THE NET STABLE FUNDING RATIO: THEORETICAL BACKGROUND AND ANALYSIS OF THE SPANISH BANKING SECTOR

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Abstract

This paper studies the Net Stable Funding Ratio (NSFR) both from a regulatory and more theoretical approach, and also from an empirical perspective focusing on the Spanish banking sector. A methodology for the estimation of the NSFR based on publicly available information is proposed, and the level of the ratio as of 2013 and 2015 across the main Spanish banks is estimated. We further analyse the specific balance sheet rearrangement measures undertaken by Spanish banks so as to enhance the NSFR, with a special focus on credit supply and deposits. Our estimates imply that the average NSFR as of December 2015 is circa 106%, and half of the sample banks meet the 100% threshold. Whilst the findings of the paper show a disparity of reallocation methods across banks, adjustment towards the NSFR does not systematically imply that banks either curtailed lending or increased deposits.

1 Introduction

Financial liquidity is of utmost importance in the management of financial institutions. It is essential for the preservation of both well-functioning institutions and a sound financial system. Liquidity risk can be defined as the risk faced by a bank by which the inability to meet short-term financial demands arises. This hazard stems from the failure to convert non-liquid assets into cash at the required moment in time and without a loss of capital or income in the process [Banks (2014)]. Liquidity risk can be further analyzed by breaking it down into two different facets: funding liquidity risk and market liquidity risk [BIS (2008b)]. The former reflects the probability that, due to the lack of funding, an entity either incurs in losses or is obliged to the refusal of growth opportunities [BIS (2008b)]. It arises from the failure to meet financial obligations when they are due [IMF (2008)] or from the inability to finance additional economic needs due to the incapacity to raise cash at short notice [Brunnemeier and Pedersen (2007)]. To wit, this aspect of liquidity relates to the fact that outflows are greater than inflows. The latter reflects the risk by which an entity is not able to unwind a market position due to the lack of market depth, tightness or resilience [Fernández (1999)], or to market imperfections, leading to transactions at "fire sale" prices.[1] Namely, market liquidity ensures that, should an entity need to sell an asset in the market, the transaction can be performed promptly within market hours and at market prices implying minimum losses of value [Nikolaou (2009)].

Managing liquidity risk is important since excessive risk taking could jeopardise the ability of a solvent institution to undertake its main role in maturity transformation and ultimately impinge on the robustness of the financial system as a whole and on the real economy [Ferguson *et al.* (2007); Diamond and Rajan (2011); Farhi and Tirole (2012)]. Funding liquidity risk is inherent to this central role of banks as intermediaries [BIS (2008a); Silva (2015)], since their balance sheets mainly embrace long-term loans, which are funded with short-term deposits. Should this mismatch not be properly managed, banks could face liquidity tensions upon demand from their depositors, given that they do not hold enough liquid assets so as to meet these claims. Conversely, holding an important buffer of liquid assets could endanger the profitability of the bank since alternative more profitable investment opportunities would be missed [Bordeleau and Graham (2010)]. The described trade-off highlights the importance of an adequate liquidity risk management, which should lie at the cornerstone of any financial institution's internal management policies.

1 *Market depth* is the ability to sustain an important number of market transactions without affecting the price of the asset. It usually relates to trading, not in the market as a whole, but within individual securities. *Market tightness* refers to the existence of narrow bid-ask spreads, that is, a market in which strong price competition on both the supply and the demand sides results into transaction prices in line with mid-market prices. Finally, *market resilience* implies that price variations from trades are quickly recalibrated and discrepancies in order flows are rapidly adjusted.

In spite of the aforementioned importance of an adequate control of liquidity risk, the recent financial crisis brought to light inefficiencies in the way how banks managed this risk [Brunnermeier (2009)]. Firstly, banks felt the shock of a sudden seize up of interbank lending markets stemming from asymmetric information [Nikolaou (2009)]: the abrupt increase in interest rates had a negative impact on the ability of debtors to repay their loans, which led to significant losses on asset-backed-securities, and to a lack of confidence within the markets arising from doubts on real exposures of banks to toxic mortgages. Gorton (2008) illustrates how complex structures of securities were shaped through successive securitizations of subprime mortgages by a long chain of financial intermediaries. This lack of confidence directly impacted the interbank market due to doubts on the quality of banks' assets, resulting on a complete freeze of interbank markets, even if the creditworthiness of borrowers had not changed [Brunnermeier (2009)]. Alongside with this, the crisis also impacted on investors' appetite for risk leading to a turn towards risk-free investments from non-financial institutions, and consequently impacting on the issuance of securities in the wholesale market [Huang and Ratnovski (2011)], up to the point that the financial crisis has been labelled a "wholesale crisis" [Gorton (2009)].

Secondly, due to the malfunctioning of these markets, banks had to resort to alternative sources in a desperate turn to get liquidity. Those institutions that followed more conservative liquidity management policies did not suffer from the described situation since they held enough liquid assets so as to service their liabilities when they fell due. Nevertheless many institutions, driven by the belief that liquidity was boundlessly obtained in the market, had undervalued the potential repercussions of liquidity mismatches incurring mainly in two mistakes: the management of liquidity on a daily basis and the maintenance of important misalignments between assets and liabilities maturities [BIS (2008b)]. These banks were obliged to resort to emergency liquidity from Central Banks [BIS (2010b)], which in turn was seen by depositors as a sign of weakness and led to the liquidation of an important number of deposits before their maturity. These bank runs further deepened the liquidity shortage of banks, and ultimately forced fire sales of their assets, extended fears among investors and precipitated additional runs [Diamond and Rajan (1999)]. These actions impinged on profit and loss accounts and eventually led initially sound and solvent banks into bankruptcy (as already described by Diamond and Dybvig in 1983 when portraying bank runs as "a common feature of the extreme crises that have played a prominent role in monetary history").

Even though regulators already focused on liquidity risk prior to the crisis, the emphasis lied primarily on non-binding recommendations and Pillar 2 measures. Moreover, deposit insurance schemes have proven not to be sufficient to limit bank runs and prevent liquidity risk and can lead to a freeze in the interbank market [Bruche and Suárez (2010)]. Therefore, in the aftermath of the financial turmoil the focus changed towards detailed and binding regulations. Specifically, the Basel Committee on Banking Supervision (BCBS) recommended the adoption of two quantitative standards with the aim of addressing the aforementioned lack of an adequate liquidity risk management [BIS (2010a)]: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR). Both ratios were embraced by the European Union (EU) through Regulation 575/2013 of the European Parliament and of the Council of 26 June 2013 *on prudential requirements for credit institutions and investment firms* (CRR). The LCR is in force since October 2015 and tries to ensure that banks hold sufficient liquid assets so as to meet net outflows throughout a period of thirty days under stressed conditions. The NSFR will come into force on 1st January 2018 and it aims at promoting long run resilience, by requiring banks to maintain a minimum level of stable funding.

The purpose of this paper is the analysis of the NSFR, both from a regulatory and more theoretical approach, and also from an empirical perspective focusing on the Spanish banking

sector. We examine the interdependence between this ratio and the other liquidity standard, the LCR, and we find that in the face of the significant connection between both, stemming from restructuring strategies that enhance both standards, fulfillment of one ratio does not automatic entail fulfillment of the other one. Consequently, even though Spanish banks nowadays meet the LCR threshold, compliance with the NSFR does not directly follow and we further estimate the current degree of observance across the Spanish banking sector.

Since the NSFR is not a binding standard yet, institutions do not disclose their level. Hence, we introduce a detailed methodology for the approximate calculation of the ratio relying on publicly available information. The NSFR is estimated for December 2013 and December 2015, covering a sample of banks that comprise twelve of the fourteen institutions considered significant within the Single Supervisory Mechanism framework. Our findings indicate that the average NSFR as of December 2015 is circa 106%, and half of the sample banks meet the 100% threshold at the mentioned point in time, representing 56% of total bank assets in the Spanish financial system. The results also lay bare that both larger and smaller banks – as measured by total assets – maintain on average a level above the future Basel requirement, whereas medium size banks do not attain the threshold. Moreover, the results suggest that Spanish banks endeavor to enhance their ratios, as indicated by the increase in average NSFR from 2013 to 2015 by 11 percentage points.

The improvement experienced by the estimated NSFR as of December 2015 is specially significant taking into account that, in the beginning of the financial crisis in December 2007 the Spanish banking system showed one of the greatest credit/deposits ratio within the euro area, notwithstanding the fact that financing obtained in bond markets presented relatively dilated maturities. As a consequence of the seize up of financial markets, it is estimated that up to the end of 2012 banks faced difficulties in order to increase the numerator of the NSFR, hence adjustments had to be performed via reductions of the denominator as loans reached their maturities. From 2012 onwards, while financial markets opened up gradually, banks still focused on the shrinkage of the denominator through maturities of loans. This paper analyzes the evolution of the ratio in the most recent period, showing an estimated improvement of 11 percentage points, as indicated by the average NSFR growth from 95% in December 2013 to 106% in December 2015.

Given the upsurge in the ratio, this paper theoretically analyzes the different reallocation strategies that institutions could undertake in order to enhance their ratios, and identifies the specific measures followed by the sample banks so as to achieve the improvement. Our findings disclose a disparity of rearrangement methods across banks, with some institutions adjusting through the asset side and some other through the liability side. Given that the analysis reveals adjustments by means of reductions in the supply of loans, and in light of the critical impact that this side effect could have on the real economy, we further assess whether improvements in the NSFR lead to contractions in lending activity. With all the caveats related to the use of a small sample, we find that the adjustment towards the NSFR does not systematically imply a contraction in credit supply. Enhancement of the NSFR by means of increasing deposits is also identified across Spanish banks. Given the impact that a potential “war for deposits” could have on banks’ funding costs and on financial stability, the relationship between the NSFR and deposits is further assessed. We find that enhancements of the NSFR do not necessarily lead to increases in deposits.

Regulators and the literature have also focused on the analysis of the NSFR from an empirical perspective. A detailed study of the NSFR was carried out by the European Banking Authority (EBA) in 2015, including a description of compliance with the NSFR for a

representative sample of banks within the EU and an evaluation of the impact of adjustments to compliance on lending. However, the EBA presents the results at an aggregated level, hence an analysis of specific institutions cannot be performed. The International Monetary Fund also calculates the NSFR for a variety of banks across the globe [Gobat *et al.* (2014)], but regarding Spain only depicts the result of the two larger Spanish banks. To the best of our knowledge a detailed study of the NSFR focusing on the Spanish banking sector has not been carried out, and this is how this paper will contribute to the literature.

