taking decisions and the ultimate impact on financial stability.

2 Previous research underscores the slow and often incomplete adjustment of lending and deposit rates to changes in central bank rates (De Bondt, 2005; Drechsler, Savov and Schnabl, 2017; Englisch, Terhalle, Horn, Lister and Hollander, 2024; and Jude and Levieuge, 2024), revealing lags and inefficiencies in the transmission process. Research papers by Hannan and Berger (1991), Neumark and Sharpe (1992) and Drechsler, Savov and Schnabl (2017) on the deposit market, and by Kopecky and Van Hoose (2012) and Scharfstein and Sunderam (2016) on the loan market, find evidence that monetary policy transmission to market rates is weaker in more consolidated banking markets. Lago-González and Salas Fumás (2005) and Van Leuvensteijn, Kok Sørensen, Bikker and Van Rixtel (2013) find similar results using Spanish data. Medrano Adán and Salas Fumás (2025) model the effect of banking consolidation on the transmission of ECB monetary policy to interest rates in Spain, using the same database as this article.

of competitors (the structural competition indicator) and the EURIBOR (marginal cost). Therefore, in theory, relative margins may vary for reasons other than shifts in market competition conditions, including changes in the interbank rate driven by central bank monetary policy. This is precisely what happens in Spain during the period under review: banking consolidation occurs at the same time as changes in monetary conditions (the EURIBOR), which complicates the task of answering the research question regarding the impact of banking sector consolidation on interest rates and margins on Spanish NFCs' loans and deposits. The lessons from this case study can be extrapolated to the extensive research conducted in recent years on measuring firms' market power.[3]

The rest of the article is structured as follows. Section 2 presents the preliminary evidence on banking consolidation and banks' margins on loan and deposit transactions with NFCs in Spain. Section 3 sets out the theoretical framework for interest rate and margin formation. Section 4 presents the results of tests conducted on certain theoretical predictions and Section 5 concludes with a summary of the main findings.

## 2 Preliminary evidence on consolidation and margins

This section presents descriptive information on developments in banking consolidation in Spain, as well as in bank margins on NFCs' loans and deposits, during the period under review (January 2003 to June 2025).

### 2.1 Consolidation

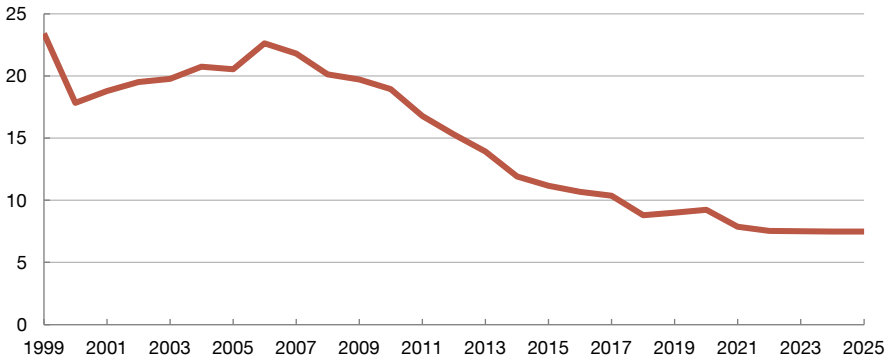
As shown in Chart 1 (based on ECB data for banking market consolidation in euro area countries), the equivalent number of equal banks in Spain, calculated as the inverse of the HHI, held relatively stable at around 20 until the great financial crisis. From 2010 the number begins to gradually decline, stabilising at 7-8 equal banks from 2020 onwards. Although the relevant banking service markets have traditionally been local, with services largely accessed through physical branches, the broad-based trend towards greater consolidation is likely to have affected all markets and customer segments, including NFCs.

### 2.2 Market power: the relative unit margin or Lerner index

The existence of an interbank market where banks can lend and borrow at competitive rates means that interest rate formation takes place independently in the loan and deposit markets.

3 Representative papers in this literature include Díez, Leigh and Tambunlertchai (2017); Berry, Gaynor and Scott Morton (2019); De Loecker, Eeckhout and Unger (2020); Eeckhout (2021) and Syverson (2024). For estimates of Spanish banks' market power see Oroz and Salas Fumás (2003); Fernández de Guevara and Maudos (2005); Maudos and Fernández de Guevara (2007); and Martín-Oliver, Salas Fumás and Saurina (2006). For estimates of European banks' market power see Fernández de Guevara, Maudos and Pérez (2005) and Carbó, Humphrey, Maudos and Molyneux (2009). Unlike this article, none of these publications analyse the responsiveness of market power indicators to marginal cost, an issue that is particularly relevant in an economic context of declining variable costs and rising fixed costs (De Ridder, 2024).

Chart 1
**Equivalent number of equal competitor banks (1999-2025)** (a)




**SOURCE:** Authors' calculations drawing on ECB data.

**a** Calculated as the inverse of the HHI for the Spanish banking sector as a whole.

With an interbank market, the EURIBOR is both the banks' marginal financial cost of loanable funds and their marginal return on customer deposits. This article assumes that banks regard the operating costs of lending and deposit-taking as fixed, irrespective of transaction volume. Therefore, the marginal cost of loans and the marginal return on deposits coincide with the interbank rate, which in this article is the 12-month EURIBOR.

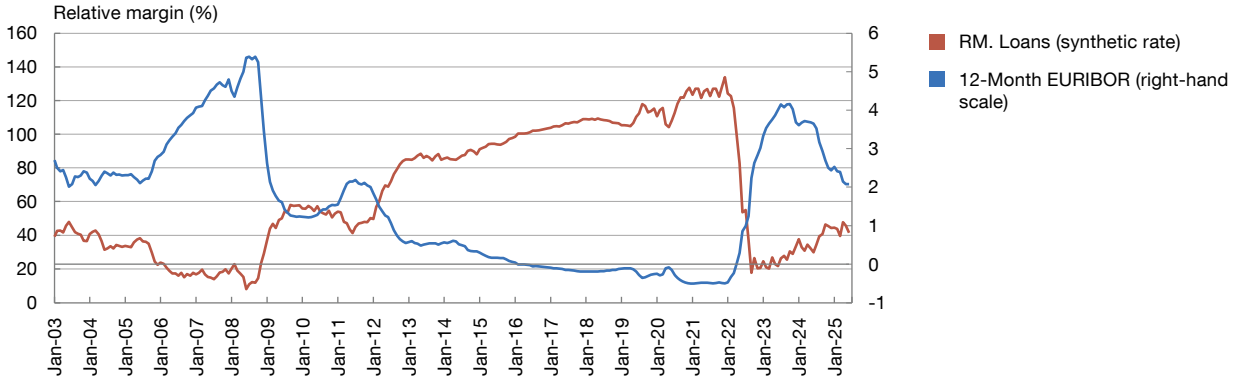
Broadly speaking, firms are said to have market power when their decisions on the volume of production for sale and/or input purchases influence the respective market prices (selling and purchase prices). In perfectly competitive markets, firms are price takers because their production and/or purchasing decisions have no impact on the equilibrium price; therefore, their market power is zero. Being a price taker also means that a firms' profit-maximising production is the quantity at which the selling price equals the marginal cost of production. In imperfectly competitive markets, where firms' individual decisions influence market prices, profit-maximising production choices take that influence into account and market equilibrium prices exceed the marginal cost of production.

The standard indicators of firms' market power are constructed based on the estimated relative difference between price and marginal cost, with the value of zero indicating the absence of market power. Moreover, larger relative differences are associated with less market competition, since the margin increasingly diverges from the zero value that represents perfect competition. In this article, banks' market power in loan and deposit markets is measured by the respective relative margins, calculated as:[4]

4 The approach to calculating banks' market power using the Lerner index varies depending on assumptions regarding the bank, intermediation and production. In the first of these, loans are produced by combining deposits, labour and capital acquired in competitive markets. All the inputs are variables and the type of deposit influences the calculation of the marginal cost of loan production (Carbó, Humphrey, Maudos and Molyneux, 2009). In the production model (as used in this article), the bank uses capital and labour to receive deposits and extend loans. Imperfect competition and bank market power is possible in both the loan and deposit markets.

Chart 2

**The EURIBOR and banks' relative margin (RM) in the loan market (monthly new loans to NFCs). January 2003 to June 2025 (a)**




**SOURCE:** Authors' calculations.

**a** Relative margin calculated as (interest rate on loans - EURIBOR) / interest rate on loans.

$$\text{Lerner index: loans} = \frac{r_P - i_E}{r_P}$$

$$\text{Lerner index: deposits} = \frac{i_E - r_D}{r_D}$$

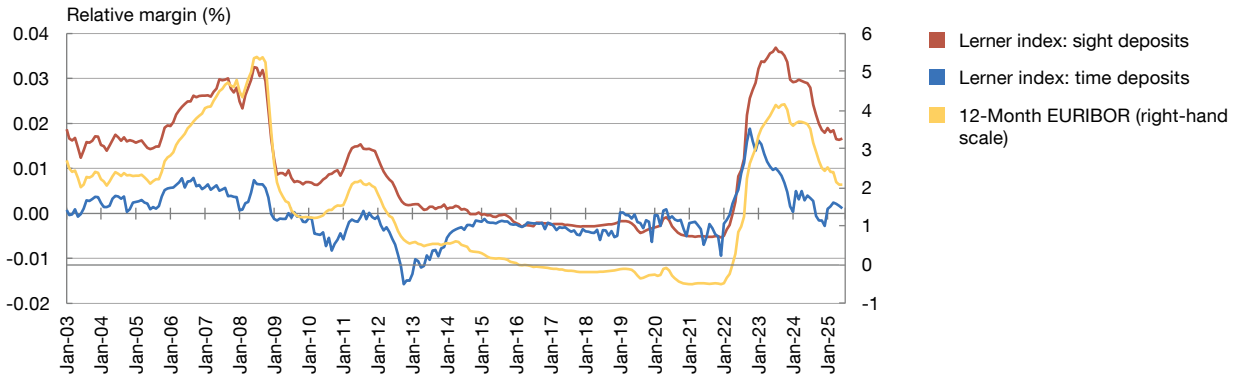
where $r_P$ is the loan rate, $i_E$ is the 12-month EURIBOR (as the benchmark interbank market rate) and $r_D$ is the net deposit rate.[5]

Chart 2 shows the Lerner index calculated as the average (synthetic) lending rate to NFCs (for new loans month-to-month between January 2003 and June 2025) and the 12-month EURIBOR (daily average for the respective month). At the start of the series the Lerner index is 40% (the absolute unit margin represents 40% of the loan interest rate). In the subsequent years the relative margin first declines gradually to a low of 8.1% in July 2008 before rising to a peak of 134% in December 2021. From the summer of 2022 onwards the Lerner index falls rapidly to 20%, before recovering to the values observed at the beginning of the period. Chart 2 also plots the path of the EURIBOR, revealing a clear negative correlation between the interbank rate and the relative margin on loans (market power).

5 The market power indicator used in the most recent research is the ratio between the selling price and the marginal cost of production (see references in note 3). The indicator is related to the Lerner index through the expression $\frac{\text{Interest rate on loans}}{\text{EURIBOR}} = \frac{1}{1-\text{Lerner index: loans}}$. The term $\frac{1}{1-\text{Lerner index: loans}}$ is interpreted as the markup, greater than or equal to 1, that the firm/bank applies to the marginal cost (the EURIBOR) to determine the interest rate that NFCs pay on loans. In the deposit market the equivalent expression is $\frac{\text{Interest rate on deposits}}{\text{EURIBOR}} = \frac{1}{1+\text{Lerner index: deposits}}$. The term $\frac{1}{1+\text{Lerner index: deposits}}$ is now the markdown applied by banks to the EURIBOR to determine the interest rate paid on each euro of the NFCs' deposits.

Chart 3

**The EURIBOR and banks' relative margin (Lerner index) in the deposit market (monthly new business with NFCs). January 2003 to June 2025** (a)




**SOURCE:** Authors' calculations.

**a** Relative margin (Lerner index) calculated as gross interest rates (1 + EURIBOR) / (1 + interest rate on deposits) -1 = (EURIBOR - interest rate on deposits) / (1 + interest rate on deposits).

In the deposit market, differences in interest rate patterns between NFCs' sight and time deposits indicate that relative margin indicators should be estimated separately for each deposit type. Both the EURIBOR and deposit rates hold close to zero for much of the period under review. Using those values to calculate the relative margin on deposits gives extreme readings that are difficult to explain. To avoid these extreme values, the relative margin on deposits is calculated using gross interest rates, $\left(\frac{1+\text{EURIBOR}}{1+\text{Interest rate on deposits}}-1\right)$. The results are shown in Chart 3.

The relative margins on time deposits stand at values close to zero throughout the period, even when the EURIBOR is moderately high. As Chart 3 shows, there is a clear overlap between developments in the EURIBOR and the Lerner index for deposits, except during the negative EURIBOR period when some divergence occurs. Therefore, the correlation between the EURIBOR and the relative margin on deposits is positive.

Charts 1 and 2 might initially suggest that the banking sector consolidation between 2010 and 2020 drove lasting increases in the relative margin on loans to NFCs. In other words, that consolidation could explain banks' increased market power in the market for loans to NFCs in Spain. However, the increase in the EURIBOR towards the end of the period, once consolidation had already concluded, coincides with a sharp drop in the market power indicator, which cannot be attributed to changes in banking consolidation. In the case of deposits, margins held at their lowest levels during the consolidation period (2010-20). Clearly then, bank consolidation alone cannot explain developments in bank margins; at the very least, EURIBOR dynamics must also be considered. The following sections analyse, first theoretically and then empirically, the interlinkages between margins, consolidation and the EURIBOR that help explain the above evidence.

## 3 Market power and its determinants

A loan market with N symmetrical banks – where all the banks "produce" loans with a unit marginal cost equal to the EURIBOR and "purchase" deposits to invest in the interbank market at the EURIBOR – is considered as a theoretical reference framework to explain the changes observed in interest rates and margins. Customers in both markets perceive the different banks' products as homogeneous and, therefore, each product (loans or deposits) will be exchanged at the same interest rate for all banks. The interbank market separates interest rate formation in loans and deposits. Table 1 summarises the main results of the Nash equilibrium under two different assumptions relating to the loan demand and deposit supply function: log-linear functions and linear functions of the relationship between quantity and price.[6]

Log-linear functions involve constant price elasticities at any point of the function. In the case of demand and supply functions that are linear with prices, elasticity changes depending on the point of the function at which it is measured. With log-linear functions, equilibrium prices and margins are determined by the constant elasticity and the given number of competitors. This implies proportionality between equilibrium rates and the EURIBOR (marginal cost and return), for a given number of competitors and elasticity. Proportionality between interest rate and marginal cost also means that the Lerner index is constant for a given number of competitors and elasticity, and inversely proportional to the number of competitors and elasticity.

With linear demand and supply functions, the strict proportionality between the equilibrium price and the marginal cost does not hold. In particular, the equilibrium interest rate equals a constant plus the marginal cost (the EURIBOR) multiplied by a factor that depends on the number of competitors, $\frac{N}{N+1}$. At banks, the EURIBOR (or interbank rate) multiplier coincides with the ECB's monetary policy pass-through coefficient.

For log-linear demand, the pass-through coefficient, $\frac{N\varepsilon_P}{N\varepsilon_P - 1}$ for example, depends on the number of competitors and the (constant) price elasticity and increases with each of the parameters (convergence to 1, complete pass-through, for high N values and/or high elasticity values). The pass-through of changes in the EURIBOR to market rates is therefore larger in structurally more competitive markets (more competitors). Once the pass-through has been completed, the change in the market rate will be proportional to the change in the interbank rate. However, for linear functions the pass-through coefficient is also higher in structurally more competitive markets, with a higher N, but the change in the market interest rate as the pass-through is completed will be smaller than that proportional to the change in the EURIBOR, because there is an intercept in the price formation function (proportionality holds only when N is high, the constant tends to 0 and the slope to 1).

6 For the general theory of price formation in oligopolies see Tirole (1988) and Vives (1999). For firms and banking markets see Freixas and Rochet (2008). For further details of the imperfect competition models in the Table 2 results, see Medrano Adán and Salas Fumás (2025).

Table 1

**Summary of Nash equilibrium values for variables selected under two assumptions on loan demand and deposit supply functions**

| | Log-linear demand: loans | Linear demand: loans | Log-linear demand: deposits | Linear demand: deposits |
|---|---|---|---|---|
| Interest | $r_P^* = \frac{N\varepsilon_P}{N\varepsilon_P - 1} i_E$ | $r_P^* = \frac{a + Ni_E}{N+1}$ | $r_D^* = \frac{N\varepsilon_D}{N\varepsilon_D + 1} i_E$ | $r_D^* = \frac{\alpha + Ni_E}{N+1}$ |
| Absolute margin | $r_P^* - i_E = \frac{i_E}{N\varepsilon_P - 1}$ | $r_P^* - i_E = \frac{a - i_E}{N+1}$ | $i_E - r_D^* = \frac{-i_E}{N\varepsilon_D + 1}$ | $i_E - r_D^* = \frac{i_E - \alpha}{N+1}$ |
| Relative margin (Lerner index) | $\frac{r_P^* - i_E}{r_P^*} = \frac{1}{N\varepsilon_P}$ | $\frac{r_P^* - i_E}{r_P^*} = \frac{a - i_E}{a + Ni_E}$ | $\frac{i_E - r_D^*}{r_D^*} = \frac{1}{N\varepsilon_D}$ | $\frac{i_E - r_D^*}{r_D^*} = \frac{i_E - \alpha}{\alpha + Ni_E}$ |
| Markup and markdown | $\frac{r_P^*}{i_E} = \frac{N\varepsilon_P}{N\varepsilon_P - 1}$ | $\frac{r_P^*}{i_E} = \frac{a + Ni_E}{(N+1)i_E}$ | $\frac{i_E}{r_D^*} = \frac{N\varepsilon_D + 1}{N\varepsilon_D}$ | $\frac{i_E}{r_D^*} = \frac{(N+1)i_E}{\alpha + Ni_E}$ |

**SOURCE:** Authors' calculations.
NOTE: * denotes Nash equilibrium values. Demand and supply functions considered: linear loan demand function, $r_P = a - bP$, where P denotes loan volume; linear deposit supply function, $r_D = \alpha + \beta D$, where D denotes deposit volume; log-linear loan demand function, $\ln(r_P) = A - \varepsilon_P \ln(P)$; log-linear deposit supply function, $\ln(r_D) = B - \varepsilon_D \ln(D)$; where a, b, β, A are positive parameters; the α sign is undetermined; $\varepsilon_P$, $\varepsilon_D$ are, respectively, the constant price elasticities of log-linear loan demand and deposit supply functions, in absolute terms; and where $a > \alpha$ in order for the result to be economically meaningful.

With a log-linear function, the absolute margin on loans (deposits) is an increasing (decreasing) function of the interbank rate, while with linear functions the sign of the function linking absolute margins to the interbank rate is exactly the opposite. Lastly, as regards the relative margin, with a log-linear function the margin is independent of the interbank rate, while on a linear basis the relative margin depends on the value of the marginal cost (the interbank rate in this case), at which it is measured. In particular, the relative margin on loans (deposits), calculated based on Nash equilibrium interest rates, is a decreasing (increasing) and convex (concave) function of the interbank rate.

The number of competitors on the market also has a role in determining prices and margins in equilibrium. In all cases, a lower number of competitors (lower N) means lower margins (lower loan rates and higher deposit rates). The sign and magnitude of the impact of changes in the number of competitors on interest rates and the equilibrium margin depend on the interbank rate used. The same applies to the sign and impact of changes in the EURIBOR on rates and margins. These interactions between the effects of the EURIBOR and the number of competitors on equilibrium price and margin values make it difficult to respond to the question raised in this article on the impact of bank consolidation on banks' market power because, as noted in the descriptive section above, changes in the EURIBOR occur at the same time as changes in the number of competitors.

## 4 Explanation of changes in market power

This section examines the correlation between the theoretical predictions in Table 1 and the descriptive data on concentration, the EURIBOR and relative margins in Section 2. First, an exploratory analysis is conducted to see whether the evidence presented is consistent with log-linear or linear demand and supply. Second, a comparison of pre- and post-consolidation

rates and margins is carried out to assess whether the reduction in the number of competitors has an impact on interest rates and margins as predicted by the theoretical model.

### 4.1 Correlation between relative margins (market power) and the EURIBOR and the number of banks

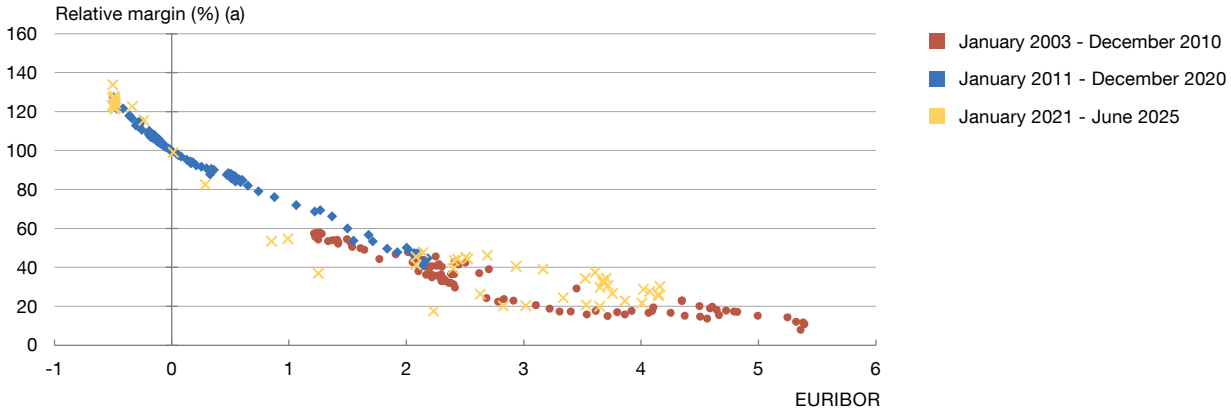
Charts 4 and 5 illustrate the relationship between changes in the EURIBOR and changes in the relative margin for loans and sight deposits. Chart 4 bears out a negative and convex association between the EURIBOR and the relative margin for loans according to Table 1, based on a linear demand function. While Chart 5 bears out a growing and concave functional relationship between the EURIBOR and the relative margin of sight deposits under the same theoretical basis (a linear deposit supply function). With the log-linear demand and supply functions, relative margins calculated based on equilibrium interest rates are independent of the EURIBOR at which they are measured. Accordingly, for the rest of the exposure the linear demand and supply assumption remains applicable.

The dot colours indicate the period: pre-consolidation (red), consolidation (blue) and post-consolidation (yellow). There are differences in the relationship with the EURIBOR over the various time periods, indicating higher margins in the post-consolidation period than in the pre-consolidation period (the details of the comparison are discussed in a later section).

Chart 6 shows a decreasing correlation between the relative loan margin and the number of competitors in the market, which is in line with the theoretical results in Table 1. The chart uses different colours for years 2006 to 2008 (red) and years 2022 to 2024 (yellow) to identify those in which policy rates increased sharply. The relative margins for sub-periods 2006-08 and 2022-24 are lower than those observed in other sub-periods for a similar number of competitors. This is theoretically explained by the negative effect of the EURIBOR increase on margins for a given number of banks. The decrease in relative margins coinciding with the rise in the policy rate was greater in 2022-24 because the increase vis-à-vis the starting levels was higher than in the period 2006-08 (in 2021 the EURIBOR was in negative territory). Also, the average value of the relative margin in the years 2022-24 (43%) was significantly higher than in the period 2006-08 (20%), which could be explained by the lower number of competing banks and the lower average EURIBOR in the post-consolidation period.

