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Regulatory Implications of the Supervision and Management of Liquidity Risk: An Analysis of Recent Developments in Spanish Financial Institutions

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Abstract: The aim of this paper is to analyze the evolution of bank liquidity regulations, considering the global regulatory framework applicable to financial institutions, from the beginning of the banking and liquidity crisis in 2007–2008 to the present. The new liquidity requirements under Basel III regulations are defined. An analysis is made of the recent evolution of credit institutions in Spain from different banking prisms to determine how the new banking regulation and supervision, following the start of supervisory powers by the European Central Bank at the end of 2014, has affected them. The methodology applied has been firstly the literature review, followed by a compilation and analysis of the financial and statistical evidence available on the main Spanish financial institutions, from the European Central Bank and the Bank of Spain, as well as information published by other agencies and the financial institutions themselves. It concludes with a reflection and analysis of the outlook for the sector once the most recent impacts, derived from COVID-19, and the supply crisis with the rise in global inflation and the increase in interest rates have been overcome. It can be stated that credit institutions in Spain have significantly improved their liquidity position over the last 15 years.

Keywords: credit institutions; risk; regulation; liquidity; banking



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1. Introduction

It is clear that regulating bank liquidity—that is, a bank’s ability to fund increases in the volume of assets on its balance sheet and meet its payment obligations when due, without incurring unexpected losses; or, alternatively, a bank’s ability to hold or obtain sufficient short-term liquid assets to meet the contractual maturities of its short-term debts; or its investment needs, not to mention various regulatory requirements ([Banco de España n.d.](#); [Orsikowsky 2002](#))—is important in today’s economic environments. However, these definitions are highly complex in their content, given the critical role that banks play in the financial system, and thus in today’s economy, as a catalyst for growth and citizens’ welfare ([Ávila Ramírez 2022](#); [Sutil 2023](#)).

Adequate liquidity risk management is extremely important because the lack of liquidity of a single institution can have repercussions for the whole system ([Cossío and Martín 2001](#)). It is necessary at this point to understand the role played by financial institutions and therefore to understand, subsequently, the importance of liquidity for a bank, since the main tasks and functions as a financial institution can be briefly summarized as follows ([Calvo Bernardino and Martín de Vidales Carrasco 2014](#); [Calvo Bernardino et al. 2018](#)):

- Channeling money from economic agents with a surplus, the savers or investors, to the economic agents demanding this liquidity who need to finance themselves in order to develop their investment projects.

- Transforming maturities, so that customers deposit money with the bank with mostly immediate availability and the bank lends it over the medium to long term.
- The transformation of money in its different forms of financial liabilities, such as deposits or debt securities into multiple and distinct financial assets, such as loans and mortgages.
- Provide the economy with levels of confidence and stability that allow money to flow, transform, and enable payment systems to function normally.

The various recent crises over the last 15 years, which began with the growing instability of the financial markets in mid-2007, have increased the complexity of liquidity risk management and its appropriate management, and have had an impact on the growing importance of liquidity management for the proper functioning of the financial markets and, in particular, the banking sector. Prior to 2007, the turning point, which marked the beginning of a period of instability that has lasted until the present day, asset markets were previously unparalleled in the modern economy, with a large availability of low-cost funding (Fernández 2015; Alonso García 2019).

Therefore, after the severe financial crisis of 2008, supervisors and regulators worldwide saw the need to regulate liquidity, as they understood that not having this risk sufficiently controlled could lead to a new financial crisis because, if banks incur liquidity risk, they would not be able to fulfill their mission of financing the economy, giving rise to a new economic crisis. In this sense, the more recent financial crisis events in 2023 have certainly represented an important test regarding the regulatory framework in place since the global financial crisis of 2008 (Bank of England 2023). That is, while those bank failures happened outside of the EU and were driven by different risk factors, they resulted in a crisis of confidence in banking systems globally and required relevant public interventions (Valderrama et al. 2023). Research questions are now being investigated on whether the current EU crisis management framework is appropriate to deal with risky situations and whether potential changes could be implemented (Blinder 2023).

Certainly, some improvements can be made through the implementation of the recent Commission proposals contained in the crisis management and deposit insurance. Thus, in the aftermath of the Spring crisis, the European Bank Authority started reflections by identifying the issues exposed by recent crisis events and assessing if supervisory changes more specific to the EU framework should be considered (Blinder 2023). These considerations point to the fact that recent crisis cases have further emphasized the importance of a strong, effective supervisory and crisis management framework to maintain trust in the system and avert contagion (Federal Reserve 2023). Particularly, focusing on their impact on liquidity risk management and the crisis management framework, some relevant aspects emerging from the recent crisis cases are related to liquidity and funding; recent events have highlighted the importance of being able to access appropriately funded public facilities as essential elements to restore trust and confidence (Standard & Poor's Global Ratings 2023). From the issues which emerged from the crisis, the main aspect of liquidity needs in resolution and assessment of resolvability capabilities have emerged as crucial (Bank of England 2023). Thus, the reflections on the recent crisis have accelerated the need to have a plan that can be effectively 'used/implemented' and 'adaptable' to the prevailing circumstances (Moody's Investors Service 2023). Strengthening of the crisis management framework remains a relevant step to progress towards consistency and avoidance of fragmentation and divergences across the Banking Union (Blinder 2023).

Given the descriptive nature of this research, this work hypothesizes that liquidity risk supervision is built on a regulatory approach that considers some key indicators for management in financial institutions. Knowledge of the reasons that led to this tension in the markets, and which have entailed a significant change in the management of liquidity by financial institutions—largely motivated by regulatory developments, as well as present and future challenges—have served as inspiration for the justification of this paper. In order to understand the banking sector in Spain and to determine the degree of banking intermediation and concentration, Monetary Financial Institutions (MFIs) can first be

defined as credit institutions resident in the area under Community law, as well as resident financial institutions whose business is to receive deposits or close substitutes for deposits from entities other than MFIs, and to grant credit or invest in securities for their own account, at least in economic terms.

The aim of this research is to study the evolution of liquidity in Spanish credit institutions supervised by the European Central Bank over the last 15 years, paying special attention to long-term liquidity indicators, such as the LCR (Liquidity Coverage Ratio) and the NSFR (Net Stable Funding Ratio). The research focuses on the context of banking regulations and supervision in Spain, and at the European Union level, in order to assess the effectiveness of these measures in maintaining financial stability and preventing banking crises.

2. An Approach to Liquidity Risk and Liquidity Risk Management Principles

The concept of liquidity allows for a multiplicity of concepts and classifications, but a taxonomy that allows for a simple understanding of the concept is one that distinguishes the following aspects ([Domingo Ortuño 2010](#)):

- (a) Funding liquidity and market liquidity, given that the concept of liquidity has, initially, two dimensions: funding liquidity, which measures an institution's ability to meet its payment obligations as agreed; and market liquidity, which measures an institution's ability to generate or unwind positions in a given market situation.
- (b) Timeframes, which commonly consider the short term, about one month, although it could be extended to three months; the medium term, which is usually considered up to one year; or, exceptionally, up to eighteen months, the usual timeframe in which they measure; and the long term above this time dimension.
- (c) Liquidity in normal conditions and liquidity in crisis situations. The former considers environments with normal market conditions, and applies going concern criteria to the institution. Liquidity in crisis situations is situated in environments of generalized, structural or systemic market crises.

In this line of analysis, bank liquidity risk occurs when a financial institution is unable to meet its customers' repayment and settlement requests because the bank does not have sufficient liquid reserves to meet its financial obligations. The situations or scenarios in which such liquidity crises may occur can be listed according to the following classification, considering first those of lesser severity or impact and greater probability, and ending with those of greater severity and less probability ([Banco de España 2017](#)):

- Situations arising from the institution's own daily operations, and/or minor systemic crises.
- Situational crises originating internally or externally to the institution itself, in which liquidity needs arise due to temporary mismatches between cash inflows and outflows arising from normal operations and/or the uneven evolution of asset and liability transactions.
- Severe systemic crises, caused by factors external to the financial institution, including macroeconomic crises, and where liquidity needs are caused by capital market or payment system dysfunction.
- Severe specific or intrinsic crises, with severe liquidity needs caused by factors internal to the financial institution that generate loss of confidence, e.g., negative rumors, a rating downgrade, insufficient capital or a large reduction in earnings.
- Combined crisis, which contains the liquidity needs caused by factors internal and external to the financial institution, being the worst-case scenario.