The remainder of this paper is organized as follows: Section 2 presents the theoretical background and introduces the two liquidity ratios and the interactions between them, alongside with an analysis of rearrangement measures that banks could embark upon so as to enhance the NSFR. In Section 3 we estimate the level of the NSFR across Spanish banks, assess the specific reallocation strategies embedded in the enhancement of the ratio, and further evaluate the impact of the NSFR on lending activity and on deposits. Section 4 concludes the paper.

2 Institutional and theoretical background

This section presents a view of the current design of the NSFR and the LCR and elaborates on the interactions between both liquidity standards, focusing on the implications that compliance with one ratio has on the other one alongside with the effect of enhancements of one ratio on the other one.

2.1 UNDERSTANDING THE LIQUIDITY RATIOS

2.1.1 Design of the LCR and the NSFR

The aftermath of the 2007 financial crisis brought to light the importance of having a framework of prudential regulation centered not only around capital requirements, but also around liquidity. As a consequence, the Basel Committee introduced the aforementioned liquidity standards in 2010. The final objectives pivoted on relaxing the excessive reliance of banks on the wholesale market along with reducing excessive holdings of short-term illiquid assets. Both the LCR and the NSFR are designed as complementary ratios, but each of them attempts to improve a specific facet of liquidity risk management.

The **LCR** was first published by the BCBS in December 2010 as part of the Basel III reform package, and afterwards revised in January 2013. In the EU, the LCR was introduced in the CRR, but it did not include detailed specifications on the ratio. On 10 October 2014, the EU Commission issued a Delegated Regulation on the Liquidity Coverage Ratio, implementing article 412(1) of the CRR, which presented detailed guidance on calculations of the ratio and timeline of implementation. The Delegated Regulation ruled that the ratio would become binding in October 2015 with a minimum requirement of 60%, gradually increasing towards the 100% target in 2018, one year ahead of Basel Committee recommendation.

The LCR aims at promoting short-term resilience by requiring banks to hold a stock of High Quality Liquid Assets (HQLA) that will allow them to withstand a money market breakdown for a period of thirty days. Namely, it sets the minimum buffer of HQLA that banks should maintain in order to meet net expected outflows under stress conditions during the mentioned period of time. The ratio is defined as follows:

$$LCR = \frac{HQLA}{\text{Net Outflows}} \geq 100$$

HQLA embraces three categories of assets: Level 1 encompasses assets of the greatest quality and the highest level of liquidity, and that can therefore be included in the ratio without a limit. Assets such as holdings of sovereign debt or claims against Central Banks would be included in this category. Level 2A includes good quality assets, yet less liquid

than the previous category. Assets such as covered bonds meeting certain requirements or bonds issued by non-financial institutions with credit rating 1 would be included in this category. Finally, level 2B comprises other liquid assets such as asset-backed-securities or corporate debt with credit rating 2 or 3, which should be capped at 15% of total stock of HQLAs. It is also worth mentioning that the amount of level 2 assets should not entail more than 40% of total HQLAs.

Net outflows are intended to measure cash outflows within a thirty-days stress scenario minus cash inflows, taking into account that the latter cannot imply more that 75% of total expected outflows. Consequently, net outflows are defined as follows:

$$\text{Net Outflows} = \text{Outflows} - \min(\text{Inflows}; 75\% * \text{Outflows})$$

The LCR regulation endeavors to stress the liabilities outflows that the entity could potentially face within the previously mentioned period given a severe market scenario. For this purpose a range of weights have been defined for the different liability items taking into account the source of the funding, the stability and the type of collateral. With the aim of making compliance with the LCR less burdensome for banks, liquidity inflows are allowed to partially offset cash outflows. This source of liquidity comprises expected cash inflows within the next thirty days meeting clearly defined criteria as stated in the Delegated Regulation: entities can only consider contractual inflows from exposures that are not past due and for which the credit institution has no reason to expect non-performance.

Annex 1 presents a summary of the different assets included in each level of HQLAs along with the components of net outflows.

The second liquidity ratio, the **NSFR**, was first described by the BCBS in December 2009, and it was included in the Basel III agreement in December 2010. Afterwards, in January 2014, the BCBS published a consultative document as a revision to the draft published in 2010, and a final version of the NSFR agreement was released on 31 October 2014. BCBS intends to implement the NSFR as a minimum standard by 1 January 2018. In the EU, the NSFR was introduced in the CRR. Specifically, on the basis of articles 510 (1) and (2) of the CRR, the EBA reported to the EU Commission in June 2015 proposing a specific methodology for the calculation of the NSFR. The Commission, considering the EBA report, is mandated to submit a legislative proposal on the NSFR final calibration by 31 December 2016.

The NSFR constitutes a structural measure that aims at fostering longer-term stability by incentivizing banks to adequately manage their maturity mismatches by funding long-term assets with long-term liabilities. The ultimate goal of this ratio is twofold: on the one hand, it tries to guarantee that given a stress scenario the bank has enough stable funding so as to continue granting loans, ensuring that the ability of the bank to undertake its main activity is not hampered [Domingo (2010)]; on the other hand, it guarantees that the confluence of maturities of short-term liabilities and potential advanced maturities of longer-term liabilities does not provoke additional market tensions. The ratio is defined as follows:

$$\text{NSFR} = \frac{\text{Available Stable Funding}}{\text{Required Stable Funding}} \geq 100$$

The Available Stable Funding (ASF) comprises those sources of funding – capital and other liabilities – which can be deemed stable over a period of time of one year. The Required Stable Funding (RSF) primarily encompasses those assets than can be considered illiquid over the above-mentioned period of time, hence needing to be matched with stable sources of funding.

The ASF feeds the numerator of the NSFR with different graduations, depending on the degree of stability. As previously indicated, at EU level the fine-tuning of the ratio is not yet finalized; hence we take the final Basel III framework published in October 2014 as a benchmark. The calibration of ASF is accomplished by dividing banks' capital and liabilities into five categories, each of them denoting a specific degree of stability and involving a certain percentage. Regulatory capital and liabilities with maturity greater than a year are considered the most stable sources of funding, since they imply a permanence in the balance sheet superior to the time horizon of the NSFR. Hence, they receive a weight of 100% in the computation of ASF. As long as deposits are concerned, a similar focus to the one embraced in the LCR was taken, applying a weight of 95% to stable deposits and 90% to less-stable ones. Finally, liabilities that mature within one year require to be matched by stable financing at a rate of either 50% or 0%, reflecting the probability of their renewal. It is worth mentioning the treatment of repurchase agreements *(repos),* since the assigned weight varies depending on the counterparty: repo transactions carried out with a financial institution are deemed completely unstable, hence receiving an ASF weight of 0%.[2] In contrast, the same transaction performed with a non-financial counterparty receives a more lenient treatment and enters stable funding with a weight of 50%.

The RSF is made upon those assets with residual maturity greater than a year along with those assets and off-balance sheet activities that can be considered illiquid during the time horizon of the NSFR calculation, thus needing to be backed by stable financing. Furthermore, it takes into account those short-term assets that should be renewed as part of the bank's financial intermediation role (primarily loans), given that the NSFR safeguards banks' main activities, and granting loans constitutes one of them. Consequently, financial institutions' assets are sorted into eight different categories, each of them entering into the NSFR's denominator with different weights: for instance, whereas cash or claims on central bank do not require any stable financing whatsoever, HQLA considered as such for the purpose of the LCR receive weights than span from 5% for Level 1 assets to 15% or 50% for Level 2 subcategories A and B respectively. Insofar as mortgages are concerned, they should be mirrored by stable sources up to a percentage of 65% (for high quality mortgage loans entailing a risk weight of 35% or less), or 85% (for riskier mortgages demanding capital at a rate of 50% or more). On the other side of the spectrum, fixed assets or non-performing loans should be 100% backed by long-term sources of funding. The treatment of *reverse repos* should also be pinpointed.[3] Similar to the ASF treatment for *repos* studied above, required stable financing depends on the counterparty: *reverse repos* with financial institutions demand 10% or 15% stable funding, whereas non-financial counterparties require 50%.[4]

The specific weighting schemes for both ASF and RSF are summarized in Annex 2.

2.1.2 Interactions between the NSFR and the LCR

After analyzing the main set-up of the NSFR and the LCR, potential interactions between both are assessed. Even though the different objectives sought by both regulatory measures were previously highlighted, the implicit interaction between both can be analysed along two dimensions:

2 *A repo* is a transaction by which an entity A sells a security to a counterparty B at a given point in time t = 0, and simultaneously agrees to buys the security back from B at a given point in time t = 1. Through this operation, which resembles a secured loan granted by B, entity A obtains liquidity.

3 *A reverse repo* is the name that a repurchase agreement receives when analyzed from the point of view of the buyer of the security (the lender of cash). That is, if entity B buys a security from counterparty A and simultaneously agrees to sell it at a higher price at a specific future date, B is said to have concluded a reverse repo transaction.

4 Weight of 10% will apply for reverse repos secured against Level 1 assets; weight of 15% otherwise.

— On the one hand, it could be thought that compliance with one ratio automatically results into compliance with the other one.

— On the other hand, it could be believed that improvements of one of them positively flow into enhancements of the other one.

The validity of the **first statement** is assessed through an example. Given the following hypothetical balance sheet, the requirements of each of the items as imposed by the LCR and the NSFR can be compared:

HIPOTHETICAL BALANCE SHEET (EXAMPLE 1) TABLE 1

Assets		Capital and liabilities	
HQLA	64	Capital	60
Level 1 - cash	34	Stable Deposits < 1 year	150
Level 2A - covered bonds	20	Less Stable Deposits < 1 year	75
Level 2B – listed shares	10	Deposits > 1 year	50
		Interbank market	40
Non HQLA – Non-performing loans	341	Other liabilities > 30 days & < 1 year	20
		Other liabilities > 1 year	10
	405		405

SOURCE: Author's elaboration.

LCR AND NSFR REQUIREMENTS FOR LIABILITIES (EXAMPLE 1) TABLE 2

	Liabilities	Run-off Rates (%)	Contribution to ASF (%)	Resulting Net Outfow	Resulting ASF
Capital	60	0	100	0	60
Stable Deposits < 1 y	150	5	95	8	143
Less Stable Deposits < 1 y	75	10	90	8	68
Deposits > 1 y	50	0	100	0	50
Interbank market	40	100	0	40	0
Other liabilities > 30 d & < 1 y	20	0	50	0	10
Other liabilities > 1 y	10	0	100	0	10
	405			55	340

SOURCE: Author's elaboration.

LCR AND NSFR REQUIREMENTS FOR ASSETS (EXAMPLE 1) TABLE 3

	ASSETS	Contribution to HQLA (%)	Stable Funding Requirement (%)	Resulting HQLA	Resulting RSF
HQLA	64				
Level 1	34	100	0	34	0
Level 2A	20	85	15	17	3
Level 2B	10	50	50	5	5
Non HQLA	341	0	100		341
	405			56	349

SOURCE: Author's elaboration.

