



Financial Stability Note

No. 24, June 2023



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The Financial Stability Note is one of the CNMV's duties within the framework of its monitoring of financial stability conditions in the areas it supervises. In particular, the Note assesses the stress level of **domestic securities markets during the past half-year**, flags any changes in the level of the various financial risks and identifies the major sources of risk.

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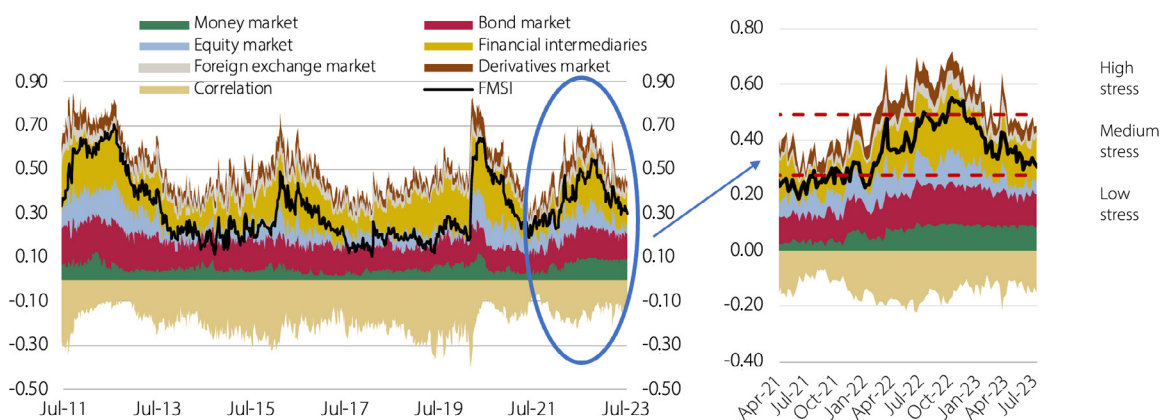
Layout: Cálamo y Cran

Summary

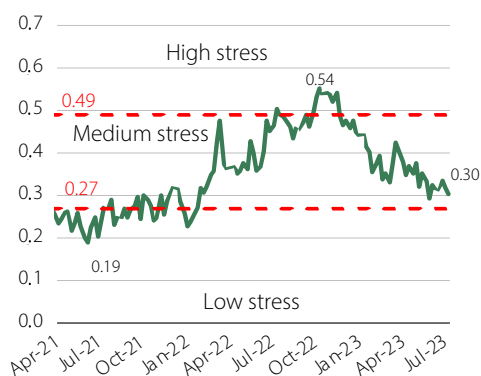
- ✓ **The stress indicator has shown a downward trend throughout the first half of the year, which was only temporarily interrupted in March due to the turbulence caused by the bankruptcy of several banks in the United States and one in Europe.** In particular, the total stress level of the Spanish financial markets decreased from 0.44 at the end of 2022 (medium-high risk) to 0.30 at the beginning of July¹ (medium-low risk), after rising to 0.42 in March. In general, the stress level of the most significant segments has progressively decreased, particularly so in the case of non-financial equities. The highest stress levels continue to be observed in the segments related to fixed income (money market and bonds, with 0.56 and 0.60 respectively), which are more affected by monetary policy decisions, as well as by changes in expectations regarding such decisions, and in financial intermediaries (0.53), reflecting a relatively low price level and a slight increase in risk premiums.

Spanish financial markets stress indicator

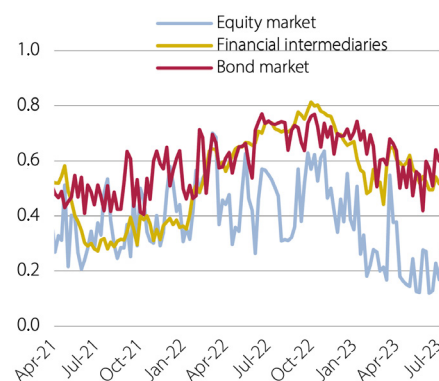
FIGURE 1



Total stress indicator



Indicators in the bond, financial intermediary and equity segments



Source: CNMV.

Para un For more details on the recent movements in this indicator and its components, see the statistical series of the CNMV (Market stress indicators), available at: <http://www.cnmv.es/Portal/Publicaciones/SeriesWeb/Inicio.aspx?codrama=1295>. For further information on the methodology of this indicator, see Cambón, M.I. and Estévez, L. (2016). "A Spanish Financial Market Stress Index (FMSI)". *Spanish Review of Financial Economics*, Vol. 14, No. 1, pp. 23-41 or as CNMV Working Paper No. 60 available at: http://www.cnmv.es/DocPortal/Publicaciones/MONOGRAFIAS/Monografia_60_en.pdf.

¹ The closing date of this note is 30 June, except for the stress indicator which stretches to 7 July and certain other specific data.

Sources of risk

Macroeconomic environment: dynamism of activity and moderation of inflation

- **After closing 2022 with interannual growth of 2.9% (5.5% on average in the four quarters), Spain's GDP started 2023 with a quarterly increase of 0.6% (4.2% interannual).** This advance was produced both by domestic demand, with a contribution to year-on-year GDP growth of 1.4 percentage points (pp), 0.3 pp higher than that of the previous quarter,² and foreign demand, which contributed 2.8 pp (0.9 pp more than in Q4 2022). Spain's growth continues above that of the main European economies,³ which, in aggregate terms, shows an average increase of 1% both in the Union as a whole and in the euro area (see Figure 21).

Forecasts for year-end 2023 have been revised upwards thanks to a better-than-expected performance at the beginning of the year and the positive evolution of commodity prices. In its latest economic projections, in June, the Bank of Spain estimates that Spanish GDP will grow by 2.3% in 2023 (0.7 pp more than its March estimate).⁴ These figures keep the growth rate of the Spanish economy above that of the euro area (0.9% according to the European Central Bank [ECB]). Forecasts for 2023, on the other hand, have been corrected slightly downwards (to 2.2%) in an environment marked by the phasing out of the measures applied as a result of the energy crisis.

- **Between March 2022 and March 2023, 368,000 jobs were created, representing growth of 1.8%. The positive path of the past two years continues, albeit at a slower rate.** The activity rate, for its part, has shown little change in recent months and stood at 58.6% at the end of the first quarter, while the number of unemployed increased throughout the quarter by 103,800 people, which generated a slight increase in the unemployment rate, to 13.3%. However, if the last 12 months are taken into account, unemployment has fallen by 0.4 pp.⁵

Social security affiliation data for May show a monthly increase of 36,800 in the number of affiliates, giving a figure of 20.72 million at the end of the month. So far this year the increase in the number of contributors has been almost 556,000, so the positive trend of the past two years continues. The Bank of Spain's forecasts for the end of 2023 indicate that the unemployment rate will stand at 12.2%, meaning that the slightly negative trend of the last three quarters will reverse.

- **The forward inflation rate stood at 1.9% year-on-year in June, 2.3 pp less than in May and more than 8 pp below what it was one year before.** The sharp slowdown in the rate of price increases that has been taking place is confirmed, with some ups and downs, since July of last year. The core inflation rate,⁶ after peaking at 7.6% in February this year, has also moderated, but much less markedly. It closed June at 5.9%, 0.2 pp below the May rate. Within the components of the core rate, processed foods continued to present the highest annual variation, although it moderated to 12.9% in May (19.2% in December). The prices

² This increase came essentially from investment, which increased by 0.6% year-on-year as against a decrease of 5.0% in Q4 2022. In contrast, growth of final consumption, while continuing to grow more than investment, fell from 2.9% to 1.6%.

³ For example, in Germany and France growth rates were -0.3% and +0.2% respectively in the first quarter of the year, whereas the euro area average stood at -0.1%. In year-on-year terms, the growth of these three economies was -0.5%, +0.9% and +1.0% respectively.

⁴ BBVA estimates a similar rate (2.4%). These forecasts are higher than the rates published by the International Monetary Fund (IMF) and the European Commission (1.5% and 1.9% respectively), possibly because they are more recent and incorporate, for example, the GDP data for the first quarter.

⁵ This reduction in the year-on-year unemployment rate is solely a consequence of the good performance in the second quarter of 2022, since in subsequent quarters unemployment increased, albeit slightly, from 12.5% to the mentioned 13.3%

⁶ This is calculated by excluding the most volatile elements from the general index, specifically energy and fresh produce.

of non-energy industrial goods and services, for their part, grew by 4.2%. **The inflation differential between Spain and the euro area as a whole continued in broadly negative territory (-3.2 pp in May).**

- **The information available on public sector finances for the month of April continues to show a notable contraction in the public deficit, thanks to the economic recovery,** which has translated into a greater increase in non-financial income⁷ than in expenditure. The consolidated public administration⁸ deficit stood at 0.3% of GDP in the first four months of the year, below the figure of 0.67% for the same period of 2022.⁹ Meanwhile, the level of public debt continued to fall in the first quarter of the year to reach 113% of GDP, 4.4 pp below the closing figure for March 2022. The Bank of Spain forecasts place the public deficit at 3.8% of GDP for the year as a whole, while the IMF puts it at 4.5%. For its part, public debt would be around 110% of GDP.
- **Data from the Financial Accounts for the first quarter of 2023 show a slight increase in the household savings rate, after the continuous decline since 2021.** This stood at 7.6% of disposable income (cumulative data for four quarters) compared with 7.2% at the end of 2022,¹⁰ still well below the levels of the euro area (14%). The net acquisition of financial assets fell from 3.1% of GDP in 2022 to 2.3% in March (cumulative data for 4 quarters)¹¹ and a change in pattern that was already beginning to appear in 2022 was consolidated: disinvestment in means of payment (cash and demand deposits), with resource outflows of more than €28 billion (8.1% of GDP) and investment in time deposits and fixed-income securities (€15.7 billion and 4.5% of GDP). Investment funds also experienced significant inflows of resources, more than €12.5 billion.

The data available on Spanish investment funds in the first quarter of the year show a continuation of the pattern observed in 2022, with high inflows of resources in the most conservative types of investment and redemptions in those considered riskier. The attractiveness of the increase in interest rates has meant that fixed-income funds have received the largest volume of investments (€9 billion).¹² Guaranteed fixed income funds have also experienced net inflows, albeit much less (€1.1 billion). In contrast, global funds, which had attracted heavy investment in 2021 and the first half of 2022, have since experienced net redemptions. In the first quarter, net reimbursements in this category were €1.1 billion and those of equity funds (euro and international) €865 million.

Thanks to the high subscription rate and the good performance of the investment portfolio, investment funds' assets increased by 5.6% in the first quarter. Net subscriptions exceeded €9.5 billion, while the revaluation of portfolio assets reached almost €8 billion. Thus, at the end of March the assets of the funds stood just below €329 billion, €17.4 billion more than at the end of 2022 and €12.8 billion more than one year before. **Along the same lines, the assets of foreign collective investment schemes (CIS) marketed in Spain, which had contracted by 27% in 2022, recovered part of what had been lost in the first quarter,** with an increase of close to 5%, to €211 billion.

⁷ Income with the biggest increases was from Corporation Tax (17.4%) and Personal Income Tax (7.5%).

⁸ Excluding local authorities and aid to financial institutions.

⁹ The decrease was due to the improvement in the central administration (0.0% of GDP compared to -0.43% the previous year) and, to a lesser extent, in social security funds (-0.06% compared to -0.12%), while in the autonomous regions there was a deterioration (from -0.12% to -0.24%).

¹⁰ Although household consumption increased by 7.4% (due to the effect of inflation), gross disposable income increased by more, specifically, 10.1% (7.8% wages).

¹¹ The rise in interest rates has led to a drop in household liabilities. Thus, the level of household debt fell in just one quarter from 53% of GDP to 51.1%.

¹² In the last four quarters, net subscriptions have exceeded €20 billion.

Interest rates context: interest rate rises continue, but their number and intensity moderate

- **The ECB and the Bank of England are leading the process of raising interest rates this year.** After starting the year with rates at 2.5%,¹³ the ECB decided on four new additional rate hikes, bringing rates to 4%¹⁴ at its meeting at the end of June,¹⁵ very close to historical maximums.¹⁶ Although inflation has moderated, the ECB points out that inflationary expectations indicate that it will remain high for a long time¹⁷ and therefore it does not rule out further rate increases to ensure that inflation returns to its target of 2% in the medium term.¹⁸ In addition, the ECB will speed up its monetary policy normalisation process by ceasing, from July 2023, to reinvest the amount of the maturities of the securities acquired within the framework of its asset purchase programme (APP).¹⁹ In this context, the market consensus suggests that the ECB could carry out up to two more rate hikes in 2023.

For its part, the Bank of England, which was one of the first central banks to begin the process of tightening monetary policy,²⁰ has decided on a cumulative increase in rates similar to that of the ECB in the first part of 2023,²¹ with the rate reaching 5% in June, its highest level since 2008.

- **The Federal Reserve, which had shown a very significant tightening in the tone of its monetary policy in 2022, has moderated the pace of its increases in the first half of 2023.** The Fed led rate increases in 2022 but has slowed down the rate and amount of its increases in 2023, in which so far there have been three increases of 25 bp,²² bringing rates to the 5%-5.25%²³ range in June, their highest level since 2007.

The Federal Reserve officials themselves, as well as the market consensus, reiterate that inflation continues to be high, so at least two additional rate hikes could take place before the end of the year for an amount of 50 bp and, in addition, they rule out rate cuts until 2024.

- **In this context, interest rate risk has become somewhat less important, both due to its impact on the adjustment of the prices of debt assets and the promotion of strategies aimed at preserving the value of money in the face of the threat of inflation.** The rises in interest rates, which caused significant valuation losses in fixed-income asset portfolios during the year 2022 and even in the first half of 2023, should in principle have a much more limited impact in the remainder of the year. The greatest risk could be concentrated in those assets with the worst credit rating, in the event of a possible deterioration in the economic situation. Likewise, the risk of loss of value of liquidity positions and risk-free assets is offset by the increase in the remuneration of the latter, thereby reducing the incentives of investors

¹³ The ECB applied an initial hike of 50 bp in July 2022 and two subsequent hikes of 75 bp in September and October, as well as a final hike of 50 bp in December, which placed rates at 2.5%, their highest level since 2008.

¹⁴ The credit and the deposit facilities increased to 4.25% and 3.5% respectively.

