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THE NET STABLE FUNDING RATIO AND BANKS' PARTICIPATION IN MONETARY POLICY OPERATIONS: SOME EVIDENCE FOR THE EURO AREA

by Antonio Scalia*, Sergio Longoni* and Tiziana Rosolin*

Abstract

Based on a review of the analytical underpinnings of the effects of the NSFR on banks' choices, this paper attempts to relate banks' strategies to developments in the value of the ratio in the euro area. In spite of a not-so-near implementation date, the evidence is that the NSFR already matters for banks' choices, and it might be more relevant as a decision variable than alternative leverage indicators. As part of a convergence process towards the 100 per cent threshold, we estimate that the ECB's 3-year LTROs have raised the available stable funding by €429 billion as of June 2012 for the sample banks with a shortfall and that the NSFR may affect loans to the economy. In view of the phasing-in of the Basel III liquidity standards, the evidence suggests that, when evaluating non-standard monetary policy measures, central banks should also take into account their impact on the fulfilment of the NSFR and the possible cliff effects related to their expiration.

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1. Introduction[1]

The aim of the Basel III liquidity standards is to promote the resilience of the banks' liquidity risk profile in the short run, by means of the Liquidity Coverage Ratio (LCR), and in the longer term, giving incentives to banks to fund their activities from stable sources on a structural basis, thus containing the maturity mismatch between assets and liabilities. The latter objective is pursued by means of the Net Stable Funding Ratio (NSFR), defined as available over required stable funding. The Available Stable Funding (ASF) is the sum of funding sources weighted according to their stability features, whereas Required Stable Funding (RSF) is the sum of uses of funds inversely weighted by their liquidity. The ratio, which must be greater than 100 per cent, is meant to support the institution as a going concern for at least one year. The standards will apply to internationally active banks and may be extended by national authorities to domestic banks which are not internationally active (BCBS, 2010a).

While the technical features of the LCR were finally endorsed by the Group of Governors and Heads of Supervision in January 2013, the Basel Committee on Banking Supervision has scheduled a review of the NSFR for 2013-2014 (BCBS, 2013). The current time frame for the NSFR envisages an observation period followed by full implementation as from 2018, compared with a gradual phase-in for the LCR starting in January 2015. Since 2010 the BCBS and the EBA have been monitoring the main banking groups. This activity focuses on a set of key capital and liquidity ratios evaluated at half-yearly frequency.

The analysis conducted so far shows that the regulation of liquidity risk will significantly affect the economics of banking and that there is considerable difficulty in clearly identifying the impact of liquidity standards on the money markets, central bank operations and the transmission mechanism of monetary policy. A careful assessment of the impact of the regulation during the observation period is therefore required. This might induce central banks to adapt their operational framework to ensure the effectiveness of monetary policy under the new regulatory regime.

While the LCR should have direct consequences for banks' liquidity demand and their recourse to central bank operations (Bech and Keister, 2012), the fulfilment of the NSFR involves changes in banks' structural funding composition, which may in turn cause adjustments to be made in the main balance sheet items of banks. These underlying changes may indirectly affect the money market and participation in monetary policy operations. This paper aims to make a contribution to the discussion of these issues, with a focus on the convergence process of euro-area banks and on their participation in Eurosystem operations.

The current observation phase going towards the adoption of the Basel III liquidity regulations is marked by important system-wide trends in the banking business. The outbreak of the financial crisis set off a deleveraging process across banks (Praet, 2012; IMF, 2012; Barclays, 2012a). Following the EBA capital-raising recommendations, since 2011 European banks have speeded up the convergence process towards the Basel III regulations.[2] The adjustment has mainly been achieved via capital increases, and the sovereign debt crisis has also put some pressure to reduce risky assets and interbank lending. The measures undertaken by euro-area banks as a response to capital concerns have caused parallel improvements in their structural liquidity position, although adding to the risk of a contraction of lending to the economy. Against this background, the ECB decision to introduce the 3-year long term refinancing operations (LTROs) at the turn of 2011 has aimed to avoid the adverse consequences of abrupt deleveraging and to sustain lending to the non-financial sector (Draghi, 2011; see also Darracq and De Santis, 2013).

Euro-area banks that participate in the EBA-BCBS Basel III half-yearly monitoring exercise have been producing their own LCR and NSFR figures since 2011. Owing mainly to the earlier implementation of the former indicator, banks are attaching a greater importance to the LCR and have introduced it as a reference point for the short-term planning of their liquidity management (Euromoney, 2012). Some banks have started publishing LCR figures as part of their financial statements. It should be noted that improvements in the LCR are generally beneficial to the NSFR as well. However, in consideration of the longer observation period, at the current juncture it is less clear if and to what extent the NSFR per se is already playing a role in banks' strategies. Since the NSFR is one among several possible indicators of a bank's degree of leverage, we ask the question: is the NSFR a driver of banks' choices or is the observed NSFR improvement simply an effect of global deleveraging?

The approach of this paper is twofold: the first part reviews the predictions of the effects of the NSFR; the second part addresses the above question and attempts to empirically relate the NSFR developments in the euro area to the adjustment in banks' activities in 2011 and the first half of 2012. In particular, we separate banks according to their fulfilment of the NSFR and view the resulting subsamples as a natural experiment. We proceed in three directions: (a) by performing statistical tests on the explanatory power of the NSFR vis-à-vis alternative leverage measures at bank level; (b) by examining the behaviour of banks whose NSFR was below and, respectively, above the 100 per cent threshold, employing the latter group as a control sample; and (c) by looking at the contribution of the ECB's long-term refinancing operations towards the fulfilment of the NSFR.

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[2] Differently, on 9 November 2012 the US Federal banking agencies (Federal Reserve, FDIC and OCC) announced the impossibility of completing the Basel III rulemaking process for regulatory capital that was to have been implemented by US banks from 1 January 2013. This partly derived from the banks' inability "to understand the rule or to make necessary systems changes" in time. On 2 July 2013 the Fed eventually approved a final rule establishing an integrated regulatory capital framework that will implement in the US the Basel III regulatory capital reforms. The phase-in period for larger credit institutions begins in January 2014.