The blue dots in Chart 6 denote periods in which changes in the number of competitors and changes in the EURIBOR coincide (Charts 1 and 2). In the Annex a theoretical relationship is established between developments in the EURIBOR and banking consolidation in Spain, based on equilibrium in the number of competitors in the market under free entry and fixed operating costs for the bank. According to the results in the Annex, the total gross margin on loans per bank decreases in line with the EURIBOR, while the total gross margin on deposits increases in line with the EURIBOR. For a given fixed cost of transactions, the decline in the EURIBOR, which started in 2010 and remained at values close to 0 for several years, may contribute to market concentration if the decline in the total gross margin on liabilities envisaged

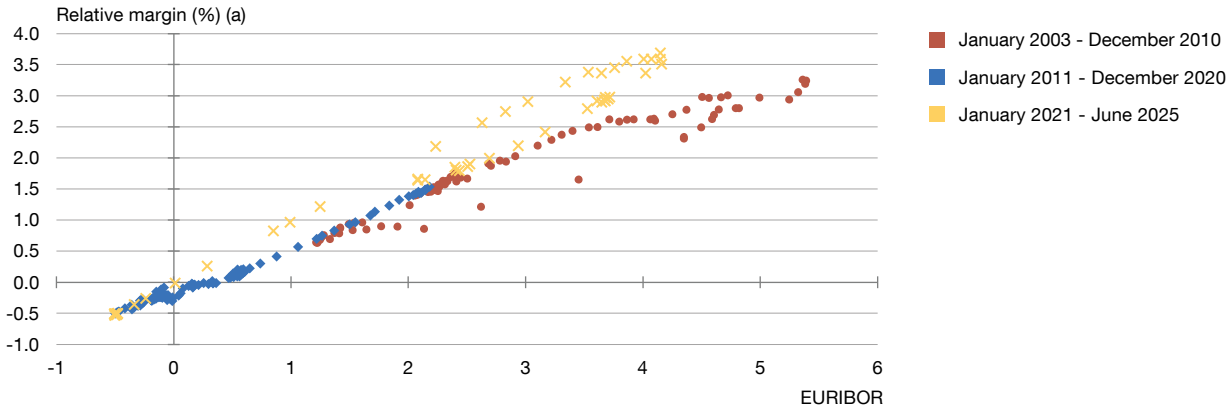
Chart 4
**Correlation between the EURIBOR and the relative margin (Lerner index) on loans**




**SOURCE:** Authors' calculations.

**a** Lerner index calculated as EURIBOR / (Interest rate on loans) –1 = (Interest rate on loans – EURIBOR) / (1 + Interest rate on loans).

Chart 5
**Correlation between the EURIBOR and the relative margin (Lerner index) on sight deposits**




**SOURCE:** Authors' calculations.

**a** Lerner index calculated as gross interest rates: (1 + EURIBOR) / (1 + Interest rate on deposits) – 1 = (EURIBOR – Interest rate on deposits) / (1 + Interest rate on deposits).

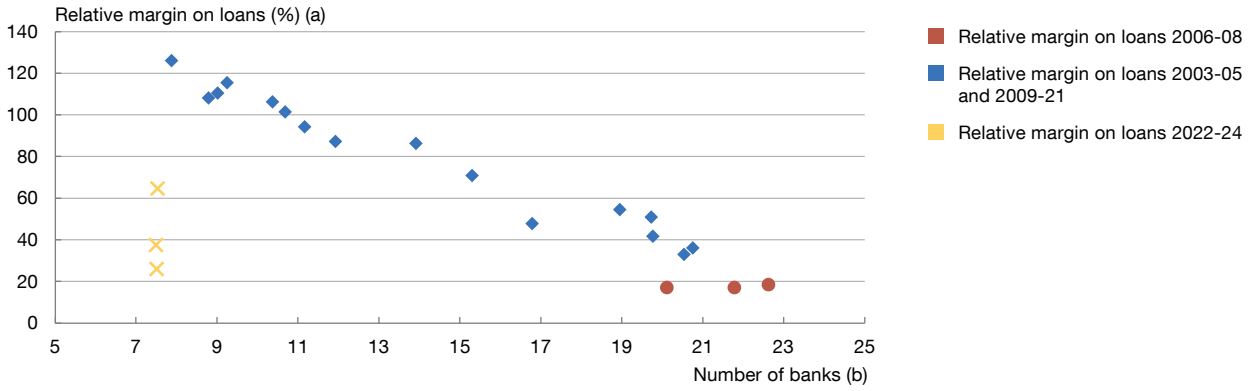
in the theory is indeed greater than the (also theoretical) increase in the total gross margin on assets. It is therefore possible that the effect on interest rates and profit margins of the prolonged decline in the EURIBOR has had a direct and an indirect component, the latter induced through the impact of EURIBOR developments on sector concentration.

## 4.2 Comparison of average interest rates and margins pre- and post-consolidation

In principle, under similar EURIBOR monetary conditions, the relative margin should be expected to be higher in the post-consolidation period than in the pre-consolidation period.

Chart 6

**Relationship between the relative margin on loans and the number of banks**




**SOURCE:** Authors' calculations.

**a** Lerner index calculated as EURIBOR/(Interest rate on loans) - 1.
**b** Equivalent number of equal competitor banks (N), calculated as the inverse of the HHI.

However, the theory says that the effect of the EURIBOR on the Lerner index is not independent of the number of competitors in the market and, moreover, the impact of N on the effect of changes in the EURIBOR on the relative margin has an undetermined sign (depending on the EURIBOR value at which the effects are calculated). Therefore, the answer to the question of whether the indicator of market power increases with consolidation is answered through evidence.[7]

Table 2 shows the average values for the main monetary variables (ECB policy interest rates, the EURIBOR), interest rates and loan and deposit margins, and the equivalent number of equal competitors, for the entire period and for three sub-periods: from January 2003 to June 2008, from July 2008 to June 2022 and from July 2022 to June 2025. Cut-off points for the sub-periods have been selected such that for the first and third sub-periods the average EURIBOR is similar (around 3%) and the number of banks is stable (around 21 in the first sub-period and around 7.5 in the third). The intermediate period therefore coincides with the sector's gradual consolidation from 21 to 7.5 equivalent equal banks and the ECB's monetary expansion (near-zero rates). A comparison of interest rates and margins between the first and the last period captures the effect of the sector's increasing concentration while similar monetary conditions are maintained. The intermediate period illustrates the combined effects of gradual consolidation and the reduction of policy rates.

The results of the comparison of pre- and post-consolidation interest rates and margins show higher (lower) average values of interest rates on loans (deposits) in the post-consolidation

7 Another possibility is to respond to the question, for example, by estimating the formation equation for equilibrium interest rates. Based on Table 2, $\frac{\Delta r_P^*}{\Delta i_E} = \frac{N}{N+1}$. Therefore, $\frac{\Delta}{\Delta N}\left(\frac{\Delta r_P^*}{\Delta i_E}\right) = \frac{\Delta}{\Delta N}\left(\frac{N}{N+1}\right) > 0$. In other words, the impact of the change in the equilibrium interest rate on changes in the EURIBOR is greater in markets with more competitors. Medrano Adán and Salas Fumás (2025) use this test to answer the question posed.

Table 2

**Average values of monetary variables, observed interest rates, absolute and relative margins and average number of competitors**

| Period | Total period: January 2003 - June 2025 | Sub-period 1: January 2003 - June 2008 | Sub-period 2: July 2008 - June 2022 | Sub-period 3: July 2022 - June 2025 |
|---|---|---|---|---|
| Interest rate on deposit facilities | 0.79 | 1.71 | -0.03 | 2.90 |
| Interest rate on loan facilities | 1.97 | 3.71 | 0.95 | 3.56 |
| 12-month EURIBOR | 1.55 | 3.13 | 0.60 | 3.12 |
| Interest rate on loans (composite) | 3.49 | 4.27 | 2.93 | 4.65 |
| Interest rate on sight deposits | 0.54 | 1.05 | 0.36 | 0.47 |
| Interest rate on time deposits | 1.58 | 2.76 | 0.92 | 2.46 |
| Interest rate on deposits (composite) | 0.91 | 1.71 | 0.62 | 0.85 |
| Absolute margin on time deposits | -0.03 | 0.37 | -0.33 | 0.66 |
| Absolute margin on sight deposits | 1.01 | 2.08 | 0.23 | 2.65 |
| Absolute margin on deposits | 0.64 | 1.42 | -0.02 | 2.27 |
| Absolute margin on loans | 1.93 | 1.14 | 2.33 | 1.53 |
| Total absolute margin | 2.57 | 2.56 | 2.31 | 3.80 |
| Relative margin on time deposits* | -0.028 | 0.355 | -0.322 | 0.643 |
| Relative margin on sight deposits* | 0.998 | 2.060 | 0.230 | 2.638 |
| Relative margin on deposits* | 0.627 | 1.396 | -0.023 | 2.252 |
| Relative margin on loans | 65.4 | 28.1 | 87.0 | 33.3 |
| Number of equal banks | 14.0 | 21.0 | 12.7 | 7.5 |

**SOURCE:** Authors' calculations drawing on the Banco de España's statistical data.

years. Something similar is true for the average values of the absolute and relative margins on loans and deposits.

Although this paper places emphasis on explaining relative margins (market power), it is important to understand the relationship between changes in market power and changes in market interest rates. Based on the Lerner index for loans, $L = \frac{r-i}{r}$, $r = \frac{i}{1-L}$ is obtained by taking the logarithms and differentiating, $\frac{\Delta r}{r} \approx \frac{\Delta i}{i} + \frac{1}{1-L}\Delta L = \frac{\Delta i}{i} + \frac{r}{i}\Delta L$ (given that $1 - L = i/r$). Since the $\frac{r}{i}$ markup is greater than or equal to 1, the absolute change in the relative margin is a lower bound than the relative change in the interest rate on loans. According to the data in Table 2, the average EURIBOR is virtually the same during the pre- and post-consolidation periods. The absolute change in the relative margin during the post- and pre-consolidation periods is $\Delta L = 33.3 - 28.1 = 5.2$; therefore, the minimum bound of the relative change in the interest rate on loans ($\Delta r/r$) is 5.2%. The markup estimated based on the average interest rate on loans and the EURIBOR in the pre-consolidation period is $(r/i) = 4.27 / 3.13 = 1.36$. Accordingly, an increase in the interest rate on loans in the post-consolidation period of $(\Delta r/r) = 1.36 \times 5.2\% = 7.1\%$ is estimated. The difference in average relative margins between post- and pre-consolidation predicts an average interest rate of $1.071 \times 4.27\% = 4.57\%$ in the post-consolidation period, compared with the observed 4.65% (Table 2).

Table 3
**Estimation of the empirical model for determinants of the relative margin-Lerner index**

| | Lerner index: loans | Lerner index: sight deposits (based on gross interest rates) |
|---|---|---|
| Constant ($\phi_0$) | 79.138 | 0.028 |
| *p-value* | 0.000 | 0.860 |
| EURIBOR, $i_{E,t}$ ($\phi_1$) | -19.812 | 0.574 |
| *p-value* | 0.0001 | 0.000 |
| EURIBOR squared, $(i_{E,t})^2$ ($\phi_2$) | 1.216 | 0.020 |
| *p-value* | 0.065 | 0.016 |
| $Z_{2011\text{-}2020}$ ($\phi_3$) | 24.564 | -0.300 |
| *p-value* | 0.0053 | 0.289 |
| $Z_{2021\text{-}2025}$ ($\phi_4$) | 22.260 | -0.249 |
| *p-value* | 0.012 | 0.408 |
| $i_{E,t} \times Z_{2011\text{-}2020}$ ($\phi_5$) | -24.754 | 0.315 |
| *p-value* | 0.0003 | 0.187 |
| $i_{E,t} \times Z_{2021\text{-}2025}$ ($\phi_6$) | -25.085 | 0.425 |
| *p-value* | 0.0000 | 0.0001 |
| $(i_{E,t})^2 \times Z_{2011\text{-}2020}$ ($\phi_7$) | 6.759 | -0.032 |
| *p-value* | 0.0017 | 0.733 |
| $(i_{E,t})^2 \times Z_{2021\text{-}2025}$ ($\phi_8$) | 5.400 | -0.032 |
| *p-value* | 0.0000 | 0.057 |
| $\rho$ | 0.888 | 0.977 |
| R squared, $R^2$ | 0.996 | 0.999 |
| Durbin-Watson | 2.362 | 1.968 |

**SOURCE:** Authors' calculations.
NOTE: Lerner index of sight deposits calculated on the basis of gross interest rates, Lerner index: deposits $= \frac{(1+i_E)-(r+1_D)}{(1+r_D)} = \frac{i_E - r_D}{(1+r_D)}$.

In the case of deposits, the relative margin has been calculated on the basis of gross interest rates, $L_D = \left(\frac{1+i}{1+r_D} - 1\right) = \frac{I}{R_D} - 1$, where $R_D$ and I denote the gross interest rates on sight deposits and the EURIBOR, respectively, $R_D = 1+r_D$, $I = 1+i$. Differentiating, it holds that $\frac{\Delta R_D}{R_D} = -\frac{R_D}{I}\Delta L_D + \frac{\Delta I}{I}$. Based on Table 3 data, the absolute change in the relative margin (post-consolidation minus pre-consolidation) is $\Delta L_D = 2.638 - 2.060 = 0.577$. For a markdown (in gross rates) in the pre-consolidation period of $\frac{R_D}{I} = \frac{1+r_D}{1+i}$ = (101.5 / 103.13) = 0.98, and given $\Delta I/I$ = -0.01146, the estimated relative change in the (gross) interest rate on deposits is -0.577 × 0.98 = -0.5769, compared with the observed value $\Delta R_D / R_D = 100 \times (1.0047 / 1.0105 - 1) - 100$ = -0.5717. The estimated value $\Delta R_D / R_D$ = -0.5769 would imply an (average) interest rate on deposits in the post-consolidation period of 0.4627% (compared with the observed 0.47%) and a relative change compared with the pre-consolidation rate of 0.4627 / 1.0456 − 1 = -55.75%.

The impact of consolidation on market interest rates can also be assessed directly from the equilibrium interest rate formation equation in Table 1. In the pre-consolidation period (N = 21),

the pass-through coefficient is $\frac{N}{N+1}=0.955$, close to 1, $\frac{a}{N+1}\approx r_P^* - \frac{21}{22}i_E = 4.27-(21/22)\times 3.13 = 1.283$ and $a=(N+1)r_P^* - Ni_E = 22\times 4.27 - 21\times 3.13 = 28.22$. If N declines from 21 to 7.5, the interest rate predicted, assuming that the parameter does not change, is $(28.22+7.5\times 3.13)/8.5 = 6.08$. For EURIBOR around 3%, with the same parameters of the loan demand function as in the pre-consolidation period, the reduction in the number of competitors from 21 to 7-8 is estimated to increase the interest rate on loans by 33% (from 4.27 to 6.08). The estimated interest is higher than the observed average interest on loans after consolidation of 4.65 in Table 2, although the purely approximate nature of the calculations should be taken into account. In any event, note that with a log-linear demand function and constant elasticity, reducing the number of competitors to one-third directly multiplies by three the relative margin (Table 1). Therefore, given the relationship between the change in the relative margin and the change in the interest rate, the equilibrium interest rate on loans would change by at least the same proportion.[8]

The average value of the variables in Table 2 in the intermediate period (from July 2008 to June 2022, when banking consolidation tool place and the EURIBOR declined) is consistent with changes in the EURIBOR having a stronger influence on developments in interest rates and margins than changes in the number of competitors. Lending and deposit rates are below the values in the pre- and post-consolidation periods, in line with a lower average EURIBOR value (0.6% compared with 3%). Moreover, as expected based on the theory (Table 1), average, absolute and relative loan margins are higher when interest rates are lower, while the opposite is true for deposit margins.

### 4.3 Structural changes in the models

The relationship between the EURIBOR and the number of competitors as determinants of the relative margin suggests that the functional relationship between the margin and the EURIBOR varies structurally as the number of competitors in the market rises or falls. To account for this possibility when comparing pre- and post-consolidation average margins, the following econometric model is formulated for subsequent estimation:

$$L_t = \phi_0 + \phi_1 i_{Et} + \phi_2 i_{Et}^2 + \phi_3 Z_{2011-2020} + \phi_4 Z_{2021-2025} + \phi_5 i_{Et} Z_{2011-2020} + \phi_6 i_{Et} Z_{2021-2025} + \phi_7 i_{Et}^2 Z_{2011-2020} + \\ + \phi_8 i_{Et}^2 Z_{2021-2025} + u_t,$$

$$u_t = \rho u_{t-1} + \varepsilon_t.$$

8 In the case of deposits, a major structural change in the supply function is necessary in order to reconcile the average values in Table 3 with the theoretical predictions. Another significant factor not considered in the above comparative statics is the speed of the pass-through of the EURIBOR to market rates. For instance, in April 2022 when the EURIBOR turned positive (0.013%) after a long period with negative values, the rate on sight deposits was 0.029% and that on time deposits was -0.2%. In December 2022, with the EURIBOR at 3%, these values were 0.11% and 1.6%, respectively. The maximum sight deposit rate was reached 12 months after the EURIBOR peak.

where $L_t$ is the Lerner index for month t; $i_{E,t}$ is the interbank interest rate for month t; $Z_{2011-2020,t}$ is a binary variable equal to 1 for periods between January 2011 and December 2020 and 0 otherwise; and $Z_{2021-2025,t}$ is likewise a binary variable equal to 1 from January 2021 to June 2025. The sub-periods were selected based on times when significant changes took place in the number of competitors (Chart 1). The error term $u_t$ captures the random disturbance that is modelled to account for possible autocorrelation in the estimation residuals, $u_t = \rho u_{t-1} + \varepsilon_t$.

The parameters $\phi_l, l = 1-8$, have different expected signs for loan and deposit margins (a decreasing and convex function of the Lerner index with respect to the EURIBOR for loans, and an increasing and concave function for deposits). The estimated values of $\phi_0, \phi_1, \phi_2$ correspond to the pre-consolidation model, while the estimated values of $\phi_0 + \phi_4, \phi_1 + \phi_6, \phi_2 + \phi_8$ correspond to the post-consolidation model. The remainder correspond to the intermediate period during which the consolidation takes place.

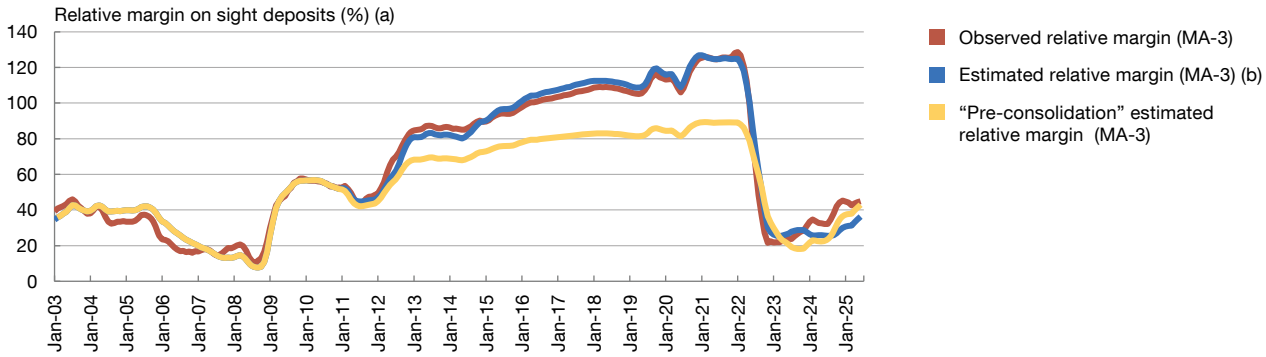
Table 3 shows the results of the econometric model's estimation for the Lerner index of (gross) loans and sight deposits with the error term modelled as an autoregressive (1) process. In general, the statistical significance of the estimated coefficients for the variables defined in multiplicative terms, in both loan and sight deposit margins, confirms the structural change in the relationship between the relative margin and the EURIBOR. The theoretical prediction regarding the function's form (decreasing and convex for loans and increasing and concave for deposits) is also confirmed.

If the estimated coefficients for the multiplicative variables were not significantly different from zero, the effect of the number of competitors on relative margins would be determined directly by the estimated coefficient for the respective binary variable, Z. However, when the coefficients for the multiplicative variables are not zero, measuring the effect of the number of competitors on relative margins requires accounting for the change in the slopes of the EURIBOR variable's effect owing to the variance in the number of competitors. With these considerations, the comparison between pre- and post-consolidation is replaced by a comparison between the relative margin values observed and those predicted by the model estimated in the pre-consolidation period. Charts 7 and 8 display the moving averages of order 3 of the values observed, those predicted by the models estimated in Table 3 and those predicted for the entire period on the basis of the model estimated in the pre-consolidation period.

Although there are notable differences between the observed values and those predicted by the pre-consolidation model in different sub-periods, it is particularly interesting to compare them in the post-consolidation period from January 2023 to June 2025. After performing the relevant calculations, an average difference of 6.2 percentage points (pp) is estimated for the relative margin on loans and -60 pp for sight deposits. These values are consistent with those estimated directly from the differences between the pre- and post-consolidation average values in Table 3. The charts also demonstrate that the differences between the observed and estimated relative margins change within the sub-period with EURIBOR variations, as predicted by the theoretical results.

Chart 7

**Observed and predicted relative margin on loans**

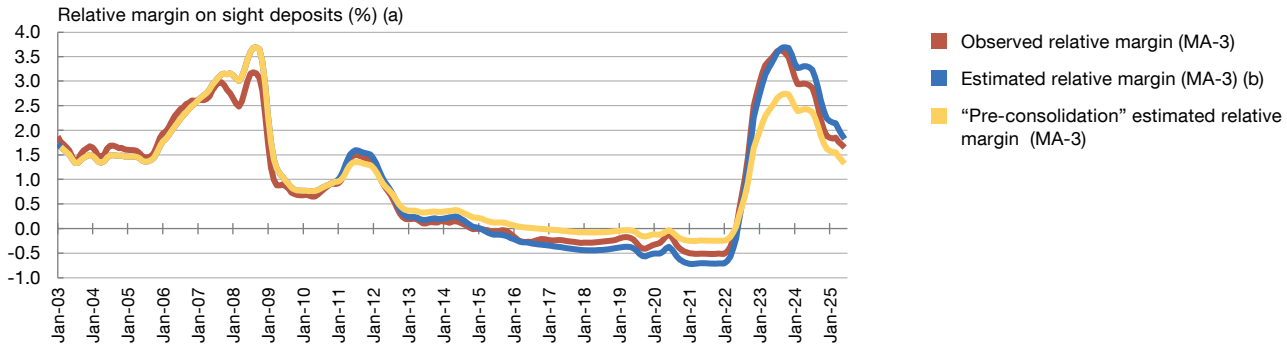



**SOURCE:** Authors' calculations.

**a** Relative margin (Lerner index) calculated as (Interest rate on loans - EURIBOR) / (Interest rate on loans).
**b** The "estimated relative margin" on loans has been calculated using the estimated coefficients shown in Table 3. Furthermore, the predicted values (of the "pre-consolidation" estimated relative margin) have been calculated that would be found for the entire period (2003-25) based on the estimated coefficients in the pre-consolidation period $\Phi_0$, $\Phi_1$, $\Phi_2$. The moving averages of order three (MA-3) are shown.