¹⁵ The ECB raised rates by 50 bp in February and March, and by 25 bp in May.

¹⁶ ECB rates reached their all-time high in the euro era in 2000, when they stood at 4.25% and 4.75% at a fixed and floating rate, respectively.

¹⁷ Those responsible for the ECB point out that inflationary pressures could be coming from the labour market, the growth of wages and the services sector.

¹⁸ The ECB recalled at the end of June that future decisions by the Governing Council of the ECB will ensure that policy rates are set at sufficiently restrictive levels to bring inflation back to the 2% medium-term objective soon, and that these levels are maintained for as long as necessary.

¹⁹ In the case of the PEPP (Pandemic Emergency Purchase Programme), the ECB plans to reinvest the principal of the securities acquired within the framework of this programme at least until the end of 2024.

²⁰ The first rise in interest rates of the current cycle dates back to December 2021.

²¹ The Bank of England raised rates by 50 bp in February, 25 bp in both March and May, and another 50 bp in June.

²² In February, March and May.

²³ The Federal Reserve has made 10 consecutive rate hikes since March 2022.

to invest in assets with higher return expectations and, therefore, higher risk levels.²⁴ Apart from this, although the rise in rates favours the improvement of margins in the financial sector, in the medium term it could accentuate some vulnerabilities related to the possible increase in delinquency of those agents that are financially more vulnerable and have a higher level of indebtedness.

Crypto-assets and cyber risk

- **In the field of crypto-assets, which covers a variety of segments such as unbacked crypto-assets, decentralised finance (DeFi) and stablecoins, increasing risks are observed in relation to market integrity, investor protection and financial stability.** These risks originate from the very nature of these assets (absence of intrinsic value and high levels of volatility) and from the possible uses that can be made of them (for example, for illegal activities), all within a framework of practically non-existent regulation and scarce reliable and homogeneous data with which to assess the risks. In the field of consumer protection, surveys reveal that the penetration of these products among retail investors is relatively low (around 10% in the EU²⁵ and 7% in Spain),²⁶ but increasing since 2020, so these investors should be made fully aware of the risks of these products. To this end, it is worth noting the warnings that different European and Spanish financial authorities have issued over the last few years.²⁷
- **The risks posed by crypto-assets to financial stability, which derive mainly from the size of these activities and the degree of interconnection with the traditional financial system, continue to be relatively low, but they are elements of concern,** in view of the rapidity with which these activities are expanding, their complexity and the increase in interrelationships with the rest of the system.²⁸ The fact that the degree of interconnection, although increasing, is relatively low has been observed as the reason for the little or no impact that various negative events occurring in the field of crypto-assets in recent months have had on the traditional financial system. Events that particularly stand out are the significant loss of value of the best-known crypto-assets such as bitcoins or Ether in 2022 (they lost more than 60%),²⁹ the collapse of Terra – a crypto-asset that claimed to be stable against the dollar without having dollar reserves –, the lack of liquidity of the Celsius loan protocol and, mainly, the bankruptcy of the FTX crypto-asset trading platform, which did not have the balance of crypto-assets acquired by its clients
- **These events highlight the risks of providing services on crypto-assets without the existence of a solid regulatory framework. In Europe, the Regulation on crypto-asset markets, known as MiCA, published in the *Official Journal of the European Union* at the beginning of June,³⁰ regulates the issue, offer and negotiation of crypto-assets, as well as the provision of services on them and the rules relating to the prevention of market abuse. In Spain, as indicated in previous editions of this note, last year an important**

²⁴ These types of assets are typically associated with high levels of volatility (equities, emerging market or crypto-currencies) and credit risk (they have worse credit ratings – subordinated and high-yield debt), and are less liquid (subordinated and high-yield debt, private equity and real estate funds).

²⁵ ECB's Consumer Expectation Survey (CES).

²⁶ <https://www.cnmv.es/portal/verDoc.axd?t=%7B714e1e4c-b334-4252-b1f5-677cf438bcb5%7D>

²⁷ In March 2022, the European authorities for the supervision of the financial system (EBA, ESMA and EIOPA), published a warning regarding the risks that crypto-assets pose to consumers in the EU. This warning was in turn endorsed in a joint statement by the Bank of Spain, the DGSFP and the CNMV (see the press release of 17 March 2022). Available at: https://www.bde.es/f/webbde/GAP/Secciones/SalaPrensa/NotasInformativas/22/presbe2022_19en.pdf

²⁸ Decrypting financial stability risks in crypto-asset markets"; *Crypto assets and financial stability* (ESMA 50-165-2251).

²⁹ In the first half of the year, the price of these two cryptocurrencies has partially recovered and the losses accumulated since December 2021 have been reduced to 38% in the case of bitcoins and 45% in that of Ether.

³⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1114&qid=1689575243199>

step was taken in terms of protecting investors in crypto-assets, by regulating advertising that promotes investment in these.³¹ This regulatory initiative will be complementary to MiCA, when it is applicable, since the Regulation does not specifically address this matter. The circular establishes the rules, principles and criteria to which advertising of crypto-assets as an investment must be subject, not in any case regulating their issue or the provision of services in this area. Pursuant to this circular, in 2022 the CNMV managed 116 information files and analysed 957 advertisements. In most cases, administrative actions were discontinued, mainly after the entities corrected the problems detected in the advertisements.

- **Cyberattacks continue to increase in frequency and severity on a global scale.**³² The latest available data reveal that in 2022 the number of attacks grew by 45% worldwide, exceeding the highs that had been reached in 2020 in the context of the pandemic, when a substantial part of activities had to be carried out remotely.³³ In general, the progress of global digitisation and economic and political instability increase the probability of this risk. The sectors most frequently affected by cyberattacks have changed since the pandemic, since then they were the companies most sensitive to the development of said pandemic (technology and health), while more attacks are currently observed in public administration and in financial and manufacturing companies. Although it is difficult to know precisely the costs associated with these attacks, since in many cases they are not made public (for reputational reasons) or are difficult to quantify, there is no doubt that these incidents can create a systemic risk if a critical entity is affected by a cyberattack, if there are multiple attacks on non-systemic but highly interrelated entities, or if trust in the financial system is undermined.
- **Carrying out an adequate management of this risk requires making significant investments, as well as achieving a high degree of coordination between the different sectors and authorities to try to reduce and prevent the possible systemic consequences of a cyber incident.** In the international arena, important works on cyber-resilience are observed in the G7³⁴ and in the Financial Stability Board (FSB).³⁵ In the EU, in 2022 the European Systemic Risk Board (ESRB) issued a recommendation for the establishment of a pan-European systemic cyber incident coordination framework (EU-SCICF), with the main objective of strengthening coordination among the various financial authorities in the EU as well as with other authorities in the EU and major international players. At the regulatory level, it is worth noting the Regulation known as DORA,³⁶ which was approved on 14 December 2022 and will come into force in January 2025. This Regulation establishes a transversal cybersecurity framework throughout the financial sector and covers both market infrastructures and entities that offer services in the securities markets as well as the banking and insurance sectors. The CNMV would be the authority responsible for its application in the field of financial institutions that are under its supervision. It is important to highlight that mechanisms for the application of the principle of proportionality have been established.

³¹ CNMV Circular 1/2022, of 10 January on advertising of crypto-assets for investment purposes.

³² See ECB publication "Towards a framework for assessing systemic cyber risk" and statistical information from the University of Maryland, CISSM Cyber Attacks Database, which collects information on publicised cyberattacks on a global scale.

³³ ECB (2023). *Financial Stability Review*, May.

³⁴ Work carried out by the G7 Cyber Expert Group, the last one on ransomware and third party risk.

³⁵ For example, the preparation and updating of a dictionary with common definitions and taxonomy around the cyber field in order to promote resilience and greater convergence in the reporting of this type of incident. <https://www.fsb.org/2023/04/cyber-lexicon-updated-in-2023/>

³⁶ Regulation (EU) 2022/2554 of the European Parliament and of the Council of 14 December 2022 on digital operational resilience for the financial sector.

- **In Spain, it should be remembered that the CNMV promotes the TIBER-ES³⁷ framework, in which it participates together with the Bank of Spain and the General Directorate of Insurance and Pension Funds (DGSFP), as a tool to achieve greater technological resilience of financial institutions.** In February 2022, the three supervisors held an informative session with the sector, in which they explained the importance of having implemented the European framework TIBER-EU in Spain, where it is now called TIBER-ES. Likewise, the operating guidelines for this advanced testing framework were published and financial institutions with greater maturity in this area were invited to assess the possibility of submitting to them. The three authorities mentioned make up the TIBER Cyber Team (TCT), the body that governs TIBER-ES and validates that the tests are carried out following this framework, which is applicable on a voluntary basis to all financial entities, including market infrastructures. These tests have the advantage of being recognised in all EU countries that have implemented TIBER-EU. The DORA Regulation will require the most significant financial institutions to carry out advanced tests, similar to TIBER-EU, on a regular basis.

Risk related to climate change

- **Economic agents are attaching increasing importance to ESG³⁸ aspects in their financial decisions. The set of financial assets with ESG characteristics continues to expand both internationally and nationally, with an increasing number of bond issuers and CIS declaring that they comply with certain sustainability standards.** In the case of Spain, the number of sustainable CIS³⁹ continues to increase, so that by the end of May a total of 333 CIS of this type had been registered⁴⁰ (325 investment funds, 6 variable capital investment companies [SICAVs] and 2 hedge funds), of which 315 were covered to Article 8 of the SFDR Regulation and 18 to Article 9 thereof. The volume of the assets held by these institutions, in excess of €118 billion, represented nearly 34% of the total assets of Spanish CISs.
- **The most significant risks identified for financial stability continue to be related to difficulties in correctly evaluating the risk map associated with climate change.⁴¹** In this matter, it should be noted that the CNMV has recently produced two working papers within the scope of the entities included in its supervisory perimeter: one on securities issuing entities and another on investment funds. The objective of the former⁴² is to make an initial estimate of the amount of greenhouse gas emissions from these companies and it also carries out a first exercise on the degree of alignment of their emission reduction goals with the objectives set out in the Paris Agreement and in the EU. The second paper⁴³ proposes a global methodology to measure the impact of the ecological transition on investment fund portfolios.
- **Finally, it is necessary to comment that one of the most important risks identified in terms of sustainability is related to the possible existence of greenwashing⁴⁴ in some**

³⁷ Threat Intelligence Based Ethical Red-Teaming.

³⁸ In accordance with environmental, social and corporate governance criteria.

³⁹ CISs covered by Articles 8 and 9 of the European Sustainable Finance Disclosure Regulation (SFDR).

⁴⁰ Corresponding to a total of 348 sub-funds.

⁴¹ The pricing mechanism for carbon emissions does not allow a correct assessment of the negative externalities associated with the climate, in the absence of complete information on this risk.

⁴² Losada, R. and Martínez, A. (2022). *Spanish securities issuers and their relationship with climate change*. CNMV, Working Paper No. 82.

⁴³ Crisóstomo, R. (2022). *Measuring transition risk in investment funds*. CNMV, Working Document, No. 81.

⁴⁴ Greenwashing refers to a set of mechanisms whereby companies try to make their products or activities appear sustainable when in fact they are not, with the aim of attracting the interest of potential investors or clients.

products, which, in part, may be encouraged by excess demand for these assets. Thus, one of the most important focuses of regulators and supervisors in their investor protection function is oriented towards work that tries to prevent this type of phenomenon, as well as any other that may affect investor confidence and, consequently, the credibility of markets and companies.

In this group of analyses, the CNMV has made a first approximation of the phenomenon known as “greenium”, whereby it is argued that bonds with ESG characteristics may present a lower yield (or a higher price) than equivalent conventional bonds. This phenomenon is usually explained in terms of the value that investors place not only on the profitability and risk of an asset, but also on its ESG characteristics. The analysis carried out (included in this publication) on a set of bond issues by Spanish issuers between 2017 and June 2022 finds evidence of greenium in the primary market for those green bonds that have a third-party rating (CBI, Climate Bond Initiative). In contrast, no evidence is found in the secondary market data.

Other sources of uncertainty: geopolitical uncertainties at high levels and increase of other uncertainties

- **Geopolitical uncertainties remain at very high levels and are significant from the point of view of financial stability** because, among other things, they can give rise to episodes of market volatility, price falls and negative contagion spirals between assets or markets. In relation to the war between Russia and Ukraine, there is still very high uncertainty about its duration, which at a European level has significant implications in several areas, among which energy (for example, the possibility of gas restrictions) and non-energy commodities (for example, decrease in grain supply from Ukraine). In both cases, possible supply restrictions could lead to further price increases and give rise to increased financial risks.
- **One of the most important sources of uncertainty that has emerged during the first half of the year is related to the banking sector.** First of all, there was the resolution of Silicon Valley Bank (SVB) and Signature Bank (SB) and, later, we heard of the problems of First Republic (which was finally acquired by JP Morgan), all of them based in the US. In mid-March, the price of the European bank Credit Suisse collapsed. The bank was finally acquired by UBS, after the intervention of the Swiss authorities, which supported the acquisition. Finally, mistrust also occasionally affected Deutsche Bank. These events gave rise to turbulence in the international financial markets, with significant drops in prices, especially in the banking sector, and spikes in volatility. Bank sectoral indices came to present considerable declines (between 14% and 25%) in a few days. These collapses or incidents of mistrust had different origins. On the one hand, in the United States they were mainly related to the materialisation of interest rate risk in their fixed income portfolios. The regulatory relaxation of non-systemic banks and deficiencies in the management of the institutions, as well as in the supervision itself, also seem to have played a significant role.

The response of the various supervisory and regulatory authorities to the first signs of weakness was quick and determined, although not exempt from criticism due to the nature and depth of some of the measures, and managed to limit the scope of the crisis, which was at levels far removed from those of other previous banking crises. Although analyses are being carried out in different international forums in order to reflect on the advisability of reviewing banking regulations on a global scale, the fact of the matter is that these situations

have left a residue of mistrust among agents and could give rise to new episodes of turbulence if vulnerabilities in other entities should become known.

- **The uncertainty related to the difficulties in approving a new debt ceiling in the United States highlights the importance of these types of issues for financial stability.** Although an agreement was finally reached on this matter, it is worth mentioning the significance of episodes of this nature, which for several weeks were a cause of great concern for market participants. This was comparable to the turbulence that occurred in the financial markets in 2011 as a result of an episode similar to this.⁴⁵
- **A final element of political uncertainty, on a national scale, is related to the various electoral processes scheduled between May and July of this year.** Previous articles have highlighted the high degree of parliamentary fragmentation as a source of uncertainty when adopting some decisions and also the lack of definition related to the effective execution of the projects financed with the funds allocated to Spain within the framework of the Next Generation EU programme.