The empirical analysis has two limitations. First, in practice we do not use the actual NSFR data at individual level, as calculated for the EBA-BCBS monitoring exercise by the bank themselves; we construct instead NSFR estimates using publicly available data with the addition of individual data on recourse to the 3-year LTROs, which represent a stable source of funding and thus directly affect the NSFR. These estimates therefore involve a certain degree of approximation. Second, banking activity in recent years has been affected by the aforementioned financial trends and by major macroeconomic developments: the economic slowdown, the ensuing reduction in the demand for loans, and the bank-sovereign debt crisis (ECB, 2012a). In addition to the conceptual difficulties and the early stage of implementation of Basel III, the macro developments make it hard at present to identify the contribution of convergence to the liquidity standards in banks' behaviour. With these qualifications, the empirical analysis is a first attempt at monitoring NSFR developments and their possible impacts.

Section 2 presents an overview of the implications of the NSFR on the banking business, the main balance sheet items, financial markets, and central bank operations. Section 3 describes the empirical results. Section 4 concludes.

2. Theoretical predictions

Three approaches have been used in the analysis of the impact of the Basel III liquidity regulations, and of the NSFR in particular. First, adopting a macro perspective some studies provide estimates of the NSFR impact on GDP based on the structural econometric models developed by central banks (MAG, 2010; Angelini et al., 2011). The key assumption is that, in order to meet the NSFR, banks will increase the average maturity of their wholesale liabilities. This will cause a reduction in profitability, which banks will tend to restore via an upward pressure on lending margins.[3]

Second, other studies have analysed the possible financial effects of the NSFR, by looking at the banking business, financial markets and central bank operations from various angles. These studies generally derive qualitative hypotheses.

Third, the "quantitative impact" exercises adopt an empirical approach which hinges on the financial data of the banking system. These studies are based on the estimation of the NSFR shortfall of the banking sector at a certain point in time. Two sources of data are employed: (a) accurate data collected by BCBS and EBA from banks as part of the quantitative impact studies (QIS data), and (b) publicly

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[3] The role of central bank funding is generally muted in these models. Slovik and Cournède (2011) examine the impact of the Basel III capital requirements on lending spreads and estimate a steady-state increase of 65 basis points as of 2019. Santos and Elliott (2012) estimate the effects that the Basel III liquidity changes would cause on lending rates using a credit pricing formula. Combining these effects with those of the capital requirements, they obtain a much smaller increase in lending rates (+18 basis points). Kopp, Ragacs and Schmitz (2010) estimate that the macroeconomic effects of implementing the NSFR for Austrian banks will cause a moderate reduction in GDP growth.

available balance sheet data (from Bankscope, Bloomberg, etc.).[4] Although this strand is mainly backward looking, the resulting estimates may be used to simulate plausible adjustment paths for the key balance sheet items in order to fill the gap sequentially at the least cost. Banks are likely to adopt a series of actions to reach a satisfactory structural funding ratio (ECB, 2011). They could act first to increase the numerator of the NSFR, by issuing more equity relative to debt and reducing short-term wholesale funding, and/or by extending the maturity of wholesale funding beyond one year, for instance issuing more long-term bonds. Second, banks could reduce the denominator of the NSFR by replacing lower-rated bonds with more highly-rated bonds in their investment portfolios; banks might also attempt to replace/reduce other asset types, including long-term private sector loans.

The remainder of this section presents a conceptual map of the theoretical predictions developed under the different approaches.

2.1 Business model

Intermediation margin - As the ability to obtain earnings from maturity transformation is reduced, banks will need to develop new or different intermediation services. For instance banks might find it more convenient to act as advisors in corporate bond issuance rather than to lend directly to the companies concerned (McKinsey, 2010).

Interest margin - With a positively sloped yield curve, the reduction of maturity mismatch should cause a contraction of the interest margin (MAG, 2010; Resti, 2011). In parallel, liquidity risk mitigation might stabilize the interest margin; the cost of funding should be less sensitive to temporary liquidity strains since the bank is considered as more resilient to liquidity risk overall.[5] In order to preserve their profitability, banks might seek to exploit their market power and increase the interest differential between lending and deposit rates (Angelini and Gerali, 2012).

ROE - Compliance with the liquidity requirements may have a substantial negative impact on bank profitability (MAG, 2010).[6] As the liquidity standards strengthen the resilience of bank funding, in bad

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[4] The studies of the second type tend to underestimate the NSFR compared with the actual QIS values. Using public data for 34 large European banks as of the end of 2009, Ötker-Robe and Pazarbasioglu (2010) estimate a NSFR shortfall of €2.8 trillion. This figure grossly overstates the actual gap computed with QIS data. Indeed, the shortfall calculated by BCBS (2010b) for a much larger sample of 249 banks from all over the world turns out to be equal to €2.9 trillion, that is almost equal to the previous figure. For the euro-area subset, ECB (2010) reports a QIS shortfall of €1.5 trillion as of 2009. Considering 156 European banks, EBA (2012a) computes a NSFR shortfall of €1.9 trillion in June 2011, which decreased to €1.4 trillion at the end of the year (EBA, 2012b). The bias in type-b estimates might also affect subsequent empirical studies by the IMF staff (IMF, 2011; Vazquez and Federico, 2012).

[5] In a recent study, Kapan and Minoiu (2013) show that banks with a strong structural funding position were better able to sustain syndicated lending to firms during the 2007-2008 crisis. This provides support for the notion that the adoption of the NSFR will enhance the resilience of banks to liquidity strains.

[6] McKinsey estimates that Basel III would reduce the return on equity by approximately 4 per cent on average in Europe and 3 per cent in the US. The NSFR would cause a reduction of the leverage ratio, thus also reducing ROE. However other authors (Dietrich et al., 2012), on the basis of an empirical analysis of a large sample of

times banks will need to reduce the leverage by less than before. The effect should be a reduction of the volatility of ROE through the business cycle.

Securitization - Banks will tend to place assets into covered bonds and/or standardize assets for plain securitization. This will help banks reduce both their reliance on unsecured funding and their funding costs. The reactivation of the securitization market is essential in order to prevent credit contraction, particularly towards riskier borrowers (Credit Suisse, 2012).

Leverage ratio and equity - By promoting longer term funding of assets, the NSFR will force banks to shift funding from short term to long term and from debt to equity (Dietrich et al., 2012).