In February 2008, the Basel Committee on Banking Supervision published the document *Liquidity Risk: Management and Supervisory Challenges* ([Basel Committee on Banking Supervision 2008a](#)), which set out for the first time the problems that many banks had experienced as a result of ignoring a number of basic liquidity risk management principles. In September of the same year, the document *Principles for Sound Liquidity Risk*

Management and Supervision ([Basel Committee on Banking Supervision 2008b](#)) was published, which, through 17 principles, detailed the framework for the sound management of a credit institution's liquidity risk, highlighting principle 1 (fundamental principle for the management and supervision of liquidity risk):

“A bank is responsible for sound liquidity risk management. A bank should establish a robust liquidity risk management framework that ensures that the bank maintains sufficient liquidity, including a cushion of unencumbered, high-quality liquid assets, to withstand a range of stress events, including those that result in the loss or impairment of both secured and unsecured funding sources. Supervisors should assess the adequacy of a bank's liquidity risk management framework and liquidity position. Supervisors should take appropriate action if they identify weaknesses in either of these areas in order to protect depositors and limit potential damage to the financial system”. ([Basel Committee on Banking Supervision 2008b](#))

The remaining principles are grouped together to set out guidelines for good governance of liquidity risk management (principles 2–4), risk measurement and management (principles 5–12), public disclosure (principle 13), and the role of supervisors (principles 14–17).

The Basel III accords were established in 2010 and introduced new measures to address liquidity risk. The main objective of these accords was to improve the ability of financial institutions to withstand liquidity shocks through a tighter adjustment of the maturity profile of inflows and outflows to the stock of high-quality liquid assets. As a result of these changes, more stringent liquidity buffer requirements have been established, resulting in a more stable funding structure for financial institutions, with higher liquidity demands in the short and medium term.

Ultimately, the Basel III accords seek to ensure the stability of the financial system and the ability of banks to cope with potential market shocks in the area of liquidity.

Two new standards were initially considered by the banking industry as excessively stringent, so their adoption has taken place gradually. The first of these is the liquidity coverage ratio (LCR), which seeks to increase the stock of high-quality liquid assets in the very short term, so that financial institutions can cope with defined stress situations extending up to one month. On the other hand, the second standard, known as the net stable funding ratio (NSFR), has a more structural and long-term focus. It aims to ensure stronger and more stable funding through medium- and long-term liabilities, in order to cope with protracted stress situations or scenarios. Both standards aim to strengthen the stability and soundness of the financial system, and to ensure that banks can cope with adverse liquidity situations.

In addition to these two standards, a set of tools for monitoring and assessing liquidity risk exposures, as well as the review of an adequate level of information exchange between supervisors, were introduced in a complementary manner.

3. Regulatory Framework and New Instruments: Regulation and Supervision of Liquidity Risk

Following the publication of Basel III, which included the International Framework for Liquidity Risk Measurement, Standardisation and Monitoring in December 2010 (BASEL, 2010), a period of consultation and regulatory development began ([Ibáñez Sandoval and Domingo Ortuño n.d.](#)). The European Commission issued a series of guidelines in July 2011, and presented a legislative proposal called CRD IV (Directive 2013/36/EU and EU Regulation No 575/2013), with the aim of adopting the international liquidity framework proposed by Basel III in the European Union. Importantly, Basel III addresses for the first time the issue of banks' liquidity on a stand-alone basis. In contrast, Basel I (1988) focused on credit risk, while Basel II (2004) introduced operational risk and market risk. With the required precision, Basel III specifically introduces liquidity risk.

The initial rule consisted of a Directive ([Directive 2013/36/EU 2013](#); CRD IV), which would set out the Principles for Sound Liquidity Risk Management and Supervision, and a Regulation (EU Regulation No 575/2013, CRR) with the minimum standards presented above, i.e., the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). As for the implementation timetable, it was in line with the initial Basel proposal, i.e., compliance with the LCR in 2015 and the NSFR in 2018.

The LCR was agreed in 2010 as part of Basel III, and was scheduled to come into force on 1 January 2015. However, in 2013, the Basel Committee on Banking Supervision agreed to delay its entry into force to 1 January 2018, in order to allow banks to adapt to the new rules. Similarly, the NSFR was also agreed in 2010 as part of Basel III, and was scheduled to come into force on 1 January 2018. However, in 2017, the Basel Committee on Banking Supervision (Basel, 2017) agreed to delay its entry into force to 1 January 2021, in order to allow sufficient time to adapt to the new rules. In addition to the Directive and Regulation, a series of Commission Delegated and Implementing Acts (EU Implementing Regulation No 1423/2013) are published to give full effect to the single rulebook on banking. These specify how competent authorities and institutions should comply with the obligations set out in CRD IV/CRR. In addition, in December 2017, the Commission proposed a revision of the prudential framework for investment firms.

Following the publication of Basel III, a period of consultation and regulatory development began, which led the European Commission to issue a proposal in July 2011. This proposal, known as CRD IV ([Directive 2013/36/EU 2013](#); EU Regulation No 575/2013), sought to adopt the international liquidity framework proposed by Basel III in the European Union. Subsequently, Directive 2013/36/EU (CRD IV) was amended with Directive (EU) 2019/878 (CRD V), while Regulation 648/2012 (CRR), which is binding and directly applicable in all EU member states without the need for implementing measures at national level, was amended with Regulation (EU) 2019/876 (CRR 2) and Regulation 2020/873. In Spain, the initial transposition of Directive 2013/36/EU into Spanish law was carried out by Royal Decree-Law 14/2013, Law 10/2014, Royal Decree 84/2015, and Bank of Spain Circular 2/2014, as well as Circular 2/2016. In 2021, Directive 2019/878 was transposed into Spanish law through Royal Decree-Law 7/2021, Law 10/2014 (as amended), Royal Decree 970/2021 (as amended), and Circular 5/2021 (as amended).

The post-crisis regulatory framework introduced multiple requirements on banks' capital and liquidity positions, sparking a discussion among policymakers and academics on how the various requirements interact with one another. Literature review in this aspect reinforces the discussion on the interaction of different regulatory metrics by examining the interaction between the liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) for banks in the euro area ([Ananou et al. 2021](#)).

There has been some discussion among policymakers and academics on whether the two requirements are indeed complementary, and whether both are needed to ensure sound liquidity profiles and management ([Mankart et al. 2018](#)). The more recent literature regarding these indicators is that the two liquidity requirements are complementary and constrain different types of banks in different ways, similarly to the risk-based and leverage ratio requirements in the capital framework ([Calomiris et al. 2015](#); [Goel et al. 2017](#)). This consideration underlines the need for a faithful and consistent implementation of both measures across all major jurisdictions, to maintain a level playing field at the global level and ensure that the post-crisis regulatory framework delivers on its objectives.

3.1. Liquidity Coverage Ratio (LCR)

The first ratio, known as the Liquidity Coverage Ratio ([Basel Committee on Banking Supervision 2013](#)), aims to ensure that banks have sufficient liquidity to face situations of market stress during a very short-term period, which is set at 30 days. However, this ratio is not sufficient on its own and must be complemented by adequate liquidity risk management, in line with the principles for its management and supervision explained above. Thus, the ratio pursues two main objectives: first, to increase banks' liquidity buffers

so that they can cope more safely with stressed market situations; secondly, to enable banks to have a pool of liquid assets of sufficient size to withstand liquidity stress for a period of 30 days. And it has two components: (1) stock value of high-quality liquid assets (HQLA) available in stressed situations and conditions; and (2) total net cash outflows.

The objective of the LCR is to promote short-term resilience of a bank's funding profile by ensuring that it has sufficient liquid assets to cover possible short-term liquidity outflows. In particular, the LCR specifies that a bank needs to have "an adequate stock of unencumbered high-quality liquid assets (HQLA) that can be converted into cash easily and immediately in private markets to meet its liquidity needs for a 30-calendar day liquidity stress scenario" (Basel Committee on Banking Supervision 2013). Liquidity needs over the 30-day period are calculated by multiplying outstanding balances of various types of liabilities and off-balance sheet commitments by the rates at which they are expected to be drawn down in a stress scenario, and are netted with expected liquidity inflows over the same period to calculate net liquidity outflows (Hoerova et al. 2018).