Chart 8

**Observed and estimated relative margin on sight deposits**




**SOURCE:** Authors' calculations.

**a** Relative margin (Lerner index) calculated as gross interest rates, (1 + EURIBOR) / (1 + Interest rate on deposits) –1.
b The "estimated relative margin" on sight deposits has been calculated on the basis of the estimated coefficients shown in Table 3. In addition, the predicted values (of the "pre-consolidation" estimated relative margin) have been calculated that would have been found for the entire period (2003-25) based on the estimated coefficients in the pre-consolidation period, $\Phi_0$, $\Phi_1$, $\Phi_2$. The moving averages of order three (MA-3) are shown.

# 5 Conclusion

This paper documents changes in interest rates and margins on Spanish banks' loan and deposit transactions with NFCs in terms of new transactions month by month between January 2003 and June 2025. This period coincides with significant fluctuations in ECB policy interest rates, along with the consolidation of the Spanish banking sector, which saw the equivalent number of equal competitor banks in the domestic market as a whole drop from 20 to eight. This raises the question of the influence of changes in monetary conditions and competition on market power and on the interest rates on loans and deposits.

The analyses combine a theoretical framework for equilibrium price formation in imperfectly competitive markets with observation and statistical treatment of the data. The results highlight the complexity of separating the effects of monetary conditions and competition on developments in banks' market power in Spain in the period under review. Lastly, it is estimated that, for the EURIBOR monthly values between January 2023 and June 2025, using the price formation model estimated for the period 2003-08, loan interest rates (sight deposits) would have been on average 6.2% (60%) higher (lower) than those observed. This is a preliminary estimate of the effect of banking sector consolidation on the interest rates on transactions with NFCs in Spain, although it cannot be ruled out that other changes in the sector and its environment have contributed to these differences in this period (for example, different liquidity conditions for firms and banks and barriers to negative rates on sight deposits).

A second noteworthy result concerns the conditions under which the Lerner index, or other equivalent measures of market power, is a reliable indicator of the degree of competition in the market. With linear demand functions, for instance, the Lerner index, calculated on the basis of Nash equilibrium prices in an oligopoly, varies according to the level of marginal cost at which it is assessed. As a result, changes in marginal cost over time alter the value of the relative margin, even if market competition conditions remain unchanged. In the case of the banking markets, where the interbank rate accounts for a significant share of the marginal cost of loans and the marginal return on deposits, the indicator of banks' market power will be sensitive to the ECB's monetary policy, given the influence the latter has on the interbank rate. The evidence presented in this study is consistent with loan demand and deposit supply functions that are linear with interest rates, which makes it difficult to identify structural competition trends in the sector based solely on the Lerner indices calculated. The caution required when interpreting developments in the relative margin as an indicator of trends in competition in the market is also needed for any activity where marginal costs may vary over time.

The data on interest rates and margins have been assessed based on theoretical predictions from a stylised model of banking competition that does not take into account some real-life aspects of granting loans and taking deposits, such as incorporating credit risk when setting interest rates on loans, solvency and liquidity regulation, and NFCs' potential access to alternative sources of financing and investment. Moreover, the aggregated data (sector averages) for loan and deposit interest rates used in the analysis do not allow for controlling heterogeneity across banks and markets, nor for any relaxation of the assumption of fixed costs for labour and capital resources. All these are significant limitations and point the way for further research.

## REFERENCES


Berry, Steven, Martin Gaynor and Fiona Scott Morton. (2019). "Do Increasing Markups Matter? Lessons from Empirical Industrial Organization". *Journal of Economic Perspectives,* 33(3), pp. 44-68. https://doi.org/10.1257/jep.33.3.44

Boar, Corina, and Virgiliu Midrigan. (2024). "Markups and Inequality". *The Review of Economic Studies,* 92(5), pp. 2828-2860. https://doi.org/10.1093/restud/rdae103

Carbó, Santiago, David Humphrey, Joaquín Maudos and Philip Molyneux. (2009). "Cross-country comparisons of competition and pricing power in European banking". *Journal of International Money and Finance,* 28(1), pp. 115-134. https://doi.org/10.1016/j.jimonfin.2008.06.005

Carletti, Elena, Agnese Leonello and Robert Marquez. (2024). "Market Power in Banking". *Annual Review of Financial Economics,* 16(2024), pp. 233-251. https://doi.org/10.1146/annurev-financial-082123-105257

Choi, Michael and Guillaume Rocheteau. (2023). "A model of retail banking and the deposits channel of monetary policy". *Journal of Monetary Economics,* 139, pp. 127-147. https://doi.org/10.1016/j.jmoneco.2023.06.010

Crouzet, Nicolas, and Janice C. Eberly. (2019). "Understanding Weak Capital Investment: the Role of Market Concentration and Intangibles". NBER Working Paper Series, 25869, National Bureau of Economic Research. https://doi.org/10.3386/w25869

De Bondt, Gabe J. (2005). "Interest Rate Pass-Through: Empirical Results for the Euro Area". *German Economic Review,* 6(1), pp. 37-78. https://doi.org/10.1111/j.1465-6485.2005.00121.x

De Graeve, Ferre, Olivier De Jonghe and Rudi Vander Vennet. (2007). "Competition, transmission and bank pricing policies: Evidence from Belgian loan and deposit markets". *Journal of Banking & Finance,* 31(1), pp. 259-278. https://doi.org/10.1016/j.jbankfin.2006.03.003

De Loecker, Jan, Jan Eeckhout and Gabriel Unger. (2020). "The Rise of Market Power and the Macroeconomic Implications". *The Quarterly Journal of Economics,* 135(2), pp. 561-644. https://doi.org/10.1093/qje/qjz041

De Ridder, Maarten. (2024). "Market Power and Innovation in the Intangible Economy". *American Economic Review,* 114(1), pp. 199-251. https://doi.org/10.1257/aer.20201079

Diez, Federico J., Daniel Leigh and Suchanan Tambunlertchai. (2018). "Global Market Power and its Macroeconomic Implications". IMF Working Papers, 137, International Monetary Fund. https://doi.org/10.5089/9781484361672.001

Drechsler, Itamar, Alexi Savov and Philipp Schnabl. (2017). "The Deposits Channel of Monetary Policy". *The Quarterly Journal of Economics,* 132(4), pp. 1819-1876. https://doi.org/10.1093/qje/qjx019

Edmond, Chris, Virgiliu Midrigan and Daniel Yi Xu. (2023). "How Costly Are Markups?". *Journal of Political Economy,* 131(7), pp. 1619-1675. https://doi.org/10.1086/722986

Eeckhout, Jan. (2021). *The Profit Paradox.* Princeton University Press. https://doi.org/10.1515/9780691222769

Englisch, Dominik, Jan Terhalle, Marcel Horn, Michael Lister and Dirk Holländer. (2024). *Interest rate pass-through in a sharply rising interest rate environment - evidence from Germany.* https://doi.org/10.13140/RG.2.2.17674.48324

Federal Reserve Bank of Kansas City. (2018). *Changing Market Structures and Implications for Monetary Policy.* Jackson Hole Economic Policy Symposium, Jackson Hole, August 23-25. https://www.kansascityfed.org/research/jackson-hole-economic-symposium/changing-market-structures-and-implications-for-monetary-policy/

Fernández de Guevara, Juan, Joaquín Maudos and Francisco Pérez. (2005). "Market Power in European Banking Sectors". *Journal of Financial Services Research,* 27(2), pp. 109-137. https://doi.org/10.1007/s10693-005-6665-z

Freixas, Xavier, and Jean-Charles Rochet. (2008). *Microeconomics of Banking* (2nd ed.). MIT Press. https://mitpress.mit.edu/9780262062701/microeconomics-of-banking/

Hannan, Timothy H., and Allen N. Berger. (1991). "The Rigidity of Prices: Evidence from the Banking Industry". *The American Economic Review,* 81(4), pp. 938-945. http://www.jstor.org/stable/2006653

Jude, Cristina, and Grégory Levieuge. (2024). "The pass-through of monetary policy tightening to financing conditions in the Euro area and the US. Is this time different?". SUERF Policy Note, 342, SUERF. https://www.suerf.org/publications/suerf-policy-notes-and-briefs/the-pass-through-of-monetary-policy-tightening-to-financing-conditions-in-the-euro-area-and-the-us-is-this-time-different/

Kopecky, Kenneth J. and David D. Van Hoose. (2012). "Imperfect Competition in Bank Retail Markets, Deposit and Loan Rate Dynamics, and Incomplete Pass Through". *Journal of Money, Credit and Banking,* 44(6), pp. 1185-1205. https://doi.org/10.1111/j.1538-4616.2012.00527.x

Lago-González, Raquel, and Vicente Salas Fumás. (2005). "Market power and bank interest rate adjustments". Documentos de Trabajo, 0539, Banco de España. https://repositorio.bde.es/handle/123456789/6852

Manning, Alan. (2021). "Monopsony in Labor Markets: A Review". *ILR Review,* 74(1), pp. 3-26. https://doi.org/10.1177/0019793920922499

Maudos, Joaquín, and Juan Fernández de Guevara. (2005). "Los costes sociales del poder de mercado en la banca española". *Perspectivas del Sistema Financiero,* 83, pp. 25-36. https://www.uv.es/~maudosj/publicaciones/Fernadez%20y%20Maudos-%20Perspectivas2005.pdf

Maudos, Joaquín, and Juan Fernández de Guevara. (2007). "The cost of market power in banking: Social welfare loss vs. cost inefficiency". *Journal of Banking & Finance,* 31(7), pp. 2103-2125. https://doi.org/10.1016/j.jbankfin.2006.10.028

Martinez-Miera, David, and Rafael Repullo. (2020). "DP15063 Interest Rates, Market Power, and Financial Stability". CEPR Discussion Paper, 15063, Centre for Economic Policy Research. https://cepr.org/publications/dp15063

Medrano Adán, Luis, and Vicente Salas Fumás. (2025). *Passthrough of Policy Interest Rates and the Market Power of Banks.* https://doi.org/10.2139/ssrn.5143830

Neumark, David and Steven A. Sharpe. (1992). "Market Structure and the Nature of Price Rigidity: Evidence from the Market for Consumer Deposits". *The Quarterly Journal of Economics,* 107(2), pp. 657-680. https://doi.org/10.2307/2118485

Martín Oliver, Alfredo, Vicente Salas Fumás and Jesús Saurina. (2006). "Risk premium and market power in credit markets". *Economics Letters,* 93(3), pp. 450-456. https://doi.org/10.1016/j.econlet.2006.06.021

Oroz, María, and Vicente Salas Fumás. (2003). "Competencia y eficiencia en la intermediación financiera en España: 1977-2001". *Moneda y Crédito,* 217, pp. 73-99.

Scharfstein, David, and Adi Sunderam. (2016). *Market Power in Mortgage Lending and the Transmission of Monetary Policy.* https://www.hbs.edu/ris/Publication%20Files/Market%20Power%20in%20Mortgage%20Lending%20and%20the%20Transmission%20of%20Monetary%20Policy_8d6596e6-e073-4d11-83da-3ae1c6db6c28.pdf

Syverson, Chad. (2024). "Markups and Markdowns". NBER Working Paper Series, 32871, National Bureau of Economic Research. https://doi.org/10.3386/w32871

Tirole, Jean. (1988). *The Theory of Industrial Organization.* MIT Press.

Van Leuvensteijn, Michiel, Christoffer Kok Sørensen, Jacob A. Bikker and Adrian A. R. J. M. van Rixtel. (2013). "Impact of bank competition on the interest rate pass-through in the euro area". *Applied Economics,* 45(11), pp. 1359-1380. https://doi.org/10.1080/00036846.2011.617697

Vives, Xavier. (1999). Oligopoly Pricing. MIT Press.

Wang, Yifei, Toni M. Whited, Yufeng Wu and Kairong Xiao. (2022). "Bank Market Power and Monetary Policy Transmission: Evidence from a Structural Estimation". *The Journal of Finance,* 77(4), pp. 2093-2141. https://doi.org/10.1111/jofi.13159

Yeh, Chen, Claudia Macaluso and Brad Hershbein. (2022). "Monopsony in the US Labor Market". *American Economic Review,* 112(7), pp. 2099-2138. https://doi.org/10.1257/aer.20200025

Based on the Nash equilibrium results in the market, including those in Table 1, the gross profit of a bank is equal to the sum of the gross profit in the loan market and in the deposit market, as follows:

$$\text{Banks' gross profit on loans}_j^* = \left(r_P^* - i_E\right)P_j^* = \frac{1}{b}\left(\frac{a - i_E}{N+1}\right)^2$$

$$\text{Banks' gross profit on deposits}_j^* = \left(i_E - r_D^*\right)D_j^* = \frac{1}{\beta}\left(\frac{i_E - \alpha}{N+1}\right)^2$$

The asterisk * denotes the value at Nash equilibrium and $P_j^*\left(D_j^*\right)$ the loans (deposits) of bank j at the (symmetric) Nash equilibrium.

$$\text{Total profit} = \frac{1}{b}\left(\frac{a - i_E}{N+1}\right)^2 + \frac{1}{\beta}\left(\frac{i_E - \alpha}{N+1}\right)^2 = \left(\frac{1}{N+1}\right)^2\left(\frac{\left(a - i_E\right)^2}{b} + \frac{\left(i_E - \alpha\right)^2}{\beta}\right)$$

For a bank to remain viable, gross profit must be greater than or equal to the fixed operating cost, represented by F:

$$\left(\frac{1}{N+1}\right)^2\left(\frac{\left(a - i_E\right)^2}{b} + \frac{\left(i_E - \alpha\right)^2}{\beta}\right) \geq F$$

This means that the maximum number of competitors in the market for banks to remain economically viable is:

$$N+1 = \sqrt{\frac{\left(\frac{\left(a - i_E\right)^2}{b} + \frac{\left(i_E - \alpha\right)^2}{\beta}\right)}{F}}.$$

With free entry and exit of competitors, the equilibrium number of banks will adjust to satisfy this condition. The equilibrium number of banks depends on the interbank rate, although whether the effect is positive or negative is not known a priori. An increase in interbank rates leads to lower gross profits in the loan market, which depresses the equilibrium number of competitors. However, a higher EURIBOR contributes to increased gross profits in the deposit market, which lifts the equilibrium number of competitors. It is a notable theoretical finding that ECB monetary policy can influence the number of competing banks in the market, although whether positively or negatively is dependent on the characteristics (supply and demand functions) of the loan and deposit markets. The evidence presented in the main text

shows that banking consolidation since 2010 coincides with a period of particularly low ECB policy rates and relatively low banking profits in Spain. The relatively low profits across the banking sector in this period suggest that the expected positive effect of low rates on gross profits in the loan market may have been outweighed, in absolute terms, by lower total gross margins in the deposit market. Given fixed costs per bank, the decline in total gross profits from both loans and deposits likely exerted pressure in favour of consolidation and concentration in the sector.

With the rise in policy rates in 2022 and subsequent developments in these rates and the EURIBOR up to mid-2025 (the latest available data), the extraordinarily loose monetary conditions of the 2012-22 decade may be coming to an end. In the near future, more "normal" EURIBOR values, of around 2%, could be expected. Taking this EURIBOR as a reference, the current equivalent number of equal banks (sector concentration) may be below the equilibrium number. In other words, with the present number of banks and less accommodative monetary conditions, the economic profits of banks could once again become sustainably positive, which would act as a draw for potential entrants to the market.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# DETERMINANTS OF INTERNAL RATINGS-BASED CREDIT RISK-WEIGHTED ASSETS IN EUROPE: 2015-2023

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# DETERMINANTS OF INTERNAL RATINGS-BASED CREDIT RISK-WEIGHTED ASSETS IN EUROPE: 2015-23


## Abstract

Risk-weighted assets (RWAs) and RWA density (RWD) are key metrics for assessing banks' credit risk and for enabling cross-bank comparisons under the internal ratings-based (IRB) approach. Using data from the European Banking Authority, we analyse IRB-RWD levels across banks and countries, as well as their evolution over time. We relate IRB-RWD to credit risk indicators such as the non-performing loans ratio, provisions, probability of default and loss given default. Our findings show that country-specific dummy variables are not significant for most portfolios and countries and that systematic differences in domestic exposures suggest retail portfolios benefit from favourable treatment.



**Keywords:** credit risk, risk-weighted assets, internal ratings-based approach.


## 1 Introduction

Banking regulation – specifically the Capital Requirements Regulation (CRR) and Capital Requirements Directive (CRD) (European Parliament and European Council, 2019; 2024) – aims to safeguard financial stability by requiring banks to hold a minimum level of own funds. Central to this framework is the principle of risk sensitivity: banks with riskier portfolios must maintain higher capital buffers. To operationalise this, regulators use RWAs, which adjust accounting exposures to reflect credit risk.

The CRR and CRD define three approaches for calculating credit RWAs. The standardised approach (SA) assigns fixed regulatory risk weights to balance sheet exposures and is designed for banks without internal risk models. Under the foundation internal ratings-based (F-IRB) approach, banks estimate the probability of default (PD) and the maturity (M), while the loss given default (LGD) and exposure at default (EAD) are prescribed by regulators.[1] In turn, the advanced internal ratings-based (A-IRB) approach allows banks to use internal estimates for all key parameters, subject to regulatory approval and compliance with both qualitative and quantitative requirements.

RWAs have become a key market indicator, reflecting the underlying credit risk of banks since both their levels and trends are closely monitored by market participants and supervisors. RWD, defined as the ratio of RWAs to EAD, is widely used as a proxy for portfolio credit risk. Bank profitability is often assessed using the return on RWAs, defined as the ratio of profit to RWAs. Credit rating agencies also rely on RWA and RWD metrics to evaluate a bank's

1 Specifically, credit conversion factors are provided for EAD estimation.

creditworthiness. These uses underscore the importance of understanding RWA and RWD levels and dynamics for all stakeholders.

RWAs and RWD are publicly disclosed through banks' Pillar 3 reports. To enhance transparency and comparability, the European Banking Authority (EBA) publishes harmonised bank-level metrics, with two main EBA datasets available, namely: (i) the annual EBA EU-wide transparency exercise, which has provided quarterly data[2] on RWAs and exposures by portfolio and institution since December 2014; and (ii) the EBA Risk Dashboard, which reports averages of IRB parameters (PD and LGD) at country level. These datasets support a wide range of comparative analyses, although bank-level IRB parameters are not publicly disclosed.

Under the A-IRB framework, RWAs should, in principle, depend exclusively on PD, LGD, EAD and M. Hence, additional factors, such as the bank's or the counterparty's country, should not affect RWA outcomes. Empirical evidence shows that RWD differs across countries and banks, even for comparable portfolios (Trucharte, Pérez Montes, Cristófoli, Ferrer and Lavín, 2015; Turk-Ariss, 2017), which raises the question of whether observed differences stem from risk parameters or other underlying drivers. Even if differences are attributable to risk parameters, it is relevant to investigate the underlying causes of cross-country disparities.

Several studies have explored this issue. Trucharte, Pérez Montes, Cristófoli, Ferrer and Lavín (2015) compare RWD across countries and portfolios using EBA data, distinguishing between the SA and IRB approaches. However, their findings are inconclusive. Indeed, Le Leslé and Avramova (2012) argue that regulatory frameworks allow for substantial RWD variability, while Cannata, Casellina and Chionsini (2020) find that RWD dispersion is comparable to that of other financial ratios. These contrasting results highlight ongoing debates regarding the consistency and comparability of RWD outcomes under the current regulatory framework.

This study contributes to the literature on RWD variability by: (i) examining its determinants across banks, portfolios and countries over time; (ii) incorporating explanatory variables, such as PD, LGD, non-performing loan (NPL) and provision coverage ratios based on EBA data; and (iii) exploiting the panel structure of the dataset to model RWD dynamics over time. Our results indicate that country-specific dummy variables are not significant for most portfolios and countries. Lastly, we identify a systematic difference in the treatment of domestic exposures: retail portfolios tend to benefit from favourable treatment, while wholesale portfolios appear to be penalised.

The remainder of this article is organised as follows. Section 2 reviews the empirical literature on RWA analysis. Section 3 describes the EBA dataset and its structure and presents some descriptive statistics for the most relevant portfolios and countries. Section 4 introduces the models used to obtain our results. Lastly, Section 5 summarises the main findings and outlines potential avenues for future research.

2 Initially published every six months.

## 2 Literature review

Over the past decades, RWAs and RWD have been extensively studied. Arroyo, Colomer, García Baena and Gónzalez Mosquera (2012) examine RWD as of 31 December 2010 for 16 European banks. Their analysis does not differentiate between portfolio types and proposes an alternative risk metric that incorporates both RWD and provisions. Due to data limitations, they conclude that robust inferences cannot be drawn. They suggest that the observed RWD variability may reflect differences in business models, such as portfolio composition and the use of the SA versus IRB approaches.

In the same year, Le Leslé and Avramova (2012) conducted a more comprehensive study, analysing a sample of 50 systemically important banks worldwide over the period 1998-2008. They document the evolution and dispersion of RWD, distinguishing between the SA and IRB approaches. Focusing on credit risk, they highlight the subjectivity inherent in RWD calculation, noting that differences arise not only from business models and methodologies but also from heterogeneous supervisory practices: *"... The current set-up for RWA calculation leaves considerable scope for subjectivity and interpretation ... Differences in RWAs are not only the result of banks' business model, risk profile, and RWA methodology (good or bad), but also the result of different supervisory practices ...".*

Bruno, Nocera and Resti (2014) develop two models: one to predict changes in RWD over time and another to estimate the extent of IRB coverage across banks. Using data from 50 large European banks over the period 2008-12, their analysis is based on aggregated RWD figures. Their models incorporate bank-specific variables such as size, deposit-to-asset ratio, retail and corporate loan shares and IRB coverage, in addition to country factors such as GDP growth.

In contrast to earlier studies using aggregated data, Trucharte, Pérez Montes, Cristófoli, Ferrer and Lavín (2015) were the first to use RWD information disaggregated by portfolio, country and regulatory approach (standardised versus IRB), based on the 2014 EBA stress test. They identify substantial cross-country variation in IRB coverage and in the reductions in RWD achieved through IRB usage. Notably, IRB-RWD varies significantly across countries for the same portfolio types. Building on a similar granularity level, Turk-Ariss (2017) uses data from the EBA transparency exercise on 21 European countries to model IRB-RWD at portfolio and country level. Using a panel dataset covering two reference dates (December 2014 and June 2015), they include bank-level fundamentals and country fixed effects, achieving an explanatory power of approximately $R^2$ = 40%.

More recently, Bastos e Santos, Esho, Farag and Zuin (2020) analyse annual data for 76 banks over the period 2001-16 to model the ratio between accounting-based and market-implied RWD. The latter is derived from credit default swap data to estimate point in time (PiT) PDs.[3] They find that the divergence between the two RWA measures (accounting-based and market-implied) is influenced by the share of complex assets and country-specific factors. However,

3 Employing the F-IRB value of LGD.

they do not account for the use of PiT PDs rather than through-the-cycle (TtC) PDs, as required under regulatory capital rules.[4]

In turn, Cannata, Casellina and Chionsini (2020) challenge the financial industry's narrative of excessive volatility in RWD. They compare the volatility of RWD with that of other financial ratios and find it to be of a similar size. As in Arroyo, Colomer, García Baena and Gónzalez Mosquera (2012), they construct a composite risk measure that includes provisions.