Table 2 presents the treatment that each of the items of the liabilities side of the balance sheet would receive for its consideration as either a potential source of LCR outflows (therefore feeding the denominator of the ratio), or as a source of NSFR stable funding (entering the numerator as ASF). Columns "run-off rates" and "contribution to ASF" depict a noticeable match across most of the weights. Except for the item "other liabilities with residual maturity greater than thirty days and less than a year", the "matching" is clear: the weight imputed as contribution to ASF is 100% minus the run-off rate assigned for estimating net outflows. Therefore, the regulator has considered that the share that is not imputed as an outflow in the LCR should be deemed stable in the NSFR. Taking the simplistic approach that this hypothetical bank's inflows within the next thirty days are zero, net outflows amount to 55, therefore requiring the same volume of HQLA so as to meet the LCR.

Table 3 depicts the treatment of the asset side of the balance sheet, showing the contribution of each item towards HQLA (feeding the numerator of the LCR) and towards RSF (thus, entering the denominator of the NSFR). The third column shows the contribution of each of the levels to total HQLA by applying mandatory haircuts to each of them. The fourth column presents the rates at which different assets demand stable funding. Similarly to the result illustrated in table 2, a match across the different weights can be observed: the share not considered liquid should be tallied with stable financing. Yet, the alignment revealed in the weights cannot be translated into an automatic compliance of one ratio given observance of the other one. The example lays bare that, even though LCR is greater than 100%, the remainder stable financing (amounting 340 as indicated in table 2) presents a gap with required stable sources (a total of 349 as shown in table 3), generating a NSFR of 97% and thus a shortfall of stable funding even though the LCR is met.[5] In the example, the gap between ASF and RSF stems from the mentioned mismatch in weights for "other liabilities with residual maturity greater than thirty days and less than a year", which implies that stable financing is 10 units lower than required.

As presented in the previous example, the regulation of both liquidity standards has been carefully tailored so as to reach two measures that, despite being conceptually complementary, do not entirely condition each other. This flexibility has been achieved by means of attributing non-matching weights to specific balance sheet items. Should these weights mismatches not have been introduced, the liquidity ratios could have led to an excessive limitation of maturity transformation. Taken to the extreme, we could conceive the following situation: a financial institution presenting the balance sheet below, with total assets equal to 1, composed exclusively of an amount C of cash and a volume L of loans financed by an amount E of equity or other stable funding along with a quantity I of interbank borrowing.

HYPOTHETICAL BALANCE SHEET (EXAMPLE 2) TABLE 4

Assets		Liabilities	
Cash	C	Equity	E
Loans	L	Interbank	I
Total	1		1

SOURCE: Author's elaboration.
NOTE: C = Amount of Cash, L = Amount of Loans, E = Amount of Equity/Stable funding, I = Amount of Interbank borrowing.

5 Albeit the NSFR gap is negative in the example presented, a surplus could arise should the non-HQLA in the balance sheet require a lower percentage of stable funding. For instance, if non-performing loans in the asset side are replaced by residential mortgages with a risk weight of less than or equal to 35% under the standardised approach, stable funding requirement decreases from the previous 100% to 65%, driving the NSFR from 97% to 148%, thus implying compliance with both the NSFR and the LCR.

The treatment that this balance sheet would receive under the scope of the NSFR and the LCR is the following:

LCR AND NSFR REQUIREMENTS FOR LIABILITIES (EXAMPLE 2) TABLE 5

	Liabilities	Run-off Rates (%)	Contribution to ASF (%)	Resulting Net Outfow	Resulting ASF
Equity	E	0	100	0	E
Interbank	I	100	0	I	0
	1			I	E

SOURCE: Author's elaboration.

LCR AND NSFR REQUIREMENTS FOR ASSETS (EXAMPLE 2) TABLE 6

	Assets	Contribution to HQLA (%)	Stable Funding Requirement (%)	Resulting HQLA	Resulting RSF
Cash	C	100	0	C	0
Loans	L	0	100	0	L
	1			C	L

SOURCE: Author's elaboration.

The resulting LCR would be:

$$LCR = \frac{HQLA}{Net\ Outflow} = \frac{C}{I} = 100\%$$

Clearly, if we impose that LCR equals 100% so that the entity complies, it follows that C=I. Likewise, the NSFR can be obtained as:

$$NSFR = \frac{ASF}{RSF} = \frac{E}{L} = 100\%$$

If the NSFR is forced to equal 100%, it follows that E = L. Moreover, given that C + L = 1, then C = 1 – L. Equally, given that E + I = 1, then I = 1 – E. Therefore, it follows that we would have 1 – L = 1 – E and consequently L = E.

This extreme case shows that, if all the items in the balance sheet received a weight of either 100% or 0% in each of the ratios, hence considering assets as either entirely liquid or totally illiquid and liabilities as entirely stable or fully non-stable, regulators would be forcing to fund short-term assets with short-term liabilities (C = I in the example), and longer-term assets with stable sources of funding (L = E). Hence, this set-up would jeopardize the main role of banks in maturity transformation and would de facto transform banks into a sort of "narrow banking".[6]

Fortunately, the introduction of a range of weights from 0% to 100% leaves room for maturity transformation while at the same time controlling the degree of maturity mismatch between short-term liabilities and longer-term assets.

6 Narrow banking implies constraining the activity of deposit-issuing banks to the funding of fully safe assets, so as to rid depositors of the risk of issuer default [Bossone (2001)]. Therefore, this system entails that the two main functions of a bank (deposits taking and granting loans) are performed by two different sets of firms, such as finance companies (lending) and banks (deposits). The bank in the above example still develops both activities within a single entity but this set-up forces to keep all the funds considered as "unstable funding" in the form of cash.

After analyzing the close relationship between both ratios, we further assess the **impact that enhancements in one ratio** have on the other one. Improvements in the LCR could be achieved through one of the following strategies:

— Increasing cash inflows by replacing long-term assets with shorter-term ones, consequently driving net cash outflow down. The NSFR would be positively impacted by this adjustment, through way of diminishing RSF.

— Dwindling cash outflows by impinging on the liabilities side of the balance sheet and increasing stable financing. The positive direct effect on the NSFR could come from the rise in ASF.

Likewise, the NSFR can be ameliorated through one of the following approaches:

— Increasing ASF, which would derive into an upsurge in the numerator of the ratio. In most cases, the LCR would expand through shrinkage in cash outflows.

— Decreasing RSF, primarily by engaging into activities that span across a shorter time horizon (for instance, by replacing loans with government bonds). In most cases, the LCR would automatically improve through an increasing in HQLA.

Consequently, we might conclude that, even though complying with one ratio does not mechanically mean complying with the other one, both requirements are highly interconnected and the impact of the implementation of one of them alone will be thus similar (albeit not completely equal) to the effect of implementing both of them together.

2.2 STRATEGIES THAT CAN HELP BANKS COMPLY WITH THE NSFR

The NSFR regulation aims at promoting a more resilient balance sheet structure, and even though it does not directly impose a specific configuration in financial institutions' balance sheets, the entry into force of this ratio may indirectly imply rearrangements of banks' strategies and structures. This section elaborates on measures that non-compliant banks could undertake in order to meet the standard by 2018, together with potential undesirable impacts that these restructuring measures could lead to.

In order to meet the NSFR target of 100%, financial institutions may choose to modify the asset side of their balance sheet, the funding side, or both of them. Moreover, within each of these options banks are presented with a variety of paths. In a nutshell, the range of options that banks face can be summarized as:

— Adjustment through the asset side by shifting their portfolio towards liquid assets by decreasing either loans or other assets with high RSF.

— Adjustment through the liabilities side by changing its funding mix and rising long-term debt or retail deposits at the expense of short-term wholesale funding.

2.2.1 Adjustment through the Asset Side

Enhancements of the NSFR can be achieved by decreasing the denominator of the ratio, namely impinging on longer-term assets that require an important volume of stable financing. The emphasis being placed on one asset or another other will eventually depend on the relationship between each asset's rate of return and its associated RSF weight [EBA (2015a)]. For example, given an asset A that yields a return of 4% and demands 85% stable

funding, and another asset B that yields the same return but demands 65% long-term financing, the bank will be inclined to the reduction in asset A and the shift towards B.

Admittedly, a viable strategy that banks willing to reduce RSF can pursue is the reduction of *longer-term loans,* thus entailing negative effects on lending to the real sector, exacerbating the already dried-up lending market and ultimately hampering economic growth [Domingo (2010)]. However, the preference for this strategy will depend on the aforementioned relationship between returns and RSF weights of longer-term loans versus HQLA. The current calibration of the NSFR seems to foster traditional lending activities by allowing for a positive gap between required and available sources of funding: a financial institution granting mortgages and funding them with equity or stable deposits would benefit from a gap between RSF of 65% or 85% (depending on the loan-to-value of the mortgage loan) and ASF of 100% or 95% (depending on whether the funding is raised through equity or stable deposits). Only if the bank financed these long-term loans with short-term market funding, the ratio would involve a negative gap, thus reflecting the NSFR's main goal of funding illiquid assets with stable debt.

When analyzing the impact of the NSFR on lending activity, an additional disruption can be pinpointed. Perotti and Suárez (2011) identify that, given a range of banks that differ only on their ability to lend profitably, the NSFR could lead to an inefficient allocation of resources. The liquidity standard would oblige more-profitable banks, which perform a maturity transformation activity to a larger scale and therefore lend more, to reduce short-term funding, hence pushing lending downwards. On the other side, less-profitable banks, for which the NSFR will not be binding due to their lower proportion of both lending and short-term debt, will be encouraged, via the equilibrium effect on the expected cost of liquidity crises, to increase short-term funding and consequently lending activity.[7]

In order to reduce RSF, banks can also focus on decreasing trading book activities, especially *derivatives,* given the high percentage of stable financing that these assets demand: NSFR derivative assets net of NSFR derivative liabilities will be subject to 100% RSF given that the former is greater than the latter.[8] Otherwise, should NSFR derivative liabilities be greater than NSFR derivative assets, the net amount would receive an ASF weight of 0%. On top of that, an amount of 20% of derivative liabilities (before deducting variation margin posted), consume 100% RSF. Regarding initial margin posted, there exists an additional requirement of 85% of stable funding. Unlike the previous strategy (reducing lending activity), dwindling derivatives trades is in line with the aim of Basel III of addressing concerns about the large holdings of short-term non HQLAs such as derivatives held by banks before the crisis [Nomura (2014)]. Notwithstanding the regulator's desire for a shift towards HQLAs, increasing the cost of engaging into derivatives activity could lead banks to diminishing other investment activities (e.g. if they cannot be hedged at a reasonable cost), or to an increase in their risk exposure in case the investments are pursued without being tallied by hedging strategies [EBA (2015a)].