The LCR is based on traditional liquidity coverage ratio methodologies used internally by banks to assess liquidity exposures. Total net cash outflows for the scenario must be calculated for 30 calendar days. The standard requires that, in the absence of financial stress, the value of the ratio should not fall below 100% on a continuous basis: $HQLA \text{ balance} / \text{Total net cash outflows in the next 30 days} \geq 100\%$. However, during periods of stress, it would be entirely appropriate for banks to use their stock of HQLA to address potential liquidity pressures, falling below the minimum.

The LCR should be monitored by institutions on an ongoing basis to help monitor and control liquidity risk. The LCR should be reported to supervisors at least monthly, with the operational ability to increase the frequency to weekly or even daily in stress situations, at the discretion of supervisors. The reporting period should be as short as possible and ideally should not exceed two weeks. Banks should also notify supervisors immediately if their LCR has fallen, or is expected to fall, below 100%. From the supervisors' point of view, they are expected to conduct an ongoing assessment of the ratio situation, choosing the optimal measures depending on each institution and situation. Supervisors should therefore focus on the following factors:

- * Factors for which the institution may decrease the ratio below 100%.
- * Verify whether a decline is due to a cyclical market situation or to the institution itself.
- * Significance of the fall in the stock of liquid assets, as well as its frequency and possible duration.
- * Overall assessment of the institution and its risk profile.
- * Potential transmission or contagion to the system with the reduction in liquidity in the market.
- * Alternative financing measures such as through central banks.

Supervisors may determine to implement corrective measures to return to business as usual as soon as possible.

3.2. Net Stable Funding Ratio (NSFR)

The NSFR objective is complementary to the LCR in that it aims to ensure funding resilience over a longer time horizon, requiring banks to fund long-term assets with long-term liabilities and thus limit the degree of maturity mismatch. Specifically, the NSFR requires that banks' available stable funding over a one-year horizon is at least as large as the required stable funding over the same horizon, where available stable funding and required stable funding are defined as weighted fractions of liabilities and assets, respectively, as well as off-balance sheet items (Basel Committee on Banking Supervision 2013). The NSFR aims to prevent banks from excessively financing long-term assets with short-term liabilities and thus seeks to mitigate the potential for future funding stress. While the NSFR has thus far not been a binding requirement in the European Union, it has been implemented via the revised version of the Capital Requirements Regulation (CRR) published in June 2019 (Behn et al. 2019; Chami et al. 2017).

The objective of a sustainable funding structure is to reduce the likelihood that shocks to a bank's normal sources of funding will erode its liquidity position in a way that increases the risk of failure and could lead to broader systemic stress. In contrast to the LCR, the time horizon set for the NSFR (liquidity coverage ratio and liquidity risk monitoring tools) is more long term, with one year as the period to be considered. The aim is therefore to make financial institutions aware of the benefits of seeking a better balance in their sources of funding, prioritizing more stable sources of funding—such as deposit-taking—rather than recurrent wholesale funding. Another objective is to try to lengthen the average maturity of assets, avoiding potential mismatches (Fernández de Guevara et al. 2000; Pérez 2006).

The net stable funding ratio (NSFR) requires banks, individually, on a consolidated or group basis, to maintain a stable funding profile relative to the composition of their assets and off-balance sheet activities. The NSFR limits excessive reliance on short-term wholesale funding, encourages better assessment of funding risk across all on- and off-balance sheet items, and promotes funding stability. For its calculation, the NSFR is defined as the amount of stable funding available relative to the amount of stable funding required, and must be at least equal to 100% on a rolling basis: $\text{Stable funding available} / \text{Stable funding requirements} \geq 100\%$. In this sense, “available stable funding” is defined as the portion of capital and liabilities that is expected to be reliable and stable over the one-year time horizon considered by the NSFR. The amount of an institution's stable funding requirement (required stable funding) will be a function of the residual maturities, the institution's own liquidity characteristics, and the characteristics of the various assets held by the institution, as well as those of its off-balance sheet exposures. In addition, the NSFR must be reported at least quarterly, and on a time-lagged basis according to the rules established by the Basel Accords.

While there is broad agreement on the necessity of complementing regulatory capital with liquidity standards, there has recently been some discussion on whether both the LCR and the NSFR are needed. Using a simplified version of a bank's balance sheet, Cecchetti and Kashyap (2018) argue that the two types of requirements will almost surely never bind at the same time and may be treated as substitutes of each other. Specifically, they divide assets into liquid, illiquid, and other assets, and liabilities into runnable, stable, and other liabilities, and illustrate that the relative tightness of the LCR and the NSFR depends on the relative importance of other assets and other liabilities. Using a sample of UK banks, they show that the relative importance of other assets and other liabilities tends to be such that the LCR is the tighter constraint, which leads them to conclude that only one of the requirements is needed.

4. Methodology

The methodology used in this paper is based on a documentary, bibliographical, and historical-regulatory review of recent developments in Spanish financial institutions, with particular emphasis on liquidity risk management and supervision. Firstly, a detailed bibliographical review will be made of the regulations, studies, and papers published on the management and supervision of liquidity risk in the banking sector, both at national and international level, in order to understand and contextualize the theoretical framework in which this paper is framed. Next, we will compile and analyze the financial evidence and statistics available on the main Spanish financial institutions, using financial and statistical data from official sources, mainly the European Central Bank and the Bank of Spain, as well as information published by other bodies and the financial institutions themselves.

For the analysis of the data collected on the two main variables of interest (LCR and NSFR), descriptive tools and statistical techniques will be used on the basis of comparisons between Spanish financial institutions and institutions in our environment, at a consolidated level within the Banking Union (European Central Bank 2022a), both in absolute and relative terms; all this, in order to identify the strengths and weaknesses of each of them in terms of the management of this risk and its recent evolution.

This study focused on the graphic visualization and numerical analysis of the relationship between the main indicators here considered. This analysis is broadly based on existing methodologies (European Central Bank, Banking Supervision, Centre for European Policy Studies) and aims to include banks that are similar along some core characteristics. Recent papers studying the interaction between different capital requirements include [Goel et al. \(2017\)](#) and [Mankart et al. \(2018\)](#). The interaction between capital and liquidity requirements is studied by [Chami et al. \(2017\)](#), [Cecchetti and Kashyap \(2018\)](#), [Hoerova et al. \(2018\)](#), and [Behn et al. \(2019\)](#).

5. Analysis and Discussion of Results

5.1. An Overview of the Banking Sector in Spain in a Globalized Context

As regards the structure of the Spanish banking sector in recent times, it is clear that, since the entry into force of the euro as the single currency and the creation of the European Central Bank (ECB) on 1 January 1999, there has been a concentration of the sector, with a significant reduction in the number of financial and/or credit institutions (banks, savings banks, credit co-operatives) and similar Community institutions, other non-bank credit institutions, financial credit institutions, Instituto de Crédito Oficial (I. C. O.) and similar Community institutions, as well as investment funds in Community money market assets (in Spain, FIAMM, C.O.) and similar Community institutions, as well as Community money market funds (in Spain, FIAMM). In this respect, in recent years, Spanish credit institutions have undergone a series of changes in their structures with the aim of adapting to new market requirements and improving their efficiency. Some of these are as follows:

- Mergers and acquisitions, with a clear process of concentration in the banking sector, leading to the creation of larger financial groups. This has enabled credit institutions to increase their size and diversify their activity, improving their ability to compete in the market.
- Branch reductions, accelerated by technological developments and changing customer habits, which have led banks to reduce their network. Many banks have opted for digital banking and online services, enabling them to reduce costs and improve efficiency.
- Increased specialization, so that institutions have been evolving towards greater specialization in certain sectors or financial products.

Observation of the income statement of credit institutions reflects the difference between income and expenses over a given period of time ([Millán 2017](#); [Pancorbo 2017](#)), although it certainly presents a series of particularities specific to their activity, in terms of the elements that determine it and the respective margins that comprise it. In this respect, the special characteristics of banks' assets and liabilities and the major impact of non-performing loans modify the traditional approach to solvency. In terms of the interest income of Spanish credit institutions as a whole in the period 2007–2021, interest income (net interest income) has remained stable during the period under analysis, coinciding with a period of low (and stable) benchmark interest rates. Similarly, for all banks in the euro area (Figure 1), the behavior of total interest income and net interest income is similar to that of Spanish banks ([Guzmán 2019](#); [Hernández 2014](#)).