Leogrande, Costantiello, Laureti and Matarrese (2023) and Böhnke, Ongena, Paraschiv and Reite (2024) have provided two recent contributions. The former use EBA data spanning 30 quarters and develop models with up to 139 candidate variables, reporting an $R^2$ of 99.99%, raising concerns about possible overfitting and limited model robustness. By contrast, the latter adopt a more rigorous methodology, using quarterly aggregated RWD data from 52 listed banks across 14 European countries over the period 2007-19. They estimate two models: one capturing the change in RWD during the transition from the SA to the IRB approach, and another modelling quarterly RWD changes. Their findings reveal a convergence in RWD levels over time. The initial IRB adoption by banks leads to a drop in RWD, followed by further declines in jurisdictions with more lenient supervisory practices and increases in stricter regulatory environments, particularly in recent years.

Compared with previous studies, the key contributions of this article are the use of bank, country, portfolio[5] and quarter-specific RWD data, similar in scope to Trucharte, Pérez Montes, Cristófoli, Ferrer and Lavín (2015), as well as the incorporation of country-level PD and LGD information disclosed by the EBA in its annual transparency exercises. To the best of our knowledge, this is the first study to model RWD at portfolio level using EBA PD/LGD data. Furthermore, the panel structure of the dataset enables the use of long-run averages as explanatory variables and supports the analysis of the evolution of RWD over time.

## 3 Data

The data used in this study are sourced from the EBA.[6] The primary dataset is the EU-wide transparency exercise, which provides information on RWAs from December 2013 to June 2023, initially at a half-yearly frequency, and quarterly from 2020 onwards.[7] From this dataset, we extract credit risk IRB-RWA data for the following regulatory portfolios: corporates, retail secured, retail qualifying revolving and other retail. We also include further breakdowns such as specialised lending, corporates-SME, corporates other, and SME/non-SME segments within retail secured and other retail. All portfolios are disaggregated by default status (defaulted versus

4 TtC PD estimates are based on sufficiently long time series that capture the likely range of default rate variability over an economic cycle.

5 Specifically, corporate, retail secured, retail qualifying revolving and other retail, along with their possible further disaggregation.

6 *EU wide transparency exercise*.

7 This change in the reporting frequency does not have an impact on our calculations as we have not used differences or lagged variables.

non-defaulted exposures). Additionally, we retrieve data on provisions and defaulted exposures from the same source,[8] enabling the construction of key risk indicators. The final dataset combines all reporting periods into a panel comprising approximately 130,000 observations covering the period from December 2013 to June 2023. Each observation is uniquely identified by the reporting bank, regulatory portfolio,[9] country of the reporting institution, country of the counterparty and reporting quarter. To ensure data quality, we exclude observations with negative values and those reporting RWD levels exceeding 1,250%.[10]

In addition, we incorporate PD and LGD data from the EBA Risk Dashboard,[11] which provides aggregated information by counterparty country, portfolio and quarter. Unlike the EU-wide transparency exercise, this dataset does not contain bank-level information. The portfolio classification is broadly aligned with the transparency exercise, though it does not distinguish between SME and non-SME exposures in the retail secured and other retail portfolios. Another limitation is that it only covers a subset of counterparty countries, focusing on the most relevant jurisdictions. Risk parameter data (PD and LGD) are available from June 2015 onwards.

The Risk Dashboard reports exposure-weighted averages for PDs (on non-defaulted exposures, referred to as "PD adjusted" in EBA terminology) and LGDs (also on non-defaulted exposures) provided by banks, along with the 25th, 50th, and 75th percentiles[12] offering a measure of distributional dispersion. All PD and LGD parameters are merged into the RWA database described above,[13] resulting in a unified dataset for the empirical analysis.

Table 1 reports the number of unique values for bank, exposure type, country of the bank, country of the exposure and reporting periods. Not all banks report data across all breakdown dimensions.

In turn, Charts 1 and 2 depict the evolution of the PD, LGD and RWD for the total database and for the five largest countries.[14] The analysis focuses on the corporates and retail secured by real estate portfolios. We only report the exposure-weighted average PD and LGD.

In the corporates portfolio, Chart 1.a shows the changes in RWD, with a value close to 45% for the total portfolio. Germany and Italy display a clear downward trend, while in Spain it initially decreased but has recently increased. RWD levels also vary considerably by country. Chart 1.b highlights cross-country differences in exposure-weighted PD levels: Italy declines from 12% to 3%, whereas Germany changes from 2% to 0.8%. Chart 1.c presents a more

8 These variables are used to compute NPL and provision coverage ratios for the IRB portfolios.

9 Defaulted and non-defaulted exposures are recorded in separate columns rather than separate rows, consistent with EBA reporting.

10 Multiplying the 1,250% RWD by the 8% minimum capital ratio results in a capital requirement greater than 100% of the loan amount.

11 *Risk dashboard*.

12 These percentiles reflect inter-bank variability, where PD and LGD values are weighted by exposure at bank and portfolio level.

13 We use a left join and maintain all the RWA data. We do so because the risk parameter information in the EBA Risk Dashboard does not cover all the portfolios-countries-quarters that are available in the EU-wide transparency exercise.

14 Defined based on the counterparties' location rather than the banks' headquarters. Exposures are measured using the IRB portfolios of corporates, retail qualifying revolving, retail secured by real estate and retail other, as of June 2023.

Table 1
**Unique counts (a)**

| | Unique counts |
|---|---|
| Banks | 96 |
| Exposure type | 14 |
| Bank's country | 16 |
| Counterparty's country | 68 |
| Periods | 28 |

**SOURCE:** Authors' calculations.

**a** Not all banks report information for each possible portfolio-country-period combination.

stable pattern for the exposure-weighted LGD, which ranges between 32% and 42% across most countries, except for the Netherlands, where it remains around 28%. Other than Spain, where it has clearly increased, there is no trend in the change in LGD over time.[15]

In the retail secured by real estate portfolio, Chart 2.a shows a decline in the RWD for the total portfolio followed by a recent increase. However, France exhibits a persistent downward trend, while Spain's RWD remains stable until a recent rise. The Netherlands displays a sawtooth pattern due to the half-yearly reporting of Rabobank. Chart 2.b indicates an exposure-weighted PD variability by country of 0.5%-1.8%, with sudden peaks in Germany and Spain not reflected in RWD. Chart 2.c shows largely stable or ever increasing LGDs in all the countries (notably in Spain) except for a sharp drop in the Netherlands in 2019, whose impact on RWD became visible only several years later.

Therefore, it is clear that for both portfolios RWD and the PD and LGD parameters show different levels and more importantly different trends over time by country. RWD tends to stay stable over time while PD and LGD show quarterly variability and trends. From a general perspective, given that regulatory PDs are estimated on a through-the-cycle basis and LGDs on a downturn basis, these parameters should remain relatively stable over time, unless: (i) there are changes in the risk profile of the portfolios; (ii) the scope of portfolios under the IRB approach changes; or (iii) parameter estimation methodologies are revised (e.g. due to new regulatory guidance or supervisory interventions). However, because country-level PDs and LGDs are averages across multiple institutions, such effects should be partially diluted, and any significant shift should also be reflected in RWD levels, which, in contrast, behave in a more stable manner. Sudden quarterly jumps in PDs are therefore difficult to justify. For example, in the corporates portfolio in the Netherlands during 2016, the exposure-weighted PD rises sharply from 3.3% to 5% in June, before falling back to 2.6% by year-end. Such inconsistencies may reflect reporting errors by banks. We recommend that the EBA strengthen its data validation procedures[16] to enhance reporting quality as well as the public availability of its bank-level data, i.e. bank-level PDs and LGDs.

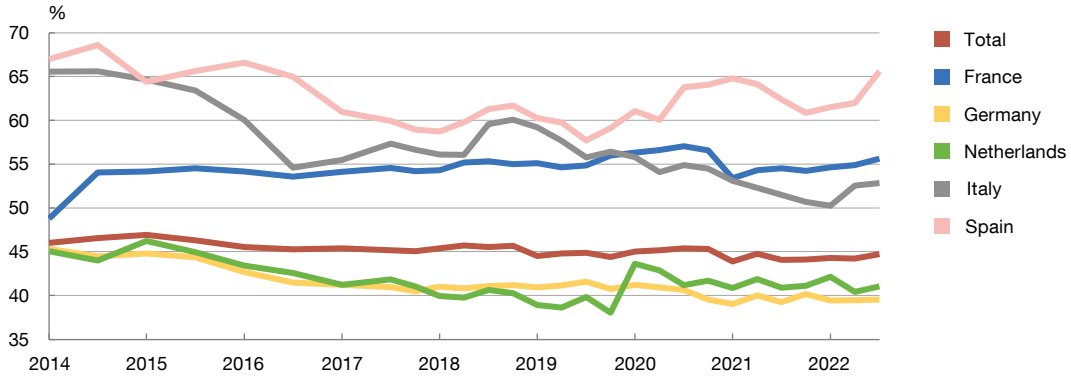
15 Figures for the average percentile parameters are available upon request.

16 This may include the detection of changes in PDs, LGDs and RWDs or inconsistencies in their changes.

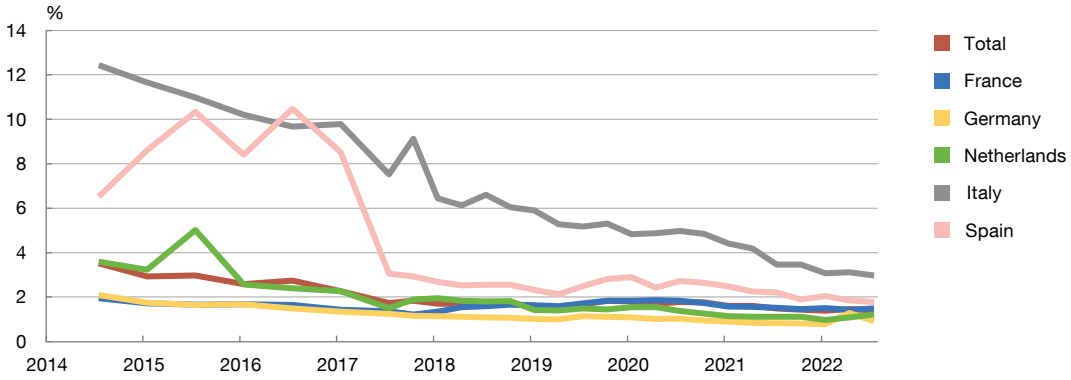
Chart 1

**Corporates portfolio. Change in RWD, PDs and LGDs over time (a)**

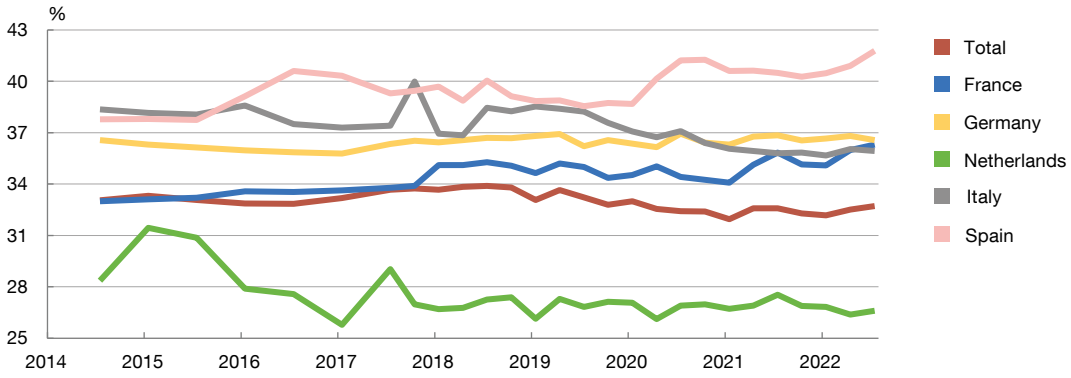
1.a RWD (non-defaulted)




1.b PD (weighted average)




1.c LGD (weighted average)




**SOURCE:** Authors' calculations.

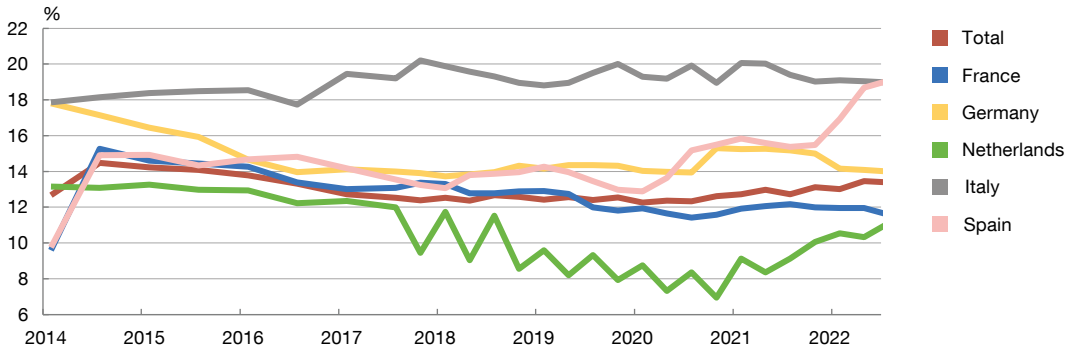
**a** Only weighted-average PDs and LGDs are plotted.

Following our analysis of the dataset, Chart 3 presents the average values of the PD and LGD parameters reported between 2015 and 2023 for the corporates and retail secured by real estate properties portfolios and across the total and top five counterparty countries. Within this group, Italy and Spain exhibit significantly higher exposure-weighted PDs during the early

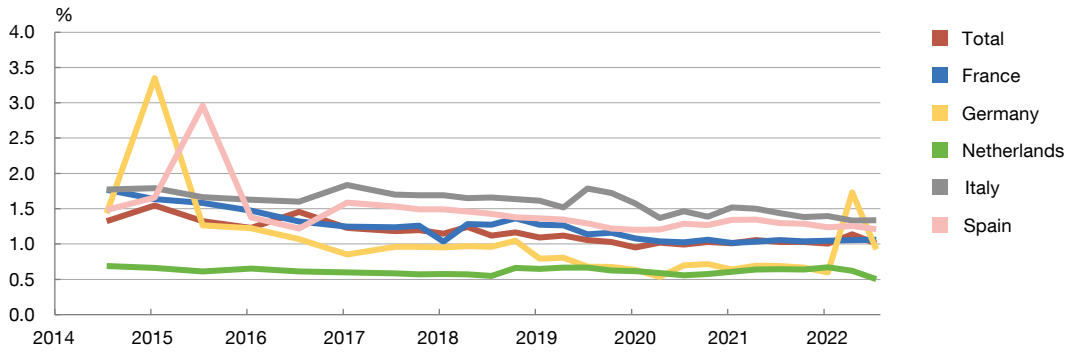
Chart 2

**Retail secured by real estate portfolio. Change in RWD, PDs and LGDs over time (a)**

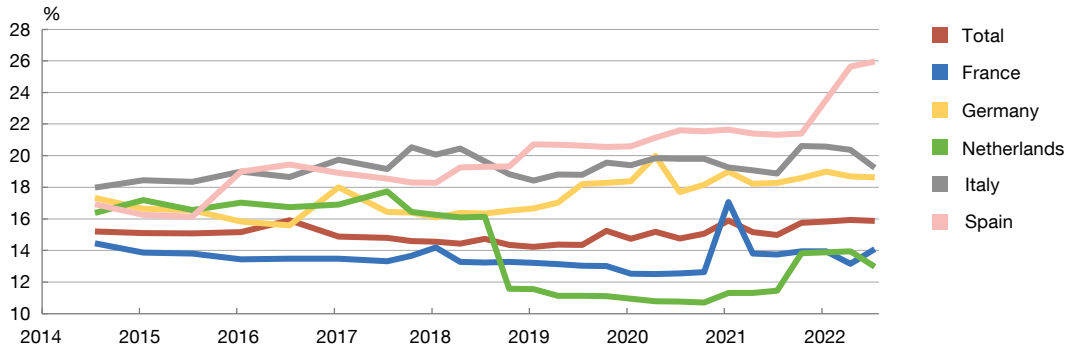
2.a RWD (non-defaulted)




2.b PD (weighted average)




2.c LGD (weighted average)




**SOURCE:** Authors' calculations.

**a** Only weighted-average PDs and LGDs are plotted.

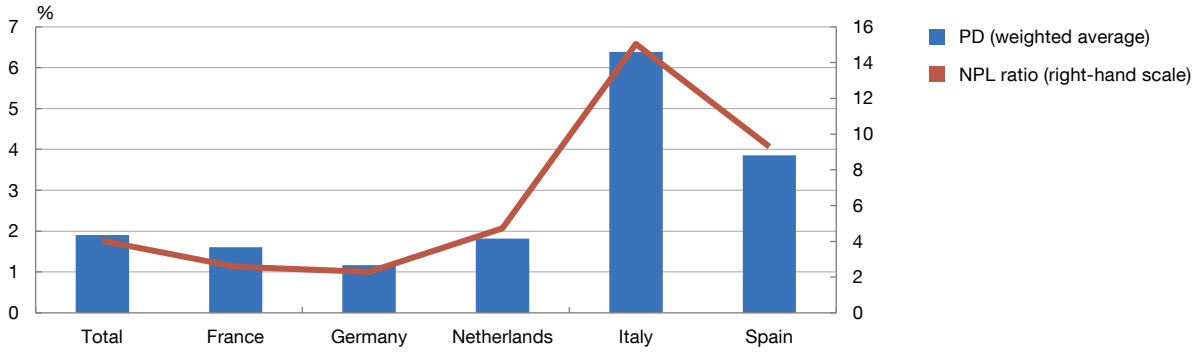
years of the time period available for the corporates portfolio, resulting in elevated exposure-weighted PDs compared with other countries. Overall, PDs exhibit greater relative variability across countries than LGDs. Chart 3 also reports the NPL ratio[17] and the provision coverage

17 Defined as the ratio of defaulted exposure to total exposure.

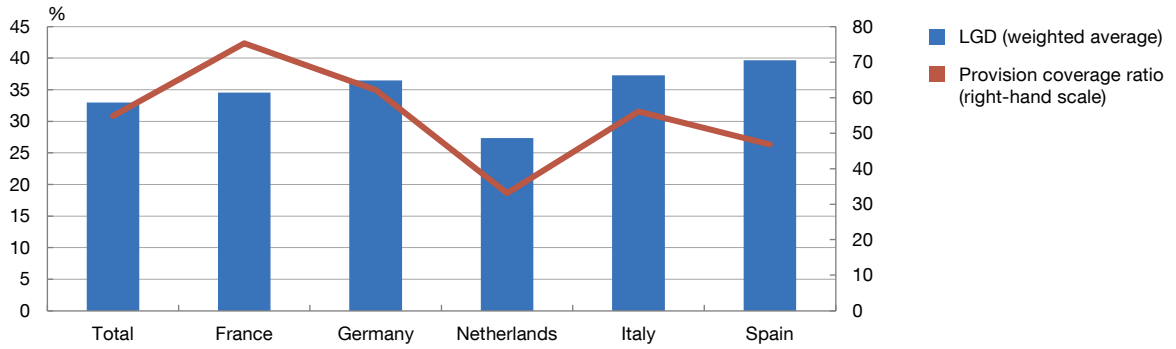
Chart 3

**Average PD, LGD, NPL ratio and provision coverage ratio reported by the EBA over the period 2015-2023 (a)**

3.a PD versus NPL ratio (corporates)




3.b LGD versus provision coverage ratio (corporates)




**SOURCE:** Authors' calculations.

**a** Simple average over time of all ratios.

ratio,[18] both of which are standard metrics disclosed in banks' financial reports, which are indicators closely monitored by investors to assess credit quality, with higher values typically associated with increased credit risk. Unlike PD and LGD, which are derived from banks' internal models, the NPL ratio and the provision coverage ratio are accounting-based metrics drawn from audited financial statements. The NPL ratio is expected to be positively related to the PD level,[19] while the provision coverage ratio may serve as a proxy for LGD.[20] Indeed, for the corporates portfolio countries with higher exposure-weighted PDs clearly tend to report higher NPL ratios, but this is not so obvious for the retail secured by real estate portfolio. By contrast, the relationship between LGD and the provision coverage ratio appears to be even less clear. To further explore the relationship between PD and LGD and the accounting variables, we compute all the possible correlations in Table 2 using the analogous country-level

18 Calculated as the ratio of provisions to total defaulted exposure.

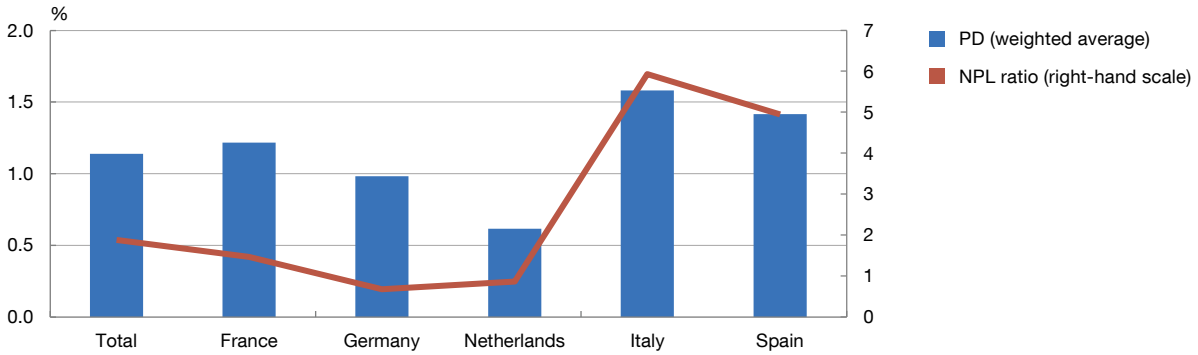
19 The NPL ratio measures the stock of defaulted assets while PD measures the flow to default, meaning that as PD increases so too will the stock of defaulted assets.

20 Provisions can be seen as a proxy of the expected loss calculated as EAD x PD x LGD and the NPL stock as a proxy of EAD x PD, meaning that their ratio can be seen as a proxy of LGD.