⁴⁵ See ECB (2023). *Financial Stability Review*, May.

Risk categories

Market risk: orange

- **The international equity markets, which had mostly ended 2022 with losses, started the year with gains, which lasted for most of the half-year despite the uncertainties that arose around the banking sector- after the bankruptcies and bailouts of some financial institutions⁴⁶ in both the United States and Europe.** Most of the indices performed positively in the first and second quarters, so that in some European markets the first half closed in the area of historical maximums.⁴⁷

Even though the major central banks continued to tighten their monetary policy (see interest rate context), the prospect that interest rate rises will be less intense, that inflation is showing signs of a decline and that the economy, in general, is holding up better than expected a few months ago may have led investors to increase their risk positions in assets such as equities.

- **All relevant international indices showed significant gains in the first quarter,⁴⁸ which extended and, in some cases, expanded strongly in the second,⁴⁹ which made it possible to recover all or a large part of last year's accumulated losses.⁵⁰** The most homogeneous behaviour was for the markets of the euro area,⁵¹ while the most disparate was seen in the US markets, which suffered from the problems in the financial sector, but which also reflected the favourable effects of the recovery in the technology sector. The substantial revaluation of the Japanese markets⁵² also stood out.

The US indices presented advances in the half-year that ranged from 3.8% for the Dow Jones and 31.7% for the Nasdaq,⁵³ which allowed them to recover a large part of the losses accumulated in 2022. The Dow Jones, with the greatest weight among the companies of the traditional economy (banks and industry), suffered from the problems of the financial sector, while the Nasdaq⁵⁴ benefited from the recovery of the technology sector, led by the development of artificial intelligence. The semi-annual advances in the main European securities markets⁵⁵ were more homogeneous, with gains ranging between 14.3% for the French benchmark and 19.1% for the Italian index. Among the best-performing sectors were consumer goods, automotive, technology and banking, this last named continuing to benefit from rising rates.

⁴⁶ See the heading "Other sources of uncertainty".

⁴⁷ The German Dax 30 index and the French Cac 40 ended the half-year at historical highs, while the Eurostoxx 50 did so at its highest level since 2007.

⁴⁸ The US indices accumulated advances ranging from 0.4% for the Dow Jones to 16.8% for the Nasdaq, while in the case of the European indices, revaluations in the same period ranged between 12.2% for Spain's Ibex 35 and 14.4% for Italy's FTSE Mib. The Eurostoxx 50, the Dax 30 and the Cac 40 advanced by 13.7%, 12.2% and 13.1% respectively.

⁴⁹ In the second quarter, the US indices advanced by between 3.4% for the Dow Jones and 12.8% for the Nasdaq, while gains of indices in the euro area ranged between 1.1% for the French Cac 40 and 4.1% for the Italian FTSE Mib. The Eurostoxx 50 advanced by 1.9%, while the Dax 30 and the Ibex 35 did so by 3.3% and 3.9% respectively.

⁵⁰ All the major European indices recovered the losses accumulated in 2022 and the US indices also did so to a large extent.

⁵¹ With the exception of the British FTSE 100, which posted increases of 2.4% in the first quarter and falls of 1.3% in the second.

⁵² The Japanese Nikkei 225 and Topix indices appreciated by 27.2% and 21% respectively in the first half of the year.

⁵³ The broader S&P 500 index rose 15.9% in the first half. The S&P 500 index is the most representative of the US economy and includes all sectors, from technology to manufacturing. The weight of technology companies in this index represents more than 28% of its capitalisation, compared with 26% at the end of 2022. Of the top 10 companies by weighting in this index, eight are technology stocks, accounting for more than 27% of the total.

⁵⁴ The Nasdaq index fell by 33.1% in 2022 after three consecutive years of significant increases.

⁵⁵ In the euro area, advances ranged from 14.3% for the French Cac 40 to 19.1% for the Italian FTSE Mib. The Eurostoxx 50 and the German Dax 30 appreciated by 16%, which increased to 16.6% in the case of the Spanish Ibex 35. Outside the euro area, the UK FTSE 100 rose by 1.1%.

- **In Spain, the Ibex 35 rose by 16.6%⁵⁶ in the first six months of the year, in line with the best performing indices in the euro area, reaching its highest value since January 2020.** Even so, it has still not closed the profitability gap that opened up relative to the other European indices in recent years. Apart from this and despite the significant advance in share prices, the good performance of corporate profits meant that the price-earnings ratio (PER) remained almost unchanged, going from 10.8 in mid-December to 11⁵⁷ in June – its historical average is 13.5 – (see Figure 4).
- **Most sectors presented positive trends in the first half-year, with the best performance corresponding to leisure, tourism and hospitality companies, which benefited from the good performance of the sector.** Advances in the consumer goods and services sectors, technology⁵⁸ and banks were also notable. On the other hand, the largest falls (between 5% and 10%) were concentrated in oil companies, which suffered from the fall in oil prices, as well as in renewable energy companies and listed real estate investment companies (SOCIMIs), which were affected by the increase in the cost of financing their expansion plans (the former) and the adjustments in their valuation (the latter).
- **The international debt markets showed a dual behaviour based on the terms of the curve, with stability in debt yields in the medium and long term, which had already largely anticipated the tightening of monetary policy, and significant increases in the short sections of the curve as interest rate rises materialised.** In Spain, interest rates on short-term debt intensified their increases during the first half of the year, reaching values close to or higher than 3.5%⁵⁹ depending on the term, so that the curve has become practically flat, given that the medium and long-term rates also fluctuate around this same level. The yields of the public debt of all the European economies⁶⁰ followed a similar trend, with significant increases in the shorter terms and stability and even some downward bias in the longer terms. At the end of June, only the 10-year debt yield presented values below 2.5% in Germany (2.39%), while in the Netherlands, Ireland, France and Finland it was below 3%. In Belgium, Austria and Portugal this yield reached values slightly above 3%, in Spain it was close to 3.5%, in Greece 3.75% and in Italy it was slightly above 4%.
- **Corporate debt yields also increased in all sections of the curve, although in this case the intensity of the increases was homogeneous and more significant in its medium and long tranches, which had benefited most from the ECB's purchases.** This type of asset shows a greater dispersion of its yields,⁶¹ but there is an increase in spreads in all terms on public debt, which could increase in the coming months depending on ratings and the degree of subordination. The normalisation of interest rates is reversing the phenomenon known as the search for yield of the last few years, whereby many assets with high credit risk presented increases in their prices and falls in yield due to strong demand.
- **Market risk on debt assets has moderated from previous quarters as the tightening of monetary policy is largely complete, so further interest rate increases would have a more limited impact.** Even so, this risk remains significant for high yield corporate debt, with the worst credit rating, and subordinated debt, since their credit risk premiums tend to

⁵⁶ The Ibex 35 advanced 12.2% in the first quarter, moderating to 3.9% in the second.

⁵⁷ In the same period, the PER of the US S&P 500 stock index increased to 19 times, while that of the Eurostoxx 50 increased to 12 times.

⁵⁸ The consumer goods sector benefited from the strong revaluation of Inditex, while the advances in the technology sector originated in Amadeus, whose business is linked to the tourism sector.

⁵⁹ The yields of the Spanish debt curve presented yields in excess of 3.5% from the 6-month term onward. In the primary market, the last treasury bill auctions of 9 (mid-June 3 and 9 months, early July 6 and 12 months) showed an average yield of 3.255%, 3.599%, 3.462% and 3.775% in the 3-, 6-, 9- and 12-month terms respectively.

⁶⁰ In the case of the United States, 10-year rates remained below 4% in the half-year.

⁶¹ Corporate debt yields present greater dispersion depending on the type of asset (senior or subordinated debt), the credit rating and whether or not the debt is eligible for purchase by the ECB.

increase even more in a context of rising rates and their liquidity is usually low, a circumstance that is further aggravated during episodes of market volatility. Likewise, those companies with a weaker financial structure and greater leverage – a vulnerability that will have increased in many of them during the pandemic – could be more affected by rate increases in a scenario of economic slowdown. A similar situation could occur, in general, for all those agents that are most indebted, including the most vulnerable economies, with higher levels of debt and significant fiscal imbalances, since the increase in interest rates has given rise to a significant increase in debt service and has substantially hardened the conditions for access to new financing.

Based on the foregoing, the potential effects of the foreseeable increase in risk premiums demanded by the market in an adverse scenario for prices and valuations of certain assets bear repeating. This is particularly relevant in the case of certain fund portfolios, especially fixed income funds, which are sometimes exposed to assets that are illiquid,⁶² complex and have credit ratings below investment grade.

Credit risk: green

- **Risk premiums in both the public and private sectors showed slight declines in the first half of the year.** Thus, the sovereign risk premium – measured as the difference between the yields of the 10-year public debt of Spain and Germany – has shown few changes in the half-year, with a slightly downward trend that leaves the indicator at 99 bp at the closing date of the note, below the 108 bp at which it started the year (see Figure 11).
- **The risk premiums of private sector entities fell somewhat more sharply, especially financial companies.** Despite the increase in the financing costs of companies, the better-than-expected performance of the economy and the solidity of corporate results allowed the average CDS of non-financial companies to fall to 61 bp, 20 bp less than at the beginning of the year. In the case of the CDS of financial institutions, their average fell by 13 bp in the half-year (to 77 bp), favoured by the improvement in their margins and the good behaviour of NPLs/delinquency.
- **The credit ratings of Spanish private issuers did not show significant changes in the first quarter of 2023, while the majority of Spanish debt continued to be of high quality.** In March, 89.7% of debt was investment grade, a slightly smaller percentage than in December June (90%), the credit quality of the financial sector debt being noticeably better than that of non-financial companies (91.4% of the total outstanding balance of the former is investment grade, while in the non-financial sector this proportion was 81.3%). In financial institutions, the percentage of high-quality debt fell slightly in the first quarter of the year (by 0.3 pp) as a result of the greater volumes of repayments within this group. Regarding non-financial companies, the proportion of high-quality debt remained practically constant, after having increased by almost 2 pp in the fourth quarter of 2022, thus interrupting the progressive deterioration that had occurred since the start of the pandemic.⁶³ In addition, several credit reclassifications were detected with respect to December, all of them asset-backed securities.⁶⁴

⁶² The abundant purchases of corporate debt and of some types of debt issued by financial institutions, both in the primary market and in the secondary, carried out by the ECB could have affected the liquidity of some issues, to which should be added the effect of episodes of volatility in the markets, which discourage market-making activity, especially in assets with relatively large spreads.

⁶³ Since the onset of the COVID-19 crisis, the proportion of investment grade debt went from 90% of the total balance in March 2020 to 79.6% in September 2022.

⁶⁴ A total of €277 million in asset-backed bonds moved from the high credit quality group to high yield, while €162 million moved in the opposite direction.

- **Financing to the non-financial sectors of the economy,⁶⁵ which had slowed noticeably in the latter part of 2022, turned negative in 2023, standing at -2.1% year-on-year in May.** This evolution is explained by the drop in financing to both non-financial corporations and households. Financing to non-financial corporations fell progressively throughout the half-year to present a negative rate of 2.7% in May, which is the biggest fall since 2015. This decline is explained both by financing via debt securities (-7.8%) and, to a lesser extent, via credit (-2.2%). For its part, financing to households also decreases (-1.4%), due, above all, to the fall in lending for home purchases (-2.3%). Consumer credit advanced by 3.5%, slightly below the 4% at the end of 2022.
- **The information available on the evolution of the credit ratings of Spanish issuers, as well as on other financial indicators, still does not show significant changes in the assessment of credit risk.** Even so, it is necessary to consider some circumstances that could cause qualitative changes in this regard in the coming months: i) the decrease in the amounts reinvested from the maturities of the debt purchases made by the ECB,⁶⁶ which could affect the size of the risk premiums of all issuers in the euro area, and ii) the possibility that a certain degree of fragmentation may reappear among the various issuers based on their credit ratings, which would particularly affect high yield issuers.

Also, as has been mentioned in previous editions of this note, it must be borne in mind that the ratings and risk premiums analysed mostly correspond to large or medium-sized companies, which have relatively great financial capacity with which to face a fall in business volumes. Thus, a scenario of deteriorating economic activity would have a greater impact on smaller companies such as SMEs, many of which have not yet fully recovered from the pandemic. For this reason, we do not rule out an increase in the credit risk in the coming months.⁶⁷

Liquidity, financing and fragmentation risk: green

- **Fixed income issues registered with the CNMV in the first half of 2023 came to €36.25 billion, 14.2% less than in the same period of 2022.** This decline had its origin, above all, in the fall in asset-backed security issues, which went from amounting to almost €16 billion in 2022 to just €6.6 billion in 2023. Issues of all types of fixed-income assets fell in the 6-month period, except for simple bonds (which, even so, barely accounted for 13% of the total issued). Admissions to trading of commercial paper reached €14.78 billion, 9% more than in the first half of last year.⁶⁸ Fixed income issues made by Spanish issuers abroad amounted to €47.12 billion (data to April), almost 45% more than in the same period of 2022, thanks to the growth of both medium and long-term issues (50%) and commercial paper (40.3%). This would be explained by the fact that both non-financial corporations and financial institutions have intensified their issuing activity given the prospect of financing continuing to become more expensive in the coming months and also, in the case of financial institutions, with a view to replacing the financing previously offered by the ECB on favourable terms.

⁶⁵ Source: *Statistical Bulletin* of the Bank of Spain.

⁶⁶ The ECB will stop reinvesting maturities of debt acquired under its APP debt purchase programme from July 2023, although it will maintain reinvestments of debt maturities carried out under the PEPP programme at least until 2024.

⁶⁷ Resident private credit non-performing loans stood at 3.55% in April.

⁶⁸ Issues of commercial paper benefited from the measures deriving from Law 5/2021, which exempts issuers from the obligation of preparing a prospectus for the issue of promissory notes with a maturity of less than one year, as well as others adopted by the CNMV to simplify and expedite the issue process.