Concentration risk - The NSFR, in combination with the LCR, enforces the sovereign-bank link owing to the preferential treatment of government bonds. Those belonging to the high quality liquid assets (HQLA) class have an RSF factor of between 0.05 and 0.20. Therefore it is likely that banks will increase the share of assets invested into HQLA government bonds.

Asset and liability management - The NSFR will induce banks to shift their business model from liability management (making business decisions about asset volumes and finding the financing in short-term wholesale markets as necessary) to asset management (the availability of long-term funding drives asset volume and composition; Allen et al., 2010).[7]

Loan-to-deposit ratio - The NSFR is calibrated so that loans with residual maturity below one year should be financed by stable funding (the RSF factor is 0.50 for corporate loans, 0.65 for residential mortgages, 0.85 for loans to retail customers and small business customers), thus making loans more expensive. On the other hand, the deposits from retail and small business customers are considered as stable and therefore they will benefit from an ASF factor of between 0.80 and 0.90. Empirically there is a negative correlation between NSFR and the loan-to-deposit ratio (IMF, 2011).

Specialized banks - Owing to limited access to retail deposits, specialized banks often rely on wholesale funding, which is penalized by the terms of NSFR. In consideration of the type of assets of specialized banks, which should be financed by stable funding, their business model will be heavily hit by the new liquidity standard (Credit Suisse, 2012).

2.2 Banks' balance sheets

Loans - The NSFR considers loans to retail customers and small and medium-sized enterprises (SMEs) as a stable investment even when their maturity is below one year, because banks cannot

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banks from seven Western European countries, find that the NSFR has no statistically significant effect on bank profitability. An explanation could be that the banks with higher NSFRs can pay lower risk premiums.

[7] Before the crisis, funding was not considered as a constraint since wholesale liquidity supply was highly elastic. This allowed banks to focus primarily on the investment side, neglecting funding risk. The underestimation of funding risk was partly induced by the Basel II rules, which did not lay down a specific capital requirement for liquidity risk by relegating it into pillar III (Allen et al., 2010).

completely revoke credit at maturity without threatening the financial soundness of debtors. Thus even some of the loans with maturity below one year should be financed by stable funding, making them more expensive.[8] The higher cost of loans caused by longer-term funding would imply a higher lending spread to reduce the impact on ROE (King, 2010). The cost of credit will be raised in good times, however cost and volume would be more stable in bad times.[9]

Low and high yield securities - The NSFR, coupled with the LCR, will give an incentive to banks to invest in HQLA. Since these are considered marketable even in crisis periods, the NSFR attributes them with low RSF factors even when their maturity is beyond one year. In particular government bonds with maturity longer than one year have an RSF factor of between 0.05 and 0.20; corporate and covered bonds rated at least AA- have a factor of 0.20. Other securities with maturity longer than one year should be financed with 100 per cent stable funding. That will significantly limit the capacity of banks to invest in high yield securities, thus favouring low yield ones. The yield spread between these two asset classes should rise and the volatility and depth of markets of non-HQLA should worsen.

Retail deposits - The NSFR considers deposits from retail and small business customers as a stable funding source, with an ASF factor of between 0.80 and 0.90. Wholesale and operational deposits (such as those held by a custodian bank) are penalized, with an ASF factor at 0. As customer deposits are an efficient vehicle to fulfil the NSFR, the competition on this form of funding will increase. This would make retail deposits less stable and more expensive to banks.[10]

Wholesale funding – Banks will reduce short-term wholesale funding on the interbank market and make greater recourse to bond issuance as a stable funding source. This will reduce the volatility of banks' liquidity needs.

Covered bonds - Banks will have an incentive to increase the issuance of covered bonds, which have an ASF factor equal to 1. Besides, the demand for covered bonds included in HQLA and eligible for central bank operations will also be stimulated by preferential treatment on the asset side with RSF factors of between 0.20 and 0.50 (McKinsey, 2010).

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[8] Those banks whose main business line is the financing of SMEs will be overly penalized to the extent that they are funded by other financial institutions. The penalty arises because there are large discrepancies between the ASF factor of their usual funding sources for loans to SMEs and the RSF factor of that type of loan. Banks will have an incentive to increase the share of short maturity lending to reduce funding costs, e.g. by offering more revolving loans and fewer corporate mortgages.

[9] There are two reasons for this. First, banks will suffer less rapid outflows and would need to deleverage less. Second, countercyclical charges will be lowered in a credit crunch. These effects may sustain credit supply in bad times. Since the outbreak of the crisis there has been a consensus that volatile credit access is simply too costly for businesses, households and ultimately taxpayers (Goodhart and Perotti, 2012; Resti, 2011). Besides banks will try to reduce the difference between committed credit and disbursed credit, because a positive RSF factor is applied to overall committed credit.

[10] In order to reduce competition, banks might seek to establish a link between loans and deposits, for example by offering mortgages with interest paid on the difference between outstanding credit and deposits.

2.3 Financial markets

Segmentation by maturity **-** Banks with an NSFR value below the threshold will lengthen the maturity of their liabilities. In equilibrium, banks with an NSFR value close to 100 per cent would face a constraint in funding themselves on money markets, with a consequent reduction in their trading volume. At the same time, banks as lenders will prefer the short end rather than the long end of the market. The increase in the funds offered could be limited by the opportunity cost related to other instruments requiring a low level of stable funding, like government bonds. Therefore the expected impact on money market volume will be negative as the shift of the demand curve should be greater than that of the supply curve.

Asset encumbrance - The new liquidity regulations foster funding through covered bonds and more generally the securitization process. That reduces inevitably the remaining value of assets to cover unsecured liabilities, thus lowering their recovery rates in case of default (Resti, 2011).

Yield curve steepness **-** The lengthening of maturity implied by the NSFR would lead to a steeper yield curve. The expected segmentation by maturity could make long-term rates less responsive to the shift of the monetary policy rate.

Interbank rates **-** The reduction in the volume of money market lending might lead to higher volatility of Euribor rates.

Interlinkages stemming from interbank operations – The reduction in wholesale interbank funding will reduce the interlinkages among banks, thus reducing systemic risks (ECB, 2012b).