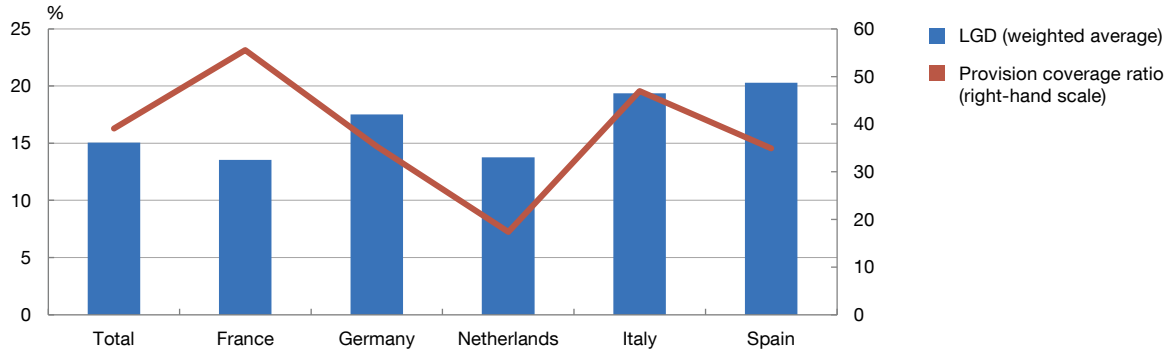
Chart 3

**Average PD, LGD, NPL ratio and provision coverage ratio reported by the EBA over the period 2015-2023 (a) (cont'd)**

3.c PD versus NPL ratio (retail secured by real estate property)




3.d LGD versus provision coverage ratio (retail secured by real estate property)




**SOURCE:** Authors' calculations.

**a** Simple average over time of all ratios.

Table 2

**Correlation between risk parameters and accounting variables for the largest 30 countries. The correlation is more relevant for the PD parameter and the corporates portfolio**

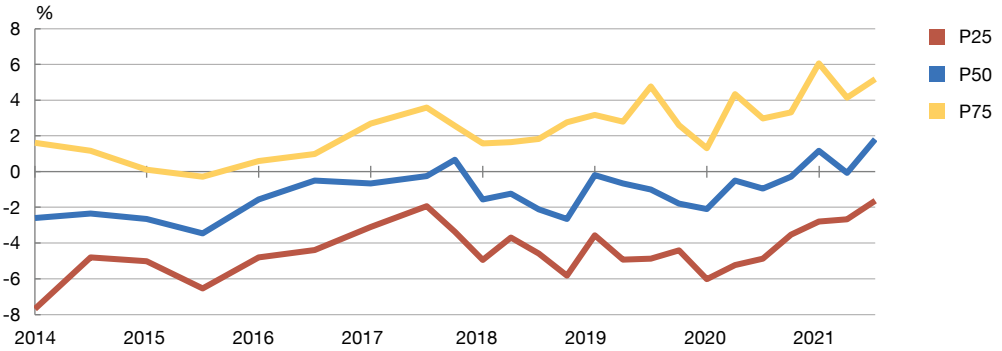
%

| | Corporates | Retail secured by real estate |
|---|---|---|
| PD (weighted average) and NPL ratio | 91.93 | 74.76 |
| PD (weighted average) and provision coverage ratio | 1.52 | 47.02 |
| LGD (weighted average) and NPL ratio | 34.76 | 63.01 |
| LGD (weighted average) and provision coverage ratio | 36.65 | 43.08 |

**SOURCE:** Authors' calculations.

data used in Chart 3 for the top 30 biggest countries. As shown in the results, the correlation between PD and the NPL ratio is relevant for both portfolios. However, the correlation between LGD and the accounting variables is low. This is also true for the provision coverage ratio. One possible explanation for this low correlation with the provision coverage ratio might be the

Chart 4
**Yearly distribution of relative RWD changes in 12 months**




**SOURCE:** Authors' calculations.

introduction of the International Financial Reporting Standard 9 provisioning rules, which require banks to provision the one-year expected loss in some cases but the lifetime expected loss in others. International Financial Reporting Standard 9 rules also require banks to estimate a PiT expected loss based on PiT parameters, therefore reducing the correlation with the TtC PD and downturn LGD used for capital requirements purposes.

To conclude this section, we examine the variability over time of banks' RWD. Specifically, we compute the relative change in RWD over a 12-month horizon.[21] First, RWD is calculated for each bank, and the relative 12-month variation is subsequently derived. Using data from all available periods, we find that the median relative change in RWD is -1.1267%, with the 25th and 75th percentiles at -4.48% and 2.83%, respectively, during the period 2015-23. These findings indicate that RWD exhibits non-negligible variation over a 12-month horizon.[22]

Chart 4 shows the evolution of the percentiles of 12-month RWD changes over time. The interquartile range (Q1-Q3) remains broadly stable for most of the period; however, from 2021 the distribution shifts upwards. Several factors could account for the variability of RWD over time: (i) changes in banks' risk appetite; (ii) correlations between internal model outputs and macroeconomic conditions, potentially inducing volatility; (iii) the annual recalibration of internal models; (iv) regulatory developments and their supervisory implications; (v) the introduction or removal of supervisory RWD add-ons; and (vi) changes in the scope of internal models.[23] Because the chart aggregates data across countries, banks and portfolios, idiosyncratic effects are largely smoothed out. Consequently, explanations (i), (iii), (v) and (vi) appear less likely, as they are primarily driven by bank-specific factors. Moreover, since PD estimates are intended to be through-the-cycle and LGD estimates downturn-adjusted, they should not be directly affected by cyclical economic fluctuations, making explanation (ii) less plausible. By contrast, explanation (iv) – adjustments to internal models in response to new

21 For consistency, we compare the same IRB portfolios within each country and bank over a 12-month period, thereby isolating effects from transitions between the SA and IRB approaches.

22 As the data end in June 2023, the last available 12-month relative variation in RWD that can be calculated is that of June 2022.

23 For example, portfolios may migrate from the SA to the IRB approach over time.

regulatory requirements, such as the new definition of default (EBA, 2016), the *EBA Guidelines on PD and LGD estimation* (EBA, 2018) and the *ECB Guidelines on Internal Models* (first issued in 2017, see European Central Bank (2025) for the latest version) – is more consistent with the observed upward shift. Lastly, the latest data show a median 12-month relative change in RWD of approximately 2%.[24]

The 12-month variability of RWD is a relevant metric for supervisors and banks alike. Regulators may use this measure to assess the annual change in RWD at both bank and portfolio level, which may also serve as a benchmark when evaluating Pillar 2 Requirements and Pillar 2 Guidance buffers, while for banks, monitoring 12-month RWD variability is essential for defining internal capital adequacy assessment processes, designing capital plans and determining the appropriate size of management buffers.

# 4 Methodology and results

## 4.1 Accounting variables

Our objective is to examine the evolution of credit RWD under the IRB approach over time and its relationship with key risk parameters. Since RWD is intended to capture long-term TtC credit risk,[25] its association with cyclical indicators such as the NPL and provision coverage ratios may be subject to timing mismatches and lag effects. These accounting-based measures are typically considered PiT indicators, as they fluctuate with the economic cycle. To account for these dynamics, we define $RWD_{B,C,P,t}$ as the PiT RWD for bank B, country C, portfolio P and time t, along with its corresponding average $\overline{RWD}_{B,C,P}$ over time. Similarly, the NPL ratio is denoted as $NPLratio_{B,C,P,t}$, with its time average represented by $\overline{NPLratio}_{B,C,P}$. The provision coverage ratio is expressed as $ProvCov_{B,C,P,t}$, and its average as $\overline{ProvCov}_{B,C,P}$.

Based on these definitions, we estimate the following two model specifications:

$$RWD_{B,C,P,t} = \alpha_P + \beta_{1,P} \times NPLratio_{B,C,P,t} + \beta_{2,P} \times ProvCov_{B,C,P,t} \quad (1)$$

$$\overline{RWD}_{B,C,P} = \alpha_P + \beta_{1,P} \times \overline{NPLratio}_{B,C,P} + \beta_{2,P} \times \overline{ProvCov}_{B,C,P} \quad (2)$$

We estimate the regression models using weighted least squares, where portfolio exposure is used as the weighting factor. This approach reflects the assumption that the relationship between RWD and the explanatory variables may be more pronounced in larger portfolios.[26] Table 3 reports the estimated coefficients, corresponding p-values and the adjusted $R^2$ for both model specifications across portfolio types.

24 We also compute the 12-month range of RWD variability by exposure class. While RWD percentiles differ across portfolio types, the interquartile range (Q1-Q3) remains stable, between 10% and 12%.

25 IRB models employ TtC PDs and downturn LGDs to generate structural risk estimates that are less sensitive to short-term economic fluctuations.

26 It is reasonable to assume that risk parameter estimates and, consequently, RWD values are more robust for larger exposures, due to better data quality, improved model calibration and closer portfolio monitoring.

Table 3
**Estimated coefficients, corresponding p-values and the adjusted $R^2$ for both model specifications across portfolio types**

| | Equation (1) | | | | | Equation (2) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | # | Const | NPLratio | ProvCov | $R^2$Adj (%) | # | Const | NPLratio | ProvCov | $R^2$Adj (%) |
| Corp. | 8582 | 0.39*** | 1.31*** | 0.02*** | 21 | 269 | 0.34*** | 1.82*** | 0.05** | 27 |
| Corp. Other | 6112 | 0.40*** | 1.63*** | 0.01*** | 18 | 181 | 0.39*** | 2.13*** | 0.01 | 26 |
| Corp. SME | 5005 | 0.38*** | 1.14*** | 0.003 | 19 | 158 | 0.30*** | 1.42*** | 0.09 | 20 |
| Corp. Specialised lending | 4164 | 0.38*** | 1.16*** | 0.03*** | 11 | 121 | 0.31*** | 1.20** | 0.11*** | 12 |
| Ret. | 9908 | 0.11*** | 0.98*** | 0.06*** | 27 | 330 | 0.07*** | 1.23*** | 0.12*** | 38 |
| Ret. Other | 8573 | 0.13*** | 0.79*** | 0.15*** | 15 | 290 | 0.08*** | 1.10*** | 0.18*** | 21 |
| Non-SME | 8341 | 0.05*** | 2.92*** | 0.17*** | 32 | 282 | -0.02 | 3.36*** | 0.22*** | 40 |
| SME | 5229 | 0.22*** | 0.34*** | 0.05*** | 7 | 170 | 0.19*** | 0.46*** | 0.07** | 9 |
| Ret. Qual. | 4629 | 0.09*** | 1.82*** | 0.09*** | 24 | 150 | -0.13*** | 2.62*** | 0.23*** | 67 |
| Ret. Sec. RE | 7853 | 0.10*** | 1.03*** | 0.03*** | 30 | 259 | 0.10*** | 1.32*** | 0.03* | 39 |
| Non-SME | 7763 | 0.10*** | 1.17*** | 0.02*** | 29 | 254 | 0.09*** | 1.56*** | 0.02 | 37 |
| SME | 3098 | 0.19*** | 0.56*** | 0.03*** | 8 | 98 | 0.19*** | 0.59** | 0.03 | 7 |

**SOURCE:** Authors' calculations.

**a** The first five columns report regression results using quarterly observations, while the last five columns present results based on time-averaged variables. Significance levels: (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$.

The following conclusions can be drawn from the regression results:

- The coefficients of both *NPLratio* and *ProvCov* exhibit the expected signs and are statistically significant in most portfolios across both specifications, with only a few exceptions.

- The adjusted $R^2$ of equation (2) exceeds that of equation (1), which is consistent with the notion that RWD captures long-term TtC credit risk estimates.

We extend the baseline models by including country-specific dummy variables[27] to explore potential cross-country differences. Table 4 reports the adjusted $R^2$, the estimated coefficients and significance levels of the dummies for a subset of countries.[28] Overall, most of the country dummies are not statistically significant, except in the case of the total corporates portfolio. In this specification, corresponding to equation (1), for the corporates portfolio the dummies for France and Spain are positive, whereas those for Germany, the Netherlands and Italy are negative. These results suggest the presence of implicit support or penalisation mechanisms, potentially driven by an array of variables including supervisory or institutional practices.[29] Additionally, we conducted a joint significance test of the country dummies, which rejected the null hypothesis that all coefficients are equal to zero across exposure types and both model specifications, at the 1% significance level.

27 A similar analysis using quarter dummies rather than country dummies was conducted, but it did not yield a material improvement in model performance or provide additional insights.

28 For simplicity, we report results only for the five countries with the largest portfolio exposures.

29 Previous papers, such as Turk-Ariss (2017) and Böhnke, Ongena, Paraschiv and Reite (2024) had measured the effect of country dummies on RWD levels, controlling for macroeconomic variables but not for PDs and LGDs.

Table 4

**Estimated coefficients and significance levels of country-specific dummy variables for a selected group of countries (a)**

| | Equation (1) | | | | | | | | Equation (2) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NPLratio | ProvCov | France | Germany | Netherl. | Italy | Spain | $R^2$Adj (%) | NPLratio | ProvCov | France | Germany | Netherl. | Italy | Spain | $R^2$Adj (%) |
| Corp. | 0.74*** | 0.01*** | 0.04** | -0.10*** | -0.11*** | -0.03* | 0.07*** | 57 | 1.37*** | 0.04** | 0.05 | -0.09** | -0.11*** | -0.10* | 0.04 | 62 |
| Corp. Other | 0.85*** | 0.01*** | 0.02 | -0.09*** | -0.07*** | -0.02 | 0.06** | 50 | 1.21** | 0.01 | 0.03 | -0.09* | -0.06 | -0.04 | 0.05 | 59 |
| Corp. SME | 0.80*** | 0.02*** | 0.09 | -0.19 | -0.18 | -0.12 | -0.01 | 61 | 1.53*** | 0.13** | 0.13** | -0.13* | -0.14* | -0.20** | -0.02 | 61 |
| Corp. Specialised lending | 0.82*** | 0.02*** | -0.17** | -0.12* | -0.27*** | -0.08 | 0.08 | 39 | 0.52 | 0.05 | -0.16 | -0.14 | -0.27* | -0.07 | 0.07 | 28 |
| Ret. | 0.30*** | 0.04*** | -0.09 | -0.04 | -0.11 | -0.01 | -0.04 | 62 | 0.72*** | 0.10*** | -0.09 | -0.03 | -0.07 | -0.03 | -0.04 | 70 |
| Ret. Other | 0.16*** | 0.06*** | -0.24 | -0.09 | -0.09 | -0.07 | 0.01 | 57 | 0.25 | 0.13*** | -0.13 | 0.014 | 0.02 | 0.02 | 0.11 | 48 |
| Non-SME | 2.20*** | 0.07*** | -0.23 | -0.03 | -0.02 | -0.03 | -0.003 | 65 | 3.08*** | 0.15*** | -0.11 | 0.07 | 0.10 | 0.00 | 0.07 | 60 |
| SME | 0.28*** | 0.06*** | -0.12 | -0.10 | -0.01 | -0.09 | 0.05 | 50 | 0.32* | 0.09*** | -0.10 | -0.07 | -0.01 | -0.08 | 0.07 | 50 |
| Ret. Qual. | 1.74*** | 0.00 | -0.10 | -0.13 | -0.03 | 0.13 | -0.07 | 81 | 1.82*** | 0.02 | -0.04 | -0.11 | -0.05 | 0.16 | -0.02 | 89 |
| Ret. Sec. RE | 0.51*** | 0.01*** | -0.06 | -0.03 | -0.07 | -0.01 | -0.05 | 63 | 1.01*** | 0.03** | -0.05 | -0.02 | -0.06 | -0.03 | -0.06 | 77 |
| Non-SME | 0.55*** | 0.01*** | -0.07 | -0.02 | -0.07 | -0.01 | -0.05 | 63 | 1.01*** | 0.03* | -0.07 | -0.02 | -0.06 | -0.03 | -0.06 | 78 |
| SME | 0.20*** | 0.02*** | -0.04 | -0.21 | -0.02 | -0.06 | -0.06 | 53 | 0.20 | 0.05* | -0.08 | -0.16 | -0.06 | -0.11 | -0.08 | 51 |

**SOURCE:** Authors' calculations.

**a** Country dummy coefficients in equations (1) and (2). Only the five largest countries by portfolio exposure are reported. Significance levels: (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$.

Lastly, we examine the effect of a dummy variable indicating whether the reporting bank and the counterparty are located in the same country, i.e. whether the exposure is domestic. We denote this dummy variable as *Nac,* which might capture several factors including potential supervisory bias in the treatment of domestic exposures, or differences in portfolio composition or in loan maturity, among other factors. Table 5 reports the estimated coefficients and p-values for this variable under both model specifications. Notably, the *Nac* dummy is negative and statistically significant for retail portfolios, while it is positive and significant for corporate portfolios. This pattern is consistent across both specifications, suggesting a differential treatment of domestic exposures across portfolio types. This suggests a relatively adverse treatment of domestic corporate exposures and a more favourable treatment of retail portfolios.

## 4.2 PD and LGD variables

We extend our analysis by estimating a novel model that incorporates country-level credit risk parameters. Specifically, we use the quarterly values of $PD_{C,P,t}$ and $LGD_{C,P,t}$, defined for each country C, portfolio P and time t. As detailed in Section 3, two versions were available for each parameter: an exposure-weighted average and an unweighted average based on the percentiles published quarterly by the EBA at country level. Empirical testing showed that the exposure-weighted averages yielded better explanatory power; therefore, we report results based on these parameters. Specifically, the estimated model is specified as:

$$RWD_{B,C,P,t} = \alpha_P + \beta_{1,P} \times LGD_{C,P,t} \times f\left(PD_{C,P,t}\right) \quad (3)$$

Table 5
**Effect of the domestic exposure dummy (Nac) on equations (1) and (2)** (a)

| | Equation (1) | | | | | Equation (2) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Const | NPLratio | ProvCov | Nac | $R^2$Adj (%) | Const | NPLratio | ProvCov | Nac | $R^2$Adj (%) |
| Corp. | 0.37*** | 1.18*** | 0.02*** | 0.06*** | 24 | 0.33*** | 1.67*** | 0.05** | 0.05** | 29 |
| Corp. Other | 0.37*** | 1.39*** | 0.01*** | 0.08*** | 25 | 0.36*** | 1.74*** | 0.01 | 0.08*** | 34 |
| Corp. SME | 0.34*** | 1.09*** | 0.01 | 0.06*** | 21 | 0.27*** | 1.35*** | 0.10* | 0.05 | 21 |
| Corp. Specialised lending | 0.35*** | 1.12*** | 0.03*** | 0.07*** | 13 | 0.30*** | 1.16** | 0.11** | 0.03 | 12 |
| Ret. | 0.15*** | 1.02*** | 0.06*** | -0.05*** | 34 | 0.10*** | 1.23*** | 0.12*** | -0.05*** | 46 |
| Ret. Other | 0.26*** | 0.85*** | 0.12*** | -0.14*** | 27 | 0.24*** | 1.18*** | 0.13*** | -0.15*** | 38 |
| Non-SME | 0.18*** | 2.83*** | 0.14*** | -0.14*** | 41 | 0.17*** | 3.24*** | 0.15*** | -0.16*** | 52 |
| SME | 0.27*** | 0.36*** | 0.05*** | -0.06*** | 11 | 0.23*** | 0.5*** | 0.08** | -0.06*** | 15 |
| Ret. Qual. | 0.24*** | 1.67*** | 0.07*** | -0.15*** | 34 | 0.03 | 2.44*** | 0.20*** | -0.07** | 68 |
| Ret. Sec. RE | 0.12*** | 1.04*** | 0.03*** | -0.03*** | 35 | 0.11*** | 1.33*** | 0.04** | -0.03*** | 44 |
| Non-SME | 0.12*** | 1.17*** | 0.03*** | -0.04*** | 35 | 0.11*** | 1.55*** | 0.03* | -0.03*** | 42 |
| SME | 0.20*** | 0.56*** | 0.03*** | -0.01 | 8 | 0.20*** | 0.60** | 0.03 | -0.01 | 6 |

**SOURCE:** Authors' calculations.

**a** Estimated coefficients and significance levels of the Nac dummy variable, which equals one when the bank and the counterparty are domiciled in the same country. Significance levels: (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$.

The term $LGD_{C,P,t} \times f\left(PD_{C,P,t}\right)$ corresponds to the regulatory formula used to compute RWD, as defined under the CRR and CRD frameworks (European Parliament and European Council, 2019; 2024).

Table 6 reports the estimated coefficients, associated p-values and adjusted $R^2$ values for each portfolio. Based on these results, we draw the following conclusions:

- The constant term is positive and statistically significant in most specifications, suggesting that RWD may be strictly positive even when regulatory risk parameters approach zero.[30]
- The coefficient in the regulatory RWD formula deviates substantially from one, indicating a potential gap between observed RWD levels and those implied by the capital requirements function.
- The adjusted $R^2$ values are relatively low, which may reflect the limitation of using country-level averages for PD and LGD, rather than bank-specific internal estimates. Indeed, the $R^2$ values are comparable to or lower than those reported in the previous section.

It is important to emphasise that the regulatory capital formula is not linear but concave in PD.[31] As a result, computing capital using average input parameters does not generally yield

30 However, due to the concavity of the capital requirements formula, this hypothesis cannot be fully tested unless more detailed PD and LGD data are provided.

31 The PD used in the capital requirements formula needs a count-based PD, meaning that using an exposure-weighted or percentiles-based PD is a deviation from the regulatory framework.

Table 6
**RWD as a function of the regulatory capital formula** (a)

| | # | Const | LGD x f(PD) | $R^2$Adj (%) |
|---|---|---|---|---|
| Corp. | 7893 | 0.15*** | 0.47*** | 34 |
| Corp. Other | 5538 | 0.20*** | 0.31*** | 26 |
| Corp. SME | 4668 | 0.20*** | 0.39*** | 35 |
| Corp. Specialised lending | 3170 | 0.14*** | 0.47*** | 11 |
| Ret. | 9140 | 0.03*** | 0.58*** | 46 |
| Ret. Other | 7903 | 0.02*** | 0.60*** | 46 |
| Non-SME | 7696 | -0.08*** | 0.81*** | 50 |
| SME | 4936 | 0.16*** | 0.28*** | 25 |
| Ret. Qual. | 4124 | 0.07*** | 0.40*** | 28 |
| Ret. Sec. RE | 7404 | 0.05*** | 0.37*** | 46 |
| Non-SME | 7296 | 0.05*** | 0.38*** | 44 |
| SME | 3000 | 0.15*** | 0.39*** | 7 |

**SOURCE:** Authors' calculations.

**a** Regression results using the IRB regulatory formula LGD x f(PD) as the explanatory variable for RWD. The table reports estimated coefficients, p-values and adjusted $R^2$ for each portfolio. Significance levels: (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$.

Table 7
**Country dummy coefficients in equation (3)** (a)

| | Const | LGD x f(PD) | France | Germany | Netherl. | Italy | Spain | $R_2$Adj (%) |
|---|---|---|---|---|---|---|---|---|
| Corp. | 0.42*** | 0.18* | 0.02 | -0.12*** | -0.10*** | -0.04*** | 0.04*** | 55 |
| Corp. Other | 0.48*** | 0.08* | 0.00 | -0.12*** | -0.07** | -0.02 | 0.04* | 47 |
| Corp. SME | 0.40*** | 0.20* | 0.10 | -0.16* | -0.08 | -0.09 | 0.02 | 59 |
| Corp. Specialised lending | 0.29 | 0.45 | -0.13 | -0.20 | -0.20 | -0.04 | 0.09 | 29 |
| Ret. | 0.16*** | 0.24*** | -0.05** | -0.03 | -0.07*** | 0.01 | -0.04* | 55 |
| Ret. Other | 0.30*** | 0.16* | -0.14*** | -0.03 | -0.04 | -0.02 | 0.04 | 56 |
| Non-SME | 0.22*** | 0.34* | -0.15*** | -0.04 | -0.06* | 0.03 | 0.02 | 58 |
| SME | 0.31 | 0.13* | -0.10 | -0.14 | -0.03 | -0.10 | 0.01 | 46 |
| Ret. Qual. | 0.21 | 0.18*** | -0.07 | -0.12 | -0.04 | 0.12 | -0.09 | 45 |
| Ret. Sec. RE | 0.14*** | 0.14*** | -0.04 | -0.03 | -0.06* | 0.002 | -0.04 | 62 |
| Non-SME | 0.14*** | 0.14*** | -0.06* | -0.02 | -0.06* | 0.001 | -0.04 | 62 |
| SME | 0.26* | 0.24*** | -0.03 | -0.21 | 0.002 | -0.06 | -0.06 | 53 |

**SOURCE:** Authors' calculations.

**a** Estimated coefficients and significance levels of country-specific dummy variables for a selected subset of countries. Only the five largest countries by portfolio exposure are shown. Significance levels: (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$.

the same outcome as calculating it on a loan-by-loan basis because of the concavity of the capital function, the use of average parameters tends to produce upward-biased (i.e., conservative) estimates. Furthermore, employing average PD and LGD values does not account for potential correlations between these two variables. Consequently, capital requirements computed at individual loan level are likely to be higher than those derived from portfolio level averages when PD and LGD are positively correlated. In wholesale portfolios,

Table 8
**Effect of the domestic exposure dummy (Nac) on equation (3)** (a)

| | Const | LGD x f(PD) | Nac | $R^2$Adj (%) |
|---|---|---|---|---|
| Corp. | 0.14*** | 0.44*** | 0.06*** | 38 |
| Corp. Other | 0.19*** | 0.27*** | 0.09*** | 34 |
| Corp. SME | 0.16*** | 0.37*** | 0.07*** | 36 |
| Corp. Specialised lending | 0.14*** | 0.43*** | 0.05*** | 13 |
| Ret. | 0.06*** | 0.57*** | -0.03*** | 50 |
| Ret. Other | 0.10*** | 0.55*** | -0.08*** | 50 |
| Non-SME | 0.02* | 0.74*** | -0.08*** | 53 |
| SME | 0.18*** | 0.27*** | -0.02*** | 26 |
| Ret. Qual. | 0.13*** | 0.39*** | -0.07*** | 32 |
| Ret. Sec. RE | 0.07*** | 0.37*** | -0.02*** | 48 |
| Non-SME | 0.07*** | 0.38*** | -0.03*** | 48 |
| SME | 0.15*** | 0.39*** | -0.001 | 7 |

**SOURCE:** Authors' calculations.

**a** Estimated coefficients and significance levels of country-specific dummy variables for a selected subset of countries. Only the five largest countries by portfolio exposure are shown. Significance levels: (*) $p < 0.05$, (**) $p < 0.01$, (***) $p < 0.001$.

adjustments for company size and loan maturity also affect RWD. In this analysis, we assume sales to be €5 million and a maturity of 2.5 years, as this information is not disclosed by the EBA.