- **The primary equity market continues to show little activity, with a cumulative amount of issues up to June of just over €1.53 billion (€2.21 billion in the same period of 2022).** So far in 2023, no IPO has taken place through public offerings for sale or securities subscriptions, but it is worth noting two listings, one of MFE MediaForEurope NV, for an amount of €941 million, and another by Ferrovial SE for an amount of €21 billion. In both cases the Spanish companies (Mediaset and Ferrovial) were delisted, merged by absorption with their parent companies in the Netherlands and Italy respectively, and subsequently listed in Spain. For the rest, the relatively low valuations of some companies, the uncertainty surrounding economic developments and the recent volatility in the banking sector, as well as the high levels of demand for information and market transparency seem to be continuing to have a negative effect on companies' interest in listing on the markets, in a context in which there are financing alternatives and competitive purchase offers, for example, those of private equity funds. Finally, it is worth noting the incorporation of five new companies (two growth companies and three SOCIMIs) to the BME Growth alternative market, which thus continues to grow, albeit at a somewhat slower rate.
- **The amount of green, social, sustainable or sustainability-related (ESG) issues by Spanish issuers grew by 3.5% YoY in the first half of the year, to reach €10.84 billion.** Of this, 29.5% was issued by non-financial companies,⁶⁹ 34.5% by financial institutions and the remaining 36% by public bodies and institutions.⁷⁰ Regarding the type of issues, although green bonds continue to account for the majority (50% of the volume issued), it continued to lose relative weight (58.4% in the first half of 2022) to the benefit of sustainable issues and, to a lesser extent, social ones, which together represent more than 44% of the total, compared to 17% one year ago.
- **Household deposits fell by 0.5% year-on-year in May, while those of non-financial companies decreased by 4.1%, to €979.7 billion and €298.9 billion respectively.** The decline has been more intense in the cumulative period of the year (over €43 billion). The reasons that would explain this fall would be the need to dispose of part of the balance of sight deposits to meet consumption and financing needs as a result of the increase in inflation⁷¹ and financial expenses, the early repayment of mortgage and other loans given their increased cost⁷² and the transfer of resources to investment funds⁷³ given the low remuneration of deposits. It is worth noting the relative recomposition observed between sight deposits (down) and term deposits (up), which try to benefit from a certain increase in the returns offered. This trend had already been observed in companies since the middle of last year – in households much more recently.
- **Consolidated household and corporate debt decreased to 121.1% of GDP in the first quarter of 2023,⁷⁴ to a total of €1.65 trillion, below the amount registered at the end of 2022 (125.4%).** Household debt fell to 51.1% of GDP, almost 2 pp less than three months earlier, while that of companies fell to 70% of GDP (72.4% in December). The financial wealth of households stood at €2.75 trillion (202% of GDP), values similar to those of one year earlier, standing in net terms at €2 trillion (147% of GDP). In relation to GDP, financial wealth fell by 16.1 pp in the last four quarters, mainly due to the increase in GDP.

⁶⁹ Prominent among them were issues by companies in the energy and utilities and transport sectors (47% and 34% respectively).

⁷⁰ In the same period of 2022, issues of non-financial companies, financial institutions and public bodies and institutions represented 26%, 32% and 42% respectively.

⁷¹ See data on household situation described in the "Macroeconomic environment" section.

⁷² One-year EURIBOR was above 4% in June, thus exceeding the values reached in the same period of 2022 by more than 300 bp.

⁷³ Mutual funds with a target return (whose portfolio is made up mainly of public debt and fixed-income assets) have registered high subscriptions in recent months.

⁷⁴ Source: Financial Accounts of the Spanish Economy, published by the Bank of Spain.

- **Average daily trading on the continuous market stood at €1.28 billion in the first half of the year, below the almost €1.65 billion in H1 2022 (€1.39 billion for the whole of 2022).**⁷⁵ Analysing this indicator over time, we see a slight increase in volumes traded in March, coinciding with the period of greatest market volatility associated with the banking sector, followed by a decline in trading.
- **Total trading of Spanish shares was €348.5 billion in H1, 19% less than in H1 2022.** This amount is distributed between the Spanish regulated market, BME, with €161.31 billion (21.7% less) and the rest of the competing venues,⁷⁶ with €187.19 billion (16.7% less). Therefore, a decrease in the volumes traded in shares is observed, which extends, with more or less intensity, to all the trading venues and is part of a context characterised by contained levels of volatility, except for a few days in March. Trading carried out on BME as a proportion of the total traded⁷⁷ stood at 46.5%, a percentage relatively similar to that observed for the past year.⁷⁸

On the other hand, there was a slight increase in the trading of Spanish shares carried out through systematic internalisers, which concentrated around 6.5% of the total trading of Spanish securities, compared to a share close to 5% in 2022.

- **The liquidity indicator of the Ibex 35 (measured through the bid-ask price differential) remained fairly stable at satisfactory levels in the first half of the year.** In the case of the 10-year sovereign bond, the spread stands at very low levels in both absolute and relative terms, after showing a downward trend during the 6-month period, benefiting from greater price stability compared to the second half of 2022 (see Figure 15).
- **Interest rate spreads between loans to Spanish companies and loans to companies in the euro area as a whole increased slightly in the first half of the year for loans of less than €1 million while narrowing for those of higher amounts.** In the former case, the negative differential went from 21 bp in December to 26 bp in May, while in the latter case it fell slightly to 8 bp from 9 bp but showed very high variability. The Survey of Bank Loans for the first quarter of the year showed a new tightening of financing conditions for the fourth consecutive quarter, which would have been more intense for households. The decrease in the supply of credit is a consequence of the increase in perceived risks due to the deterioration of the economic outlook and of borrowers' solvency, as well as the increase in entities' financing costs.

Risk of contagion: orange

- **The correlation between the daily returns of the different types of Spanish assets declined significantly during the first half of this year, as a result of the disparate behaviour between the prices of fixed-income assets and equities.** Thus, the half-yearly average value of the correlation stood at 0.33, below the average values for the second half of 2022 (0.38). The decrease in the correlation was especially intense in the last month, in which the evolution of the different sectors of the equity market was very uneven. The median of these correlations ended June at around 0.11, after having reached a value of 0.36 at the beginning of the month. It is also observed that the difference between the

⁷⁵ The average shrinkage for the years 2021 and 2020 stood at €1.45 billion and €1.65 billion respectively.

⁷⁶ Information calculated with data obtained from the financial information provider Bloomberg.

⁷⁷ Total trading, understood as trading subject to non-discretionary market rules.

⁷⁸ Other alternative sources of information, in particular BME, based on Liquidmetrix data, point to BME's having a market share in securities trading of around 67.6%, although with a declining trend. The difference is explained by the trading volume in foreign centres, which is considerably lower in the information provided by Liquidmetrix.

minimum and maximum values of these correlations increased notably with respect to the previous year: the minimums, which were positive in the last months of 2022, were at values below -0.60 at many times in May and June, while the maximums remained similar to those of 2022 (between 0.60 and 0.80). It should be remembered that the probability of contagion increases with higher correlation levels and that, furthermore, high correlations facilitate portfolio diversification.

- **The correlation between the yield of the 10-year Spanish sovereign bond and the rest of the European sovereign bonds remained at high levels throughout the half-year, although it showed a slight decline in June.** The correlation between the yield of the Spanish sovereign bond and that of the core European countries remained stable and at high levels, around 0.98 between January and May, while in June it fell to close the half-year at 0.89 (see Figure 32). In the case of the correlation between the yield of the Spanish sovereign bond and that of the peripheral countries, the evolution was very similar, although the decline began to take place at the end of the first quarter. Thus, in the first months of the year it was above 0.90, a value that gradually decreased until it reached levels close to 0.75 in June.

Market risk: orange

Figure 3: Stock prices

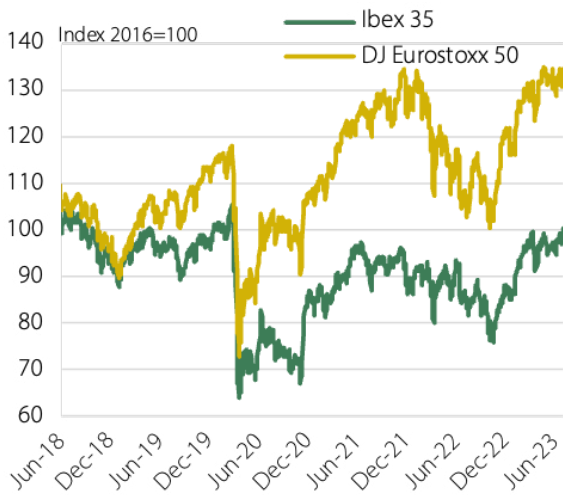
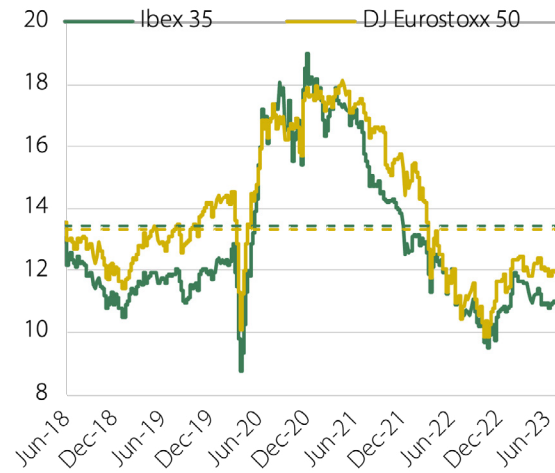


Figure 4: Price-earnings ratio (PER)



The dotted lines correspond to the average P/E ratio calculated since 2000.

Figure 5: Short-term interest rates (3 months)

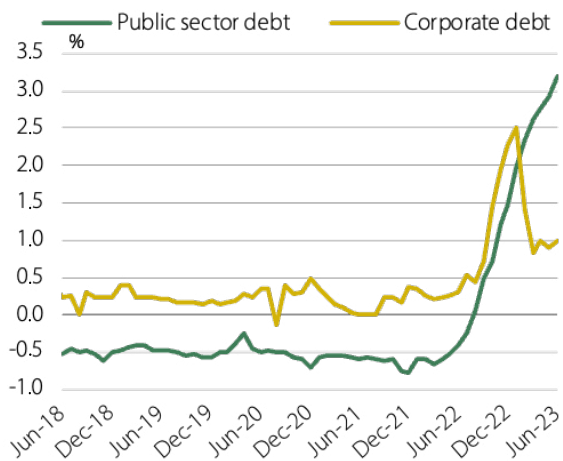


Figure 6: Long-term interest rates (10 years)

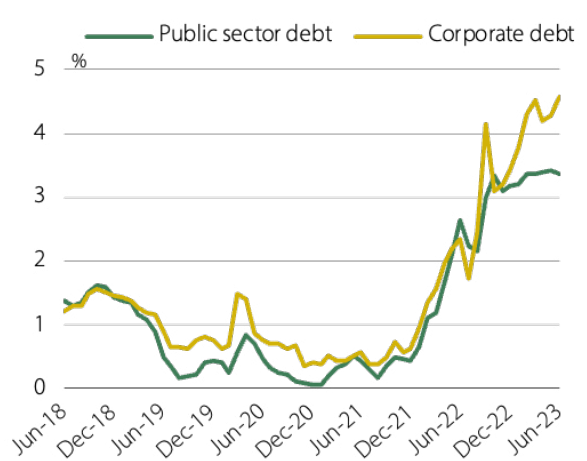
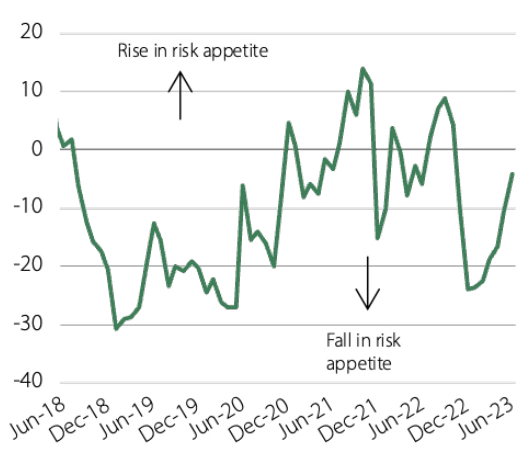


Figure 7: Oil price



Figure 8: Risk appetite (State Street)



Credit risk: green

Figure 9: Financing of the non-financial sector

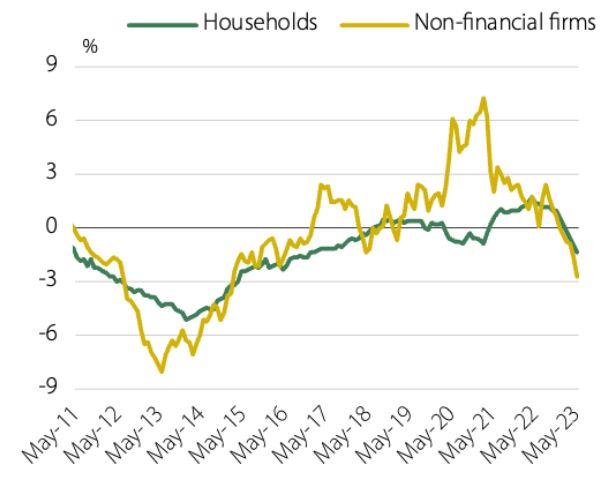


Figure 10: NPL (delinquency) ratio and unemployment rate

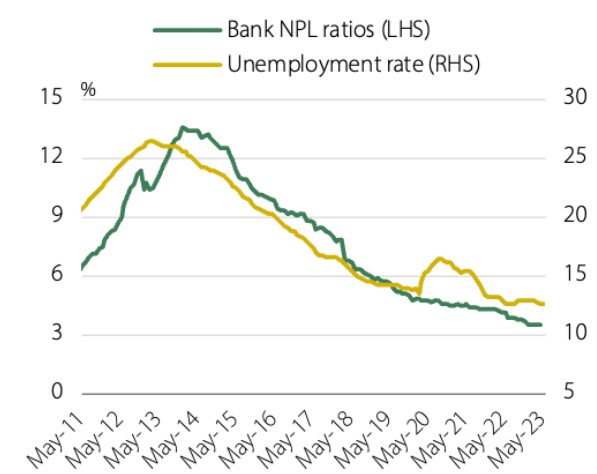


Figure 11: 10-year government debt risk premium (rate differential with Germany)