For a complete analysis and calculation of the successive banking margins (ordinary, operating: [Rodríguez de Codes 2010](#)), it is necessary to analyze the banking costs associated with the operations and business of the institutions, beyond the cost of financing (and the corresponding interest payment), and as can be seen in the following graph, the evolution of the different costs of Spanish credit institutions has been as follows:

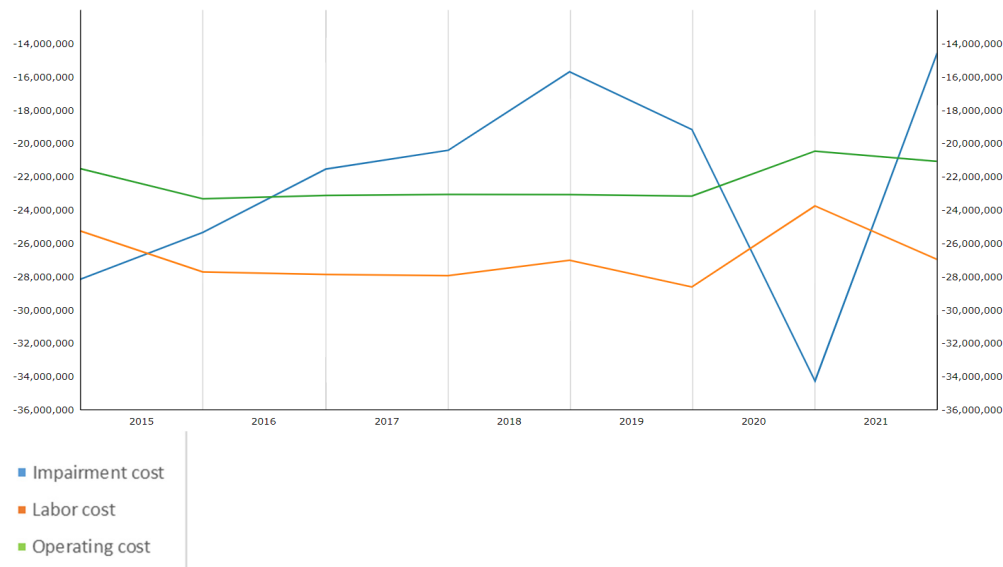


Figure 1. Evolution of the different banking costs of Spanish banks in the period 2014–2021 (in thousands of euros). ECB SDW source (2022).

As can be seen in Figure 1, the blue line corresponds to loan portfolio impairment charges, i.e., the cost of asset impairment due to the decline in quality and increase in delinquency in the loan portfolio, which makes it necessary to increase bank provisions to cover possible defaults in the same.

As can be seen in the figure, from 2014 to 2019, there was a significant reduction in the Spanish banking industry of these asset impairment losses due to various factors, such as adequate management of banking risks by institutions, a general improvement in the economic situation in Spain, mainly in the real estate market after the bursting of the bubble between 2007 and 2012, and finally, a reduction in the default of bank customers.

In 2019, the situation is reversed by the worsening of the general economic situation, the increase in unemployment, and an increase in bank delinquency. Moreover, in 2020, with the economic–financial storm and the turbulence derived from the outbreak of the COVID-19 pandemic, there is a rapid acceleration in the depreciation of credit portfolios and an increase in delinquency and defaults, basically due to the financial consequences of the pandemic and the effects of the consecutive confinements in Spain, which led to an economic paralysis not seen in decades in the Spanish economy.

In 2021, the recovery, in the form of a reduction in impairment costs, has been proportional to the increase in costs experienced in the previous year and there has been an improvement in the form of V. With regard to another of the relevant costs faced by credit institutions, namely personnel costs (in Figure 1, in orange), these have behaved very stably in the period 2014–2019, although the total number of employees of banks has fallen; this stability in costs means higher costs per employee, derived from wage increases and the respective social security contributions borne by the companies.

However, in 2020, as a result of the pandemic and the various public employment programs and other public aid granted to cushion the negative effects of the pandemic that followed (ERTE, ERE), labor costs were reduced, returning to the pre-pandemic situation in terms of costs in 2021. Finally, for the rest of the operational costs and costs of running credit institutions, the amount has remained constant over the period 2014–2019, with a reduction in the main year of the pandemic (2020) probably due to lower costs of supplies, rents, and other similar expenses related to banking operations (Pérez 2006).

A comparison of the evolution of the expenditure of Spanish institutions with that of the overall number of institutions participating in the euro area is shown in Figure 2 below:

It can be seen that the analysis carried out specifically for Spanish institutions is perfectly valid for credit institutions in the euro area as a whole, in terms of impairment

costs, labor costs, and other operating costs, although it is true that the fluctuations are more subdued, without so many variations in the evolution and especially in the impact of the pandemic.

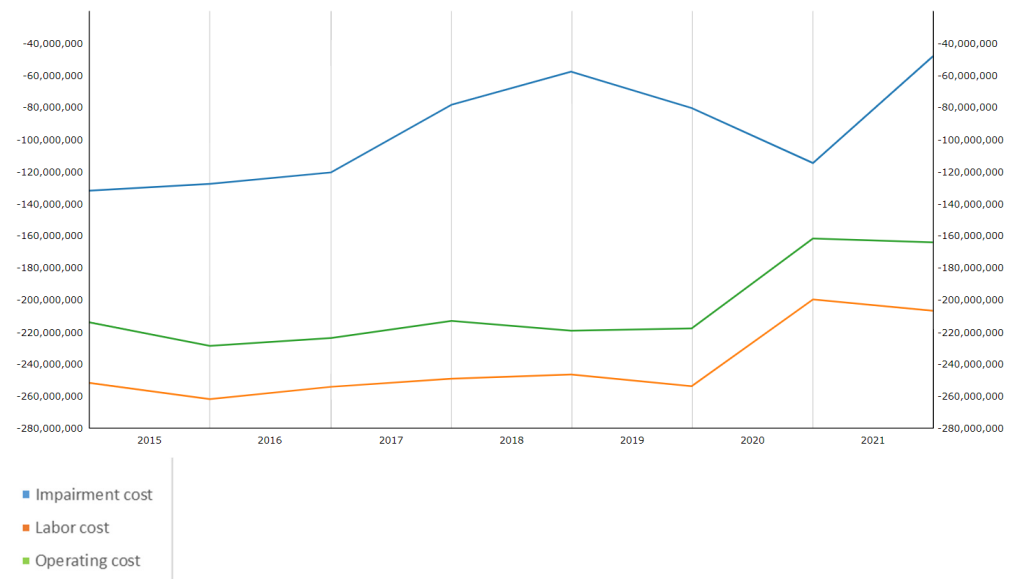


Figure 2. Developments in euro area banks' various bank costs over the period 2014–2021 (in thousands of euros). ECB SDW source (2022).

Recent developments in the income statement allow multiple readings to be made both for Spanish credit institutions and for the euro area as a whole, as detailed below:

- For the 15-year period under study, it is worth mentioning that, in the baseline year of the study in 2009, Spanish banks were making a profit, while European banks were making a loss.
- From 2009 onwards, the evolution was the opposite: European banks made profits in 2010, tripling their profits in 2012, while in those two years Spanish banks gradually reduced the positive results of their profit and loss accounts.
- Between 2011 and 2013, there was a gradual deterioration in the income statements of both Spanish and European institutions, due to the worsening of the general and Spanish economic situation in particular, which led to record losses for Spanish institutions in 2013.
- From 2014 onwards, the situation, from the point of view of results, improves, although in European banks profits improve year by year until 2020; however, the results of Spanish institutions remain stable between 2014 and 2019, a period that coincides with the process of restructuring, organization, and concentration of Spanish institutions.
- In 2020, Spanish banks will show negative results, significantly reducing the results of European institutions.
- By 2021, there was a V-shaped recovery in both cases, returning to the pre-COVID-19 crisis levels of 2019.