Not only derivatives, but also *investments in other financial assets* may be hampered. When analyzing the possible shift in investment activity the treatment received by each

7 Arising from the described distortion, Perotti and Suárez conclude that replacing the NSFR with a liquidity levy could avoid those inefficiencies and better adapt to the different business models, by means of allowing more-profitable banks to increase lending by simply paying a higher tax.

8 NSFR derivative assets are defined as derivative assets minus total collateral posted as variation margin on derivative assets. Likewise, NSFR derivative liabilities comprise derivative liabilities minus total collateral posted as variation margin on these liabilities.

type of financial security is key. As previously stated, RSF weights are 5% for Level 1 assets, 15% for Level 2A securities, and 50% for Level 2B and for non-HQLAs with maturity less than a year. These factors may incentivize banks to transfer investment from non-HQLAs (entailing higher funding costs) to other categories benefiting from lower weights, thus in line with the main goal pursued by the NSFR regulation. This turn towards HQLAs could potentially have a negative effect on the real economy: it could result in banks reducing their acquisitions of less liquid bonds or equity instruments, thereby limiting financing sources for companies aiming at raising funds on capital markets [EBA (2015a)]. Additionally, HQLAs' markets could be impacted by a concentration in the range of investors, shifting from a more diversified investor base to a market primarily led by banks. This could leave HQLAs' markets exposed to one-way-risk, especially relevant given scenarios of severe tension that could lead to fire sales and have a ubiquitous impact on the financial system. On top of that, given the restrictive definition of Level 1 assets, a strategy to increase HQLAs could lead to a significant upsurge in demand for public debt holdings, potentially resulting into an expansion of government deficits [Toledo (2011)].

Ultimately, the extent to which the shift in portfolio composition will take place will hinge upon the relative benefits that banks receive from these different types of securities. Given that HQLA – especially Level 1 securities – bear a reduced amount of risk, its associated expected return will symmetrically be low, hence the shift towards a greater volume of this category of securities will depend on the relative savings on funding costs compared to the relative losses in expected return. Namely, if the reduction in expected returns between asset categories is greater than the reduction in funding costs, the rule will still make riskier assets relatively more attractive compared to HQLAs.

2.2.2 Adjustment through the Liabilities Side

Compliance towards the NSFR target can also be achieved by increasing the numerator of the ratio, therefore altering the funding mix of the bank and resorting to more stable sources of financing.

One of the main strategies that a bank can aim at is the increase in the amount of *retail deposits* raised, given the stability granted to this source of funding by the NSFR (considered 100% stable if maturing in a period longer than a year; otherwise 95% or 90% depending on stability). However, this rearrangement could lead to a "war for deposits", as banks raise the interest rates offered so as to enhance competitiveness in a run towards market share. Given the whole spectrum of types of deposits that credit institutions could be interested in raising, the combination of the scope of both the NSFR and the LCR could foster inclination towards term deposits with maturity higher than thirty days. Demand deposits and term deposits with residual maturity of less than thirty days are considered cash outflows, feeding the denominator of the LCR with allocated run-off rates of either 5% or 10% (depending on stability), thus driving this ratio down. On the contrary, term deposits maturing in a period over thirty days, albeit receiving the same treatment within the NSFR (ASF with allocated weights of either 90% or 95% depending on stability), do not penalize the LCR since they are not deemed cash outflows. Consequently, liquidity regulation could lead to a fight towards term deposits with residual maturity higher than thirty days, resulting in interests paid on these deposits increasing above benchmark rates compared to shorter dated deposits.

Alongside with the previously assessed option, banks also face incentives to increase their share of *funding with maturity greater than a year*, since these resources account 100% as ASF. However, financial institutions may encounter the problem that, given an important upsurge in the offering of long-term bonds by non-compliant banks, investors' demand is

not sufficient to accommodate the entire raise. On top of that, a direct consequence of this shift is an uptrend in funding costs for financial institutions, which could stem from different factors. Firstly, similarly to the issue described when analyzing deposits upsurges, it could arise from a potential increase in banks' demand for longer-term funding, thus driving equilibrium yields up. Secondly, it could arise from investors demanding to be compensated for the additional credit and liquidity risks that long-term bonds endure when compared to shorter-term securities.

Banks may also drive their NSFR up by altering their strategy regarding *repo markets*. As previously analyzed in subsection 2.1.1, Basel regulation introduces an asymmetric treatment for repo transactions depending on whether the counterparty is a financial or non-financial institution. This asymmetry implies that the activity of book matching will derive into different requirements depending on the counterparty of the transaction: a bank engaging into a repo operation with a non-financial corporation and simultaneously signing a matching reverse repo with a similar counterparty will not face liquidity requirements, since both the ASF from the repo and the RSF from the reverse repo coincide at 50%. On the other side of the spectrum, the same matching strategy carried out with a financial counterparty, would leave the bank with a net requirement of stable financing of either 10% or 15%, given the existing mismatch between the ASF of 0% and the RSF of either 10% or 15%. Consequently, this could spur traders to turn to non-financial institutions to refinance reverse repos. Eventually, this could have a perverse effect on financial institutions' availability of liquidity, since engaging into repo transactions is an important technique for banks to generate liquidity. Moreover, the mentioned asymmetry could undermine market-making activity, since the NSFR could hindrance reverse repos with non-banks, which would limit financial institutions' receptiveness to meet buy orders from clients, and would eventually impinge on the liquidity of the underlying security [EBF (2014)].

Given the increase in financial institutions' funding costs arising from the afore-mentioned readjustments, combined with a reduction in returns stemming from investments in more liquid assets, liquidity regulation could impinge on banks' profitability. Hence, institutions may be incentivized to transfer these additional costs to clients, thus driving loan rates up and ultimately impacting on the real sector. Additionally, these extra costs could be offset by embracing riskier investment opportunities in a search for higher yield, thereby reducing liquidity risk at the expense of other risks. Nonetheless, if liquidity regulation is not assessed in isolation but in conjunction with capital requirements this effect is partially offset: the decrease in yield due to HQLAs will be partly compensated with lower risk-weighted-assets and savings in capital requirements, hence alleviating the pure liquidity effect [Roger and Vlček (2011)].

3 Empirical analysis

This section aims at providing an overview on the estimated level of the NSFR across Spanish banks as of 2013 and 2015, alongside with the rearrangement measures undertaken in-between so as to achieve the 2015 figure.

3.1 THE NSFR ACROSS SPANISH BANKS

3.1.1 Estimated level of the NSFR

Based on publicly available information, we proceeded to the calculation of an approximate measure of the NSFR for twelve Spanish banks in two separate points in time: 31 December 2013 and 31 December 2015.

More precisely, the *scope of banks* in the study encompasses twelve of the fourteen Spanish banks considered as significant institutions within the scope of the Single Supervisory Mechanism, as defined in Article 6.4 of Council Regulation (EU) No 1024/2013 *conferring specific tasks on the European Central Bank concerning policies relating to the prudential*

supervision of credit institutions.[9] The logic for the choice of these entities is twofold: they account for more than 90% of total assets in the Spanish banking industry (therefore, conferring an ample view of the situation of the financial system), and they comprise a sufficiently diversified range of banks in terms of size (measured as value of assets). Regarding group level at which the calculations have been performed, the study focuses on individual legal entities. Even though the obligations laid down by liquidity requirements apply both on an individual and consolidated basis – as mandated by Article 6 of CRR –, and in the face of the possible waiver on individual application in accordance with Article 8 of CRR, our analysis pivots on the individual level for two reasons. First, following the principles for best practices published by the Bank of Spain on *Memoria de Supervisión Bancaria* (2001), and in line with Principle 6 outlined in the BCBS *Principles for Sound Liquidity Risk Management and Supervision* (2008), banks should actively manage their liquidity not only on a consolidated basis but also at the individual level. Second, the analysis at a consolidated level could lead to a distorted view in banks with relevant international activity, given that even if a banking group meets the NSFR threshold at the consolidated level, this does not necessarily imply that its subsidiaries are individually sufficiently protected from liquidity risks. For instance, there could exist legal, regulatory and operational limitations to the transferability of liquidity within the group [EBA (2015a)].

The rationale for the determination of the *time horizon* is the following: the 2013 starting period tries to capture a point in time when the NSFR was still not binding, so as to analyze banks' convergence methods towards future compliance. Notwithstanding the BCBS publication of the ratio already in 2009, it could not be deemed binding thereupon given that the Committee frames guidelines and standards but it does not issue binding regulation [Kerwer (2005)]. Only in June 2013, when the CRR was promulgated, European banks were reassured that it would become a binding standard. Commencing from that initial point in time, the NSFR is calculated up to 2015 so as to analyze rearrangement strategies hitherto, using the latest year-end available information.

Data compilation pivoted on information published on banks' balance sheets and on the notes to the annual accounts. Several assumptions had to be made for certain balance sheet items, given that the required level of detail could not be obtained through publicly available information – similar issue to the one encountered by the IMF on their NSFR Report of 2014 –.[10] Since the same hypotheses were consistently applied for the calculation of the NSFR across all the banks in the sample, reliable comparisons can be carried out albeit each individual ratio may not be completely accurate. Nonetheless, the spirit implicit on the BCBS guideline of 2014 was maintained throughout our analysis, broadly capturing the liquidity of each category of the balance sheet.

More precisely, the calculation is underpinned by the following additional *adjustments and assumptions:*

— Regarding *sovereign debt,* the notes to the annual statements provide information on the split between Spanish and foreign sovereign debt, but do not further differentiate the precise country issuing the debt. This distinction is relevant for the consideration as HQLA, depending on the rating of the

9 The scope of banks considered includes: Santander, BBVA, Caixabank, Bankia, Popular, Bankinter, Ibercaja, Kutxabank, Abanca, BMN, Unicaja and Liberbank. The study does not incorporate Banco Sabadell due to information gathering issues.

10 Due to these assumptions, the ratios calculated may not exactly coincide with the ratios reported by banks to the Supervisor or with the BCBS QIS figures. The latter are based on prudential reporting provided to the regulator, which entail greater granularity and hinge upon behavioural hypotheses.

country. Further information was compiled from the EBA transparency exercise of 2015, which reports holdings of sovereign debt per entity and country. This data allowed to split foreign sovereign debt into issuers from European countries (Level 1 asset, with a RSF of 5%), other 1-rated countries (Level 1 asset and RSF of 5%), other countries with a risk weight of 20% under the CRR credit risk standardized approach (Level 2A asset and RSF of 15%) and other countries (non-HQLA and assigned RSF of 100%).