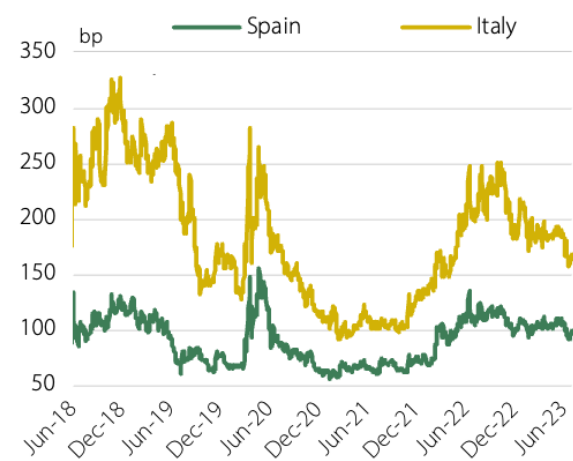


Figure 12: Private debt risk premium (5-year CDS)

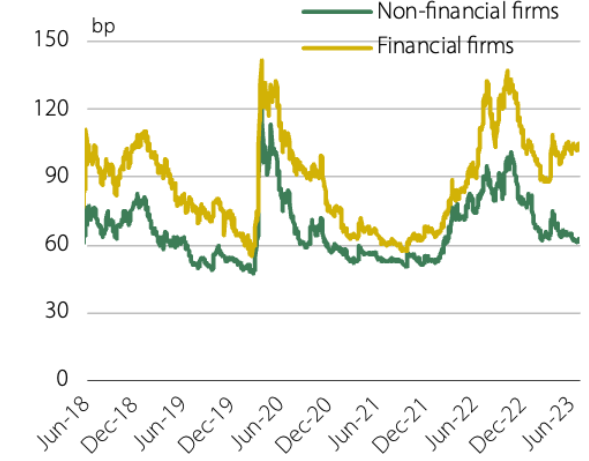


Figure 13: Housing prices (year-on-year change)

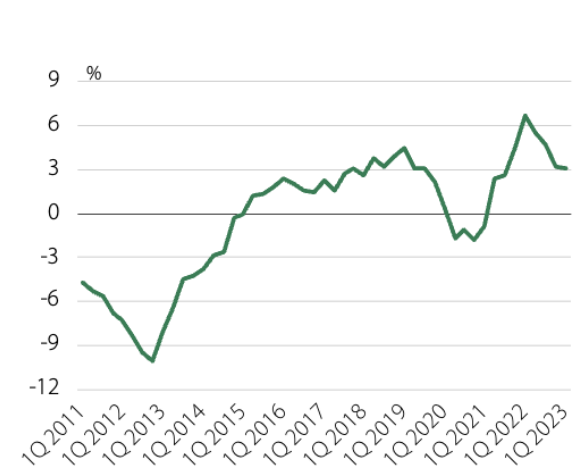
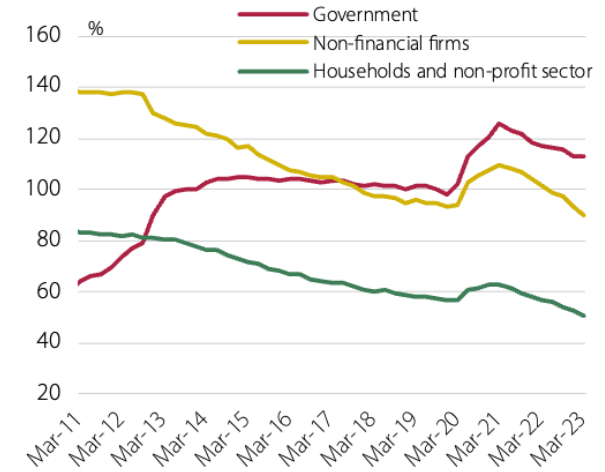
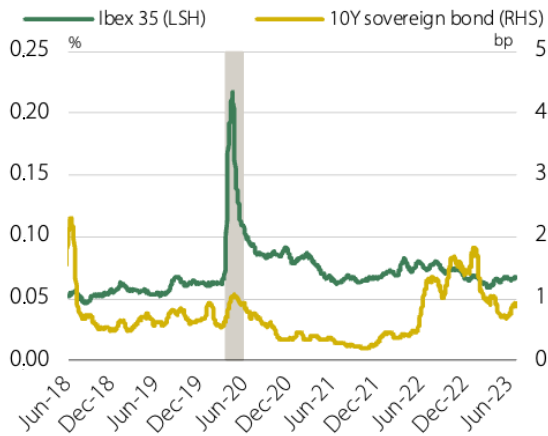


Figure 14: Indebtedness (% GDP)



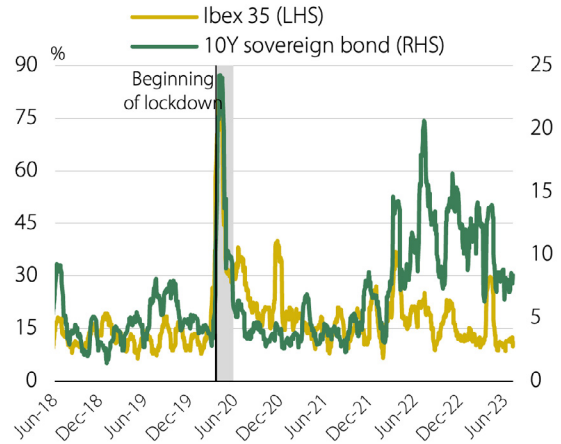
Liquidity, financing and fragmentation risk: yellow

Figure 15: Liquidity (bid-ask spread)



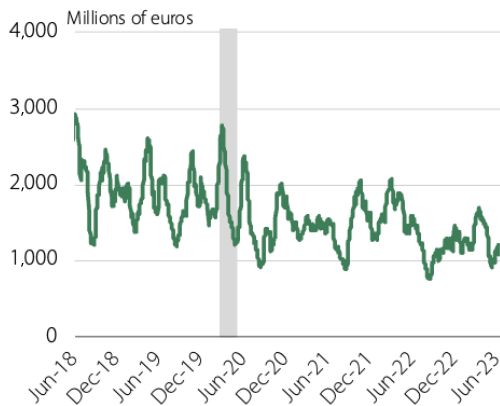
The shaded area corresponds to periods when short-selling was prohibited.

Figure 16: Volatility (1-month moving average)



The shaded area corresponds to periods when short-selling was prohibited.

Figure 17: SIBE trading (1-month moving average)



The shaded area corresponds to periods when short-selling was prohibited.

Figure 18: Interbank spread (LIBOR-OIS)



Figure 19: Spread (Spain-EMU) on corporate lending rates

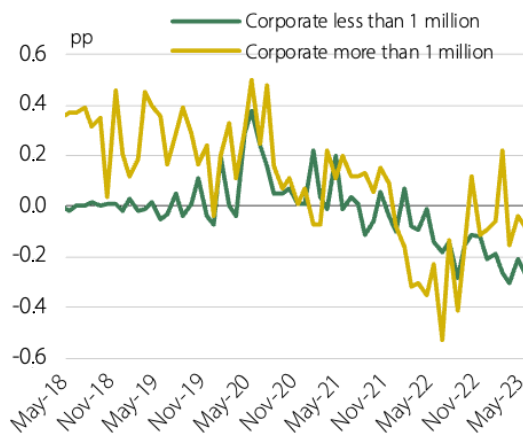
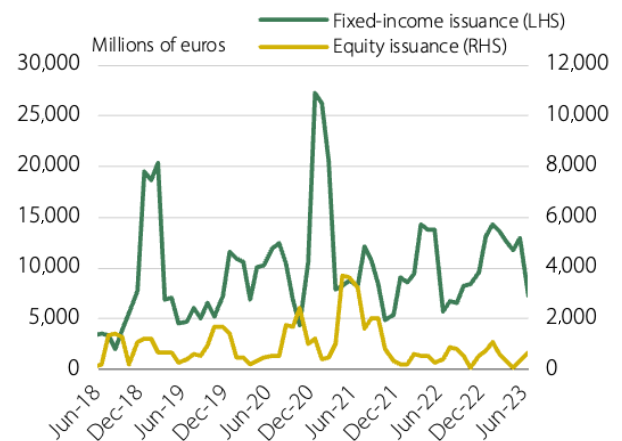


Figure 20: Issues (3-month moving average)



Macroeconomic risk: orange

Figure 21: GDP (year-on-year change)

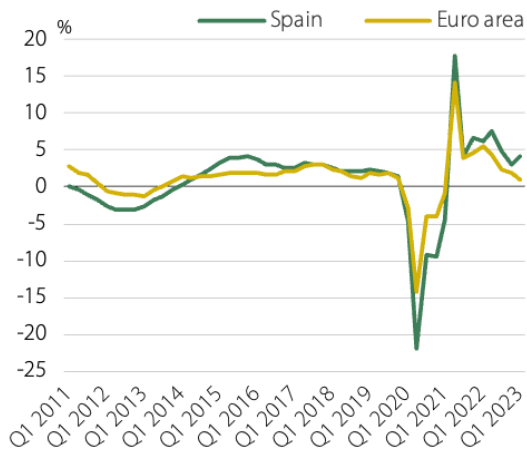


Figure 22: HCPI and core CPI (year-on-year change)

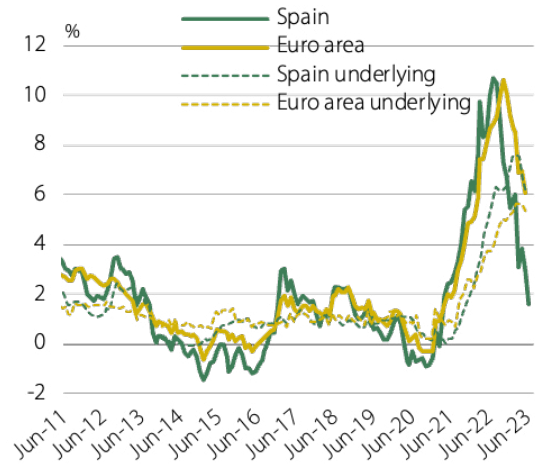


Figure 23: Employment (year-on-year change)

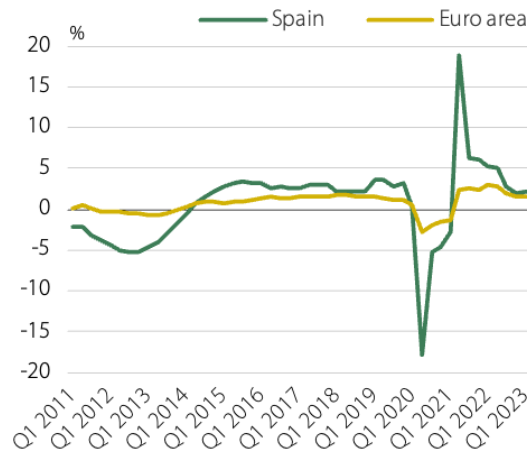
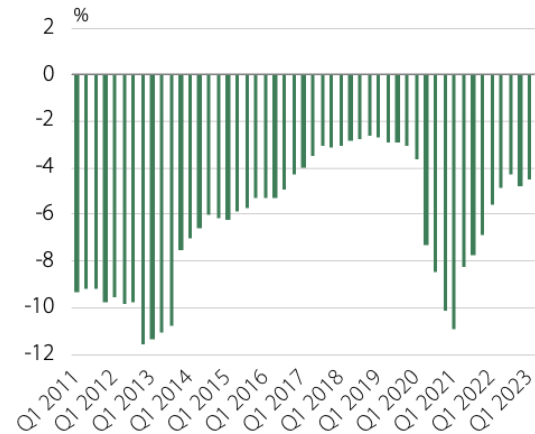


Figure 24: Public deficit (% of GDP)



Cumulative data for four quarters.

Figure 25: Exchange rates

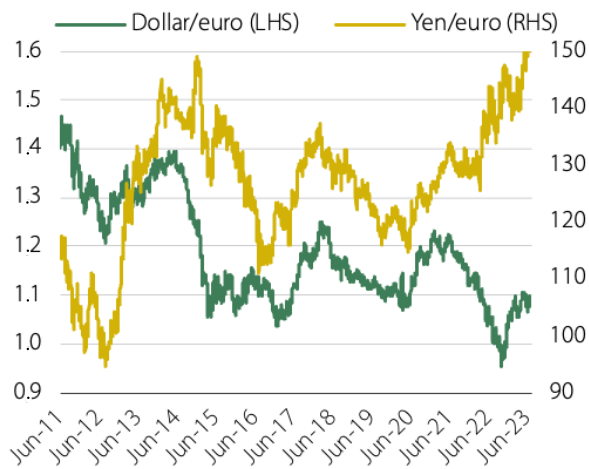
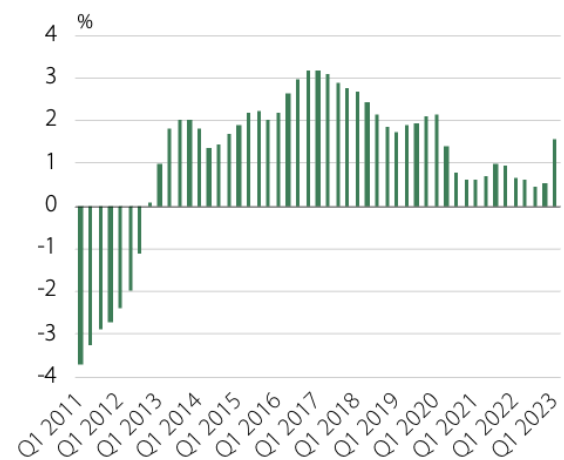
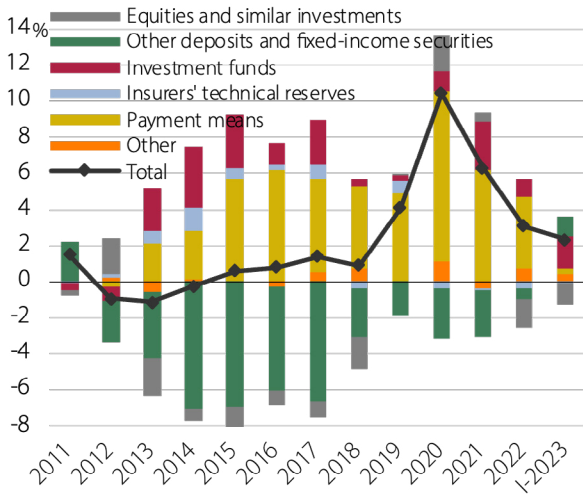


Figure 26: Current account balance (% of GDP)



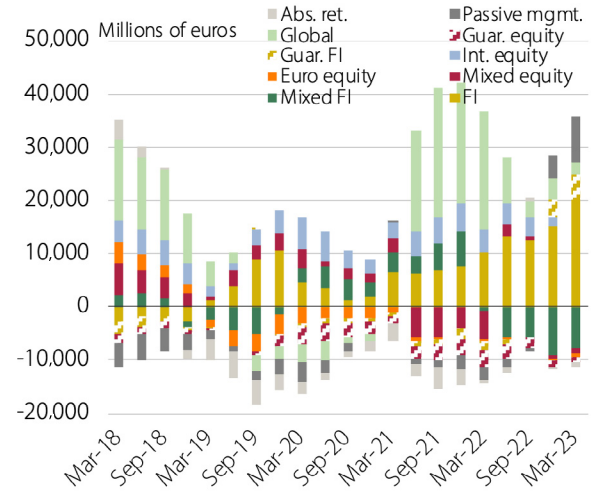
Investors

Figure 27: Households: net acquisition of financial assets (% of GDP)



Cumulative data for four quarters.