On the other hand, in terms of understanding the evolution of the profitability of Spanish institutions, the return on equity from 2007 to 2021 is correlated with that of the income statement. In the case of Spanish institutions, the analysis of the available information is similar to the previous one:

- From 2007 to 2011, profitability experienced a progressive reduction from positions above 12% in 2009 to zero profitability in 2011, reaching an all-time low with a negative profitability of 25.61% in 2012.
- A recovery began in 2013, maintaining a stable performance and with higher yields than the euro area, until 2019.

- Due to the pandemic in 2020, losses in Spanish institutions amount to -3.46% (compared to an EU-wide ROE of 2.30%).
- In 2021, the most pronounced recovery in Spanish institutions was in 2021, with a return of over 10% , which had not been reached in the previous 13 years.

In terms of bank asset quality, as defined by the European Central Bank ([European Central Bank 2022b](#)) in its role as financial supervisor, and considered as the loans granted to firms and households—with the interest charged on these assets as a key component of banks' revenues and profits, and the possibility that loans may not be repaid, in a timely manner, as the main risk factor—it is clear that the higher this credit risk, the lower the asset quality. In terms of this asset quality analysis, this paper focuses on the NPL ratio, as the ratio of non-performing bank loans (before deducting loan loss provisions) to the total loan portfolio. Recent developments in the NPL ratio are presented below for euro area financial institutions as a whole, and for domestic local banks in the four main euro area countries: Germany, France, Italy, and Spain.

The following comments emerge from the analysis of the above developments (see Figure 3):

- Since the end of 2007, there has been a progressive deterioration of credit portfolios in almost all euro area banks and at the level of the four major economies, with the exception of Germany.
- The peak in defaults is quite uneven, arriving in France in mid-2010, in Spain in the last quarter of 2013, in the EU area as a whole in mid-2014, and being delayed in Italy until the end of 2015.
- Since 2016, there has been a notable improvement in asset quality, as a result of the ongoing restructuring of banks' balance sheets, reducing non-performing loans through transfers and sales of non-performing loan portfolios, and thanks to the use of public-private management instruments, as has occurred in the case of Spain, with the transfer of non-performing portfolios to the SAREB.
- The current levels of NPLs are very similar in all these countries and globally, at around 2% .

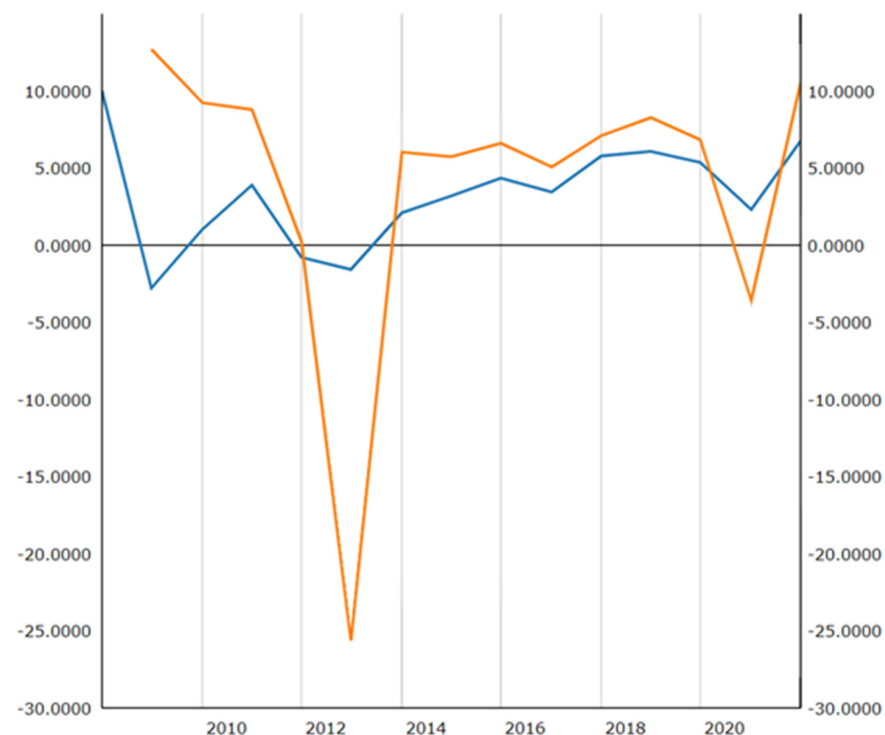


Figure 3. Evolution of the ROE of both euro area banks (in blue) and Spanish banks (in orange) for the period 2007–2021, as a percentage. Source: ECB SDW.

Another valid indicator for understanding its management processes, beyond the level of quality of the loan portfolio, is through the coverage ratio, as an expression of the protection that financial institutions have against their customers' defaulted loans; in other words, how institutions have managed the deterioration of their loan portfolios. This is calculated as the total provisions that the institution has over total doubtful loans (Ibáñez Sandoval and Domingo Ortuño n.d.; Domingo Ortuño 2010).

Figure 4 shows, similarly to the previous figure, the developments for financial institutions in the euro area as a whole, but also for institutions in the four major euro area countries.

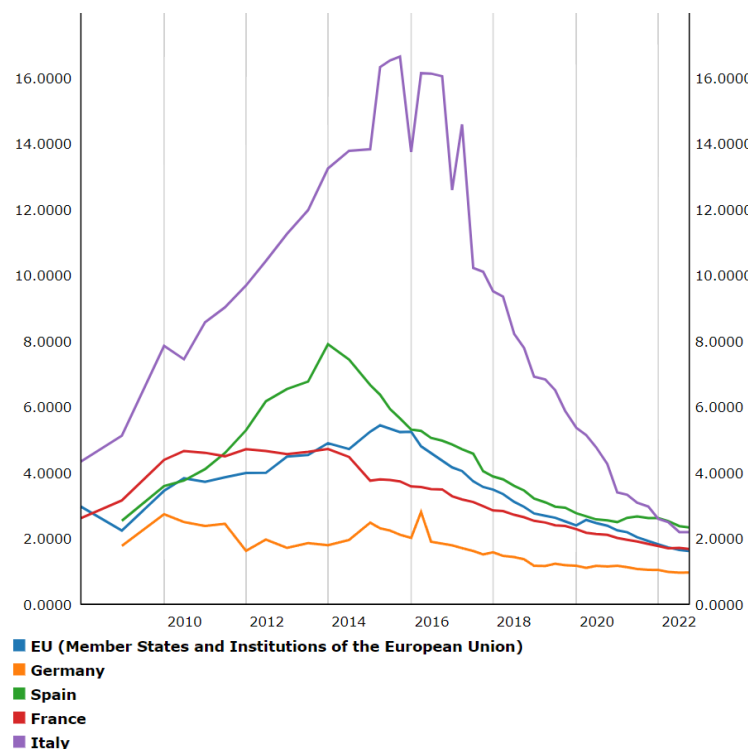


Figure 4. Evolution of the NPL ratio for euro area banks and for banks in the 4 major euro area countries: Germany, Italy, France, and Spain. ECB SDW source (2022).

It can be seen that the institutions in the countries considered, which at the beginning of the period under study (last quarter of 2014) had the lowest coverage ratios—such as Italy (45%) and Germany (35%)—have the highest ratios at the end of the study period (the latest data available, referring to the third quarter of 2022), with Germany (51%) and Italy (50.5%) also standing out with appreciable figures. In the case of Spanish institutions, the ratio for the third quarter of 2022 was 43%, while for the EU as a whole it was 45.5%.

5.2. New Tools for Liquidity Analysis: Evolution of Key Ratios and Indicators

The Liquidity Coverage Ratio (LCR) is a prudential measure that forms part of the set of reforms known as Basel III, and which was designed to ensure that banks have sufficient liquidity to withstand periods of financial stress.

Given its configuration, the ratio has generally increased in recent years and stabilized in the most recent quarters; only the increase in liquidity that occurred in the first two quarters of 2020, due to the measures and policies adopted by supervisors and institutions to deal with the pandemic in its first months, is worth mentioning.

Similarly, liquidity was traditionally measured by the ratio of liquid assets to short-term liabilities, which only considered fully liquid assets (unlike the LCR, which establishes a term of 30 days) over short-term liabilities, thus measuring the possibility or viability of credit institutions to meet these liabilities.