Similar to the previous section, we extend the model by including country[32] and domestic-exposure dummy variables to assess the role of jurisdiction-specific effects. Table 7 reports the results with the inclusion of country dummies. Notably, their introduction substantially increases the value of the constant term while reducing both the size and significance of the regulatory formula coefficient. As in the previous analysis (Table 4), in the corporates portfolio the country dummies for Germany, the Netherlands and Italy are negative and statistically significant, whereas the dummy for Spain is positive and significant. In the retail portfolio, the only significant country dummies are those for France and the Netherlands, both of which are negative. These findings support the presence of cross-country differences that may reflect institutional factors, such as variations in regional supervisory practices or support mechanisms, which could influence the calibration or reporting of RWD. Lastly, as with the accounting variables, the joint significance test for the country dummies rejects the null hypothesis that all coefficients are equal to zero across exposure types, at the 1% significance level.

Table 8 shows a similar pattern for the domestic exposure dummy *(Nac)* as that observed in the previous section. The *Nac* variable is associated with a negative and statistically significant effect for retail portfolios. Conversely, for wholesale portfolios, the coefficient is positive and significant.

32 As in the previous section, the inclusion of quarter dummy variables neither improved model performance materially nor provided additional insights.

# 5 Conclusion

RWD is a key indicator for market participants, particularly in cross-bank and cross-country assessments of credit risk. However, drawing robust conclusions remains challenging due to the limited availability of granular, publicly disclosed data. This article offers a systematic comparison of RWD across countries and banks over time, using data published by the EBA on RWD and key credit risk parameters – namely, PD and LGD.

We begin with a descriptive analysis of the levels of and change over time in RWD and its underlying risk parameters. We then compare the long-term average PD and LGD across countries for two representative portfolios. Additionally, we analyse the distribution of 12-month relative changes in RWD, revealing that RWD can exhibit substantial variation over short horizons, underscoring the importance of understanding its underlying drivers.

We then estimate two regression models to explain RWD, using both quarterly and time-averaged accounting variables. In both specifications, the explanatory variables exhibit the expected signs and are statistically significant, including a positive and significant constant term. As expected, the model based on average values outperforms the one using quarterly data, reflecting the through-the-cycle nature of RWD.

When introducing country-specific dummy variables, statistically significant effects are observed only for the corporates portfolio. In this case, the dummies for Spain and France exhibit positive coefficients, suggesting relatively higher RWD levels than in other countries. More notably, the inclusion of a dummy variable indicating whether the reporting bank and the counterparty are domiciled in the same country reveals a distinct pattern: it is associated with a negative and statistically significant effect for retail portfolios and a positive effect for wholesale portfolios, which might suggest the presence of a potential bias in the RWD treatment across portfolio types.

We extend the analysis by modelling RWD as a function of internal risk parameters (PD and LGD). The results again show a positive and statistically significant constant term, suggesting that RWD remains strictly positive even when estimated risk parameters approach zero. When including country-specific and domestic-exposure dummies, we observe patterns consistent with previous specifications: Spanish corporate portfolios are associated with relatively higher RWD, while retail (wholesale) portfolios exhibit a negative (positive) and statistically significant effect when the exposure is (is not) domestic. These findings could point to persistent cross-country differences and potential biases in the calibration or reporting of RWD.

Lastly, we find that the EBA databases provide valuable opportunities for further research, particularly in the analysis of parameter cyclicality and its correlation with macroeconomic variables. However, a fundamental limitation in the publicly available data constrains the depth of such analyses. Specifically, PD and LGD values are disclosed only at portfolio and country level. As a result, model performance is constrained by the inability to capture bank-specific risk parameters. Greater data granularity, particularly the disclosure of PD and LGD at bank

level, would significantly enhance the ability of researchers and supervisors to understand the determinants of RWD and to assess cross-bank and cross-country differences more accurately. For those reasons, we encourage regulators, especially the EBA, to expand the scope of public disclosures in order to support more robust and transparent analyses.

## REFERENCES


Arroyo, José María, Ignacio Colomer, Raúl García Baena and Luis Manuel González Mosquera. (2012). "Comparing risk-weighted assets: the importance of supervisory validation processes". *Estabilidad Financiera - Banco de España,* 22 (mayo 2012), pp. 9-29. https://repositorio.bde.es/handle/123456789/11470

Bastos e Santos, Edson, Neil Esho, Marc Farag and Christopher Zuin. (2020). "Variability in risk-weighted assets: what does the market think?". BIS Working Papers, 844. Bank for International Settlements. https://www.bis.org/publ/work844.pdf

Böhnke, Victoria, Steven Ongena, Florentina Paraschiv and Endre J. Reite. (2024). "Back to the roots of internal credit risk models: Does risk explain why banks' risk-weighted asset levels converge over time?". Deutsche Bundesbank Discussion Paper, 02/2024. https://www.bundesbank.de/resource/blob/840810/cc283fdff365b542c75a83b0f40d04a1/472B63F073F071307366337C94F8C870/2024-01-15-dkp-02-data.pdf

Bruno, Brunella, Giacomo Nocera and Andrea Resti. (2014). "The credibility of European banks' risk-weighted capital: structural differences or national segmentations?". BAFFI CAREFIN Centre Research Paper, 2015-9. Centre for Applied Research on International Markets Banking Finance and Regulation, Università Bocconi. https://www.eba.europa.eu/documents/10180/846261/5dc93cf3-2cf1-4f5c-91b5-ffba94664407/The%20credibility%20of%20European%20Banks'%20risk-weighted%20capital%20-%20B.%20Bruno,%20G.%20Nocera,%20A.%20Resti.pdf

Cannata, Francesco, Simone Casellina and Gaetano Chionsini. (2020). "Time to go beyond RWA variability for IRB banks: An empirical analysis". *EBA Staff Paper,* 10. European Banking Authority. https://doi.org/10.2853/80825

European Banking Authority. (2016). *Guidelines on the application of the definition of default under Article 178 of Regulation (EU) No 575/2013* (EBA/GL/2016/07). https://www.eba.europa.eu/documents/10180/1721448/052c260f-da9a-4c86-8f0a-09a1d8ae56e7/Guidelines%20on%20default%20definition%20(EBA-GL-2016-07)_EN.pdf

European Banking Authority. (2018). *Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures* (EBA/GL/2017/16). https://www.eba.europa.eu/documents/10180/2033363/6b062012-45d6-4655-af04-801d26493ed0/Guidelines%20on%20PD%20and%20LGD%20estimation%20(EBA-GL-2017-16).pdf

European Central Bank. (2025). *ECB Guide to Internal Models. July.* https://www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.supervisory_guide202507.en.pdf

European Parliament and European Council. (2019). Regulation (EU) No 2019/876 of the European Parliament and of the Council of 20 May 2019. *Official Journal of the European Union,* OJ L 150, 7.6.2019, pp. 1-225. ELI: http://data.europa.eu/eli/reg/2019/876/oj

European Parliament and European Council. (2024). Directive (EU) 2024/1619 of the European Parliament and of the Council of 31 May 2024. *Official Journal of the European Union,* OJ L, 2024/1619, 19.6.2024. ELI: http://data.europa.eu/eli/dir/2024/1619/oj

Le Leslé, Vanessa and Sofiya Avramova. (2012). "Revisiting risk-weighted assets: Why do RWAs differ across countries and what can be done about it?". IMF Working Paper, 12/90. International Monetary Fund. https://www.imf.org/external/pubs/ft/wp/2012/wp1290.pdf

Leogrande, Angelo, Alberto Costantiello, Lucio Laureti and Marco Maria Matarrese. (2023). "The determinants of risk weighted assets in Europe". *Academy of Entrepreneurship Journal,* 29(1). https://www.abacademies.org/articles/The-determinants-of-risk-weighted-assets-in-Europe-1528-2686-29-1-104.pdf

Trucharte, Carlos, Carlos Pérez Montes, María Elizabeth Cristófoli, Alejandro Ferrer and Nadia Lavín. (2015). "Credit portfolios and risk weighted assets: analysis of European banks". *Estabilidad Financiera - Banco de España,* 29 (noviembre 2015), pp. 63-85. https://repositorio.bde.es/handle/123456789/11431

Turk-Ariss, Rima. (2017). "Heterogeneity of bank risk weights in the EU: Evidence by asset class and country of counterparty exposure". IMF Working Paper, 2017/137. International Monetary Fund. https://doi.org/10.5089/9781484302958.001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# THE BANCO DE ESPAÑA AND THE BANKING SUPERVISION ARCHITECTURE IN THE 20TH CENTURY THROUGH ITS KEY MILESTONES: 1921, 1962 AND 1977

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# THE BANCO DE ESPAÑA AND THE BANKING SUPERVISION ARCHITECTURE IN THE 20TH CENTURY THROUGH ITS KEY MILESTONES: 1921, 1962 AND 1977


## Abstract

Banking supervision in Spain during the 20th century can be understood through three pivotal moments: 1921, 1962, and 1977. The Banking Law of 1921 introduced basic prudential regulations and for the first time entrusted the Banco de España – then a private institution – with the inspection function, although it was hardly exercised before the Civil War. After a period without any effective supervision during the Franco regime (1939-1955), inspections were resumed under the oversight of the Ministry of Finance, focusing on compliance with interbank interest rate agreements. After the nationalisation of the Banco de España, the 1962 Framework Law reinstated its supervisory responsibility, which was resumed gradually. Over the following years the Inspection Service and the Central Credit Register were created and an in-house inspectorate was set up. The decisive transformation towards modern supervision came with the 1977 banking crisis. Institutions such as the Deposit Guarantee Scheme and the Banking Corporation were established and the Inspectorate was strengthened with more resources and specialised training. At the same time, the process of European integration and Spain's accession to international organisations contributed to the convergence of Spanish regulations on solvency and banking risk.



**Keywords:** banking supervision, Banco de España, inspection, solvency


## 1 Introduction and objectives

The banking crises of the 1980s led to the adoption of the international Basel accord, which introduced recommendations on banking regulation and supervision to strengthen banks' financial soundness globally, with a focus on credit risk control and capital adequacy. Following the 2007-2008 financial crisis, banking supervision became a central pillar of international economic policy, which today faces challenges requiring ongoing adaptation beyond the original Basel framework. In Spain the supervisory framework was redesigned after the Great Recession of 2007-2008, with the main European supervisory mechanisms implemented between 2009 and 2013. This entailed a change in the historical supervisory functions of the Banco de España, which now directly supervises the Spanish financial system's less significant institutions and collaborates with the European Central Bank (ECB) in on-site inspections and oversight of significant institutions.[1] In addition, the Banco de España's supervision has gradually expanded beyond microprudential supervision to include conduct, reporting transparency and credit institutions' relationship with their customers, as well as monitoring

1 In addition to supervising banks, from 1971 the Banco de España was also tasked with supervising savings banks and credit cooperatives. In 1988 its remit was expanded to include specialised credit institutions, followed by other types of credit institutions not limited to banks, including mutual guarantee societies and currency-exchange bureaux.

payment systems and instruments, providing payment services and supervising system operators and payment processors (Banco de España, 2024).

Before the current regulations were in place, the Banco de España's role in supervision shifted throughout the 20th century under the various regulatory frameworks and economic and institutional contexts. This paper provides a brief historical overview of banking supervision in Spain during the 20th century, highlighting three key milestones when its supervisory scope was expanded:[2] 1921, 1962 and 1977. In the 19th century, Spain had early banking supervision mechanisms linked to the emergence of its domestic banking system. The banking laws of 1856, along with earlier rules enacted in 1829, 1849 and 1851, regulated the publication of balance sheets and created the role of royal commissioner at the Banco de San Fernando (predecessor of the Banco de España) and local issuing banks, and of inspector at credit corporations. This legal framework reflected the State's interest in controlling banking activity, particularly monetary issuance and circulation. However, this first attempt at banking supervision, led by the Ministry of Finance and not by the Banco de España, was short-lived and largely ineffective. First, the financial crisis of 1864-1866 and the subsequent shift in economic policy triggered by the Glorious Revolution of 1868 meant that the regulations were in force only during the 1870s, after which a half-century of banking laissez-faire ensued. Second, supervision merely certified the information provided by banks on their balance sheets and failed to prevent the crisis that destroyed much of the financial system. Weak enforcement and "regulatory capture" undermined effective supervision. The importance of supervision was not brought back into focus until the Banking Law of 1921. An overview of the history of Spanish banking supervision is provided in Table 1.

This paper is organised into four parts, starting with this introduction. The second part provides a brief overview of the international literature on the history of supervision. The third part focuses on the Banco de España's role in supervision during the 20th century. Lastly, the paper puts forth a short conclusion.

## 2 The history of banking supervision. Origins, factors and key players

Historical studies about supervision, particularly over the long term, are scarce.[3] However, Hotori, Wendschlag and Giddey (2022) recently analysed this issue in the United States, Japan, Sweden, Germany, Switzerland, Belgium, France and Great Britain during the 19th and

2 This work summarises the research carried out on the history of supervision in Spain, financed by the Banco de España through its Economic History programme, and published in the *Estudios de Historia Económica* series (Cuevas and Pons, 2025a). The research and documentary sources, which are mainly from the Historical Archive of the Banco de España (HABE), are detailed therein. The study focuses exclusively on the supervision of the banking sector and not on the supervision of other financial institutions.

3 For the United States, extensive research exists focusing on specific periods (Mitchener, 2005; White, 2009), along with some long-term analyses (Mitchener and Jaremski, 2015; Conti-Brown and Vanatta, 2025). For Great Britain, Hall (1999) analysed how supervision had changed since 1945 and James (2020) addressed supervisory aspects in his study on the Bank of England between 1979 and 2003. For Germany, see Bähre (1984), and for France, Mastin and Touchelay (2023) explores various aspects of bank control during the 20th century.

Table 1
**Timeline of banking supervision in Spain, 1851-1986**

| Years | Supervisory authority | Main characteristics |
|---|---|---|
| 1851 - 1868/69 | Ministry of Finance | • Publication of balance sheets<br>• Royal commissioner at the Banco de San Fernando (from 1856 onwards, the Banco de España) and issuing banks<br>• Inspectors at credit corporations |
| 1868/69 - 1920 | — | • No supervision |
| 1921 - 1936 | Banco de España | • Controlled access to the sector<br>• Creation of the Spanish Banking Supervisory Authority and the Banking Commission<br>• Prudential measures: minimum capital and solvency ratio<br>• Publication of accounting information in a standardised format |
| 1939 - 1962 | Ministry of Finance | • Monitoring with little banking supervision<br>• Inspections to monitor interest rates on deposits |
| 1963 - 1986 | Banco de España | • Publication of accounting information in a standardised format<br>• Submission of credit information to the Central Credit Register<br>• Creation of the Private Banking Inspection Service<br>• Creation of the Inspectorate<br>• Creation of the Deposit Guarantee Scheme and the Banking Corporation |

**SOURCE:** Prepared by the authors based on Cuevas and Pons (2025a).

20th centuries. For more recent periods, Penikas (2015) provides an overview of international banking supervision between 1974 and 2014.

The goals of bank regulation and supervision have changed depending on the historical and institutional context and the characteristics of each country's financial system. Although "modern supervision" is relatively recent – with just four decades of existence (Masciandaro and Quintyn, 2013) – in countries such as the United States and Spain its origins date back to the 19th century, The first supervisory initiatives were based on two instruments: (i) controlling access to the sector through registration or authorisation subject to certain requirements, and (ii) the collection of statistical information to mitigate information asymmetry and to make it easier for shareholders and depositors to assess banks' financial situation and risks. Banks also had the obligation to publish balance sheets and other accounting information, such as the composition of their portfolio, profit and loss accounts and annual reports. However, these requirements were not always complied with and they didn't follow a standardised format.

Financial crises have been a driver of supervisory change, even if it is not possible to establish a consistent pattern (Hotori, Wendschlag and Giddey, 2022). In the United States bank failures throughout the 19th century triggered the emergence of supervision.[4] In Spain too financial instability in the 19th century led to an inspection system for credit corporations. Following the 1907-08 crisis Germany chose – with the support of the then central bank (the Reichsbank) – to implement self-regulation through "gentlemen's agreements". The First World War and the

4 The 1873, 1884 and 1890 crises in the United States bolstered banking supervision and the 1907 bank run led to the establishment of the Federal Reserve System in 1913 (Conti-Brown and Vanatta, 2025).

subsequent restructuring of the financial system also influenced regulation and supervision. This was the case in Spain, with the Banking Law of 1921, and Italy, with the 1926 reform following the 1921-23 banking crisis (Molteni and Pellegrino, 2022).[5] This link between crises and supervision became even more evident after the Great Depression of the 1930s. In the United States, the 1929 crisis led to a stricter supervisory arrangement, with the creation of dedicated market control institutions (the Securities and Exchange Commission) and, for the first time, a deposit guarantee scheme (the Federal Deposit Insurance Corporation) (White, 2009). In Germany, a 1934 law made it mandatory for banks to submit monthly reports and report new loans, and created a supervisory authority, although its effectiveness was limited during the Nazi regime and was not strengthened until after the Second World War (Bähre, 1984).

However, "modern supervision" only emerged in the 1970s and 1980s, again driven by banking crises and runs.[6] In the United Kingdom, the "secondary banking crisis" (1973-75) forced the Bank of England to assume supervisory responsibilities, although a formal supervisory system was not introduced until 1979 (Capie, 2010). In the United States, supervision was strengthened following the crisis of the late 1970s and the 1980s, coupled with problems in international banking and deregulation (Schenk, 2014). Between 1980 and 1994, nearly 1,600 banks failed or received assistance and nearly 1,300 savings institutions collapsed, prompting a strengthening of the supervisory framework and the adoption of a risk assessment system (White, 2009). All these crises led the Basel Committee on Baking Supervision (BCBS), which had been established in 1974 after the bankruptcy of the Herstatt Bank, to define in 1988 what was then known as the Basel framework (now, Basel I) on international minimum bank capital standards (Drach, 2019). Instability in the banking sector also affected the Bank for International Settlements (BIS), which for the first time set up an early warning system to detect liquidity and credit problems in a timely manner and prevent contagion (Wood, 2005).

Another crucial aspect of supervision concerns the assignment of responsibility: should supervision rest with central banks, a ministry of the Government or an independent agency (Grossman, 2010)? There is no one-size-fits-all solution: the characteristics and structure of the banking sector, the degree of central bank independence from the government, its monetary policy and reputation, and the level of integration into global financial markets all shape the architecture of the supervisory system and determine who should exercise oversight (Goodhart and Schoenmaker, 1922). For De Krivoy (2000), the systemic crises of the 1990s were partly attributable to supervision which depended on political power. In countries with weak institutions and limited human capital which face challenges in coordinating and running State agencies, an independent agency may prove more effective. Conversely, in developed countries central banks have the prestige, human capital and resources to perform supervisory functions.

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5 Other examples from that period are the reforms in Austria (1924-25), Czechoslovakia (1919-20 and 1924), Norway (1924-25), Portugal (1925), Canada (1924) and Japan (1927).

6 The 1970s crisis, the collapse of the Bretton-Woods monetary system, increased financial liberalisation and technological changes heightened financial instability, leading to numerous banking crises around the world: Great Britain (1973-75), Germany (1973-74), Italy (1973-83) and the United States (1973-75 and 1980-84).

# 3 The Banco de España and banking supervision during the 20th century

## 3.1 The Banking Law of 1921 and the Banco de España

In the early 20th century, the Spanish financial system grew significantly as banks expanded through share issues and major domestic banks emerged (Martín-Aceña, 2011).[7] This boom was driven by the repatriation of funds from Spain's former colonies and by Spain's non-belligerent stance during the First World War (1914-18). Spain's neutrality caused the banking sector to initially suffer, but later demand for financial services increased, and they became more prominent in industry and services (Roldán, García Delgado and Muñoz, 1973; Tortella and Palafox, 1984). The number of banks rose from 52 in 1915 to 91 in 1920, and assets, paid-up capital and branches – which reached almost one thousand in 1923 – increased (Martín-Aceña, 2005). The end of the Great War led to the collapse of some banks, as renewed international competition rendered many businesses created during the conflict non-viable. Fraudulent behaviour by bank managers, currency speculation and the absence of effective legislation also played an important role (Sudrià, 2014).

Financial instability, the post-war banking crisis and, particularly, the difficulties faced by Catalan banks led to the introduction of the 1921 Banking Law, known as the Cambó Law (Pons, 2022). The Law had two goals: renewing the Banco de España's monopoly over banknote issuance, which was due to expire that year, transforming it into a "true central bank" (although it was still a private institution), and adapting the regulation in order to "organise and strengthen Spanish private banking". Savings banks were left outside its scope, even though in 1914 they managed nearly 20% of the Spanish financial system's deposits and competition with banks for retail savings was increasing (Martínez Soto and Hoyo, 2019). The 1921 Law preserved unrestricted access to banking activity, but was more interventionist than previous legislation, as Cambó considered that liberalisation had led to too much competition and *"exaggerated, almost anarchic individualism"* in banking (draft Banking Law, Part Three, Title I, p. 7). The Law defined what a bank was and created a voluntary register of banks and bankers, providing incentives to those who registered. It also established the Banking Commission (with a royal commissioner who reported to the Ministry of Finance) and the Spanish Banking Supervisory Authority (CSB), which acted as an official link between private banking and the authorities. Lastly, and most importantly, the responsibility for banking inspection was finally entrusted to the Banco de España.

The 1921 Banking Law can be considered to have laid the foundation for current supervisory activity. For the first time, the Banco de España was given supervisory powers (Article 2, Section IV). As Cambó stated in Congress: "For the Banco de España there can be no mysteries or reservations in private banking; no bank should consider its dignity offended or its }professional secrecy violated for making the details of its operations available to the Banco

7 The main banks established during this period were Banco Guipuzcoano (1899), Banco Hispano Americano (1900), Banco Vizcaya (1901), Banco Español de Crédito (1902), Banco Urquijo (1918), Banco Central (1919) and Banco Exterior de España (1929).

de España...".[8] However, supervision was considered a one-off, non-permanent activity, and its initial effectiveness was limited. The 1922 CSB Regulation laid the foundations for the inspection and sanctioning activities of the CSB and the Banco de España.[9] Article 16 set out the penalties applicable, ranging from warnings to expulsion from the banking community (a precedent of the sanctioning model later adopted by the Franco regime). Article 39 (Section X) provided that the inspections would be carried out by the Banco de España at the request of the CBS. In 1925 an attempt was made to strengthen banking inspection[10] through a specific draft regulation, approved by a CSB committee, but it was not ratified by the Government.