Figure 28: Net subscriptions to investment funds



Cumulative data for four quarters (millions of euros).

Figure 29: Households: savings (% of disposable income)

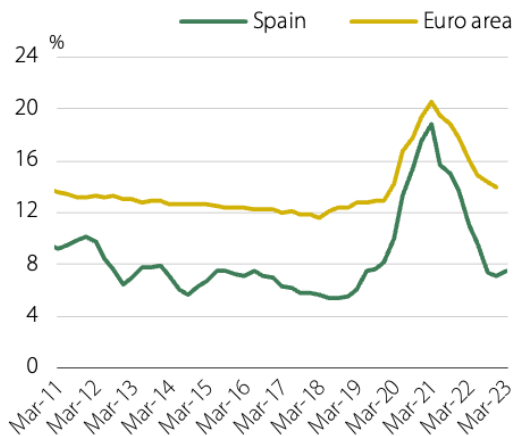
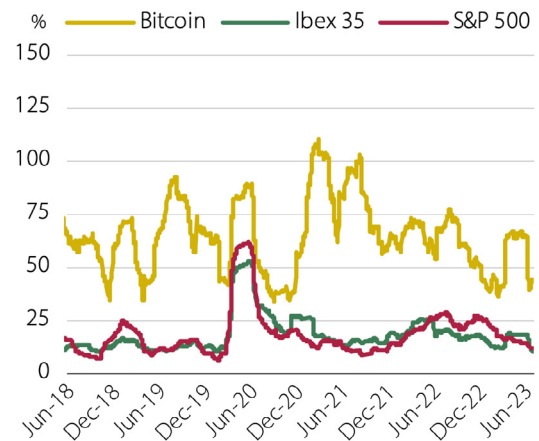


Figure 30: Bitcoin volatility



Risk of contagion: orange

Figure 31: Correlations among asset classes

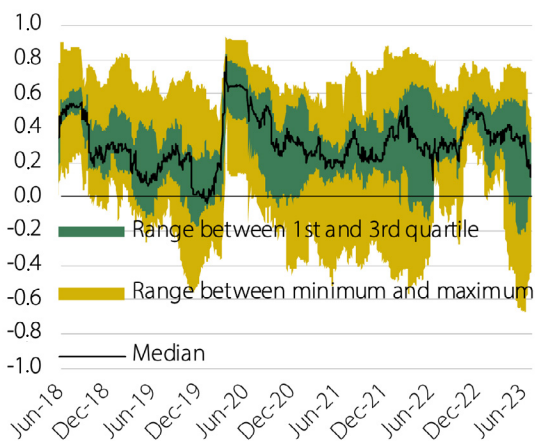
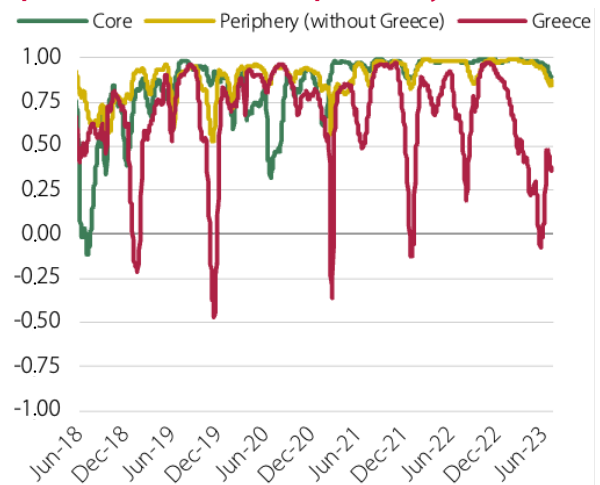


Figure 32: Correlation between the yield on Spanish and other European 10-year bonds



Heat map: risk categories

INDICATOR	Reference intervals ¹	2017			2018			2019			2020			2021			2022			2023		
		j	a	s	j	f	m	j	f	m	j	f	m	j	f	m	j	f	m	j	f	m
MACROECONOMIC RISK																						
GDP (% a.c.)	fixed_1t																					
Unemp. rate (% active population)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
CPI (% a.c.)	fixed_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Public deficit (% GDP)	fixed_1t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Public debt (% GDP)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Competitiveness indicator	fixed_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Economic sentiment index	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
MARKET RISK																						
Ibex 35	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Medium Caps Index	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Small Caps Index	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
FTSE Latibex All-Share Index	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
P/E ratio Ibex 35	p_h_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
ST interest rate 3m public debt (%)	p_3Y_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Interest rates 3m commercial paper (%)	p_3Y_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
LT interest rate 10Y public debt	p_3Y_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
LT 10Y private fixed-income interest rate (%)	p_3Y_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Steepness of 10Y-1Y curve (bp)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Oil price (US\$/barrel)	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Gold price (US\$, 31/12/1969 = 100)	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Risk aversion indicator	fixed_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
CREDIT RISK																						
Lending-households (% a.c.)	fixed_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Lending-non-financial companies (% a.c.)	fixed_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Property prices (% a.c.)	fixed_2t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Risk premium sovereign debt bond (bp)	fixed_1t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
CDS sovereign debt bond (bp)	fixed_1t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
CDS non-financial sector (bp)	fixed_1t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
CDS financial sector (bp)	fixed_1t	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Changes standards credit supply (%)	fixed_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Credit/deposits ratio	fixed_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
NPL ratio (%)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
LIQUIDITY, FINANCING AND FRAGMENTATION RISK																						
Bid-ask spread Ibex 35 (%)	p_3Y_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Volatility Ibex 35 (%)	p_3Y_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Liquidity - LT public debt (%)	p_3Y_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Trading SIBE (daily average, €M)	p_3Y_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Interbank spread (LIBOR-OIS) 3m (bp)	p_3Y_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Lending from the Eurosystem (€M)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Spr. Int. Rt. Bus. Cred. Sp-EMU, <1m (%)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Spr. Int. Rt. Bus. Cred. Sp-EMU, >1m (%)	fixed_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Volatility public debt price (%)	p_3Y_1t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Gross fixed-income issues (€M)	p_h_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Equity issues (€M)	p_h_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
Correlation int. rate 10Y public-debt bond																						
with euro bonds: Germ, Fr, Neth, Bel	corr_3m_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		
with euro bonds: It, Por, Gre, Ire	corr_3m_2t	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		

Source: CNMV, Bloomberg and Refinitiv Datastream.

1 Reference intervals can be: i) fixed: predetermined numerical thresholds, one (1t) or two-tailed (2t); (ii) "corr_3m": 3 month windows on correlation coefficients; (iii) "p_3Y": percentiles obtained from 3 past years distribution, one (1t) or two-tailed (2t) or (iv) "p_h": percentiles obtained from historical distribution.

Explanatory notes

Spanish financial markets stress indicator (Figure 1): The stress index provides a real-time measurement of the systemic risk facing the Spanish financial system, ranging from zero to one. To this end, stress is evaluated in six segments of the financial system (equities, fixed income, financial intermediaries, the money market, derivatives, and the exchange markets) which are then aggregated to obtain a single figure. The stress for each segment is evaluated by means of cumulative distribution functions, with the subsequent aggregation taking into account the correlation between segments. In this way, the index places greater emphasis on stress situations in which correlations are very high. In general terms, the stress variables chosen for each segment (three for each) correspond to volatilities, risk premiums, liquidity indicators, and sudden loss of value. These variables are good indicators of the presence of stress in the markets. Econometric estimates indicate that index values below 0.27 correspond to periods of low stress in the financial system, while scores between 0.27 and 0.49 correspond to periods of medium stress, and values above 0.49 indicate periods of high stress. The methodology of this index follows the work of Holló, Kremer and Lo Duca in 2012, who proposed a similar index for the euro area. For further details on recent movements in this index and its components, see the CNMV's statistical series (market stress indicators), available at <http://www.cnmv.es/portal/Menu/Publicaciones-Estadisticas-Investigacion.aspx>. For further information on the methodology of this index, see Cambón, M.I. and Estévez, L. (2016). "A Spanish Financial Market Stress Index (FMSI)". *Spanish Review of Financial Economics*, Vol. 14, No. 1, pp. 23-41 or as CNMV Working Document No. 60 available at http://www.cnmv.es/DocPortal/Publicaciones/MONOGRAFIAS/Monografia_60_en.pdf.

Heat map: summary by market and risk category (Figure 2 and final annex). The heat maps provided in this release show the monthly trend of the most important indicators in the Spanish financial system in recent years. They contain information on domestic securities markets, the banking sector and also certain macro-economic variables. The main purpose behind the production of these maps is to provide an idea of the position of the reference indicators in relation to their recent history (in most cases three years) or with certain predetermined limits, by associating this position with a certain colour. When an indicator changes from green to a warmer colour (orange or red), it does not necessarily mean the existence of risk. Instead, it indicates a movement towards an extreme value (very high or very low) over the period or range of values used as a reference. If an indicator remains at extreme values for a prolonged period, it may suggest the need for a more detailed analysis; that is to say, it may be interpreted as an alarm signal. The most comprehensive heat map includes 43 indicators,⁷⁹ five of which are prepared by the CNMV. The large number of indicators taken into consideration allows us to make an analysis of vulnerabilities for each segment of the financial markets (equity income, fixed income, banking sector, etc.) or for different risk categories (macro, market, liquidity, credit, etc.), as shown in Figure 2. The colours of these aggregates (markets or risk categories) are assigned by calculating a weighted average of the values of the individual indicators they comprise. In each aggregate, one of the individual indicators determines the generation of the overall colour: for example, in macro-economic risk, the indicator used to calculate the aggregate is GDP. This means that until this is published, the macro-economic risk block is not given any colour in the map. For more detail on the methodology and analysis of these maps, see Cambón, M.I. (2015). "Identification of vulnerabilities in the Spanish financial system: an application of heat maps". *CNMV Bulletin*, Quarter I, pp. 109-121.

Bitcoin historical volatility (Figure 30): Annualised standard deviation of daily price variations in 90-day windows.

⁷⁹ Since June 2017, the heat map has included an additional indicator: the bid-ask spread of the 10-year sovereign bond.

Risk of contagion: The indicators that make up this block are of somewhat higher complexity. We set out the most important of these indicators below:

- **Correlation between assets (Figure 31).** The correlation pairs are calculated using daily data in 3-month windows. There are six asset classes: sovereign debt, private fixed income from financial institutions, fixed income from non-financial firms and Ibx 35 securities, financial companies, utilities and other sectors. A high correlation between the different classes of Spanish assets would indicate the possible existence of herding by investors. This situation could lead to high volatility in periods of stress. Meanwhile, diversification would offer fewer advantages since in this context it would be more difficult to avoid exposure to sources of systemic risk.
- **Correlation between the yield on Spanish and other European 10-year bonds (Figure 32).** The correlation is calculated using daily data in 3-month windows. The countries of the core group are Germany, France, the Netherlands and Belgium and the peripheral countries are Portugal, Italy, Greece and Ireland.



Is there evidence of greenium in the debt assets of Spanish issuers?

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Summary

The potential for green bonds to trade at a higher price than equivalent conventional bonds – that is, to have an associated premium known as “greenium” – has been the subject of numerous analyses in recent years, with mixed results. This paper aims to contribute to this set of studies with the evaluation of the existence of greenium in the debt assets of Spanish issuers, without going into assessing its possible causes. For the work, information has been collected on all plain vanilla bond issues in euros of these issuers between 2017 and June 2022, regardless of the market in which the issue was made. In total, there are 391 bond issues, of which 77 correspond to green bonds. The analysis, which largely follows the proposal of Kapraun et al. (2021), has a triple aspect: it looks for evidence of greenium in the primary market, in the secondary market and, finally, on specific pairs of bonds, made up of a green bond and a conventional one with very similar characteristics. The results find evidence of greenium in the primary market in those green bonds that have Climate Bond Initiative (CBI) certification. In contrast, no evidence is found in the secondary market and it is partially found in the analysis of bond pairs (for about half of the pairs).

1 Introduction

The transition towards a sustainable economy is a phenomenon that is gradually gaining intensity and finds specific formulas in the financial markets with which to finance this transition. These formulas, expanding in terms of the diversity of financial assets, have one of their greatest exponents in the shape of green bonds. In principle, a green bond presents the same financial characteristics as a conventional bond and only differs from it in the destination of the resources that are captured in the issue, oriented, in general terms, to projects related to the environment. Sometimes it is argued that investors are willing to pay more for these bonds, given that not only the financial characteristics of these products are relevant to their preferences, but also the green destination of the funds. Consequently, green bonds would have a premium (“greenium”) over conventional bonds.

There are many studies that have tried to find evidence of this possible premium.¹ These studies have been carried out for both sovereign and corporate bonds and have either focused on a specific economy or have had a broader geographical spectrum. In all of them, an attempt is made to identify said greenium with data from the primary market – that is, at the time of issue –, with data from the secondary market – that is, during the life of the bond – or at both moments. The methodologies used are also varied. In general, the evidence found by these studies is mixed.² Many of them find no evidence of greenium and, among those that do, it tends to be somewhat more frequent in the primary market. There is also some evidence to the contrary.