Figure 5 below shows data on the above for the period 1997–2022 for Spanish institutions and those of neighboring countries: Germany, Italy, and Portugal.

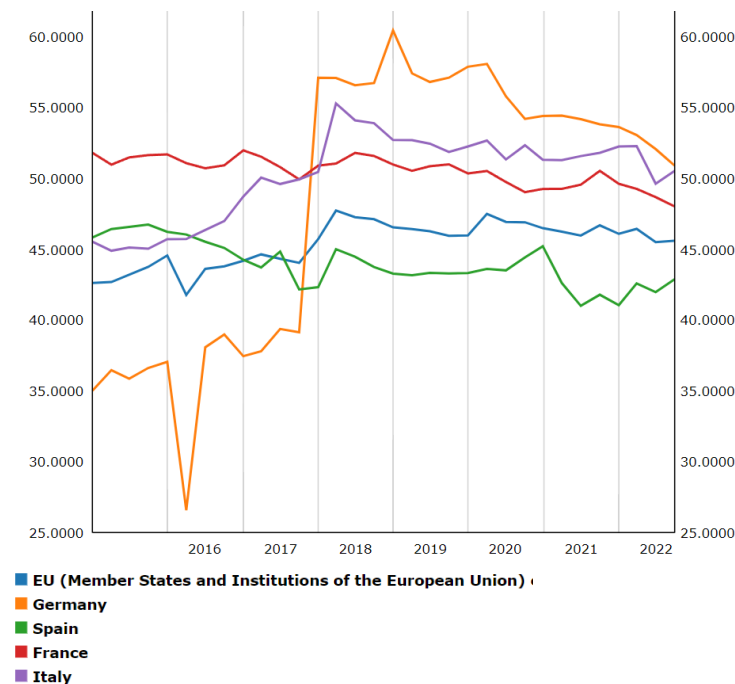


Figure 5. Evolution of the non-performing loan coverage ratio for euro area banks and for banks in the four largest euro area countries. ECB SDW source (2022).

This graph in Figure 5 explains the progressive reduction in institutions' liquidity positions until 2008, when regulators warned of this situation and the different Basel III regulations were introduced, defined in the initial chapters of this paper with the aim of improving liquidity management by financial institutions, and establishing the different requirements under analysis. Thus, the graph in Figure 5 shows the evolution of liquid assets (e.g., cash, deposits in central banks, etc.) as a proportion of total assets, in EU financial institutions (in orange) and in Spain (in blue). In this sense, this graph shows the evolution of the proportion of liquid assets as a proportion of total assets presents lower levels in Spanish institutions until the first quarter of 2020, taking into account the aforementioned measures derived from COVID-19.

Another relevant variable that constitutes the analysis of this paper is the loan-to-deposit ratio (LDR), which is used to assess a bank's liquidity by comparing a bank's total loans to total deposits during the same period. When expressed as a percentage, a high level can mean that the bank may not have enough liquidity to cover any unforeseen need for funds; conversely, if this ratio is too low, the bank may not be generating as much return as it could. Normally, the ideal loan-to-deposit ratio is 80% to 90%. That is, a ratio of 100% means that a bank lent one euro to customers for every euro received in the form of deposits. Correlated to the liquidity indicator mentioned above, but in the opposite direction, this indicator shows a decreasing structure, with a significant reduction in the first quarters of 2020 due to the effect of measures to increase liquidity and cope with the effects of the pandemic in its early stages, as well as reduced lending due to reduced economic activity.

It is worth mentioning at this point that the recent evolution of interbank lending at Spanish credit institutions has been marked by several factors. One of these has been the financial crisis of 2008, which generated great uncertainty in the financial markets and led to a significant reduction in the granting of interbank loans, together with the monetary policy of the European Central Bank which, with a policy of very low interest rates, has led to a reduction in interest rates on interbank loans and has made these loans less attractive. From the first quarter of 2020, coinciding with the onset of the COVID-19 pandemic, there is an

exponential increase in interbank lending, almost doubling the number of interbank loans. Similarly, the implementation of financial regulations, such as Basel III, has also affected the interbank market by establishing higher capital requirements for credit institutions, which has led to greater prudence in the granting of interbank loans.

In summary, interbank lending at Spanish credit institutions has undergone a complex and changing evolution in recent years, influenced by factors such as the financial crisis, the ECB's monetary policy, and financial regulation. However, they continue to be an important element in credit institutions' liquidity management and in balancing their reserves.

As mentioned in this paper on the recent evolution of the indicator defined as the net stable funding ratio, it should be noted that this is a prudential measure that is part of the set of reforms known as Basel III and was designed to ensure that banks maintain sufficient stable long-term funding to cover their long-term funding needs. Given that entry into force did not take place until 2021, there are no official data available prior to this, although, as will be indicated below, banks did consider it. The following shows these developments in financial institutions at the EU level, as well as for Spanish institutions and those in neighboring countries, Germany, France, and Italy (see Figure 6 below).

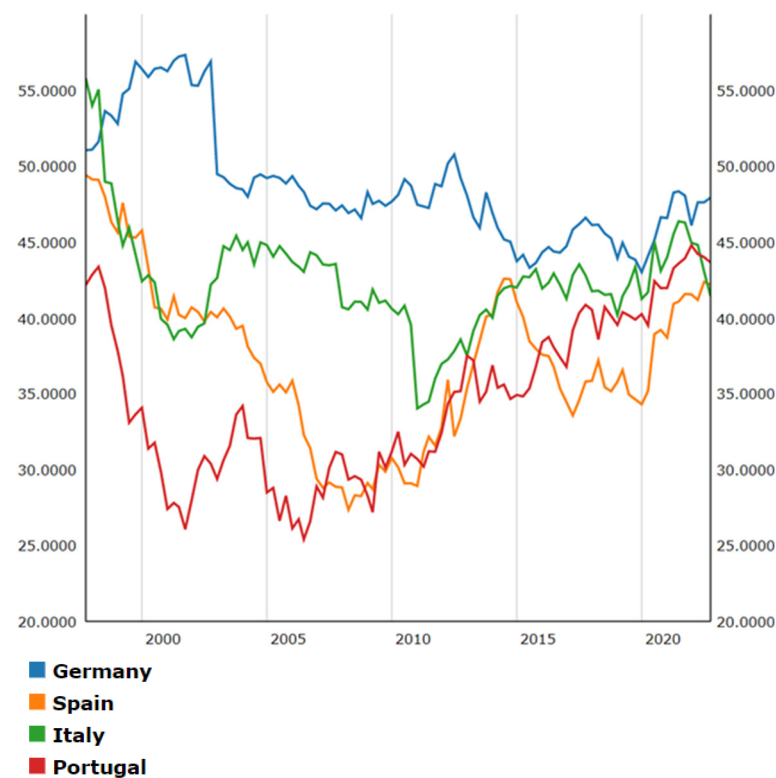


Figure 6. Evolution of the ratio of liquid assets to short-term liabilities in Spanish financial institutions and those of neighboring countries. ECB SDW source (2022).

5.3. Special Reference to Liquidity Management at Spanish Credit Institutions

With emphasis on the Spanish reality, it should be noted that the three Spanish credit institutions by volume of assets are Banco Santander, BBVA, and CaixaBank. Below is an explanation and justification for the selection of these institutions for a more detailed analysis of the recent evolution of their liquidity:

- Banco Santander: one of the world's largest banks, with a presence in more than 40 countries and assets of approximately EUR 1.4 trillion at the end of 2021. Santander has experienced steady growth in recent years and has strengthened its position through acquisitions and diversification of its financial products and services. In addition, its international expansion and focus on digital banking have enabled it to broaden its customer base (Banco Santander 2018, 2019, 2020, 2021).