2.4 Central bank operations

Demand for central bank liquidity **-** If the available maturities of refinancing operations are shorter than one year, the NSFR will have a neutral impact on demand. In principle, banks may want to increase their share of longer-term funding and would reduce their shorter-term funding accordingly; however, at least on aggregate level this will not lead to a decline in demand for central bank liquidity, due to structural liquidity deficit considerations. Banks will have an incentive to seek refinancing operations with maturities longer than one year. If these are available via the central bank, this kind of refinancing would increase the ASF, while also increasing the volume of encumbered assets. The incentive to participate will be a direct function of the RSF factor of collateral to be pledged with the Eurosytem.

Collateral **-** The impact of the NSFR depends primarily on how the pledge of collateral is considered. Collateral in the pool is not earmarked for a specific refinancing operation although it is plausible to consider collateral as weighted according to the maturity of refinancing. Banks will have an incentive

to pledge non-HQLA in order to reduce the impact on the NSFR.[11] This effect will add to a similar one related to LCR fulfillment.

Operating target **-** The NSFR would lead to segmentation of markets by maturity, since banks will tend to reduce the portion of their funding with maturities below one year. This effect, which compounds a similar effect caused by the LCR at shorter maturities, will probably lead to the shrinkage of unsecured short-term funding markets. A decline in market activity could have implications for monetary policy implementation, since many central banks currently use the overnight or short-term market rate as their operating target.

Bank lending channel – Banks' compliance with the NSFR will make loan supply less sensitive to monetary policy shocks. This could weaken the bank lending channel of monetary policy (Giordana and Schumacher, 2011).

Table 1 provides a summary of the analytical predictions on the impacts of the NSFR.

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[11] For example, if the banks pledged government bonds rated AA- or better, the RSF on these assets would rise from 0.05 to 1; banks would be better off by pledging corporate loans since the increase in the RSF factor would be smaller, from 0.50 to 1. In principle the central bank could mitigate the tendency to pledge fewer liquid assets by applying appropriate haircuts and/or concentration limits for collateral.

Table 1: Expected impacts of the NSFR

Business model		
	impact	volatility
Intermediation margin	+	
Interest margin	-	-
ROE	-	-
Securitization	+	
Leverage ratio	-	-
Concentration risk	+	
Liability management	-	
Asset management	+	
Loan to deposit ratio	-	-
Specialized bank	-	

Balance Sheet			
	volume	rate	volatility
Assets			
Loans	-	+	-
Revolving loans	+		
Committed credit facilities	-		
Low yield bonds	+	-	+
High yield bonds	-	+	-
Covered bonds	+		
Liabilities			
Customer deposits	+	+	+
Deposits from banks	-	-	-
Deposits from investment funds	-	-	
Unsecured bonds	+	+	
Covered bonds	+		
Repos	+		
Equity	+		

Financial markets			
	Impact		
Segmentation by maturity	+		
Segmentation by instrument	+		
Volume of secondary govt. bond market	-		
Credit risk on unsecured funding	-		
Yield curve steepness	+		
	volume	rate	volatility
Short term rates	-	-	+
Long term rates	+	+	-

Central bank operations	
	Impact
Demand for central bank liquidity	
without VLTRO	neutral
with VLTRO	+
Collateral quality	-
Significance of current operating target	-
Significance of bank lending channel	-

3. Empirical analysis

3.1 NSFR estimation

We employ the financial statements for December 2010, December 2011 and June 2012 available from Bankscope.[12] The representative sample covers 89 banks in the euro area, which are chosen from the largest ones in each country (Table 2). Their total assets amounted to €23 trillion at the end of 2011, that is roughly 70 per cent of total assets of all euro area banks (€33.5 trillion). It should be noted that the EBA's 2012 report includes 120 euro-area banks. Although not exactly matching, the two samples should be largely similar (except possibly for BE and FI, see below) and representative of a large share of the banking sector in each country. Following the BCBS-EBA example, we use consolidated figures, since the NSFR must be fulfilled at consolidated level in the first place.

Table 2 - Sample banks

Country	Banks		Total assets 2011	
	Number	%	Bln €	%
AT	7	8	498	2
BE	3	3	864	4
DE	23	26	5,817	25
ES	6	7	2,666	12
FI	4	4	420	2
FR	7	8	6,855	30
GR	3	3	215	1
IE	4	4	493	2
IT	12	13	2,393	10
NL	9	10	2,267	10
PT	4	4	337	1
Other countries[1]	7	8	140	0.3
Total	89	100	22,965	100

(1) Including banks from CY, EE, LU, MT, SI and SK.

The estimation problem involves the attribution of the appropriate ASF and RSF weighting factors in the presence of limited information. On the asset side, loans should in principle be categorized according to their residual maturity and the characteristics of the borrower (retail, small business or corporate); other assets should be classified according to residual maturity, credit risk and encumbrance. Among liabilities, deposits should be classified according to residual maturity and depositor's attributes (e.g. small business). Unfortunately the data set includes aggregate items with only a partial breakdown.

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[12] Checks on data accuracy were performed using the financial statements of banks as published on the web. For Italian banks the breakdown of loans was obtained from supervisory data.

Owing to these limitations, the estimated NSFR approximates the actual figure. Following the approach of IMF (2011), we make some simplifying assumptions on the weighting scheme. The choice of the factors for each item of the available data is listed in Table 3, together with the variation range of the regulatory weights, applicable to the granular sub-items. For our purposes the applied factors are adjusted for specific countries when additional information is available (see below). Data on recourse to the 3-year LTROs at the end of 2011 and June 2012 is from the Eurosystem files. The individual pledge of collateral for the 3-year LTROs, which affects the calculation of RSF by a factor of 1, was approximated using the country-level split between securities and loans pledged with the Eurosystem, obtained from the collateral reports.