The 1921 Banking Law also introduced prudential rules and measures to improve bank transparency. It established minimum capital requirements and a "minimum ratio between minimum capital plus reserve funds and the amount in each bank or banker's creditor current accounts". According to Olano (2022), this amounted to introducing a solvency ratio, by requiring not only a minimum amount of capital but also sufficient capital to cover the risks arising from the deposits collected. The regulation also incorporated a nascent liquidity ratio by setting a mandatory ratio between realisable assets and enforceable obligations (Olano, 2022). With regard to transparency, the Law mandated the CSB to compile banking statistics, standardise the format of balance sheets and publish them.

These measures, however, did not prevent further banking crises: between 1924 and 1926 more than 12 banks failed and were wound up, including Banco de Castilla (1924), Crédito de la Unión Minera (1925) and Banco Comercial de Tarragona (1926) (Martín-Aceña, 2013). The 1921 Banking Law was amended in 1927 and 1929 to prohibit the use of the terms "bank" and "banker" without authorisation from the Ministry of Finance, subject to a favourable report from the CSB, and to encourage enrolling in the registry. The Banking Law of 25 November 1931 strengthened the interventionist nature of the 1921 law, especially with regard to the central bank, and introduced stricter oversight, security mechanisms and restrictions on foreign banks. The reform was not prompted by the banking crisis, which – despite the disappearance of seven banks (three in 1930 and four between 1934 and 1935) – was less serious in Spain than in other countries thanks to the intervention of the Banco de España and the possibility for banks to obtain liquidity (Martín-Aceña, 2013). Rather, it reflected legislative changes made abroad in response to the new international setting. It did not substantially alter banking regulation or supervision, which remained under the Banco de España's remit,[11] but it did increase Government control over the institution by adding three State representatives to its Board. The scope of government intervention in monetary policy was expanded to include setting the discount rate, intervening in the foreign exchange markets and exercising the right to access the gold reserves through advances to the Treasury (Olariaga, 1933).

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8 Cambó (1921).

9 Regulation for compliance with Article 2 of the Banking Law of 28 December 1921, which governs the Spanish Banking Supervisory Authority. *Madrid Official Gazette*, 16 June 1922.

10 The CSB supervised non-compliance with the rules on maximum interest rates and fees and imposed penalties. HABE, *Actas del CSB,* 13 August 1926 and 15 December 1926.

11 The 1931 Banking Law mirrored the 1921 law. Its Article 2(4) indicated that "any inspection of a registered bank or banker that needs to be carried out to verify non-compliance with the established regulations shall be entrusted to the Banco de España". The sanctioning regime also replicated that in the 1921 Law.

Although the 1921 Banking Law was a step forward compared with previous regulation, as it entrusted the Banco de España with supervisory and investigatory powers, interventions were sporadic. The scant evidence available, for example for the Crédito de la Unión Minera and Banco Central cases, suggests that the Banco de España neither exercised supervision nor detected the problems in advance. In the case of Crédito de la Unión Minera, the Banco de España's Bilbao branch provided very poor supervision and failed to prevent the winding up of the Basque bank. Events unfolded differently with Banco Central, whose links to Crédito de la Unión Minera ultimately dragged it down in the 1920s (Tortella and García Ruiz, 1999). After initiating insolvency proceedings in February 1925, the Count of Gaitanes, who was a director at both banks, requested the CBS to carry out an inspection to assess their solvency, believing that the report would be favourable (Tortella and García Ruiz, 1999). The advisory opinion declared the bank solvent, in what appears to be the first inspection carried out by the Banco de España, although there is no documentation on it. The inspection must have been very perfunctory, as it did not detect the problems that surfaced shortly afterwards.[12] In 1924 an inspection of Banco López Quesada was requested, but the CSB deemed it unnecessary.[13] There is also evidence that in 1925 Crédito Navarro and La Vasconia were inspected by a committee including representatives of the local and provincial government and the Banco de España.[14]

Following the amendments to the 1921 Banking Law in 1931 and up until the Civil War, official inspections became widespread (García-Agulló, 1941), making Spain a pioneer in bank oversight in Europe, with the Banco de España playing an increasingly larger role – similarly to what happened in Italy with the Banca d'Italia. In 1932 inspections targeted foreign banks, likely in connection with foreign currency control, which elicited complaints of discrimination. In 1931 problems at Banco Central resurfaced, worsened by divisions within its board of directors (Tortella, 2001). Inspections were requested in March and July 1936 and, finally, the Minister of Finance ordered an inspection[15] on 9 July 1936, which was never completed due to the outbreak of the Civil War. Only a few handwritten notes from the inspectors survive in the HABE.[16] Paradoxically, the disruption caused by the Civil War may have saved Banco Central.

### 3.2 From autarky to the 1962 Framework Law: the Banco de España regains its supervisory role

After the Civil War and during the period of autarky, the Franco regime deprived the Banco de España of its supervisory functions, which had been entrusted to it through the Law of 1921. The interventionist regulation enacted during the early years of the Franco regime, mainly

12 The request for this inspection can be found at the HABE, but without further documentation. The advisory opinion declared the bank solvent, overlooking the fact that three directors had loans backed by shares in Crédito de la Unión Minera (Tortella and García Ruiz, 1999).

13 HABE, Banca Privada, C. 64.

14 No documentation on them has been found, only references in the book *Acuerdos con síntesis y por orden alfabético del CSB (1922-1936).* HABE, Banca Privada, C. 64.

15 HABE, Banca Privada, C. 69.

16 HABE, Dirección de Sucursales, C. 901154.

reflected in the 1946 Banking Law, altered the players involved in banking oversight (see Table 1), which was returned to the Ministry of Finance. Even before the end of the Civil War, regulations already granted the Ministry of Finance the power to order ad hoc inspections of banks and bankers. The shift in banking policy, towards prioritising stability and restricting competition during the 1940s and 1950s, was initiated by the Government and backed by the banking sector (Cuevas and Pons, 2025c).

During the first 15 years of the Franco regime, heavy intervention and restriction of competition limited banking inspection, which focused on verifying compliance with interest rate rules and certain ratios. Oversight was based on the submission of accounting information to the CSB, and the Directorate General for Banking and Exchange (DGBE) of the Ministry of Finance was put in charge of "conducting at its own discretion occasional inspections of a bank or banker, using its own staff or that of the Banco de España". Although the 1946 Law envisaged penalties, they were seldom imposed, as the regime resorted to warnings and reprimands that the CSB would often soften. The Government's priorities – low-cost financing for the public sector – and the interests of the banking sector, enunciated through the CSB, relegated the Banco de España to a secondary role, subject to government control despite not having been nationalised. The CSB became the Ministry of Finance's advisory body and took on new tasks, some already set out in the 1921 Law, such as compiling banking statistics to promote transparency, interpreting and monitoring compliance with the rules on banking service fees, and reporting breaches to the DGBE. It also acted as a link between the Ministry and the banks.

The 1950s marked a shift away from the previous lack of competition and supervision. Growing demand for financial services spurred competition among banks, which adopted practices outside the regulatory framework, such as offering above-market interest rates and opening unauthorised branches. In the second half of the decade the CSB pushed for reigning in these practices. Although inspectors were concerned about risk concentration, particularly due to insider lending, their primary focus remained monitoring compliance with anti-competition rules. Supervision largely targeted local and regional banks and, as there was no dedicated inspection unit, the inspections, which were very rudimentary, were carried out by commercial teachers from the Ministry of Finance. The HABE records five inspections in 1955, nine in 1956 and eleven in 1957, which decreased to four in 1958 and two in 1959.[17] Inspection visits were also planned in 1956 and 1957 for which no documentary evidence has been found. In 1957, the year with the most activity, 12% of banks were inspected (14 out of 113 banks) (Cuevas and Pons, 2025a).

The shift towards a more modern banking supervision came with the 1962 Framework Law, as part of the economic modernisation triggered by the 1959 Stabilisation Plan. Notable changes introduced by this law include the nationalisation of the Banco de España and the definitive reassignment of supervisory powers over private banking to the issuing bank. However, these functions were effectively regained only gradually. First, an intermediation office was set up between the Banco de España and the Ministry of Finance, which was ultimately dissolved in

17 HABE, Banca Privada. C. 931 and C. 958.

1970. In addition, the Private Banking Inspection Service was created within the Banco de España under the leadership of José Luis Núñez de la Peña, and it gradually expanded its human and material resources and increased the frequency and complexity of inspections – both regular and extraordinary.

The increase in inspectors made it possible to expand supervision to include large banks, which until then had no specific oversight. In addition to stepping up inspections, the Banco de España launched two key initiatives: issuing circulars on accounting and prudential standards,[18] and creating the Central Credit Register (CCR) to centralise statistical information.[19] The transfer of responsibilities from the Ministry of Finance to the Banco de España also entailed a shift in approach: the focus moved away from managing competition to prioritising financial stability through risk control. This change was driven by increased competition and risk, stemming from the emergence of Spanish industrial banking following the entry into force of the 1962 regulations. As regards prudential regulation, a guarantee ratio was established, based on the relationship between own and external funds as a means of protecting depositors.

The Decree-Law which reassigned supervision to the Banco de España provided that control and inspection of private banks, together with the centralisation of monetary and credit statistics, were essential to its function as a central bank. It introduced four new regulatory, prudential and sanctioning developments: (i) for the first time, alongside extraordinary inspections, periodic inspections of private banks were to be conducted to verify compliance with balance sheet, account, interest, fee and credit policy rules; (ii) the Banco de España was empowered to issue warnings to boards of directors and directors themselves on inappropriate dividend policies; (iii) the Banco de España could issue recommendations about credit policy; and (iv) the Banco de España could make sanctioning proposals to the Ministry of Finance. With the exception of inspection, all other powers were reserved as non-delegable powers of the Governor.

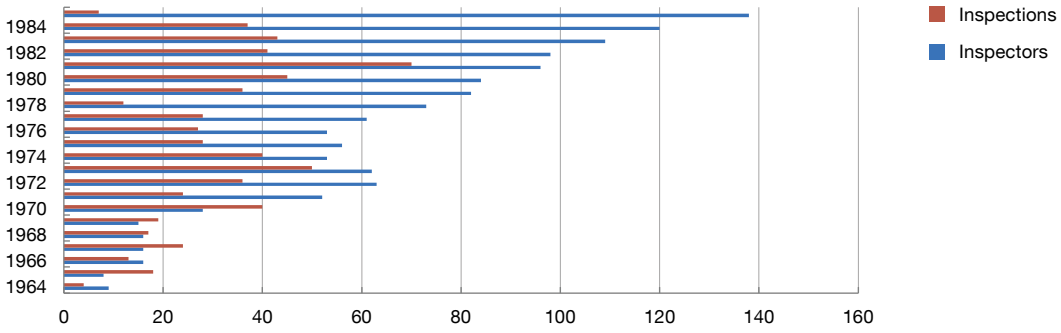
Assuming these new functions required a new body to be created at the Banco de España: the Credit Institution Inspectorate. Its implementation was initially slow due to the difficulty in recruiting staff with sufficient technical expertise. However, during that decade, Spain saw a surge in economically trained professionals, who began taking on influential decision-making roles at institutions ranging from government ministries to the Banco de España (Cuevas and Pons, 2025b). The first ten inspectors joined the Bank in September 1964 and a further eight were recruited in March 1967. Since then, the number of inspectors stabilised[20] at around 15

18 The first circular for banks was published in 1965 and the first circular for savings banks and credit cooperatives was published in 1971. Circulars were used extensively during the 1980s crisis. At first they regulated the opening of branches and aspects such as cash ratios, liquidity, compulsory investment, fees and dividend policy. Subsequently, the confidential accounting models for mandatory reporting were standardised. In the late 1970s, standardised monthly balance sheet and profit and loss account models were introduced, which had to be submitted to the Banco de España (Prado, 2002).

19 The 1962 Decree created the CCR, which was implemented in 1963 by Ministerial Order. From then on, the CCR prepared the general credit statistics and identified exceptional risks exceeding prudential limits in each bank's lending policy, with the aim of making risk analysis easier for financial institutions and acting as the Banco de España's key tool for supervision and the compilation of credit statistics.

20 HABE, Libros. Escalafones del Personal, 1966 and Supervisión, C. 6507.

Chart 1
**Number of inspections and credit institution inspectors**




**SOURCE:** Historical Archive of the Banco de España.

or 16. As Deputy Governor Gonzalo Lacalle pointed out at the 1966 Banco de España General Council, following the nationalisation and reorganisation of the Banco de España in 1962: "the Banco de España had to hastily organise a body of inspectors, not to inspect its own services (which it already did), but to inspect private banks, by identifying among its senior staff those with university or similar studies who could join this important service...".[21] The result was an increase in inspections in the second half of the 1960s, covering up to 14% of banks (18 out of 125 banks in 1965),[22] conducted by its own inspectors (see Chart 1). As in the previous decade, inspections focused on small banks, but in 1967 a comprehensive inspection of a large bank (Banco Hispano Americano) was carried out for the first time. Its importance led the Banco de España to prepare a report with detailed guidelines for periodic inspections of larger banks.

The inspection reports reveal credit concentration issues and loans granted to banks' chairs, managers and investees and to persons linked to the banks. These shortcomings, which endured from the previous decade, remained a structural feature of the banking system. In response, in 1968 the Banco de España proposed to the Ministry of Finance to apply stringent risk concentration measures (in loans to companies, subsidiary groups and related natural or legal persons), as well as to limit the loans granted to directors, managers and investee companies, which was a widespread practice especially at newly created banks.[23] As early as 1966, the Banco de España had warned about the regulatory limitations that restricted its inspection capacity in these areas:

> However, it is necessary to stress the Banco de España's legal constraints in successfully conducting its inspection functions... The Banco de España still lacks the power to inspect banks' subsidiaries, and it is through these subsidiaries that unauthorised transactions

21 HABE, *Acta del Consejo General de 25 de noviembre de 1966,* libro 26555.

22 There is little information in the HABE for the first half of the decade, probably because of the transfer of functions from the Ministry of Finance to the Banco de España.

23 *Informe del Banco de España, 30 de octubre de 1968* and Law 31/1968 of 27 July 1968 laying down the rules on incompatibilities and limitations for private bank chairs, directors and senior executives.

> are carried out. It lacks the power to impose sanctions for credit abuses and, whenever there is an incident or loss of confidence involving a bank, the underlying cause is often found to be the misuse of credit by directors for their own benefit or for the benefit of companies in which they hold an interest.[24]

Still, the inspection reports point to a growing emphasis on risk concentration and the review of the documentation sent to the CCR, reflecting two developments: a change in supervisory approach relative to the early Franco years (autarky period) – when the emphasis was on anti-competition regulations – and the operational transformation of the banking sector in the 1970s. The growing demand for financing and the 1962 liberalisation promoted competition and the creation of new industrial and commercial banks, but also increased credit risk-taking.

Although the Framework Law entailed progress, inspections continued to be beset by problems. Because of legal constraints, inspections focused on individual institutions, without supervising banking groups, as was subsequently laid bare by the Rumasa case. In addition, they focused on small banks, and the 1967 manual on inspections of large institutions had little impact. Sanctions regulations were ineffective and permissive: recommendations and sanctions were issued but without effective mechanisms against administrators other than suspension (Álvarez Rendueles, 1984). The available case files show that, despite the greater attention paid to the concentration of credit risks, neither asset quality nor management was thoroughly assessed. Lastly, although the Private Banking Inspection Office and CCR were strengthened, the lack of personnel was a chronic issue.

In sum, the Framework Law of 1962 represented an institutional leap forward in that it consolidated and reorganised banking supervision under the Banco de España's responsibility. Nevertheless, the difficulties referred to above limited the effectiveness of bank inspections and facilitated the accumulation of imbalances, risks and bank failures that would erupt even more loudly in the next decade.

### 3.3 The 1977 banking crisis and the growth of bank supervision

A third chapter in the history of bank supervision in Spain in the 20th century unfolded amid the severe banking crisis from 1977 to 1985. Internationally, the 1970s witnessed profound transformations: the end of the exchange rate regime established at Bretton Woods after the Second World War, the surge in international capital flows and the internationalisation of banking complicated domestic supervision just as new bank risks emerged, as shown by the 1974 failure of the German bank Herstatt (Schenk, 2014). This situation led to the creation of the BCBS as the first attempt at global bank supervision. Nevertheless, Spain was not involved in these supranational initiatives (the Banco de España joined the BCBS in 2001), and its supervision was conditioned by the banking crisis that broke out in 1977 and was aggravated by the industrial and stock market crisis after oil prices rose.

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24 HABE, *Acta del Consejo General de 25 de noviembre de 1966,* libro 26555.

Numerous institutions, especially the recently created banks that had emerged as a result of the distinction introduced by the 1962 Framework Law between commercial and business banks, ran into difficulties because of a combination of management problems and shortcomings in risk control (Sudrià, 2014). The conjunction of an industrial crisis with rising competition caused overhead costs to soar, by triggering the opening of more branches as a competitive strategy. Risk exposure was aggravated by the large amount of own shares and the close ties between banks and business groups. The first bank to be taken over was Banco de Navarra in 1978, followed by many small institutions. A second wave, in 1982, claimed larger banks such as Bankunión, Banca Catalana, the Rumasa Group and Banco Urquijo. Between 1978 and 1985, 63 of the 110 banks – accounting for nearly 30% of bank assets and 18% of deposits – that existed in 1977 faced difficulties (Cuervo, 1988). A total of 29 banks were taken over, and in 1983, 20 belonging to Rumasa were expropriated. The entities involved accounted for nearly 30% of the equity and liabilities in the private banking sector and 27% of the workforce (Tortella and Martín-Aceña, 1991). The crisis ended between 1984 and 1985, when the number of distressed institutions declined significantly.

The most salient aspect of the crisis from a banking supervision standpoint was that it unfolded in a context of inadequate and insufficient regulations, which had been ushered in during the preceding decade and which were ineffectual in dealing with it. Rules on inspections were weak in key respects such as requirements on bank ownership/management and on risk control. Supervisors, focused on administrative control more than on solvency, were overwhelmed. There was a need for rules on asset prices, NPL management and provisions (De Juan, 2021), as well as sanctioning capacity, prosecution of financial crimes and enhanced procedures for bankruptcies and bankruptcy protection. There were no specific legal mechanisms for managing crises, and inspections lacked effective tools for sanctioning fraudulent practices and countering the obstruction of the work of inspectors of the institutions in question. From this perspective, the crisis served as a turning point in supervision, causing changes in how the Banco de España was viewed as well as structured. Inspections were reoriented toward early detection of solvency problems arising from credit risk through, first, circulars and, later, specific prudential regulations, which led to more intense inspection work. In addition, starting in 1977-78 institutional arrangements and bank-bailout programmes were designed to deal with the bank crisis comprehensively.

At the outset of the crisis, the Governor of the Banco de España was José M. López de Letona. He was replaced in March 1978 by the then-State Secretary for Economic Affairs (1977-78), José Ramón Álvarez Rendueles. Álvarez Rendueles entrusted Luis Ángel Rojo, then-Director General of Economics, Statistics and Research at the Banco de España, with monetary policy, while the Deputy Governor, Mariano Rubio, was put in charge of bank reforms. In 1978, Rubio submitted a report titled *La función supervisora del Banco de España sobre la banca y las cajas de ahorro* (The Banco de España's supervisory function with regard to the banking sector and savings banks), which was circulated internally and became a reference document on anti-crisis policy (Tortella, 2015). Nevertheless, as noted, in 1977 there were no legal mechanisms for bank restructuring, or suitable prudential regulations, or experience in detecting losses. When liquidity problems arose, enquiries were not commonly

carried out on the possible insolvency; the parties involved would resort to rediscounting at the Banco de España, backed by credits considered healthy and, at times, supplemented with funds from the interbank market (Poveda, 2011; De Juan, 2021).

An attempt was made to resolve the problems of the first distressed banks with the available instruments – recommendations and sanctions – and also with ad hoc solutions intended to bail out viable institutions. Failing this, steps were taken ensure that the bankruptcy was less costly, though specific legal and mechanisms, most notably the creation of the DGS[25] and the BC. The two institutions were implemented progressively and experimentally, in a process that might be described as learning by doing, in which there was close collaboration between the Banco de España, the government and the banking sector.

From an organic standpoint, the crisis spurred changes in bank control. Although in the 1970s, the inspection service was strengthened, it was the Law on Governing Bodies of 1980 that consolidated Banco de España's role as a financial system regulator and superviser. This law formally created a new institutional arrangement placing banking oversight and discipline under the authority of the Executive Board and the Governor. Inspections were placed under the responsibility of a Director General and a Deputy Director General. In addition, the Executive Board acquired sanctioning powers, and raised to the General Council the most serious sanctions, which were forwarded to the competent ministry. This regulatory framework remained in effect for the entire decade, until the enactment of the 1988 Law on Discipline and Intervention of Credit Institutions.

The Bank doubled down on its efforts to expand its inspection capacity, which required strengthening the Inspectorate. Between 1977 and 1985, the number of inspectors doubled, from 61 to 138, as a result of the greater complexity of supervision and the needs relating to the banking crisis. Nevertheless, the first expansion of the Inspection Service had already taken place by the early 1970s, when the Bank assumed responsibility for inspecting savings banks and, subsequently, credit cooperatives, incorporating inspectors from the Instituto de Crédito de las Cajas de Ahorro.[26] Nonetheless, given the magnitude of the problems and the need for more intensive supervision, this expansion proved insufficient. A 1981 internal report reflects these deficiencies:

> It is clear that the Inspection Office lacks not only inspectors, but also infrastructure – a need regarding which the inspectors have voiced complaints many times. There is a lack not only of technical resources, but also of human resources, in many cases making it necessary for the inspectors to prepare simple statements themselves, and even to make numeric calculations, and also to go personally to other units to pick up the documentation they need and make to photocopies. They also consider the number of typists insufficient, at times causing delays in preparing and submitting work.[27]

25 Since 1980, it has been customary for most financial systems to establish bank guarantee funds: in 1995, a total of 40 countries had implemented such funds, and by 2003 the number had risen to 87. The various types and tiers of protection systems are currently governed by EU law. The Spanish Deposit Guarantee Scheme (FGD) continues to be a cornerstone of the current institutional framework.

26 Decree 1473/1971 of 9 July 1971, and Law 52/1974 of 19 December 1974.

27 HABE, Supervisión, C. 6506, 3 December 1981.

In addition to the increase in staff size and the provision of employee training, between 1970 and 1982 instructions were issued that unified the criteria and hence the inspection actions. Inspectors had to give the institution one month's notice, requesting key documentation: detailed shareholding structure, early withdrawals of term deposits, deposits bearing interest at above the permitted rate, possible impairment of assets, and the most recent external audit, if applicable. The advance notification contained a warning of penalties in the event information was withheld.