— As long as *corporate debt* is concerned, a breakdown depending on the rating of the issuer is not available. Hence, the following assumptions were taken: corporate debt from Spanish entities was considered 1-rated, thus included in the Level 2A basket and treated with a RSF factor of 15%; foreign corporate debt, mainly held by Santander and BBVA, was categorized as non-HQLA (with associated RSF weight of 100%), supported by the assumption that they relate to investments in Latin American companies characterized by a feebler creditworthiness arising from the unstable economic situation.

— With regard to *equity instruments,* investments on assets quoted on stock exchanges were assumed to be listed on recognized exchanges, thereby included in Level 2B and receiving a RSF percentage of 50%.

— Concerning *loans and receivables,* splits regarding loan-to-value ranges along with non-performing assets were extracted from the notes to the financial statements, thus no assumptions were needed for those categories. A problem of missing information was encounter for other more specific items within this category, and they were treated conservatively assuming a maturity greater than a year (thus, assigning RSF of 85%).

— *Derivatives* were treated on a net basis (derivative assets minus derivative liabilities) allocating a RSF factor of 100% if there was a positive net balance, and a factor of 0% otherwise.

— *Encumbered assets* were treated conservatively, assuming that all of them were encumbered for a period of a year or more, hence assigning a 100% RSF factor.

— Regarding *repos and reverse repos,* the European Banking Federation (EBF) indicated on its response document to the Basel Consultative Document on the NSFR (2014), that repos are mainly contracted with counterparties that are cash long and are willing to lend secured to banks, which especially involves money market funds, and only to a lower extent banks. Consequently, our analysis pivots on the assumption that all repo transactions were performed with non-bank counterparts, hence allocating an ASR of 50%. Similarly, the EBF states that reverse repos are executed with counterparts that are long in the underlying security, which notably includes insurers, asset managers and only to a low extent banks. Thereby, in our calculation when no detail information was found, all reverse repos were assumed to be executed with non-banks counterparts, receiving RSF of 50%.

— *Customer deposits* were split between current, term, and savings deposits. Demand deposits and term deposits were treated under the hypothesis that

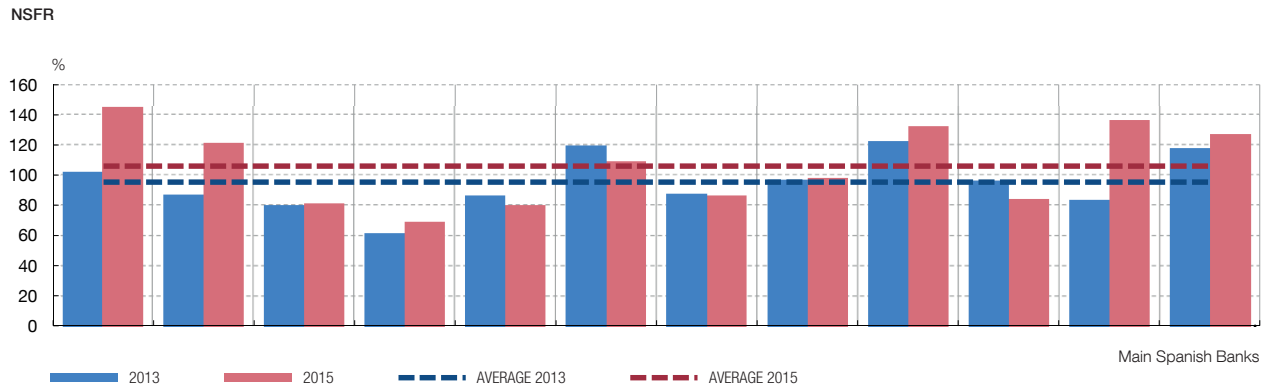
all of them were less stable, hence assigning an ASF weight of 90%. In the face of the inability to distinguish stable deposits, the most conservative option was taken upon as clearly suggested by the BCBS on paragraph 23 of the 2014 NSFR report in line with paragraph 80 of the Committee 2013 paper on LCR. Savings deposits were assumed to mature in more than one year, thus receiving a factor of 100%.

— *Other financial liabilities* lacking additional information on type of funding or maturity were treated conservatively and assumed non-liquid, allocating an ASF factor of 0%.

For more detailed information, Annex 3 presents the template used for the calculation of the NSFR, showing the specific match between each balance sheet category and the weights allotted.

After gathering all the relevant information and introducing the afore-mentioned assumptions, the different balance sheet items were further split into more detailed categories exploiting information provided on the notes to the annual accounts. Then, assets and liabilities were translated into RSF and ASF by applying the weights published by the BCBS in 2014 (see weights in Annex 2). The resulting estimated NSFR among the main Spanish banks in 2013 and 2015 is presented in the chart below.

ESTIMATED NSFR ACROSS MAIN SPANISH BANKS IN 2013 AND 2015 CHART 1



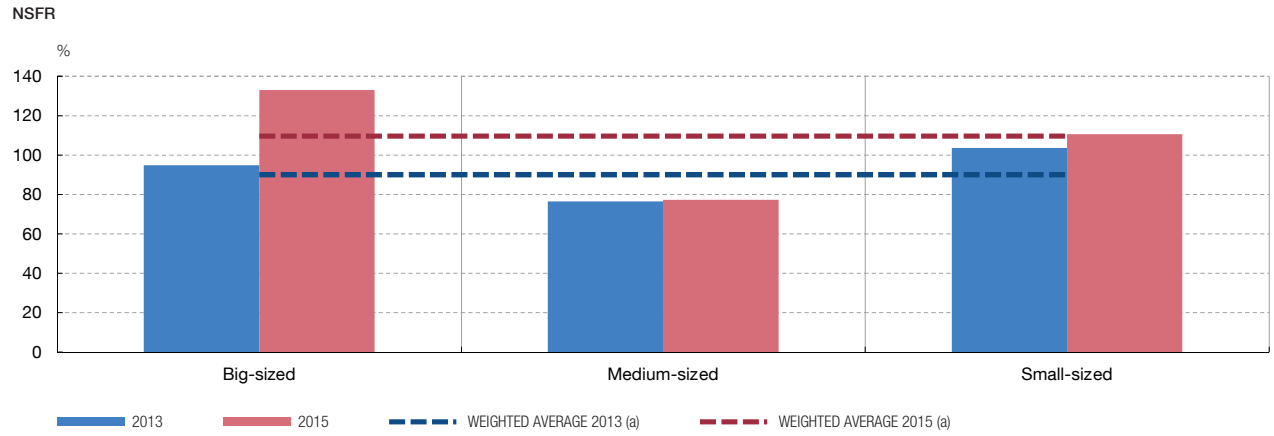
SOURCE: Own elaboration based on public information.

Chart 1 depicts that, on average, Spanish banks have made progress in addressing their structural net stable funding deficits, with NSFR presenting an upward trend as measured by its un-weighted average, which goes from 95% in 2013 to circa 106% in 2015. More precisely, half of the twelve banks included in the sample (representing 56% of total assets) meet the NSFR requirement at end-2015, most of them presenting an important surplus over the required threshold. Four of those institutions already conformed in 2013. The remaining six banks display an average shortfall of approximately 20 percentage points, thus remaining relatively far from full coverage.[11] The NSFR trend among banks with stable financing deficit is hectic: a segment of the sample banks experienced a timid improvement in their NSFRs in the period observed, whist the other segment deteriorated their ratios when compared to 2013.

11 Even though banks may be referred to as “compliant” and “non-compliant”, it should be noticed that the NSFR is not a binding standard yet and it is not expected to come into force until the 1 January 2018.

A more thorough analysis was carried out categorising the twelve banks in the sample into three different groups, clustered together depending on their size as measured by volume of assets.[12]

ESTIMATED NSFR BY CLUSTERS OF SPANISH BANKS CHART 2



SOURCE: Own elaboration based on public information.

a Weighted by volume of assets at end-2015.

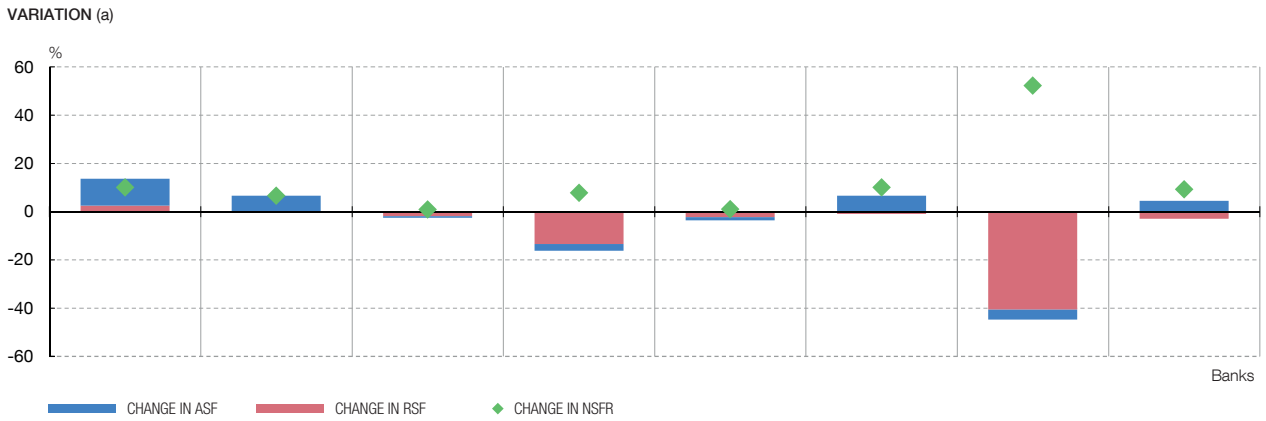
Chart 2 sheds light on the divergences in NSFRs that arise from different business models depending on banks' size. The convergence towards the 100% threshold is clearer when comparing the system wide weighted average in 2015 with its value in 2013: 109% in 2015 versus 90% in 2013. Analysis by size cluster depicted in Chart 2 endorses that in 2013 smaller banks were ahead of its peers in terms of meeting the threshold, presenting an average ratio above the 100% target. Medium-sized institutions feature an important negative gap in stable financing in 2013; whilst larger banks were on average close to the 100% target. A different landscape is shown for 2015, when the gap amongst banks was heightened: smaller banks continue meeting the standard, but larger institutions position themselves far ahead their smaller peers, arising from a strong NSFR growth in the last two years. In contrast, medium-sized banks feature a barely perceptible improvement in these two years so that NSFR future observance is still a challenge for this group of banks.