Table 3 - Weighting factors

RSF			ASF		
Assets	**Factor**		**Liabilities**	**Factor**	
	Basel	**Applied**		**Basel**	**Applied**
Residential mortgage loans	0.65-1	0.65	Customer deposits - current	0.5-0.9	0.85
Other mortgage loans	0.65-1	0.65	Customer deposits - savings	0.5-0.9	0.8
Other consumer/ retail loans	0.65-1	0.85	Customer deposits - term	0.5-0.9	0.8
Corporate & commercial loans	0.65-1	0.85	**Total customer deposits**		
Other loans	0.65-1	0.85	Deposits from banks	0-0.5	0
Less: Reserves for impaired loans/ NPLs		-1	Repos and cash collateral	0-0.5	0
Net loans			Other deposits and short-term borrowings	0-0.5	0
			Total deposits, money market and short-term fund		
Gross loans					
Loans and advances to banks	0-1	0.35	Senior debt maturing after 1 year	1	1
Reverse repos and cash collateral	0	0	Subordinated borrowing	1	1
Trading securities and at fair value through income	0.05-1	0.35	Other funding		1
Derivatives		0.25	**Total long term funding**		
Available for sale securities	0.05-1	0.35	Derivatives	0	0
Held to maturity securities	0.05-1	1	Trading liabilities	0	0
At-equity investments in associates	0.05-1	1	**Total funding**		
Other securities	0.05-1	1	Reserves for pensions and other	1	1
Total securities			Other non interest	1	0
Investments in property	1	1	**Total liabilities**		
			Pref. shares and hybrid capital accounted for as debt	1	1
Insurance assets	1	1	Pref. shares and hybrid capital accounted for as equity	1	1
Other earning assets	1	1	Non-controlling interest		
Total earning assets			Total equity	1	1
Cash and due from banks	0	0	Total liabilities and equity		
Residual assets	-	1			
Total assets			Central bank refinancing (3 years)	1	1
Liabilities					
Guarantees	0.05	0.05			
Committed credit lines	0.05	0.05			
Other contingent liabilities	0.05	0.05			

The NSFR is calculated for each bank in the sample and aggregate results are expressed in terms of a "composite bank". The average NSFR is the sum of all banks' ASF divided by the sum of all banks'

RSF. The aggregate shortfall, that is the difference between RSF and ASF for banks with a ratio below 100 per cent, is then obtained across the sample. These figures are computed within the sample and are not extrapolated to the entire population.

The resulting country-level average NSFR estimates are generally in line with the actual values in the EBA exercise for the reference date of December 2011. The quality of the estimates seems low for two countries only, Belgium and Finland, as evidenced by a large difference in the average NSFR; therefore banks for those countries are excluded from the analysis that follows.[13] Besides, the RSF estimates are calibrated for France and, to a lesser extent, Italy and Germany by applying a loan factor and/or a security factor so as to reduce the distance between the composite NSFR estimate and the country figure derived from the EBA sample.[14]

Table 4 - NSFR (percentage points) and Shortfall (billion euros) by country

Banks		Jun-12				Dec-11				Dec-10			
Country	Num.	NSFR wtd	Min	Max	Shortfall	NSFR wtd	Min	Max	Shortfall	NSFR wtd	Min	Max	Shortfall
AT	7	92.3	66.0	110.8	33	94.7	60.5	111.2	27	95.0	59.3	114.0	27
BE[1]	3	75.4	71.6	80.7	131	75.7	60.4	81.0	126	78.2	76.3	79.8	122
DE	23	92.7	69.4	126.8	238	93.3	64.5	119.5	245	91.0	64.1	113.8	291
ES	6	95.6	89.5	104.2	96	93.1	87.2	101.5	128	91.4	82.4	97.1	154
FI[1]	4	80.9	71.4	121.0	58	67.5	50.8	125.1	82	61.0	46.7	126.4	111
FR	7	93.5	67.8	144.7	378	91.4	71.7	151.4	382	93.6	73.6	152.3	343
GR	3	54.9	41.1	61.0	69	65.6	47.7	71.2	57	77.5	69.3	81.3	41
IE	4	99.4	94.8	102.8	5	78.5	48.1	99.0	73	72.1	56.3	88.1	97
IT	12	103.9	90.9	108.6	18	100.9	85.4	109.4	29	95.7	77.6	102.1	77
NL	9	100.3	74.1	130.8	41	97.0	74.4	135.0	101	100.2	77.0	132.6	47
PT	4	99.4	92.3	110.8	8	96.1	91.8	104.1	11	93.6	88.9	100.1	16
Other countries[2]	7	101.0	96.0	104.3	1	100.9	92.2	117.8	3	105.0	82.2	125.6	1
Total[3]	89	94.5	41.1	144.7	1,074	92.4	47.7	151.4	1,263	91.6	46.7	152.3	1,327
Total	82	95.6	41.1	144.7	886	93.6	47.7	151.4	1,055	92.9	46.7	152.3	1,095

(1) Banks for these countries are excluded from the analysis.
(2) Including banks from CY, EE, LU, MT, SI and SK.
(3) Including also banks from BE and FI.

We estimate a moderate increase in the aggregate NSFR in 2011, from 92.9 to 93.6 per cent, and a larger one during the first half of 2012, to 95.6 per cent (Table 4). The 18-month improvement in the NSFR is thus equal to 2.7 per cent. In June 2012 the average country figures ranged from 54.9 per cent (Greece) to 103.9 per cent (Italy).

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[13] The EBA internal report contains NSFR values at country level. The NSFR figures of banks from BE and FI are much larger compared with the estimates in this note. This gap may be related to the different composition of banks in the country samples and to discrepancies in the geographical borders used for banking groups.

[14] As part of the calibration, the loan factor for all French banks has been lowered by 0.2, in order to bring the country composite NSFR in line with that obtained from the EBA sample. For small Italian banks the loan factor has been raised by 0.1. This reflects the notion that, owing to the large presence of SMEs in Italy, the average credit quality is slightly lower than average for small banks. For German, French and Italian banks the securities factor has been slightly adjusted to reflect the average credit quality of the portfolios.

The increase in the composite NSFR is the result of a €505 billion increase in the RSF (Fig. 1) and a larger increase in the ASF, by 796 billions (Fig. 2). Among the assets included in the RSF, the largest change is observed for the two (weighted) securities components, which surged by €230 billion in the first half of 2012. The two aggregate loan items ("Loans to banks" and "Loans") also rose in the first half of 2012. The expansion of loans and securities in the RSF computation, both of which had declined moderately in 2011, can be largely related to the 3-year liquidity injections by the Eurosystem. These were crucial in easing the funding strains of banks, partly in view of large securities redemptions in 2012-2013, and provided them with a form of insurance against the occurrence of unfavourable market scenarios. Furthermore, the 3-year LTROs set off a flow of carry trades (ECB, 2012c).