The Banco de España tried to establish guidelines on risk and solvency through circulars, which it used as a tool for conveying prudential and banking oversight regulations. Circular 157 of December 1978, known as the Pastoral Letter,[28] discussed bank solvency and introduced criteria to assess the different line items of the balance sheet, prepare income statements, distribute earnings, deal with insolvencies and establish provisions and reserves. Nevertheless, the power to enforce the circular was limited. Subsequent circulars implemented aspects included in Circular 157, especially Circular 172, "The Heroic", which attempted to thwart illegal practices such as cross credits and to establish penalties for falsehoods in the information sent by the banks to the CCR.[29] According to Cuervo (1988), the circulars were intended to enhance the information provided and strengthen the inspections carried out by the Banco de España. However, as these were non-binding recommendations their effectiveness was limited and they gave rise to continuous tension between the supervisor and the targets of the supervision (De Juan, 2021). It was not until 1982 that these recommendations became mandatory accounting circulars. Lastly, the country would have to wait until 1985 for a solvency ratio that was more in line with asset risk levels and that exceeded the guarantee ratio of the 1962 Law.[30]

Until 1977, the number of inspections continued the upward trend begun in the previous decade, despite the limited human and organisational resources. In 1974, more than 33% of the country's 107 banks were inspected – a higher percentage than in the 1960s – and inspections continued to focus on small and medium-sized banks, although large institutions were also examined, including Banco Central (1971, 1972) and Banco Español de Crédito (1971). Starting in 1975-76, routine inspections detected problems arising from the rapid growth in the banking industry, with patterns similar to those observed at the beginning of the decade, although more severe.[31] Starting in 1979, and in particular in 1981, the number of

28 *Economic Bulletin - Banco de España*, February 1979. *Circular 157: Cuenta de pérdidas y ganancias*

29 *Economic Bulletin - Banco de España,* July-August 1979. *Circular 172: Políticas de crédito.*

30 In this process, in addition to the crisis, the Banco de España's gradual inclusion in international organisations such as the BIS (1983) and Spain's accession to the European Economic Community (1985), were key. Between 1986 and 1992, the implementation of European Directives ensured that Spanish regulations were aligned with those of other European countries in terms of solvency and banking risk.

31 The paradigmatic case of rapid growth linked to investees and mismanagement was the Rumasa Group, which was expropriated in 1983. A report by the Inspectorate of the Banco de España (HABE, Consejo Ejecutivo del Banco de España, 11 April 1978) underscored the problems of its nearly 20 banks: diversion of funds to the benefit of the group, lack of awareness of its financial situation and poor banking performance. Regulations made it difficult to curb purchases of new institutions or risk concentration, given that each subsidiary had its own legal personality. Banks' solvency depended on that of the group's companies, of which little was known. Credit files were incomplete, income statements were unreliable and the group's banks systematically thwarted inspections and ignored the relevant recommendations *(Informe sobre la crisis bancaria en España,* HABE, Inspección, Correspondencia General, C. 2643).

inspections rose (Chart 1). Although there is limited documentary evidence for the 1982-85 period, the inspection plans show a high number of actions, which coincide with the implementation of resolution schemes (FGD and BC). In 1982, 41 inspections were documented, although Álvarez Rendueles (1984) states that the number rose from 38 in 1979 to 89 1982. In 1981, 54 inspections were carried out, and in 1985, 47. The sum of the inspections conducted plus those envisaged in the plans indicates that the percentage of institutions supervised was higher than in any preceding period.

The Inspection Service was also charged with supervising foreign banks, which operated in Spain through branches authorised since 1978, albeit with certain limitations.[32] Regulations required these institutions to be inspected at least once a year during their first five years. The Banco de España was better positioned to pressure foreign banks than domestic banks: in the event of a bank or branch exposed to clear risks or incurring in non-compliance, it could ask the Ministry of the Economy to take it over, or even withdraw its authorisation. The final pillar of supervisory policy was the gradual inclusion of external audits, which were largely conducted by US and British firms.[33] In 1978, the Banco de España recommended that financial statements be audited annually, not only as a guarantee for shareholders but also to support inspections.[34] Within a few years, most banks and savings banks had adopted that practice.

In sum, the 1977-85 banking crisis and its resolution marked the end of an era and gave the Banco de España a central role in supervision. In addition, this encouraged the abandonment of the regulatory isolation that characterised previous decades and paved the way for regulatory and supervisory convergence with international guidelines. Since the 1990s, banking oversight began to be aligned with the international standards set out in the successive Basel Accords. Spain's entry into the European Economic Community – which would become the European Union – in 1986 and into the European Monetary System in 1989 made it necessary for the country to transpose EC regulations, adapting the sector and its supervision to banking coordination directives on solvency (since 1985), banking transactions and the prevention of money laundering (1993).

## Conclusions

Current banking supervision in Spain is consistent with global banking regulation, following Spain's inclusion in supranational institutions in the 1980s and 1990s. However, Spain had early examples – at the international level – of supervisory and prudential regulations, in the

32 Royal Decree 1388/1978 of 23 June 1978 regulated foreign banks in Spain. Authorisations were limited to opening representative offices, creating subsidiary banks and opening branches (not more than three agencies, including the head office).

33 Although the Spanish Companies Law of 1951 referenced auditing activity, only after the country's inclusion in the European Economic Community in 1986 did it adjust to European regulations (Law 19/1988 on Audits). The bank sector spearheaded the progressive implementation of the law (REA Auditores, 2021).

34 A note signed by Mariano Rubio in July 1984 highlighted the importance of external audits as a complement to Banco de España's inspection work and urged institutions to standardise the information provided in these audits (HABE, Inspección, Correspondencia General, C. 2643).

19th and 20th centuries: first under the direction of the Ministry of Finance, with little headway made, and later, in the 20th century, when the Banco de España gradually assumed supervisory functions at three pivotal moments. The 1921 Banking Law was the first attempt at implementing formal supervision by the Banco de España, which was still a private entity. This law introduced prudential regulations, measures to enhance transparency and occasional bank inspections. Inspections were interrupted by the Civil War and the closed economy of the early Franco years, when supervision was once again entrusted to the Ministry of Finance within a context of strong government intervention in the banking sector. For its part, the lack of competition among institutions encouraged supervision based on compliance with anti-competition regulations and the publication of accounting information. This situation changed starting in the late 1950s and, especially, in the wake of the related financial deregulation linked to the second pivotal moment: the 1962 Framework Law. This law nationalised the Banco de España and restored its supervisory competencies, by establishing the Private Banking Inspection Service and the Inspectorate. Inspections were carried out more frequently and they increasingly sought to detect credit risks, although the dearth of human and organisational resources and the uneven growth of the banking sector gave rise to vulnerabilities which would erupt a decade later.

The Banco de España was a protagonist of the third key moment, between 1977 and 1985. Two fundamental changes stood out: first, the strengthening of the Banco de España as a banking supervisory authority – with greater control, inspection and sanction powers – and second, the transformations of prudential regulations on solvency and risk. At the same time, the Bank designed institutional arrangements to face the crisis. This was a turning point in the history of banking supervision in Spain, marking a leap in the design and intensity of banking inspection, as well as in Banco de España's decisive action to deal with the sector's problems. The next major milestone for banking supervision in Spain came well into the 21st century with the creation of the Single Supervisory Mechanism in connection with the European Central Bank (2013).

## REFERENCES


Álvarez Rendueles, José Ramón. (1984). «El tratamiento de las crisis bancarias en España». In *Crisis bancarias. Soluciones comparadas*. Universidad Internacional Menéndez Pelayo y Asociación Española de Banca, pp. 25-54.

Bähre, Inge Lore. (1984). "Economic Development and Banking Supervision from 1934 to Today". In Hans Pohl and Bernd Rudolph (eds.), *German Yearbook on Business History 1983*. Springer, pp. 95-106. https://doi.org/10.1007/978-3-642-69482-0_6

Banco de España. (2024). *Supervision Report 2024.* https://repositorio.bde.es/handle/123456789/39431

Cambó, Francisco de A. (1921). "Discurso del ministro de Hacienda F. de A. Cambó ante el Congreso de los Diputados el 26 de octubre de 1921", p. 31, Ordenación Bancaria de España, Ministerio de Hacienda.

Capie, Forrest. (2010). *The Bank of England. 1950s to 1979*. Cambridge University Press. https://doi.org/10.1017/CBO9780511761478

Conti-Brown, Peter, and Sean H. Vanatta. (2025). *Private Finance, Public Power. A History of Bank Supervision in America*. Princeton University Press.

Cuervo, Álvaro. (1988). *La crisis bancaria en España, 1977-1985: causas, sistemas de tratamiento y coste*. Ariel.

Cuevas, Joaquim, and María A. Pons. (2025a). "Historia de la supervisión bancaria en España". *Estudios de Historia Económica – Banco de España*, 77. https://repositorio.bde.es/handle/123456789/40885

Cuevas, Joaquim, and María A. Pons. (2025b). "Who Determined the Rules of the Game in the Spanish Financial Reforms, 1970-1990?". *Management & Organizational History*, 20(1), pp. 33-56. https://doi.org/10.1080/17449359.2024.2395895

Cuevas, Joaquim, and María A. Pons. (2025c). "Between State Control and Banking Power. Spanish Banking Supervision Under Franco (1940-1975)". *Enterprise & Society*. Cambridge University Press. https://doi.org/10.1017/eso.2025.10083.

De Juan, Aristóbulo. (2021). *De bancos banqueros y supervisores. 50 años desde la trinchera*. Deusto.

De Krivoy, Ruth. (2000). *Reforming bank supervision in developing countries.* Conference Series [Proceedings], Federal Reserve Bank of Boston, 44, pp. 113-143. http.//www.bostonfed.org/economic/conf/conf44/cf44_9.pdf

Drach, Alexis. (2019). "A globalization laboratory. European banking regulation and global capitalism in the 1970s and early 1980s". *European Review of History. Revue Européenne d'Histoire*, 26(4), pp. 658-678. https://doi.org/10.1080/13507486.2019.1596069

García-Agulló, José María. (1941). *El crédito y la banca en sus relaciones con el poder público*. Sobrinos de la Sucesora de M. Minuesa de los Ríos.

Goodhart, Charles, and Dirk Schoenmaker. (1992). "Institutional Separation between Supervisory and Monetary Agencies". *Giornale degli Economisti e Annali di Economia*, 51(9/12), pp. 353-439. https://www.jstor.org/stable/pdf/23247860.pdf

Grossman, Richard S. (2010). "The Emergence of Central Banks and Banking Supervision in Comparative perspective". In Stefano Battilossi and Jaime Reis (eds.), *State and Financial Systems in Europe and the USA. Historical perspectives on regulation and Supervision in the Nineteenth and twentieth Centuries*. Ashgate, pp. 123-138.

Hall, Maximillian. (1999). *Handbook of Banking Regulation and Supervision in the United Kingdom.* Edward Elgar Publishing.

Hotori, Eji, Mikael Wendschlag and Thibeaud Giddey. (2022). *Formalization of Banking Supervision, 19th–20th Centuries.* Palgrave Macmillan. https://doi.org/10.1007/978-981-16-6783-1

James, Harold. (2020). *Making a Modern central Bank. The Bank of Englan*d, 1974-2003. Cambridge University Press.

Martín-Aceña, Pablo. (2005). "La conformación histórica de la banca en España". *Mediterráneo Económico*, 8, pp. 21-44.

Martín-Aceña, Pablo. (2011). "La banca en España entre 1900 y 1975". In José Luis Malo de Molina and Pablo Martín-Aceña (eds.). *Un siglo de Historia del sistema financiero español*. Alianza Editorial, pp. 117-159.

Martín-Aceña, Pablo. (2013). "Crisis bancarias, nada nuevo bajo el sol". In Pablo Martín-Aceña, Elena Martínez and María A. Pons (eds.). *Las crisis financieras en la España contemporánea, 1850-2012*. Crítica, pp. 53-114.

Martínez Soto, Ángel, and Andrés Hoyo. (2019). "El ahorro minorista de la banca privada española, 1900-1935". *Revista de Historia Industrial*, 28 (75), pp. 65-95. https://hdl.handle.net/10902/34581

Masciandaro, Donato, and Marc Quintyn. (2013). "8 - The Evolution of Financial Supervision. The Continuing Search for the Holy Grail". In Balling Morten and Ernest Gnan (eds.). *50 Years of Money and Finance. Lessons and Challenges*. SUERF, Larcier, pp. 263-318. https://www.suerf.org/wp-content/uploads/2024/01/doc_8e296a067a37563370ded05f5a3bf3ec_1919_suerf.pdf

Mastin, Jean-Luc, and Béatrice Touchelay. (2023). "Introduction". In Jean-Luc Mastin and Béatrice Touchelay (eds.). *Des banques sous surveillance? Pour une histoire du contrôle bancaire depuis le XIXe siècle*. Presses Universitaires du Septentrion, pp. 13-49.

Mitchener, Kris James. (2005). "Bank Supervision, Regulation, and Instability during the Great Depression". *The Journal of Economic History*, 65 (1), pp. 152-185. https://www.jstor.org/stable/3875046

Mitchener, Kris James, and Matthew Jaremski. (2015). "The Evolution of Bank Supervisory Institutions. Evidence from the American states". *The Journal of Economic History*, 75 (3), pp. 819-858. https://www.jstor.org/stable/pdf/24550761.pdf

Molteni, Marco, and Dario Pellegrino. (2022). "The establishment of banking supervision in Italy: an assessment (1926–1936)". *Business History*, 66(6), pp. 1442-1470. https://doi.org/10.1080/00076791.2022.2134347

Olano, Mercedes. (2022). "El impacto de la Ley de Ordenación bancaria de 1921 en la supervisión actual". In Pablo Martín-Aceña and Elena Martínez-Ruiz. "*100 años de la Ley de Ordenación Bancaria de 1921*". *Estudios de Historia Económica – Banco de España*, 76, pp. 99-102. https://repositorio.bde.es/handle/123456789/20899

Olariaga, Luis. (1933). *La política monetaria en España*. Librería de Victoriano Suárez.

Penikas, Henry. (2015). "History of banking regulation as developed by the Basel Committee on Banking Supervision, 1974-2014". *Revista de Estabilidad Financiera*, 28, pp. 9-47. https://repositorio.bde.es/handle/123456789/11432

Pons, María A. (2022). "La Ley de Ordenación Bancaria de 1921 y la regulación del sistema bancario". In Pablo Martín-Aceña and Elena Martínez-Ruiz. "*100 años de la Ley de Ordenación Bancaria de 1921*". *Estudios de Historia Económica – Banco de España*, 76, pp. 61-75. https://repositorio.bde.es/handle/123456789/20899

Poveda, Raimundo. (2011). "La regulación y supervisión bancarias en los últimos 40 años". In José Luis Malo de Molina and Pablo Martín-Aceña (eds.). *Un siglo de historia del sistema financiero español*. Alianza, pp. 241-294.

Prado, Rafael. (2002). "La provisión de insolvencias de entidades de crédito. Presente, futuro y pasado". *Notas de Estabilidad Financiera*, 1, pp. 7-94. https://repositorio.bde.es/handle/123456789/11125

REA Auditores. (2021). "Auditoría de cuentas en España". Estudios, enero. https://economistas.es/Contenido/Consejo/Estudios%20y%20trabajos/Estudio_Auditoria_de_Cuentas_en_Espana_Enero_2021.pdf

Roldán, Santiago, José Luis García Delgado and Juan Muñoz. (1973). *La formación de la sociedad capitalista en España*. Confederación Española de Cajas de Ahorros.

Schenk, Catherine. (2014). "Summer in the City: Banking Failures of 1974 and the Development of International Banking Supervision". *The English Historical Review*, 129(540), pp. 1129-1156. https://www.jstor.org/stable/24474612

Sudrià, Carles. (2014). "Las crisis bancarias en España. Una perspectiva histórica". *Estudios de Economía Aplicada*, 32(2), pp. 473-486. https://www.redalyc.org/pdf/301/30130732001.pdf

Tortella, Gabriel. (2001). "El Banco Central en el período de entreguerras o cómo llevar a una empresa a la ruina". *Estudis d'Història Económica*, 17-18, pp. 241-272.

Tortella, Gabriel. (2015). *Mariano Rubio Jiménez*. Biografías de personajes financieros. Finanzas para Mortales y AEHE. https://finanzasparamortales.es/mariano-rubio-jimenez/

Tortella, Gabriel, and José Luis García Ruiz. (1999). *Una historia de los Bancos Central e Hispano Americano. Un siglo de gran banca en España*, mimeo.

Tortella, Gabriel, and Pablo Martín-Aceña. (1991). *La crisis bancaria en España, 1977-1985,* mimeo.

Tortella, Gabriel, and Jordi Palafox. (1984). "Banking and industry in Spain 1918-1936". *The Journal of European Economic History*, 13(2), pp. 81-111.

White, Eugene. (2009). "Lessons from the History of Bank Examination and Supervision in the United States, 1863-2008". In Gigliobianco Alfredo and Gianni Toniolo (eds.). *Financial Markets Regulation in the Wake of Financial Crises. The Historical Experience*. Banca d'Italia Eurosistema, pp. 15-44. https://ssrn.com/abstract=2101709

Wood, Duncan. (2005). *Governing Global Banking. The Basel Committee and the Politics of Financial Globalisation*. Ashgate.

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# FIFTH CONFERENCE ON FINANCIAL STABILITY ORGANISED BY THE BANCO DE ESPAÑA AND CEMFI

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## FIFTH CONFERENCE ON FINANCIAL STABILITY ORGANISED BY THE BANCO DE ESPAÑA AND CEMFI

On 12 and 13 June 2025, the Fifth Conference on Financial Stability was held, jointly organised by the Banco de España and the Centre for Monetary and Financial Studies (CEMFI). The biennial conference aims to promote research and discussion on issues related to risks to the stability of the financial system and macroprudential policy.

This year, the event featured a keynote address by Klaas Knot, outgoing President of De Nederlandsche Bank and outgoing Chair of the Financial Stability Board (FSB). He reviewed the FSB's main areas of work and the challenges of the current environment. Before an audience of around 100 at the Banco de España's headquarters, President Knot opened the conference with his final speech as Chair, following the decision at the FSB Plenary meeting in Madrid the previous day to confirm his succession by Andrew Bailey, Governor of the Bank of England, effective from 1 July.

A discussion followed between José Luis Escrivá, Governor of the Banco de España, and Klaas Knot, moderated by Montserrat Martínez Parera, adviser to the Governor and former Vice President of the Spanish National Securities Market Commission. The discussion covered current issues, such as recent regulatory simplification efforts, regulatory arbitrage between sectors of the financial system, challenges associated with macroprudential borrower-based measures, methodological developments in bank stress tests, stablecoins and the potential of artificial intelligence.


Discussion between Governor Escrivá (left) and President Knot (right). Madrid, 12 June 2025.

A highlight of the conference was the speech by Thomas Philippon, a professor at New York University, on the theoretical basis of risk management from a macroprudential perspective and the optimal design of bank stress tests.

During the two-day conference, twelve research papers were presented by economists from central banks and academia (selected by a scientific committee from over 140 submissions received in response to the call for papers). The topics addressed included the implementation of the countercyclical capital buffer (CCyB), synthetic risk transfer, the supervision of non-performing loans (NPLs), the cost of climate risk in credit and the implications of alternative designs of contingent convertible bonds.

The conference concluded with a panel of international experts discussing housing market risks and the macroprudential policy tools available to mitigate them, paying particular attention to the case of Spain within the European and global contexts.

The event was conducted entirely in English and streamed live on the Banco de España's YouTube channel. Conference documents are available via the links provided below. The names of the presenters for each session or section of the programme appear in italics.

12 June 2025
Opening address, keynote speech and colloquium

Klaas Knot, De Nederlandsche Bank and Financial Stability Board
José Luis Escrivá, Banco de España

Moderator: Montserrat Martínez Parera, Banco de España

**Session 1.** Interest rate risk
Moderator: Rafael Repullo, CEMFI

*Interest rate risk, deposit rates, and financial stability*
Puriya Abbassi, Deutsche Bundesbank
*Rainer Haselmann,* Goethe-Universität Frankfurt
Iliriana Shala, Deutsche Bundesbank
Discussant: José Luis Peydró, LUISS and EIEF

*Banks' maturity choices and the transmission of interest rate risk*
*Paolo Varraso,* Tor Vergata University of Rome
Discussant: *Rustam Jamilov,* University of Oxford

**Session 2.** Bank heterogeneity and monetary policy transmission
Moderator: Luis Servén, CEMFI

*The heterogeneous bank lending channel of monetary policy*
Jorge Abad, Banco de España
Saki Bigio, University of California, Los Angeles
Salomón García-Villegas, Banco de España
*Joël Marbet,* Banco de España
Galo Nuño, Banco de España
Discussant: *Federico Puglisi,* Banca d'Italia

*(Unobserved) Heterogeneity in the bank lending channel: accounting for bank-firm interactions and specialization*
Bryan Gutierrez, University of Minnesota
*Alonso Villacorta,* University of California, Santa Cruz
Lucciano Villacorta, Banco Central de Chile
Discussant: *Víctor Sancibrián,* CEMFI

**Session 3. Climate risk and banking**
Moderator: Eva Ortega, Banco de España

*Business as usual: bank net zero commitments, lending, and engagement*
*David Marqués-Ibáñez,* European Central Bank
Parinitha Sastry, Columbia Business School
Emil Verner, MIT Sloan School of Management
Discussant: *Omar Rachedi,* Esade

*Climate risk, bank lending and monetary policy*
Carlo Altavilla, European Central Bank
Miguel Boucinha, European Central Bank
Marco Pagano, University of Naples Federico II
*Andrea Polo,* LUISS and EIEF
Discussant: *Sergio Mayordomo*, Banco de España

**Session 4. Bank regulation**
Moderator: Jesús Saurina, Banco de España

*Simple implementable financial policy rules*
Mauricio Calani, Banco Central de Chile
*Javier Moreno,* Banco Central de Chile
Marco Piña, Banco Central de Chile
Discussant: *Manuel Muñoz,* Bank of England

*From losses to buffer – calibrating the positive neutral CCyB rate in the euro area*
*Giorgia de Nora,* European Central Bank
Ana Pereira, Bank of England
Mara Pirovano, European Central Bank

Florian Stammwitz, Frankfurt School of Finance & Management
Discussant: *Javier Mencía*, Banco de España

**Keynote speech: Stress testing: design and implementation**
Introduced by Galo Nuño, Banco de España
Speech by *Thomas Philippon,* New York University

**13 June 2025**

**Session 5. Bank lending**
Moderator: María Gutiérrez Urtiaga, Universidad Carlos III de Madrid

*Banks' specialization and private information*
*Alejandro Casado,* Banco de España
David Martínez-Miera, Universidad Carlos III de Madrid
Discussant: *Gianmarco Ruzzier,* Banco de España

*Bank supervision and NPL cleansing*
Soner Baskaya, University of Glasgow
José E. Gutiérrez, Banco de España
José María Serena, Banco de España
*Serafeim Tsoukas,* University of Glasgow
Discussant: *Daniel Paravisini,* London School of Economics

**Session 6. Bank liabilities**
Moderator: Montserrat Martínez Parera, Banco de España

*Synthetic, but how much risk transfer?*
*Alex Osberghaus,* Universität Zürich
Glenn Schepens, European Central Bank
Discussant: *Anatoli Segura,* Banca d'Italia

*Anything but equity? On banks' preference for hybrid debt*
*Tanja Brieden,* Vienna Graduate School of Finance
Discussant: Saleem Bahaj, University College London

**Panel: Housing risk and macroprudential policies**
Moderator: Javier Suarez, CEMFI

*Gaston Gelos,* Bank for International Settlements
*Deniz Igan,* International Monetary Fund
*Caterina Mendicino,* European Central Bank

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