- **BBVA:** the second largest bank in Spain in terms of assets, with a volume of approximately EUR 676 billion at the end of 2021. BBVA also has a strong international presence, with operations in more than 30 countries, and has focused on innovation and digital transformation to improve the customer experience and optimize its operational processes (BBVA 2017, 2018, 2019, 2021, 2022).
- **CaixaBank:** Spain's third largest bank in terms of assets, with approximately EUR 415 billion at the end of 2021. CaixaBank merged with Bankia in 2021 to strengthen its market position and improve its ability to compete with other large Spanish and international banks. CaixaBank has also been a leader in the implementation of financial technology and digital solutions, and has expanded its presence in other European markets. (CaixaBank 2018, 2019, 2021)

With regard to the evolution of the Liquidity Coverage Ratio (LCR) in Spanish institutions, below (see Figure 7) are the data and the graph showing the evolution of the liquidity coverage ratio (LCR) from the end of 2017 to the end of 2021, according to the data published by the institutions (it should be clarified that 2018 is the date on which compliance became mandatory).

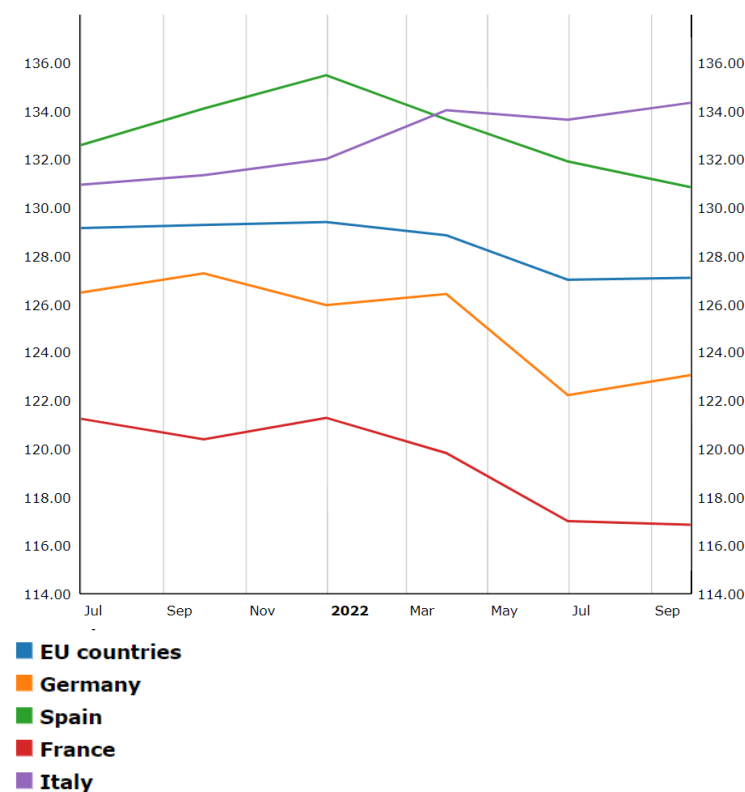


Figure 7. Evolution of the NSFR in Spanish, EU, and major neighboring countries' credit institutions from 2021 to 2022. ECB SDW source (2022).

Both BBVA and Santander show a very even situation, with CaixaBank showing the most notable increase in the short-term liquidity situation, mainly from 2021 onwards.

In terms of the evolution of the Net Stable Funding Ratio (NSFR), it should be noted that for this stable funding ratio, as indicated in the regulatory framework, there were delays in the entry into force of the regulatory requirements, to allow institutions additional time to prepare, which meant that the entry into force did not occur until 2021; therefore, there is not much information beyond that provided by the institutions themselves, which is presented in the following table and the corresponding graph (see Figures 8 and 9).

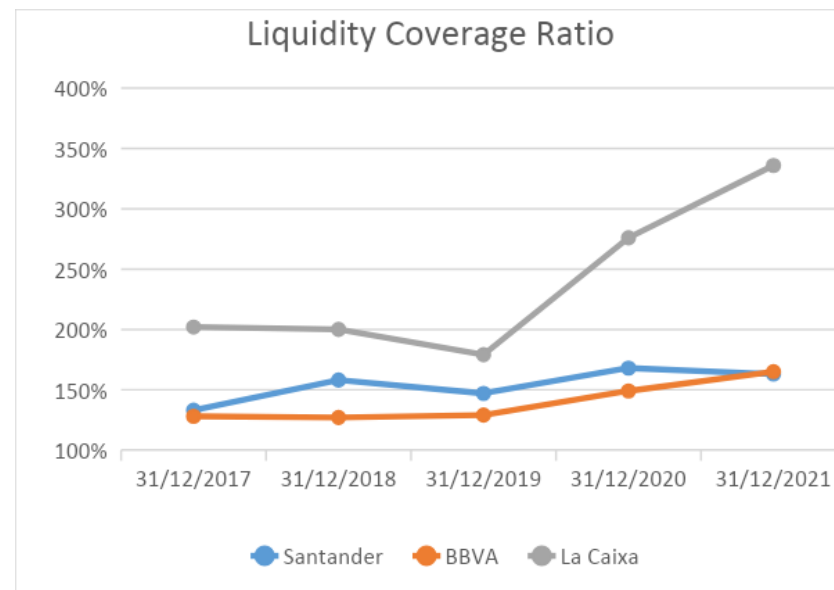


Figure 8. Evolution of the LCR ratio of the 3 largest Spanish banks. Source: annual financial reports of Banco Santander (2018, 2019, 2020, 2021), BBVA (2017, 2018, 2019, 2020, 2021), and CaixaBank (2018, 2019, 2020, 2021).

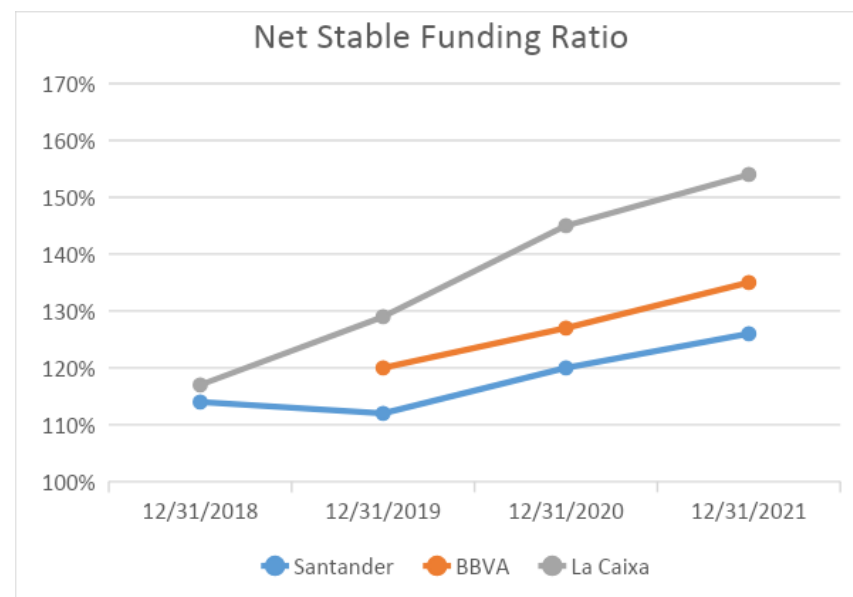


Figure 9. Main Spanish banks: Santander, BBVA, and CaixaBank. Source: annual financial reports of Banco Santander (2018, 2019, 2020, 2021), BBVA (2017, 2018, 2019, 2020, 2021), and CaixaBank (2018, 2019, 2020, 2021).

Regarding the main conclusions derived from the analysis of the liquidity situation of the main Spanish banks, in general, it is worth mentioning that these Spanish banks have faced significant challenges in recent years, due to the COVID-19 pandemic and continued regulatory pressure. In this context, liquidity has been a key factor in their management to ensure financial stability and the ability of banks to meet their obligations. Thus, in 2021, the European Central Bank (ECB) announced a temporary easing of capital and liquidity requirements for European banks, including Spanish banks, to help mitigate the economic effects of the pandemic, which has allowed banks greater room for maneuver in managing their liquidity positions.

Even so, as can be seen from the analysis of the banks' financial statements and strategic plans, they have been working to improve their liquidity position on an ongoing basis. Santander, for example, stressed the importance of prudent liquidity management and strengthened its capital position through bond issues and the sale of non-strategic assets. BBVA has also emphasized the importance of liquidity management and has improved its liquidity ratios in recent quarters, even more than Banco Santander.

CaixaBank faced the merger with Bankia, a complex process that required scrupulous management of liquidity and capital. Despite these challenges, CaixaBank has maintained a solid liquidity and capitalization position, at the highest levels of the top three banks, while continuing to implement measures to improve its financial position.