Figure 1 – Required stable funding (billion euros)
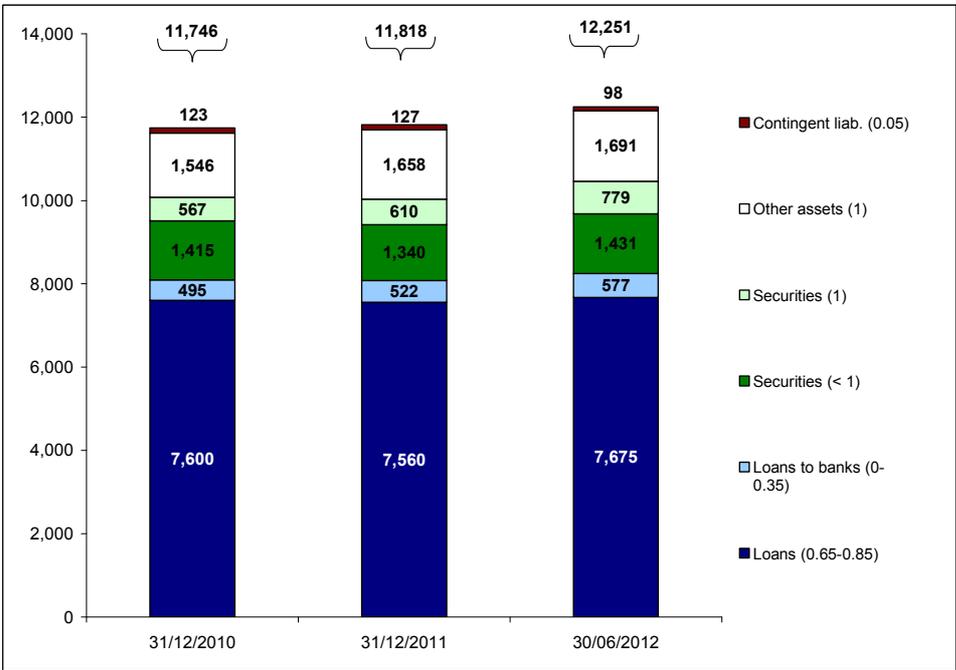
The increase in available stable funding is split between €144 billion in 2011 and, respectively, €651 billion in the first half of 2012. Whereas in 2011 the large contribution of the initial 3-year LTRO at the very end of the year (€328 billion) was partly offset by the fall in long-term funding and equity that had occurred in the previous months, in the first half of 2012 all sources of ASF rose substantially, the two largest components being the second 3-year LTRO (253 billions) and customer deposits (€215 billion). The increase in long term funding (€163 billion) and equity (€20 billion), which largely offsets the fall of 2011, reflects the easing of funding conditions for banks in peripheral countries of the euro area. We note that this trend continued after June 2012.

Overall the banks in the sample took €581 billion from the 3-year LTROs, or 57 per cent of the total amount allotted in the two operations.

Figure 2 – Available stable funding (billion euros)
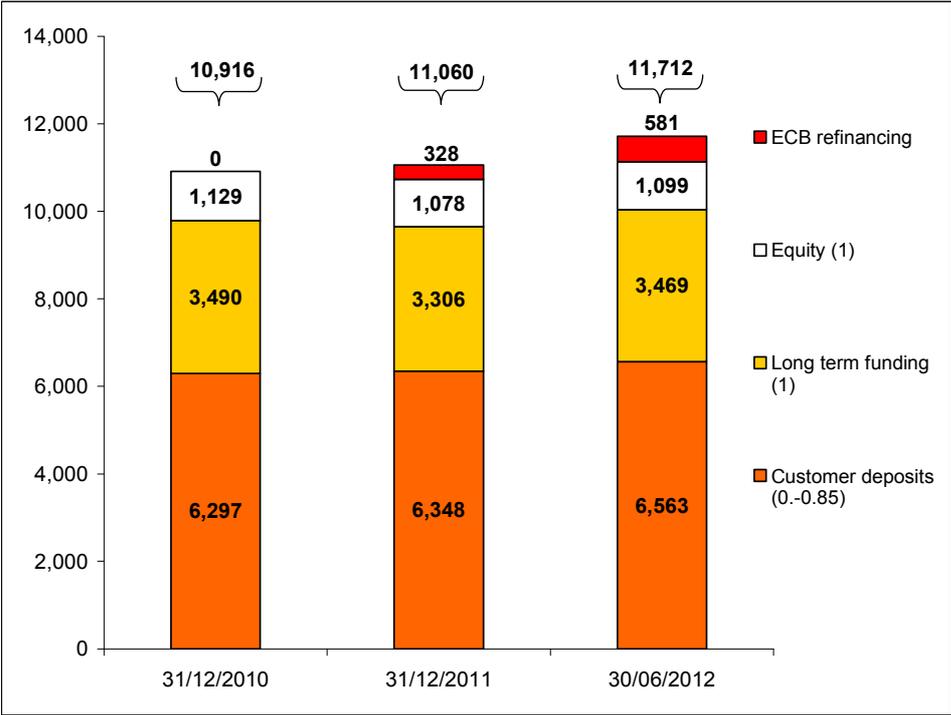
If we restrict our attention to the *banks that had been below the 100 per cent threshold* at the end of 2010, in the following year the aggregate NSFR shortfall declined moderately, from €1,095 billion to €1,055 billion (Table 5, left-hand column). This improvement is mainly the result of lower RSF (-€59 billion) rather than of higher ASF (+€22 billion). The 3-year LTRO is the major source of the increase in available stable funding (+253 billions). For the sake of comparison the EBA (2012) sample, made up of 155 banks (including from Denmark, Hungary, Norway, Poland, Sweden, UK, Belgium and Finland), presents an aggregate NSFR shortfall of €1.39 trillion at the end of 2011.

In 2012 we observe a large decrease in the NSFR shortfall, from €1,055 billion to €887 billion. The increase in ASF is equivalent to €440 billion. This is partially offset by the growth of RSF (€206 billion) plus other minor factors (Table 5, right-hand column). The 3-year LTRO of February 2012 is the single largest component to reduce the shortfall, via an ASF increase of €176 billion. There were 58 banks with a shortfall in December 2010, 52 in December 2011 and 49 in June 2012.