This study contributes to this literature by evaluating the possible existence of greenium in the debt assets of Spanish issuers in the period between 2017 and mid-2022. To this end, the proposal by Kapraun and others (2021) is partially followed, in which the estimations are made in three directions: for all the bonds in the sample in the primary market and in the secondary market, and for pairs of linked bonds. The results of the estimations through regression models in different specifications find evidence of greenium in the primary market in green bonds that have the Climate Bond Initiative (CBI) certification. In contrast, no evidence is found in the secondary market and it is partially found in the analysis of bond pairs (for about half of the pairs).

The work is structured as follows: in section 2 a description of the data set used is made, in section 3 the estimations made in the primary, secondary and pairs of bonds are described, and finally the conclusions are presented.

¹ For studies exclusively on the primary market, see, for example, CBI (2016), CBI (2018) or Tang and Zhang (2020). For studies on the secondary market, see, for example, Zerbib (2017), Zerbib (2019), NN Investment Partners (2018), Karpf and Mandel (2018), Bachelet et al. (2019) or Hackenberg and Schiereck (2018). For studies that address both the primary and secondary markets, see Ehlers et al. (2017), Baker et al. (2018), Larcker and Watts (2020), or Loffler et al. (2021).

² See Agliardi (2021), who, in addition to his own estimation proposal, presents a summary of the most important works.

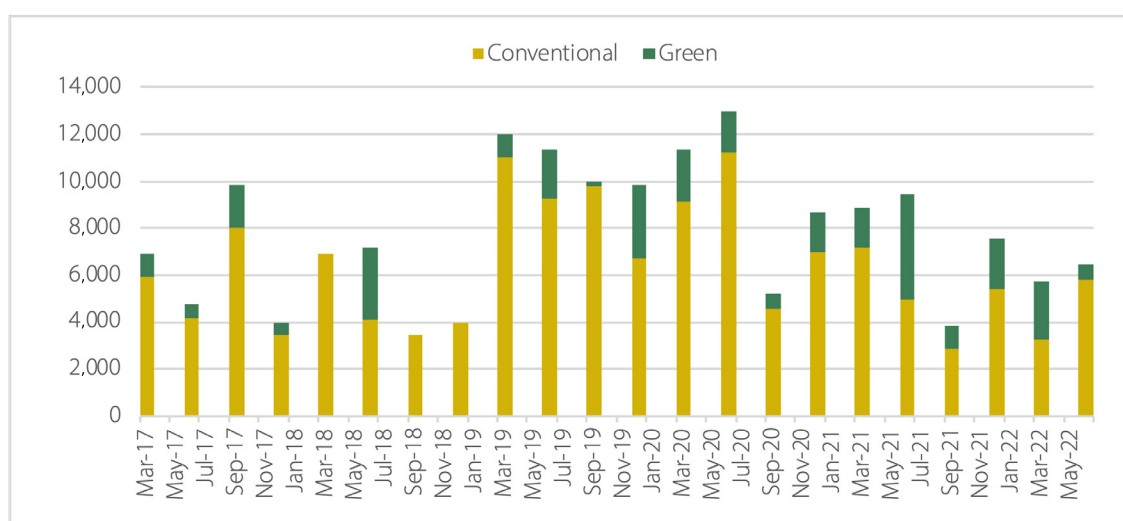
2 Data

In order to contrast the main hypothesis of this work, the possible existence of greenium in debt assets issued by Spanish issuers, information has been obtained on all plain vanilla bond issues in euros made by said issuers between 1 January 2017 and 30 June 2022. This type of asset facilitates the analysis, as they are the most common and homogeneous bonds in their structure within the scope of fixed-income instruments. Altogether, there are a total of 391 bond issues available, of which 77 correspond to green bonds.³ The information in the data set used comes from the CNMV, Bank of Spain (BdE), Refinitiv and Bloomberg.

Figures 1 and 2 show the evolution over time of these bond issues, distinguishing the type of bond (green or conventional) and the issuing sector (financial or non-financial) of the green issues. As can be seen in Figure 1, the volume of issues was low in the years 2017 and 2018 (with a quarterly average of €5.9 billion), while in 2019 and 2020 issue activity was higher (€10.17 billion per quarter), to fall again in the most recent period of the sample to an average amount close to €7 billion. The amount of green bonds issued in the reference period of the study (2017- June 2022) was close to €32.2 billion, 19% of the total issues considered.⁴

Amount of bond issues of Spanish issuers

FIGURE 1

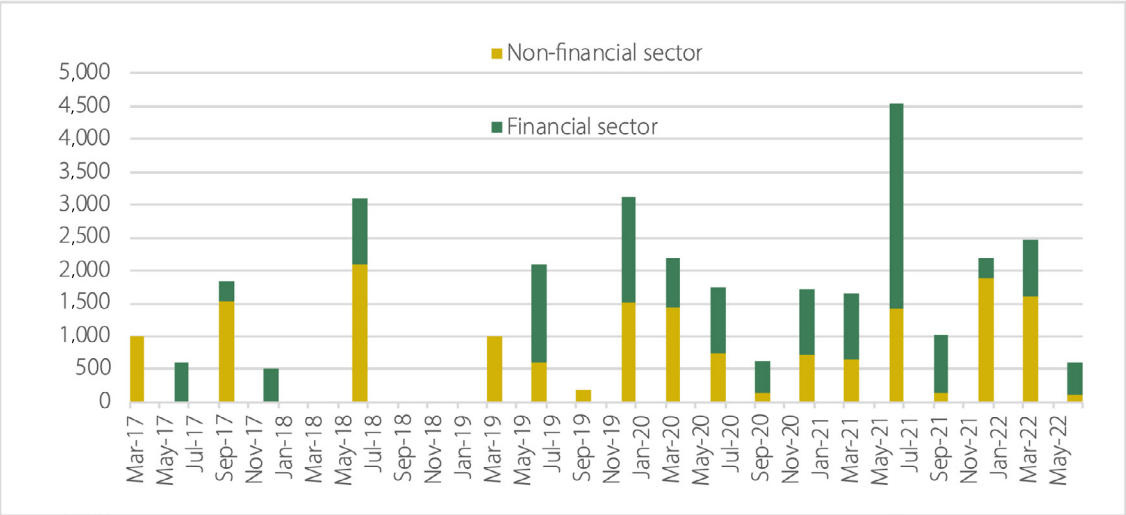


Source: CNMV, Bank of Spain and Refinitiv. Amounts in millions of euros.

The significance of the financial and non-financial sectors in green issues was relatively similar on average for the period, with 48% for issues from the financial sector and 52% for those from the non-financial sector. As can be seen in Figure 2, issues of non-financial companies tended, in general, to be somewhat more significant in the early years of the sample and those of financial companies in the more recent years, although there is notable heterogeneity between quarters

³ It should be noted that the information available does not allow us to determine whether these issues are completely new or whether they concern refinancing.

⁴ Approximately 80% of ESG debt issues made by Spanish issuers are made in foreign markets. See the CNMV's *Financial Stability Notes* for more information. <https://www.cnmv.es/portal/Publicaciones/PublicacionesGN.aspx?id=51>



Source: CNMV, Bank of Spain and Refinitiv. Amounts in millions of euros.

Table 1 lists some of the characteristics of the bond sample. For example, it can be seen that, on average, the size of green bond issues is somewhat smaller than that of conventional bonds (€418 million versus €440 million), as is their maturity (8.4 years versus 9.2) and yield at the time of issue (1.87% versus 2.07%). Regarding the credibility of green issues, it should be noted that, of the 77 green bond issues in the sample, 78% had CBI certification and 44.2% had a secondary opinion. Additionally, the rating with environmental, social and governance (ESG) criteria of the issuers of green bonds, on average, is similar to that of conventional bonds (according to information from Refinitiv), somewhat less than 80.⁵ Finally, the credit ratings of the issues have been obtained which, according to the data collected, are slightly better on average in the case of green bonds.

⁵ This score ranges from 0 to 100 and has a similar letter correspondence to credit ratings, ranging from D- to A+. For more information, see: https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf

Description of the data sample

TABLE 1

	Green bonds	Conventional bonds
Number	77	314
Average size (millions of euros)	418.1	439.6
Average maturity (years)	8.4	9.2
Average yield (%)	1.87	2.07
Average ESG rating ¹	78.3	79.9
ESG rating coverage (%)	72.7	74.5
% financial company	32.5	43.0
% CBI	77.9	-
% secondary opinion	44.2	-
Average rating ²	11.7	10.6
Rating coverage (%)	94.8	93.6

Source: CNMV, Bloomberg and Refinitiv. Information on the issue of plain vanilla bonds in euros made by Spanish issuers between 1 January 2017 and 30 June 2022.

1 Score estimated by Refinitiv (maximum value is 100).

2 The credit rating has been transformed into a numerical variable that takes the value of 1 for the worst rating and 18 for the best rating.

The above data will be the basis of the regressions to assess the possible greenium in the primary market. Secondary market analysis adds the temporal dimension to the returns on assets, as well as their liquidity range (measured through the bid-ask spread). Finally, for the third part of the analysis, which evaluates the possible existence of greenium for specific pairs of bonds, it is necessary to impose sufficiently demanding requirements so that the bonds that make up each pair (one green and one conventional) are as similar as possible but allowing a certain degree of flexibility in order to have sufficient data. In this case, to form the pairs, it has been required that the issues be equal in terms of the issuer, the currency of the issue, the rating of the issue and the type of coupon, and relatively similar in relation to the date of issue, the maturity and the size of the issue. In particular, it has been established that the difference between the issue dates of the pair's bonds and those of their maturity should be less than 2 years and that the size of the conventional bond issue should be between $\frac{1}{2}$ and 2 times the size of the green bond issue. These criteria leave a sample of 22 bond pairs, of which only 11 pairs have sufficient historical data to perform the analysis. The characteristics of the bonds of these pairs are described in Table 2 and give an idea of their similarity.

Description of Linked Bond Pairs

TABLE 2

	Green bonds	Conventional bonds
Average size (millions of euros)	818.2	853.2
Average maturity (years)	6.9	6.8
Average yield (%)	0.92	1.04

Source: CNMV. Data from 11 pairs of linked bond issues.

3 Empirical analysis

The empirical analysis consists of three parts, as previously mentioned. The possible existence of greenium arises: i) at the time of issue of the bonds (primary market), ii) during the life of the bonds (secondary market) and iii), specifically, for pairs of similar bonds (one green and one conventional). The results point to a weak evidence of greenium, since the estimates of the regressions in the primary market do find evidence of this characteristic, but not those of the secondary market. Pairwise estimates yield mixed results, as they find evidence of greenium in 5 pairs of the 11 analysed.

3.1 Primary market

The possibility of the existence of greenium in Spanish debt assets in the primary market is estimated using the following equation:

$$r_{i,t,b} = \alpha_i + \beta \text{Green}_{i,t,d} + \text{Controls}, \quad (1)$$

where $r_{i,t,b}$ is the yield on the bond b at the time of issue, performed by the issuer i in the month t . The variable $\text{Green}_{i,t,b}$, which is the main reference variable of the analysis, is a dummy which takes the value 1 if the issue is green and 0 otherwise. The control variables are:

- The maturity of the issue (years).
- The size of the issue. This variable is considered both in logarithm and in the form of interaction with other variables through a variable dummy that segments issues into large and small. Large issues are defined as those that in each year are above the 0.8 percentile of the distribution. The rest are considered small.
- The rating of the issue. Quantitative variable ranging from 1 to 18 (from worst to best credit rating). Failing that, we use the rating of the issuer (or the issuer's rating estimated by Refinitiv).
- The issuer's sector (financial/non-financial).
- CBI certification. Dummy which takes the value 1 if the issue has CBI certification or 0 otherwise.
- Second opinion. Dummy which takes the value 1 if the issue has a second opinion (according to Refinitiv) or 0 otherwise.
- ESG rating. Dummy which takes the value 1 if the ESG rating of the bond issuer is greater than 75.

Table 3 describes the results of the estimations of different specifications of the equation (1). All of them show the robustness of some of the controls used, in particular, the maturity of the issue, its size and the rating. In the eight proposed specifications, a positive relationship is found between the maturity of the issue and its yield, and between the size of the issue and its yield, and a negative relationship between the credit rating and its yield (the better the credit rating, the lower the yield offered). These relationships are within what is expected taking into account the characteristics of fixed-income assets and the term structure of interest rates.

Regarding the possible existence of greenium (captured by the variable “Green” and its interactions with other variables), it should be noted that in two of the proposed specifications there is evidence: in particular, there is evidence of greenium for those green issues that have CBI certification (specification 2) and also for those green issues that have said certification and, in addition, are smaller than the other issues (specification 7). From this analysis, the relevance of the CBI certification can be deduced (at least at the time of the bond issue) as an element that provides credibility to the green format of the issue and that allows it to reduce its yield by 35 bp on average compared to the rest of the issues.

It should be noted that evidence of greenium has not been detected for all green issues (specification 1), nor for green issues that have a second opinion, those that have a more or less large size or whose issuer has a higher ESG rating. The fact that there is no evidence of greenium for green bonds as a whole, but only for those that display third-party certification, highlights the need for the greenness of issues to be credible to investors. In this sense, the Green Bond Regulation, on which a provisional agreement has recently been reached and which aims to lay the foundations for the designation of the voluntary standard of “European Green Bond” for bonds that pursue environmental objectives related to the Taxonomy Regulation (in particular, the funds of the bonds must be invested in economic activities or assets that are aligned with the taxonomy or to be aligned with the taxonomy, by at least 80%), is an initiative that contributes to the credibility of the green bond commented on before and ultimately reduces the risk of greenwashing in fixed income markets. On the other hand, the fact that no greenium is detected for larger companies – as one would expect, in principle – can be explained by the fact that the average size of the sampled issues is relatively high and shows little dispersion. The same reasoning can be applied to green issues from issuers with a high ESG rating. It should be recalled that the mean ESG ratings for conventional bonds in the sample were very high and similar to those for green bonds.

Alternative estimates of the equation (1) have been made for robustness, in which instead of the yield on the bond, the yield spread with respect to government debt is included, and also using alternative dummies regarding the size of the issues or their ESG rating.⁶ In general terms, the results of these estimates are similar to those reported in this section.

⁶ To do this, the thresholds that determine membership in a group are modified. In the case of size, the percentile is lowered from 0.8 to 0.7 to be classified as a large issue. In the case of the ESG rating, the threshold to be classified as top ESG is reduced from 75 to 70.