In conclusion, it follows from this analysis that liquidity is a critical factor for the financial stability of Spanish banks. Although banks have faced challenges in recent years, they have worked to improve their liquidity position and have complied with regulatory requirements. It is therefore expected that, in the near future, banks will continue to focus on prudent liquidity management to ensure their financial stability.

6. Conclusions, Limitations, Implications, and Future Directions

6.1. Conclusions

This paper examines the resilience of Spanish financial institutions that have weathered various liquidity shocks and crises, including the global financial crisis and the COVID-19 pandemic. In particular, these institutions have overcome not only the immediate effects of such events, but also the broader challenges of solvency within the sector. The restructuring process, which was particularly intense in the early years after 2008 and continues to the recent times, underlines the adaptability and robustness of the Spanish banking system. A key observation is the volatility of liquidity indicators and other measures of Spanish banks, which, as expected, have been higher than the overall European average indicators. This reflects the unique challenges and responses of Spanish institutions in the face of liquidity pressures.

The aim of this paper has been to analyze the evolution of liquidity in Spanish credit institutions over the last 15 years, paying special attention to long-term liquidity indicators, such as the LCR (Liquidity Coverage Ratio) and the NSFR (Net Stable Funding Ratio). This paper focuses on the context of banking regulations and supervision in Spain and at the EU level, in order to assess the effectiveness of these measures in maintaining financial stability and preventing banking crises.

Specifically, the introduction of long-term liquidity indicators, such as the LCR and the NSFR, has been crucial to ensure that banks maintain an adequate level of liquidity to withstand adverse market conditions and potential financial shocks. In addition, Spanish banks were found to have improved in terms of diversification of funding sources, allowing them to access a wide range of financial instruments and not to rely on a single type of funding.

Banking regulation and supervision have also been important aspects in improving liquidity at Spanish banks. Regular and rigorous supervision by banking supervisors has helped to ensure compliance with regulations and the adoption of sound liquidity management practices. Moreover, coordination between banking supervisors and central banks has allowed for monetary policy measures that have also contributed to financial stability. In this regard, this paper shows that Spanish banks have significantly improved their liquidity position over the last 15 years, thanks to the new regulations implemented after the 2008 global financial crisis, and the regular and rigorous supervision by banking supervisors.

With regard to the analysis of the results and their main conclusions, it can be stated that credit institutions in Spain have significantly improved their liquidity position over the last 15 years. This progress is largely due to the new regulations implemented after the global financial crisis of 2008, and to the progressive adoption of management measures focused on improving the liquidity position, while at the same time optimizing business processes to maximize profits. Despite the recent turmoil in financial markets, first with the

COVID-19 pandemic and, more recently, with the supply shocks that have led to higher inflation and the generalized rise in benchmark interest rates, banks have been able to maintain their improved liquidity position and profits thanks to these management measures.

Moreover, this study highlights the dynamic nature of liquidity management in this context, characterized by continuous adaptation to regulatory changes and economic shifts. Spanish banks have successfully navigated these challenges and demonstrated a strong ability to absorb liquidity shocks, even amidst the complexities of the financial sector's evolving solvency and restructuring processes.

6.2. Limitations

The information restrictions and sources available today in relation to liquidity management in financial institutions are evident. Hence, the main challenges when carrying out the work have been found in the limitations with respect to access to complete, detailed, and granular information on liquidity, in terms of the lack of public information on institutions. Thus, the following have been observed:

- Limitations on the collection of individual financial data. Most supervisory information on credit institutions is subject to regulations and rules that protect the confidentiality of the information, for reasons of sensitivity of the information provided to the market, so that the information is presented in aggregate form, either by country or distinguishing by size of the institutions.
- Information not available or incomplete. In addition to financial information, there is certain information that credit institutions are not obliged to make public, such as commercial strategies, risk models, and internal policies, etc., which has limited in-depth analysis of the institution, mainly in terms of management policies, despite the fact that institutions are becoming increasingly transparent.
- Difficulties in comparing the available information. The lack of granularity in the information available for analysis makes it difficult to establish comparisons between them and therefore to draw general conclusions.

In this respect, it is recommended that in the future, the availability of sources of information and transparency criteria that facilitate the comparative analysis of the institutions taken into account in the analysis of their liquidity management be improved.

6.3. Guidances for Supervisors and Regulators

There are a number of potential actions and recommendations for the supervisors and regulators for the near future regarding the management of liquidity by the Spanish and European entities in order to face the present and most predictable challenges, bearing in mind that it is very difficult to predict what the future holds beyond a few months/years, and that the ability to adapt, not only on the part of institutions but also on the part of supervisory/regulatory bodies, is of key importance. Regarding European banking regulators and supervisors, the following is recommended:

- Proactive regulation: Move from a reactive stance to a more proactive approach to regulation. This involves anticipating financial instability and adjusting liquidity requirements in advance, thereby fostering a more resilient banking environment.
- Innovative risk management: Integrate advanced analytical tools and technologies, such as AI and machine learning, into liquidity risk management practices. These innovations can enhance the sector's ability to predict and manage potential risks more effectively.
- Adapt to fintech and cryptocurrencies: Adapt regulatory frameworks to keep pace with emerging technologies such as fintech and cryptocurrencies. These innovations are rapidly changing the financial landscape and require an adaptive regulatory approach.
- Embrace AI and customer centricity: Recognize the growing importance of artificial intelligence in analyzing financial trends and customer behavior. In addition, adapt to the changing preferences and expectations of new banking customers, which will require a significant cultural shift in the traditional banking sector. This transformation

should focus on customer centricity, aligning banking services with the evolving needs and preferences of customers in the digital age.

Finally, this study highlights the crucial role of effective liquidity management in ensuring the stability and efficiency of the banking sector. The experience of Spanish financial institutions provides valuable insights into the challenges and successful strategies for managing liquidity risk. The need for continuous adaptation, innovation, and a proactive regulatory environment is evident to ensure that the banking sector remains robust and responsive in an ever-changing financial landscape.

6.4. Implications and Future Directions

Spanish banks face an increasingly complex financial environment, characterized by greater competition, stricter financial regulation, and a constantly changing international framework. To ensure their long-term sustainability and profitability, and once the major concentration process of recent years is over, Spanish banks need to continue with effective financial management, in particular with regard to liquidity management.

In this respect, Spanish credit institutions must develop liquidity management strategies that enable them to comply with the solvency and liquidity requirements established by financial regulation. This implies maintaining an adequate level of liquidity to cope with possible stress events and reduce the risk of default, but, at the same time, ensuring levels of profitability that make them attractive to the market and to investors.

In addition, Spanish banks need to pay attention to trends and changes in the international financial market. The adoption of disruptive technologies, such as fintech and cryptocurrencies, is changing the financial landscape and requires a proactive response from banks to remain competitive and relevant.

The foreseeable introduction of the digital euro, the progressive reduction in the use of physical currency, the development of mobile and web applications, and the explosive use of artificial intelligence tools are bringing about a fundamental change in the banking and financial environment, and in particular in the relationship between institutions and their customers. The ability of institutions to adapt and be resilient to these changes and to the possible effects of external impacts will be decisive in the development of institutions, with a view to growth or being relegated to the background due to a lack of adaptation to these changing environments.

As for financial regulation, it is expected to continue to be strict, and once normality is restored following the relaxation of the requirements derived from the application of measures arising from the COVID-19 pandemic, it is unlikely that new requirements and regulations will be introduced in the future; however, the current model has enabled institutions to achieve levels of solvency and liquidity, and improved management that allows them to face possible future turbulences with sufficient buffers to cope with them—added to the supervisory and resolution regulations—aimed at favoring the survival of institutions and eliminating the public cost to taxpayers in the event of individual or systemic crises.

In short, looking to the future, it can be concluded that, following the concentration processes of Spanish financial institutions, and the change in policies and management of both liquidity and other banking risks (such as market, credit, and interest rate risk), Spanish institutions would be prepared to face adverse situations and significant turbulence such as those that have recently occurred. In this respect, Spanish credit institutions face a challenging future, but one full of opportunities, prepared to adapt quickly to changes in the international financial environment and financial regulation; it can therefore be inferred that, by acting in this way, they will have greater chances of success and ensure their long-term sustainability.

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