Table 5 – Shortfall decomposition (billion euros)

Shortfall Dec. 2010		1,095	Shortfall Dec. 2011		1,055
Changes in ASF components:			*Changes in ASF components:*		
Customer deposits (0.5-0.85)	-44		Customer deposits (0.5-0.85)	122	
Long term funding (1)	-138		Long term funding (1)	134	
Equity (1)	-49		Equity (1)	9	
ECB refinancing	253		ECB refinancing	176	
Change in ASF:	**22**		**Change in ASF:**	**440**	
Shortfall after ASF changes	*1,073*		*Shortfall after ASF changes*	*615*	
Changes in RSF components:			*Changes in RSF components:*		
Loans (0.65-0.85)	-71		Loans (0.65-0.85)	52	
Loans to banks (0-0.35)	-8		Loans to banks (0-0.35)	45	
Securities (<1)	-89		Securities (<1)	58	
Securities (1)	10		Securities (1)	104	
Other assets (1)	97		Other assets (1)	-40	
Contingent liab. (0.05)	2		Contingent liab. (0.05)	-13	
Change in RSF:	**-59**		**Change in RSF:**	**206**	
Shortfall after RSF change:	*1,014*		*Shortfall after RSF change:*	*821*	
Changes in ASF and RSF that are recorded above but should not be computed in the shortfall for 2011 as banks' NSFR has become greater than 100	40		*Changes in ASF and RSF that are recorded above but should not be computed in the shortfall for 2012 as banks' NSFR has become greater than 100*	60	
			Changes in ASF and RSF that are not recorded above as shortfall for 2012 as banks' NSFR was above 100, but went below 100 by June	6	
Shortfall Dec. 2011		**1,055**	**Shortfall June 2012**		**887**

3.2 Deleveraging

We aim to examine individual behaviour more closely. For this purpose we leave out of the analysis two banking groups that faced a vast restructuring process in 2012 H1, which generated one-off changes in the main balance sheet items. Banks from BE and FI are left out as in the previous section. The total number of banks is thus reduced to 80 from 15 countries.

If we consider the cumulative NSFR change between December 2010 and June 2012, 79 per cent of banks with an initial shortfall raised the NSFR, against 25 per cent for already-compliant banks (Table 6). Just under one half of banks in the former group (48 per cent) were persistent, i.e. they raised the NSFR consecutively in both sub-periods. These figures lend support to the hypothesis that the NSFR level matters for banks' choices.

Table 6 - Persistence of NSFR increase

Percentage frequency of banks that in 2011-2012 H1:

	Reduced NSFR	Increased NSFR	*of which in both years*
Total	37	63	*35*
NSFR <100% in 2010	21	79	*48*
NSFR ≥ 100% in 2010	75	25	*4*

A possible objection to this interpretation is that in the sample period all EU banks have undergone a deleveraging process to undo some excesses of the past and to comply with the EBA 2011 capital exercise. Thus the observed NSFR improvement would simply be an outcome of that process; the ratio itself would only be one of a group of leverage measures, with the disadvantage of being the most cumbersome to compute.

To look into this type of criticism, we present some statistical tests on three alternative leverage indicators that may potentially serve as decision variables for the behaviour of banks: (a) the NSFR; (b) the plain leverage ratio, defined as regulatory tier 1 capital over total assets; (c) the loans/deposits ratio. Compared with the NSFR, the second and third measure are quite widespread and can be calculated in a straightforward manner from balance sheet data, thus being easier to interpret and communicate.[15]

We consider the frequency distribution of banks that improved each indicator, i.e. reduced leverage, in 2011 and, respectively, the first half of 2012. The three indicators are listed along the horizontal headings of Table 7. Each cell reports the percentage frequency of banks showing an improvement. The vertical headings report seven control variables which might in principle affect the intensity of deleveraging. Controls 1 to 3 are the same leverage indicators as in the horizontal heading; controls 4 to 7 are state variables that characterise each bank. For each control variable we partition the 80 banks in the sample into two groups according to a quantitative or qualitative scale, as follows.

1) *NSFR*; we take a value of 100 per cent at the beginning of each period as the relevant threshold;

2) *leverage ratio*; we use the median, equal to 5 per cent, as the threshold;

3) *loans/deposits*; we use the median, equal to 1.4, as the threshold;

4) *core tier 1*; we take 9 per cent, the target set by the EBA, as the threshold;

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[15] We do not consider the leverage ratio as specified by the Basel III rules, which includes off-balance sheet exposures and cannot be estimated from the available data.

5) *country*; we separate banks headquartered in countries with a high sovereign rating (AT, DE, FR, LU, NL) from those headquartered in other euro-area countries;

6) *size*; we use a value of total assets equal to €100 billion as the threshold;

7) *loans/assets*; this variable captures the business model: banks above the median (equal to 0.6) are assumed to follow the traditional banking model, whereas those below the median are more geared towards universal banking.

Table 7 - Changes in leverage indicators

| | | % of banks in each category that | | | | | |
| | | increased NSFR | | increased lever. ratio | | reduced loans/depos | |
		2011	2012 H1	2011	2012 H1	2011	2012 H1
Total		**64**	**55**	**54**	**56**	**59**	**58**
1) NSFR	≥ 100%	50	40	48	50	65	69
	< 100%	70	64	57	59	56	51
	χ^2 *p-value*	***0.09***	***0.04***	*0.46*	*0.47*	*0.47*	*0.12*
2) Leverage ratio [1]	≥ median (5%)	69	53	46	55	61	58
	< median	63	58	62	57	58	62
	χ^2 *p-value*	*0.52*	*0.64*	*0.16*	*0.89*	*0.78*	*0.77*
3) Loans/Deposits [2]	> median (1.4)	74	63	60	56	72	56
	≤ median	54	46	47	57	43	60
	χ^2 *p-value*	***0.06***	*0.13*	*0.27*	*0.94*	***0.01***	*0.71*
4) Core tier 1 ratio	≥ 9%	65	60	40	58	59	60
	< 9%	68	43	63	50	59	54
	χ^2 *p-value*	*0.74*	*0.16*	***0.05***	*0.58*	*0.97*	*0.59*
5) Country [3]	Core	60	51	50	50	69	60
	Non-core	70	61	59	61	45	55
	χ^2 *p-value*	*0.35*	*0.40*	*0.43*	*0.37*	***0.04***	*0.63*
6) Size [4]	Large	69	54	57	48	58	61
	Medium	59	56	51	64	60	55
	χ^2 *p-value*	*0.32*	*0.84*	*0.65*	*0.22*	*0.85*	*0.62*
7) Loans/Total assets	> median (0.6)	67	55	49	53	54	50
	≤ median	58	55	63	61	67	70
	χ^2 *p-value*	*0.40*	*0.98*	*0.25*	*0.53*	*0.27*	***0.08***