3.1.2 Rearrangement Measures Undertaken to Enhance the NSFR

As analyzed in the previous subsection, the Spanish banking system seems to be performing reallocation measures so as to comply or improve their NSFRs, as indicated by the increase in the average ratio from 95% in 2013 to 106% in 2015. As presented in section 2.2 of this paper, banks can resort to a variety of alternatives with the final aim of driving their ratios up: increasing stable sources of funding, decreasing assets that demand an important share of stable financing, or a combination of both. We further examine the specific convergence actions tackled by Spanish banks. For that purpose, we narrow down the sample to those banks that experienced an increase in their NSFRs from 2013 to 2015. The analysis pivots around, not only banks that evolved from not meeting the threshold to observing it, but also banks that experienced improvements since the main goal of this subsection is the identification of strategies that banks are embarking upon towards the target, regardless of the distance to meet the 100% threshold.

12 Big-sized encompasses banks with a volume of assets at end-2015 greater than 350,000M Euros. Medium-sized comprises banks with balance sheets between 100,000M and 350,000M Euros. Small-sized includes the remaining banks in the sample.

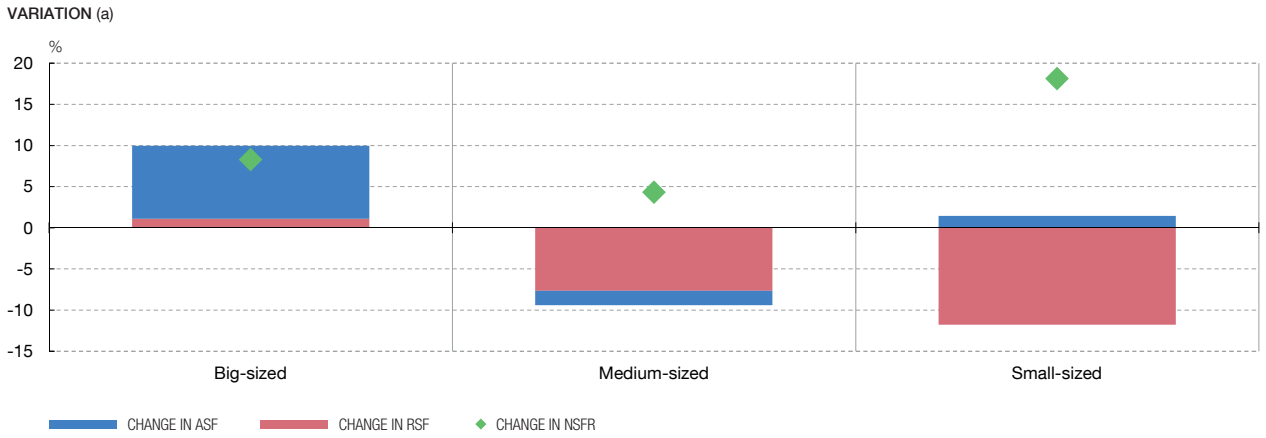
REARRANGEMENT MEASURES TO ENHANCE THE NSFR ACROSS BANKS CHART 3



SOURCE: Own elaboration based on public information.

a The variation relates to the period 2013-2015.

REARRANGEMENT MEASURES TO ENHANCE THE NSFR BY CLUSTERS OF BANKS CHART 4



SOURCE: Own elaboration based on public information.

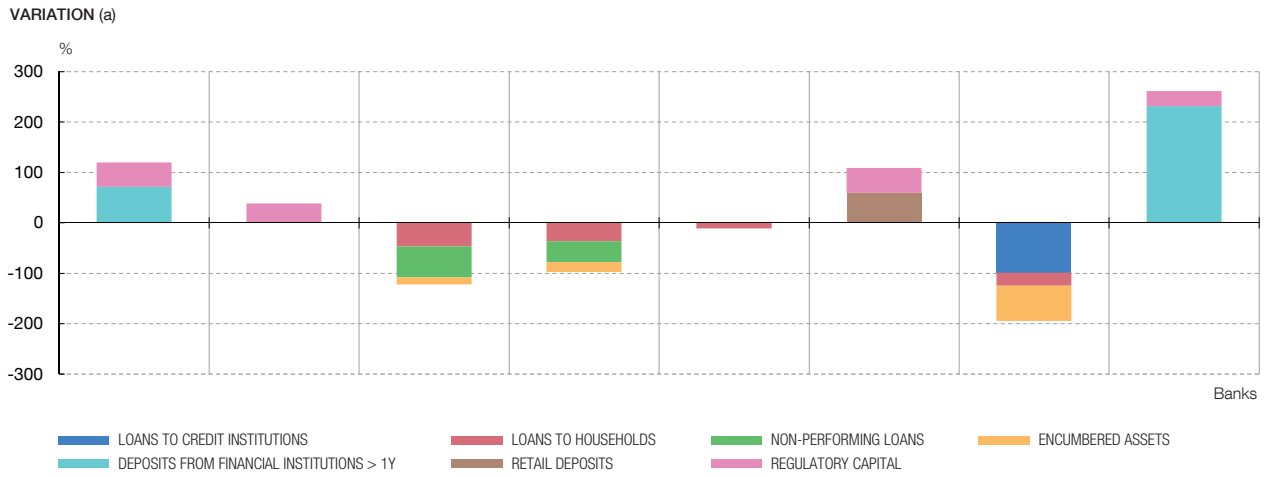
a The variation relates to the period 2013-2015.

Chart 3 portrays the percentage growth in NSFR across banks, along with variation in ASF and RSF. The first result that is noteworthy is that banks do not follow similar reallocation approaches. Whereas some of the banks accomplish the improvement through an increase in ASF, the rest of the sample experience a decline in RSF. Yet, when comparing strategies by homogeneous groups (Chart 4), it derives that larger banks tend to adjust through the liabilities side, whilst medium and smaller banks are more prone to adapt the asset side. This different behavior could reflect the stronger positioning of larger banks in the market, which allows them to strengthen deposits by deploying more aggressive campaigns, and to raise capital and long-term funding quicker and at lower cost.

We further compare the specific restructuring strategies that underlie the variations in ASF and RSF, analyzing the balance sheet items that present the greatest contribution to the enhancement of the NSFR ratio.

As depicted in Chart 5, banks that resorted to the boost in ASF for the enhancement of the NSFRs present the common characteristic that an increase in *regulatory capital* was a driver of these improvements. The remaining balance sheet items that bolstered the expansion of

DETAIL OF REARRANGEMENT MEASURES BY BALANCE SHEET ITEM ACROSS BANKS CHART 5



SOURCE: Own elaboration based on public information.

a The variation relates to the period 2013-2015.

ASF mainly comprehend *deposits,* primarily deposits from financial institutions, and to a lower extent retail deposits.

Banks that embraced a reduction in RSF as their main strategy exhibit more diverse patterns among them. On the one hand, whereas reduction in *loans to households* seems to be a common trend, the specific type of loan affected by the contraction diverges. Some banks focused on reducing mortgage loans with loan-to-value greater than 80%; and to a lower extent mortgage loans with loan-to-value lesser than 80%. Along with this common decrease in loans to households, part of the sample banks also resorted to the diminution of *loans to credit institutions* and impinged on *non-performing loans*. *Encumbered assets* constitute the final pillar that supports additional savings of RSF.

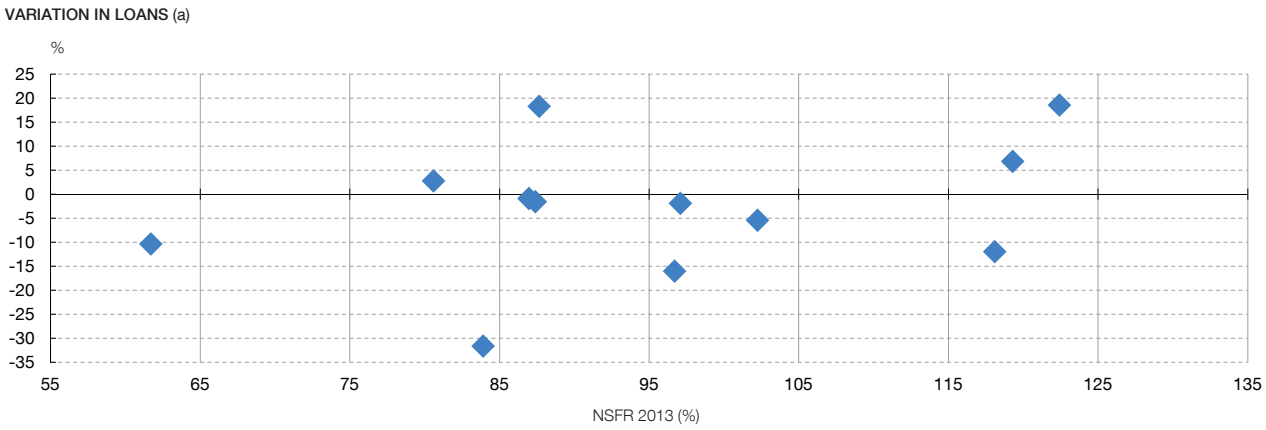
3.2 IMPACT OF THE NSFR ON LENDING ACTIVITY AND SUPPLY OF DEPOSITS

As indicated in subsection 2.1.2, the design of the NSFR through the introduction of a range of weights from 0% to 100% allows maturity transformation. Nonetheless, this core activity of credit institutions could de facto be impinged should banks focus excessively on either the reduction of lending activity or the increase in deposits raised with the main purpose of enhancing their NSFR. Hence, this section further assesses the impact of an increase in compliance with the NSFR on lending activity and deposits.

As previously presented in section 2.2, a possible strategy to enhance the NSFR is the migration of the asset side by *decreasing lending to the real economy*. Moreover, in subsection 3.1.2 we observed that this measure was indeed implemented by some Spanish banks in the period 2013-2015. Given that one of the main goals of liquidity regulation is precisely the avoidance of a credit crunch, it is important to assess whether the NSFR is indirectly breaching its own spirit.

The assessment relies on the graphical analysis presented in Chart 6, which depicts the degree of variation in lending activity between 2013 and 2015 for the sample of banks introduced in subsection 3.1.1, plotted against the level of NSFR as of December 2013. The rationale that supports the analysis is the following: if the Spanish banking sector adjusts towards NSFR compliance primarily through the reduction of the supply of loans, we would expect to observe how banks that present an important NSFR shortfall as of 2013 reduce lending activity to a large scale when compared to its peers.