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Green	-0.194 (0.156)				-0.320 (0.195)			
Green, CBI		-0.354** (0.165)						
Green, non-CBI		0.448 (0.286)						
Green-Second opinion			-0.346 (0.240)					
Green-No second opinion			-0.142 (0.168)					
Green-large				-0.036 (0.213)	0.283 (0.263)			
Green-small				-0.320 (0.195)				
Green-CBI-large						0.023 (0.211)		
Green-CBI-small							-0.633*** (0.212)	
Green-non-CBI small							0.374 (0.285)	
Green top ESG								0.005 (0.186)
Maturity	0.135*** (0.013)	0.134*** (0.013)	0.136*** (0.013)	0.135*** (0.013)	0.135*** (0.013)	0.134*** (0.013)	0.135*** (0.013)	0.12*** (0.014)
Size	0.096** (0.043)	0.115** (0.043)	0.100** (0.043)	0.093** (0.043)	0.095** (0.043)	0.088** (0.043)	0.112*** (0.042)	0.095** (0.044)
Rating	-0.109** (0.047)	-0.112** (0.046)	-0.100** (0.048)	-0.108** (0.047)	-0.108** (0.047)	-0.119** (0.046)	-0.111** (0.046)	-0.082* (0.046)
Sector (SF)	0.106 (0.408)	0.041 (0.403)	0.009 (0.424)	0.087 (0.408)	0.087 (0.408)	0.207 (0.403)	0.005 (0.398)	-0.465 (0.789)
R2 adjusted	0.76	0.76	0.76	0.76	0.76	0.76	0.77	0.80

Source: CNMV, Refinitiv & Bloomberg. The table shows the results of the regressions of equation (1), carried out on the variable “yield at issue” for a set of conventional and green bonds of Spanish issuers. The sample includes all plain vanilla bond issues in euros from Spanish issuers from 1 January 2017 to 30 June 2022. The regression of the “yield at the time of issue” is performed against the variable “green”, which takes the value 1 if the issue is green and 0 otherwise. The estimation controls for variables such as maturity (in years), the size of the issue (in logarithm), the rating of the issue (or of the issuer, on a scale from 1 to 18) and the issuing sector (financial or non-financial). It is also controlled by the time variable (month-year) and the issuer. The estimate includes different specifications in which interactions are added with other variables that include the CBI certification of the issue, the existence of a second opinion (according to Refinitiv information), the size of the issue (large or small) and the ESG rating (high or low) of the issuer. The estimated ratios and standard deviations are shown in brackets. The constant is omitted, as are the estimates for the time and issuer dummies.

* Significance at 10%, ** Significance at 5% and *** Significance at 1%. Number of observations: 365, except for the last specification (284).

3.2 Secondary market

This section reports the estimates of equation (1) in the field of the secondary market, adding one more control variable: the bid-ask price differential, as an indicator of the liquidity of each bond. For this, daily data have been obtained and monthly averages of the reference variables have been calculated. Therefore, the information available is at the bond-month level. It should be noted that in the debt market a notable percentage of the bonds do not trade every day or indeed hardly trade at all, which may constitute a limitation for this estimate.⁷

Table 4 presents the results of the estimates for different specifications, as in the analysis of the primary market. Regarding the general controls, it is observed that maturity is positively correlated to the yield of the bond and that the rating is negatively correlated in the sense that the better the credit rating, the lower the yield tends to be. These correlations coincide with those found for the primary market. However, this is not the case with the relationship between the size of the issue and the return, for which a negative and significant correlation is found in statistical terms, that is, during the life of the issue, those of greater size tend to present lower returns. The bid-ask spread shows a positive and statistically significant relationship with the bond's yield, that is, those bonds with wider spreads (less liquid) tend to obtain higher yields.

Regarding the possible existence of greenium in the secondary market, the estimates do not find evidence in this regard in any of the specifications analysed: neither for the set of green bonds nor for any of their interactions with other variables. There are several potential reasons that can explain this fact. The first, and most obvious, is that de facto there is no greenium in the secondary market. The second would be related to the lesser degree of liquidity in this market (and, consequently, to the lack of information for many bonds), which could be due to the fact that the purchase of these bonds is made with the objective of buy-and-hold and, therefore, with a very small secondary market, with the use of a data sample that corresponds to a relatively short period of time, or, finally, with a model specification problem. In this last sense, analyses of robustness with alternative variables have been carried out, as in the case of the primary market, and similar results have been obtained.

⁷ For example, for 38% of the funds in the sample, no historical information on the performance of the bonds in the period considered has been found.

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Green	-0.051 (0.132)						
Green, CBI		0.007 (0.141)					
Green, non-CBI		-0.449 (0.365)					
Green-Second opinion			-0.235 (0.274)				
Green-No second opinion			-0.007 (0.144)				
Green-large				0.042 (0.158)			
Green-small				-0.190 (0.186)			
Verde-CBI-grande					0.074 (0.155)		
Green-CBI-large						-0.117 (0.210)	
Green-CBI-small						-0.449 (0.365)	
Green top ESG							-0.005 (0.115)
Maturity	0.119*** (0.012)	0.118*** (0.012)	0.120*** (0.012)	0.120*** (0.012)	0.118*** (0.012)	0.119*** (0.012)	0.128*** (0.008)
Size	-0.103** (0.043)	-0.108** (0.043)	-0.105** (0.043)	-0.106** (0.043)	-0.112*** (0.042)	-0.105** (0.042)	-0.107*** (0.029)
Rating	-0.331*** (0.043)	-0.330*** (0.043)	-0.331*** (0.043)	-0.333*** (0.043)	-0.337*** (0.042)	-0.329*** (0.042)	-0.289*** (0.030)
Sector (SF)	-0.614* (0.364)	-0.579 (0.365)	-0.788* (0.429)	-0.665* (0.367)	-0.572 (0.356)	-0.638* (0.368)	-3.683*** (0.458)
Bid-ask spread	0.432*** (0.029)	0.432*** (0.029)	0.432*** (0.029)	0.433*** (0.029)	0.432*** (0.029)	0.432*** (0.029)	0.106*** (0.008)
R2 adjusted	0.46	0.46	0.46	0.46	0.46	0.46	0.76

Source: CNMV, Refinitiv & Bloomberg. The table shows the results of the regressions of equation (1), carried out on the variable "yield" for a set of conventional and green bonds of Spanish issuers. The sample includes a panel of month-bond observations with trading data in the secondary market (Refinitiv) for the period from 1 January 2017 to 30 June 2022. The regression of the "yield" is carried out against the "green" variable, which takes the value 1 if the issue is green and 0 otherwise. The estimation controls for variables such as maturity (in years), the size of the issue (in logarithm), the rating of the issue (or of the issuer, on a scale from 1 to 18), the issuing sector (financial or non-financial) and the bid-ask spread. It is also controlled by the time variable (month-year) and the issuer. The estimate includes different specifications in which interactions are added with other variables that include the CBI certification of the issue, the existence of a second opinion (according to Refinitiv information), the size of the issue (large or small) and the ESG rating (high or low) of the issuer. The estimated ratios and standard deviations are shown in brackets. The constant is omitted, as are the estimates for the time and issuer dummies.

* Significance at 10%, ** Significance at 5% and *** Significance at 1%. Number of observations (month-bond): 8,529, except for the last specification (6,847).

3.3 Linked bond pairs

The last analysis carried out to contrast the evidence on the possible greenium in Spanish debt assets was carried out on bond pairs linked in such a way that they are practically the same or very similar, differing almost exclusively in that one of them is green and the other is not. It should be remembered that in order to link these pairs of bonds, strict criteria have been established regarding the coincidence of the issuer, the type of bond or the rating, for example, but that some flexibility has been allowed in variables such as size, issue date or maturity. If one were to be strict in all the criteria, no pair of bonds would be found to analyse, since it is highly unlikely that a given issuer would issue two identical bonds on the same day, only one green and one conventional. After applying these criteria, a sample of 22 pairs of bonds has been obtained, of which 11 have secondary market data to carry out the analysis.⁸ The equation to be estimated in this case has the following specification:

$$\Delta Yield_{i,t} = p_i + \alpha \cdot \Delta Liquidity_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $\Delta Yield_{i,t}$ represents for each pair of bonds i the average difference in yield between the green and conventional bonds in each month and $\Delta Liquidity_{i,t}$ represents the mean difference of their bid-ask spreads. The green bond premium (greenium) for each pair would be expressed by the coefficient p_i .

As can be seen in Table 5, the analysis finds evidence of greenium in 5 of the 11 pairs analysed (p_i negative and statistically significant). This premium varies between 18 bp and 47 bp. For the rest of the pairs, the premium is negative but not significant in statistical terms and in one case it is positive, that is, the yield of the green bond is higher than that of the conventional bond in this pair. Considering the specific characteristics of these bonds, the reason could lie in the longer maturity of the green bond of this pair, which is 5.5 years, compared to 4 years for the conventional bond.

⁸ A table with the most important characteristics of these pairs of bonds is provided in the annex.

Pairs	Greenium (ρ_i)
Number 1	-0.470*** (0.105)
Number 2	-0.182* (0.106)
Number 3	-0.025 (0.106)
Number 4	-0.312*** (0.105)
Number 5	-0.120 (0.105)
Number 6	-0.019 (0.105)
Number 7	-0.361*** (0.102)
Number 8	-0.004 (0.106)
Number 9	0.331*** (0.111)
Number 10	-0.158 (0.108)
Number 11	-0.287*** (0.104)
Bid-ask spread	-0.180 (0.389)

Source: CNMV, Refinitiv & Bloomberg. The table shows the results of the regression of equation (2), carried out on the variable “yield differential between the green bond and the conventional bond” of 11 pairs of linked bonds, with trading data in the secondary market (Refinitiv) for the period from 1 January 2017 to 30 June 2022. The dependent variable is returned on the bid-ask spread of each pair of bonds and the estimate of the fixed effect is provided (ρ_i), which represents the magnitude of the greenium. The estimated ratios and standard deviations are shown in brackets.

* Significance at 10%, ** Significance at 5% and *** Significance at 1%. Number of observations (month-pair of bonds): 340.

4 Conclusions

The strong expansion of green bonds in the international debt markets in recent years and the fact that the issuers themselves classify their issues as green has highlighted the need to improve the transparency of these assets and to standardise, as far as possible, their standards and their reporting of information. Although there is a perception that investors, or at least a group of them, value the non-financial characteristics of green bonds (that is, their commitment to projects related to the environment) and are willing to pay for them, the truth is that the existing evidence is currently inconclusive. This work contributes to this evidence with a specific study on the bonds issued by Spanish issuers in the period between 2017-June-2022.

The study finds evidence of greenium (green bond premium) in the primary market for those green bonds that are certified by a third party, in this case CBI. In contrast, there is no evidence of greenium in the secondary market, although it should be borne in mind that this aspect of the analysis may present certain limitations related to the period of time of the sample (relatively short) and the fact that a significant part of the bonds do not trade or present little trading. Finally, the analysis carried out by pairs of linked bonds yields a mixed result, since there is evidence of greenium in approximately half of the analysed pairs.

From the study it could be concluded i) that the evidence of greenium for the debt of Spanish issuers is relatively weak and ii) that it is necessary to improve credibility in this area, something directly related to the phenomenon of greenwashing. In this sense, initiatives such as the future Regulation on green bonds would go in the right direction, particularly because it significantly incorporates verification (second opinion), so the verifier must be registered and supervised by ESMA.

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Appendix

Detail of linked bond pairs

TABLE A.1

Pairs	ISIN	Issuer	Issue date	Maturity date	Size (euros)
Number 1	XS1946004451	TELEFÓNICA EMISIONES, S.A.U.	05/02/2019	05/02/2024	1,000,000,000
	XS1877846110	TELEFÓNICA EMISIONES, S.A.U.	11/09/2018	11/09/2025	1,000,000,000
Number 2	XS2194370727	BANCO SANTANDER, S.A.	23/06/2020	23/06/2027	1,000,000,000
	XS2113889351	BANCO SANTANDER, S.A.	04/02/2020	04/02/2027	1,250,000,000
Number 3	XS2194370727	BANCO SANTANDER, S.A.	23/06/2020	23/06/2027	1,000,000,000
	XS2168647357	BANCO SANTANDER, S.A.	05/05/2020	05/01/2026	1,500,000,000
Number 4	XS2063247915	BANCO SANTANDER, S.A.	04/10/2019	04/10/2026	1,000,000,000
	XS2078692105	SANTANDER CONSUMER FINANCE, S.A.	14/11/2019	14/11/2026	500,000,000
Number 5	XS1820037270	BBVA, S.A.	14/05/2018	14/05/2025	1,000,000,000
	XS2058729653	BBVA, S.A.	15/11/2019	15/11/2026	1,000,000,000
Number 6	XS1820037270	BBVA, S.A.	14/05/2018	14/05/2025	1,000,000,000
	XS1956973967	BBVA, S.A.	28/02/2019	28/02/2024	1,000,000,000
Number 7	XS1682538183	IBERDROLA FINANZAS, S.A.	13/09/2017	13/09/2027	750,000,000
	XS1726152108	IBERDROLA FINANZAS, S.A.	29/11/2017	29/11/2029	735,000,000
Number 8	ES0213679JR9	BANKINTER, S.A.	06/02/2020	06/10/2027	750,000,000
	ES0213679HN2	BANKINTER, S.A.	08/07/2019	08/07/2026	750,000,000
Number 9	XS2250026734	INSTITUTO DE CRÉDITO OFICIAL	28/10/2020	30/04/2026	500,000,000
	XS2173111282	INSTITUTO DE CRÉDITO OFICIAL	13/05/2020	30/04/2024	500,000,000
Number 10	XS1979491559	INSTITUTO DE CRÉDITO OFICIAL	09/04/2019	31/01/2024	500,000,000
	XS1915152000	INSTITUTO DE CRÉDITO OFICIAL	26/11/2018	31/10/2023	500,000,000
Number 11	XS1725677543	INMOBILIARIA COLONIAL, SOCIMI, S.A.	28/11/2017	28/11/2025	500,000,000
	XS1808395930	INMOBILIARIA COLONIAL, SOCIMI, S.A.	17/04/2018	17/04/2026	650,000,000

Source: CNMV. Green shaded cells correspond to green bond issues. The unshaded cells correspond to conventional bonds.