ADJUSTMENT IN SUPPLY OF LOANS VERSUS 2013 NSFR ACROSS BANKS CHART 6



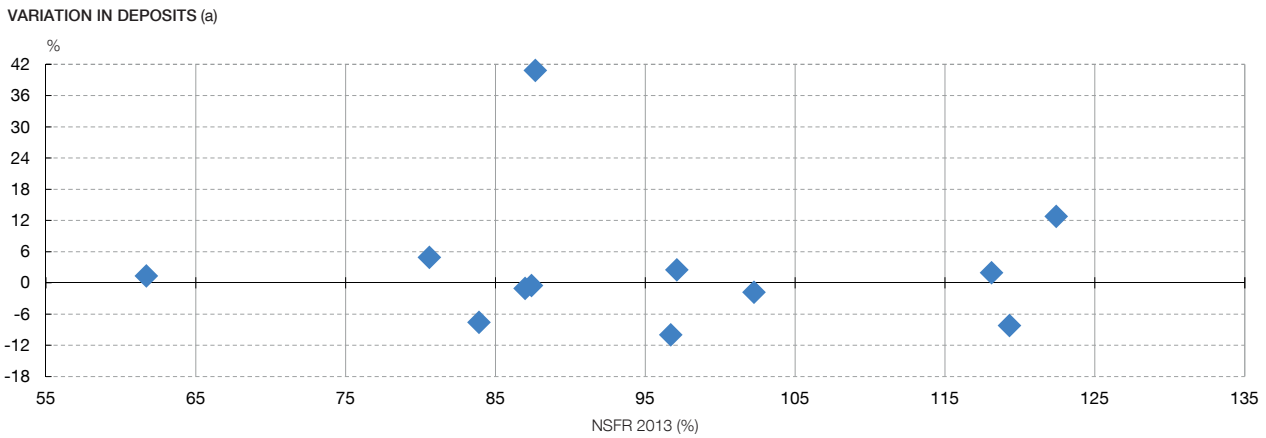
SOURCE: Own elaboration based on public information.

a The variation relates to the period 2013-2015.

Chart 6 presents a hectic trend in the evolution of loans when compared to the level of NSFR in 2013. Whereas a decrease in lending activity can be observed for some banks not meeting the threshold, the degree of loans variation does not seem to present a direct relationship with the level of the shortfall (some banks presenting an important NSFR gap reduce loans less than other peers). Furthermore, some banks with positive NSFR as of 2013 display shrinkage in credit supply. Consequently, with the available evidence we cannot conclude that the adjustment towards NSFR systematically entails a contraction in lending activity.

As previously analyzed, another strategy undertaken by some Spanish banks in order to improve the NSFR is the *increase in retail deposits*. Given the negative impact that a potential "war for deposits" could have on banks' funding costs and on financial stability, the previous graphical analysis is carried out regarding this balance sheet item. Chart 7 displays de degree of variation in deposits between 2013 and 2015 for the banks in the sample, plotted against the level of NSFR as of December 2013. The rationale of the analysis resembles the previous one: banks presenting the greatest NSFR shortfall in 2013 should increase deposits more than its peers if there exists a direct relationship between this variable and NSFR improvements.

ADJUSTMENT IN SUPPLY OF RETAIL DEPOSITS VERSUS 2013 NSFR ACROSS BANKS CHART 7



SOURCE: Own elaboration based on public information.

a The variation relates to the period 2013-2015.

Chart 7 depicts a similar trend in deposits across most of the banks irrespective of the level of NSFR as of December 2013. The great majority of credit institutions either experienced a drop in deposits or maintained a constant level from 2013 to 2015. Indeed, most of the banks with NSFR deficit in 2013 curtailed deposits or experienced a timid increase. Hence, evidence shows that given improvement of the NSFR, an upsurge in deposits does not automatically derive.

Consequently, it seems safe to assume that enhancements of the NSFR do not necessarily lead to either reduction in lending activity or increase in the supply of deposits.

4 Conclusions

In this paper we have analyzed the NSFR within the Spanish banking sector. After proving that observance of the LCR does not directly imply fulfillment of the NSFR, a methodology for the calculation of the latter has been established. The results indicate that banks present an average NSFR of 106% as of December 2015, implying that half of the sample banks representing more than 50% of total assets meet the future 100% threshold. Conversely, the rest of the sample banks show an average ratio of 85%. This shortfall could stem from the fact that an alteration of the funding mix is costly and involves a lot of time. Given that the final NSFR legal calibration has not been published yet for the European Union, some banks may be reluctant to undertake costly restructuring strategies till the final gradation is published and the real shortfall estimated.

Comparison with 2013 figures highlights that the banking system is gradually adjusting towards future compliance underpinned by a variety of rearrangement strategies. These measures span from an increase in ASF impinging mainly upon regulatory capital and long-term deposits, to a decrease in RSF mainly driven by loans to households and non-performing loans. Albeit the identified strategy of diminishing credit supply, a further analysis of the repercussion of the NSFR on lending activity allows us to conclude that the enhancement of the NSFR does not necessarily entail a contraction in the supply of loans to the real economy. Likewise, the same analysis applied to deposits suggests that the adjustment towards the NSFR does not systematically imply an increase in deposits.

We have developed a detailed methodology for the calculation of NSFR relying solely on publicly available information. Hence, this study could be useful for investors, who can use a similar methodology for the analysis of banks' positioning in terms of meeting the NSFR by 2018. Significant gaps with the required target maintained as the 2018 deadline approaches could oblige banks to alter their funding structure, undermining the profitability and ultimately hindering their solvency.

Annex 1 Summary of LCR components

HQLA

ANNEX 1.1

Component of HQLA	HQLA factor
Level 1 assets	
Coins and bank notes	100%
Qualifying marketable securities from sovereigns, central banks, PSEs, and multilateral development banks	
Qualifying central bank reserves	
Domestic sovereign or central bank debt for non-0% risk-weighted sovereigns	
Level 2 assets (maximum of 40% of HQLA)	
Level 2A Assets	85%
Sovereign, central bank, multilateral development banks, and PSE assets qualifying for 20% risk weighting	
Qualifying corporate debt securities rated AA– or higher	
Qualifying covered bonds rated AA– or higher	
Level 2B Assets (maximum of 15% of HQLA)	
Qualifying RMBS	75%
Qualifying corporate debt securities rated between A+ and BBB–	50%
Qualifying common equity shares	50%

SOURCE: Adapted from BCBS on LCR, 2013.

CASH OUTFLOWS

ANNEX 1.2

Component of cash outflows	Outflows factor
Retail deposits	
Demand deposits and term deposits (less than 30 days maturity)	
Stable deposits (deposit insurance scheme meets additional criteria)	3%
Stable deposits	5%
Less stable retail deposits	10%
Term deposits with residual maturity greater than 30 days	0%
Unsecured wholesale funding	
Demand and term deposits (less than 30 days maturity) provided by small business customers:	
Stable deposits 5%	5%
Less stable deposits	10%
Operational deposits generated by clearing, custody and cash management activities	25%
Portion covered by deposit insurance	5%
Cooperative banks in an institutional network (qualifying deposits with the centralized institution)	25%
Non-financial corporates, sovereigns, central banks, multilateral development banks, and PSEs 40%	40%
If the entire amount fully covered by deposit insurance scheme	20%
Other legal entity customers	100%

CASH OUTFLOWS (cont'd) **ANNEX 1.2**

Component of cash outflows	Outflows factor
Secured funding	
Secured funding transactions with a central bank counterparty or backed by Level 1 assets with any counterparty	0%
Secured funding transactions backed by Level 2A assets, with any counterparty	15%
Secured funding transactions backed by non-Level 1 or non-Level 2A assets, with domestic sovereigns, multilateral development banks, or domestic PSEs as a counterparty	25%
Backed by RMBS eligible for inclusion in Level 2B	25%
Backed by other Level 2B assets	50%
All other secured funding transactions	100%
Additional requirements	
Liquidity needs (e.g. collateral calls) related to financing transactions, derivatives and other contracts	3 notch downgrade
Market valuation changes on derivatives transactions (largest absolute net 30-day collateral flows realized during the preceding 24 months)	Look back approach
Valuation changes on non-Level 1 posted collateral securing derivatives	20%
Excess collateral held by a bank related to derivative transactions that could contractually be called at any time by its counterparty	100%
Liquidity needs related to collateral contractually due from the reporting bank on derivatives transactions	100%
Increased liquidity needs related to derivative transactions that allow collateral substitution to non-HQLA assets	100%
ABCP, SIVs, conduits, SPVs, etc.:	
Liabilities from maturing ABCP, SIVs, SPVs, etc. (applied to maturing amounts and returnable assets)	100%
Asset Backed Securities (including covered bonds) applied to maturing amounts.	100%
Currently undrawn committed credit and liquidity facilities provided to:	
Retail and small business clients	5%
Non-financial corporates, sovereigns and central banks, multilateral development banks, and PSEs	10%/30%
Banks subject to prudential supervision	40%
Other financial institutions (include securities firms, insurance companies)	40%/100%
Other legal entity customers, credit and liquidity facilities	100%
Other contingent funding liabilities (such as guarantees, letters of credit, revocable credit and liquidity facilities, etc.)	National Discretion
Trade finance 0-5%	0%-5%
Customer short positions covered by other customers' collateral	50%
Any additional contractual outflows 100%	100%
Net derivative cash outflows	100%
Any other contractual cash outflows	100%

SOURCE: Adapted from BCBS on LCR, 2013.

CASH INFLOWS

ANNEX 1.3

Component of cash inflows	Inflows factor
Maturing secured lending transactions backed by the following collateral	
Level 1 assets	0%
Level 2A assets	15%
Level 2B assets	
Eligible RMBS	25%
Other assets	50%
Margin lending backed by all other collateral	50%
All other assets	100%
Credit or liquidity facilities provided to the reporting bank	0%
Operational deposits held at other financial institutions (include deposits held at centralized institution of network of co-operative banks)	0%
Other inflows by counterparty	
Amounts to be received from retail counterparties	50%
Amounts to be received from non-financial wholesale counterparties, from transactions other than those listed in above inflow categories	50%
Amounts to be received from financial institutions and central banks, from transactions other than those listed in above inflow categories	100%
Net derivative cash inflows	100%
Other contractual cash inflow	National Discretion

SOURCE: Adapted from BCBS on LCR, 2013.

Annex 2 Summary of NSFR components

ASF

ANNEX 2.1

Components of ASF	ASF factor
Total regulatory capital (excluding Tier 2 instruments with residual maturity of less than one year)	100%
Other capital instruments and liabilities with effective residual maturity of one year or more	
Stable non-maturity (demand) deposits and term deposits with residual maturity of less than one year provided by retail and small business customers	95%
Less stable non-maturity deposits and term deposits with residual maturity of less than one year provided by retail and small business customers	90%
Funding with residual maturity of less than one year provided by non-financial corporate customers	50%
Operational deposits	
Funding with residual maturity of less than one year from sovereigns, PSEs, and multilateral and national development banks	
Other funding with residual maturity between six months and less than one year not included in the above categories, including funding provided by central banks and financial institutions	
All other liabilities and equity not included in the above categories, including liabilities without a stated maturity (with a specific treatment for deferred tax liabilities and minority interests)	0%
NSFR derivative liabilities net of NSFR derivative assets if NSFR derivative liabilities are greater than NSFR derivative assets	
"Trade date" payables arising from purchases of financial instruments, foreign currencies and commodities	

SOURCE: Adapted from BCBS on NSFR, 2014

RSF

ANNEX 2.2

Components of RSF	RSF factor
Coins and banknotes	0%
All central bank reserves	
All claims on central banks with residual maturities of less than six months	
Trade date receivables arising from sales of financial instruments, foreign currencies and commodities	
Unencumbered Level 1 assets, excluding coins, banknotes and central bank reserves	5%
Unencumbered loans to financial institutions with residual maturities of less than six months, where the loan is secured against Level 1 assets as defined in LCR paragraph 50, and where the bank has the ability to freely rehypothecate the received collateral for the life of the loan	10%
All other unencumbered loans to financial institutions with residual maturities of less than six months not included in the above categories	15%
Unencumbered Level 2A assets	
Unencumbered Level 2B assets	50%
HQLA encumbered for a period of six months or more and less than one year	50%
Loans to financial institutions and central banks with residual maturities between six months and less than one year	
Deposits held at other financial institutions for operational purposes	
All other assets not included in the above categories with residual maturity of less than one year, including loans to non-financial corporate clients, loans to retail and small business customers, and loans to sovereigns and PSEs	
Unencumbered residential mortgages with a residual maturity of one year or more and with a risk weight of less than or equal to 35% under the standardised approach	65%
Other unencumbered loans not included in the above categories, excluding loans to financial institutions, with a residual maturity of one year or more and with a risk weight of less than or equal to 35% under the standardised approach	
Cash, securities or other assets posted as initial margin for derivative contracts and cash or other assets provided to contribute to the default fund of a CCP	85%
Other unencumbered performing loans with risk weights greater than 35% under the standardised approach and residual maturities of one year or more, excluding loans to financial institutions	
Unencumbered securities that are not in default and do not qualify as HQLA with a remaining maturity of one year or more and exchange-traded equities	
Physical traded commodities, including gold	
All assets that are encumbered for a period of one year or more	100%
NSFR derivative assets net of NSFR derivative liabilities if NSFR derivative assets are greater than NSFR derivative liabilities	
20% of derivative liabilities as calculated according to paragraph 19	
All other assets not included in the above categories, including non-performing loans, loans to financial institutions with a residual maturity of one year or more, non-exchange-traded equities, fixed assets, items deducted from regulatory capital, retained interest, insurance assets, subsidiary interests and default securities	

SOURCE: Adapted from BCBS on NSFR, 2014.

Annex 3 Template used for the calculation of the NSFR

ASSETS

ANNEX 3.1

Assets	NSFR component	RSF factor
1 Cash and balances with central banks	Coins and claims on central banks	0%
2 Financial assets held for trading		
2.1 Loans and advances to credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
2.2 Debt securities		
Debt securities from Central Banks	Unencumbered Level 1 assets	5%
Spanish public debt	Unencumbered Level 1 assets	5%
Other public debt	Unencumbered Level 1 assets/Unencumbered Level 2A assets/Non-HQLA	5%/15% /100%
Debt securities from Spanish credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Debt securities from other credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Debt securities from corporations	Unencumbered Level 2A assets/Non-HQLA	15%/100%
2.3 Other equity instruments		
Equity from Spanish credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Equity from Spanish corporations	Unencumbered Level 2B assets	50%
Equity from other credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Equity from other corporations	Unencumbered Level 2B assets	50%
Participation in hedge funds	Other assets	100%
2.4 Trading derivatives	Other assets (derivatives assets net of derivatives liabilities)	100%
Memorandum item: Loaned or advanced as collateral	Encumbered assets	100%
3 Other financial assets at fair value through profit or loss		
3.1 Loans and advances to credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	
3.2 Debt securities		5%
Debt securities from Central Banks	Unencumbered Level 1 assets	5%
Spanish public debt	Unencumbered Level 1 assets	5%/15% /100%
Other public debt	Unencumbered Level 1 assets / Unencumbered Level 2A assets / Non-HQLA	15%
Debt securities from Spanish credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Debt securities from other credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%/100%
Debt securities from corporations	Unencumbered Level 2A assets/Non-HQLA	
3.3 Other equity instruments		15%
Equity from Spanish credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	50%
Equity from Spanish corporations	Unencumbered Level 2B assets	15%
Equity from other credit institutions	Unencumbered loans to financial institutions with residual maturity less than 6 months	50%
Equity from other corporations	Unencumbered Level 2B assets	100%
Participation in hedge funds	Other assets	100%
Memorandum item: Loaned or advanced as collateral	Encumbered assets	

ASSETS (cont'd) **ANNEX 3.1**

Assets	NSFR component	RSF factor
4 AVAILABLE-FOR-SALE FINANCIAL ASSETS		
4.1 Debt securities		5%
Spanish public debt	Unencumbered Level 1 assets	5%/15% /100%
Other public debt	Unencumbered Level 1 assets/Unencumbered Level 2A assets/Non-HQLA	100%
Debt securities from Spanish credit institutions	Other assets (Loans to financial institutions with a residual maturity of 1 year or more)	15%
Debt securities from other credit institutions	Other assets (Loans to financial institutions with a residual maturity of 1 year or more)	15%/100%
Debt securities from corporations	Unencumbered Level 2A assets/Non-HQLA	
4.2 Other equity instruments		50%
Equity from listed Spanish credit institutions	Unencumbered Level 2B assets	50%
Equity from other listed credit institutions	Unencumbered Level 2B assets	100%
Equity from other non-listed credit institutions	Other assets	100%
Memorandum item: Loaned or advanced as collateral	Encumbered assets	
5 Loans and receivables		
5.1 Loans and advances to credit institutions		
Reciprocal accounts	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Deposits with agreed maturity	Other assets (Loans to financial institutions with a residual maturity of 1 year or more)	100%
Demand deposits	Unencumbered loans to financial institutions with residual maturity less than 6 months	15%
Reverse repurchase agreements	Reverse repurchase agreement with non-financial institutions	50%
Other financial assets	Other assets (Loans to financial institutions with a residual maturity of 1 year or more)	100%
Impaired assets	Other assets (Non performing loans)	100%
5.2 Loans and advances to other debtors		
Mortgage secured loans		
Residential mortgage		
LTV less than or equal to 80% (RWA del 35%)	Residential mortgage RWA lower than 35%	65%
LTV over 80% (RWA of 50%)	Residential mortgage RWA greater 35%	85%
Of which: Impaired		
LTV less than or equal to 80%	Non performing loans	100%
LTV over 80%	Non performing loans	100%
Commercial mortgage	Residential mortgage RWA greater 35%	85%
Other secured loans	Other unencumbered performing loans with risk weights greater than 35%	85%
Other loans	Other unencumbered performing loans with risk weights greater than 35%	85%
Credit accounts	Other unencumbered performing loans with risk weights greater than 35%	85%
Commercial credit	Other unencumbered performing loans with risk weights greater than 35%	85%
Receivable on demand	Other assets with residual maturity less than 1 year	50%
Credit cards	Other assets with residual maturity less than 1 year	50%
Finance leases	Other unencumbered performing loans with risk weights greater than 35%	85%
Reverse repurchase agreements	Other unencumbered performing loans with risk weights greater than 35%	85%
Other financial assets	Other unencumbered performing loans with risk weights greater than 35%	85%
Impaired assets	Non performing loans	100%

ASSETS (cont'd)

ANNEX 3.1

Assets	NSFR component	RSF factor
5.3 Debt securities		
Government	Unencumbered Level 1 assets	5%
Credit institutions	Other assets (Loans to financial institutions with a residual maturity of 1 year or more)	100%
Other sectors	Unencumbered Level 2A assets/Non-HQLA	15%/100%
Memorandum item: Loaned or advanced as collateral	Encumbered assets	100%
6 Held-to-maturity investments		
Spanish public debt	Unencumbered Level 1 assets	5%
Debt securities from Spanish credit institutions	Other assets (Loans to financial institutions with a residual maturity of 1 year or more)	100%
Debt securities from Spanish corporations	Unencumbered Level 2A assets	15%
Debt securities from other corporations	Other assets	100%
Memorandum item: Loaned or advanced as collateral	Encumbered assets	100%
7 Changes in the fair value of the hedged items in portfolio hedges of interest rate risk	Other assets	100%
8 Hedging derivatives	Other assets (derivatives assets net of derivatives liabilities)	100%
9 Non-current assets held for sale	Fixed assets	100%
10 Investments	Other assets	100%
11 Insurance contracts linked to pensions	Insurance assets	100%
12 Tangible assets	Fixed assets	100%
13 Intangible assets	Fixed assets	100%
14 Tax assets	Other assets	100%
15 Other assets	Other assets	100%

SOURCE: Own elaboration.

LIABILITIES AND EQUITY

ANNEX 3.2

Liabilities and equity	NSFR component	ASF factor
1 Financial liabilities held for trading		
1.1. Trading derivatives	Considered net with derivatives assets	0%
2 Other financial liabilities at fair value through Profit or loss	N / A	N / A
3 Financial liabilities at amortized cost		
3.1 Deposits from central banks	Funding from central banks with residual maturity greater than 1 year	0%
3.2 Deposits from credit institutions		
Reciprocal accounts	Funding from financial institutions with residual maturity less than 1 year	50%
Deposits with agreed maturity	Funding from financial institutions with residual maturity greater than 1 year	100%
Other accounts	Funding from financial institutions with residual maturity less than 1 year	50%
Repurchase agreements	Repurchase agreement with financial institutions	0%
3.3 Customer deposits		
Government and other government agencies	Funding with residual maturity of less than one year provided by non-financial customers	50%
Current accounts	Demand deposits with residual maturity less than 1 year	90%
Savings accounts	Terms deposits greater 1 year	100%
Fixed-term accounts	Terms deposits greater 1 year	100%
Repurchase agreements	Repurchase agreement with non-financial institutions	50%
3.4 Debt certificates including bonds	Funding with residual maturity of less than one year provided by non-financial customers	50%
3.5 Other financial liabilities	Other liabilities	0%
4 Changes in the fair value of the hedged items in portfolio Hedges of interest rate risk	Other liabilities	0%
5 Hedging derivatives	Considered net with derivatives assets	0%
6 Liabilities associated with non-current assets held for sale		
7 Provisions	Other liabilities	0%
8 Tax liabilities	Tax liabilities	0%
9 Other liabilities	Other liabilities	0%
10 Total regulatory capital	Total regulatory capital	100%

SOURCE: Own elaboration.

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