Notes:
(1) Leverage ratio = Regulatory Tier 1 Capital / Total assets
(2) Loans: Gross loans (Residential Mortgage Loans; Other Mortgage Loans;
    Other Consumer/Retail Loans; Corporate & Commercial Loans; Other Loans)
    Deposits: Total customer deposits (Current, Savings,Term)
(3) Core countries: AT, DE, FR, LU, NL
(4) Medium banks: defined by total assets <=100€ bln in Dec. 2010

Let us consider first the evidence for the NSFR, in the first vertical block of results in Table 7. We notice that overall the share of banks that improved their NSFR is equal to 64 and 55 per cent in 2011 and the first half of 2012 respectively. Splitting banks according to their NSFR level, we observe that the share of those which deleveraged changes from 50 per cent, for banks above the threshold, to 70 per cent, for those below the threshold. The frequencies of "leverage improvers" in the two subgroups (50 as against 70) are statistically different at the 10 per cent confidence level based on the chi-square test, indicating that the two probability distributions are different. In the first half of 2012 the share of NSFR improvers declines for both subgroups, to 40 and 64 per cent. It remains true that banks with an NSFR below the 100 per cent threshold raised their ratio with a larger probability value, and that they did so in a statistically different fashion relative to banks with an NSFR above 100 per cent (at the 5 per cent confidence level). It may be argued that this second group of banks took some respite, and tended to increase leverage as measured by the NSFR.

If we partition the banks according to the value of the leverage ratio, we note some differences in the two sub-periods, although the percentage of NSFR improvers does not differ statistically between the sub-groups. Using the loans/deposits ratio as the control variable, the resulting sub-groups show a significant difference in the frequency distribution of NSFR changes in 2011: banks with a high loans/deposits ratio improved their NSFR with a 74 per cent probability, as opposed to 54 per cent for banks with a low ratio. In 2012 the difference is no longer significant. When we look at the effect of state variables 4 to 7 on NSFR changes we notice some broad patterns, although they are not significant in statistical terms. We observe that in the first half of 2012 banks with a high core tier 1 improved their NSFR with a higher frequency (60 per cent) compared with banks with a low core tier 1 (43 per cent). This might perhaps be interpreted in light of a staggered decision process, whereby banks focus first on fulfilling the capital requirements and, second, aim for a satisfactory liquidity ratio. Banks in non-core countries increased their NSFR by a larger share relative to core countries in both years. This seems to reflect a greater emphasis on the soundness of the liquidity profile from banks in peripheral countries in the presence of funding strains. In 2011 large banks improved their NSFR more frequently than medium-sized banks. This is consistent with the notion that the NSFR applies first and foremost to internationally active banks, and size acts as a proxy of their geographical reach.

Next we consider the frequency distribution of changes in the *leverage ratio*. Using controls 1-3 we note no cases of a significant difference between the sub-groups. In 2011 banks with high and low values of the leverage ratio adjusted it with different frequencies (46 against 62 per cent); the gap is economically intuitive but statistically not significant. Considering controls 4 to 7 we note only one significant difference in the distribution of leverage ratio changes: in 2011 banks with a core tier 1 ratio below 9 per cent increased the leverage ratio more frequently than banks with high core tier 1 (63 against 40 per cent). This is largely a mechanical consequence of that fact that in 2011 the banking

system made a major effort in terms of regulatory capital improvement following the EBA recommendations, and that bank capital appears as the numerator of the leverage ratio.

Finally we examine the *loans/deposits ratio*. In 2011 the frequency of banks that reduced the ratio varies significantly with its initial value. Banks above the median reduced the ratio with a frequency of 72 per cent, while banks below the median reduced the ratio only 43 per cent of the times. However this pattern is no longer visible in the first half of 2012. Considering controls 4-7 we note a significant difference in deleveraging related to the country of establishment: in 2011 banks in core countries put in place a reduction of the loans/deposits ratio more frequently than banks in non-core countries (69 per cent against 45 per cent). Besides in 2012 H1 and, to a lesser extent, in 2011 global banks reduced their loans/deposits ratio more frequently than traditional banks, as evidenced by the last row section of Table 7.

To sum up, the fact finding exercise and the statistical tests in Table 7 reveal some noteworthy patterns concerning the deleveraging process carried out by the banking system in 2011 and the first half of 2012. One result stands out: among the three candidate leverage measures, the NSFR, in spite of its relative complexity, is the one which most clearly appears as a target variable for banks' choices. In both periods banks are found to adjust the NSFR strategically depending on their initial level. The leverage ratio does not show the same property, nor does the loans/deposits ratio.

3.3 NSFR components

Figure 3 provides evidence on each of the two components of NSFR changes, namely the ASF and RSF, at individual level. The distributions for 2011 are presented in the top graphs, where banks are split according to their NSFR at the beginning of the period. Each bank is represented by a histogram along the x axis, showing the separate contribution of ASF and RSF (positive or negative), and by a marker giving the total NSFR change, measured along the y axis. The banks are presented from left to right in ascending order of change.[16] The graphs visually illustrate the notion that the distribution of changes between the two groups is different. In particular, the top left graph reveals that several banks with a shortfall improved their NSFR by acting on both components, with a frequency of 26 per cent. The corresponding frequency for banks above the threshold (top right graph) is 17 per cent. In 2012 H1, when the largest contribution comes from the ASF, over one third of banks with a shortfall adjusted both components in the same direction to achieve an increase in the NSFR (bottom left graph).

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[16] The NSFR changes are split into their components using the total differential and ignoring partial derivatives higher than the first order, captured by the residual term in the formula:

$$\Delta NSFR_t = \frac{\Delta ASF_t}{RSF_{t-1}} - \frac{ASF_{t-1}\Delta RSF_t}{RSF_{t-1}^2} + res_t$$

Figure 3 – NSFR changes and components

Banks with NSFR<100%	Banks with NSFR≥100%

2011

2012 H1
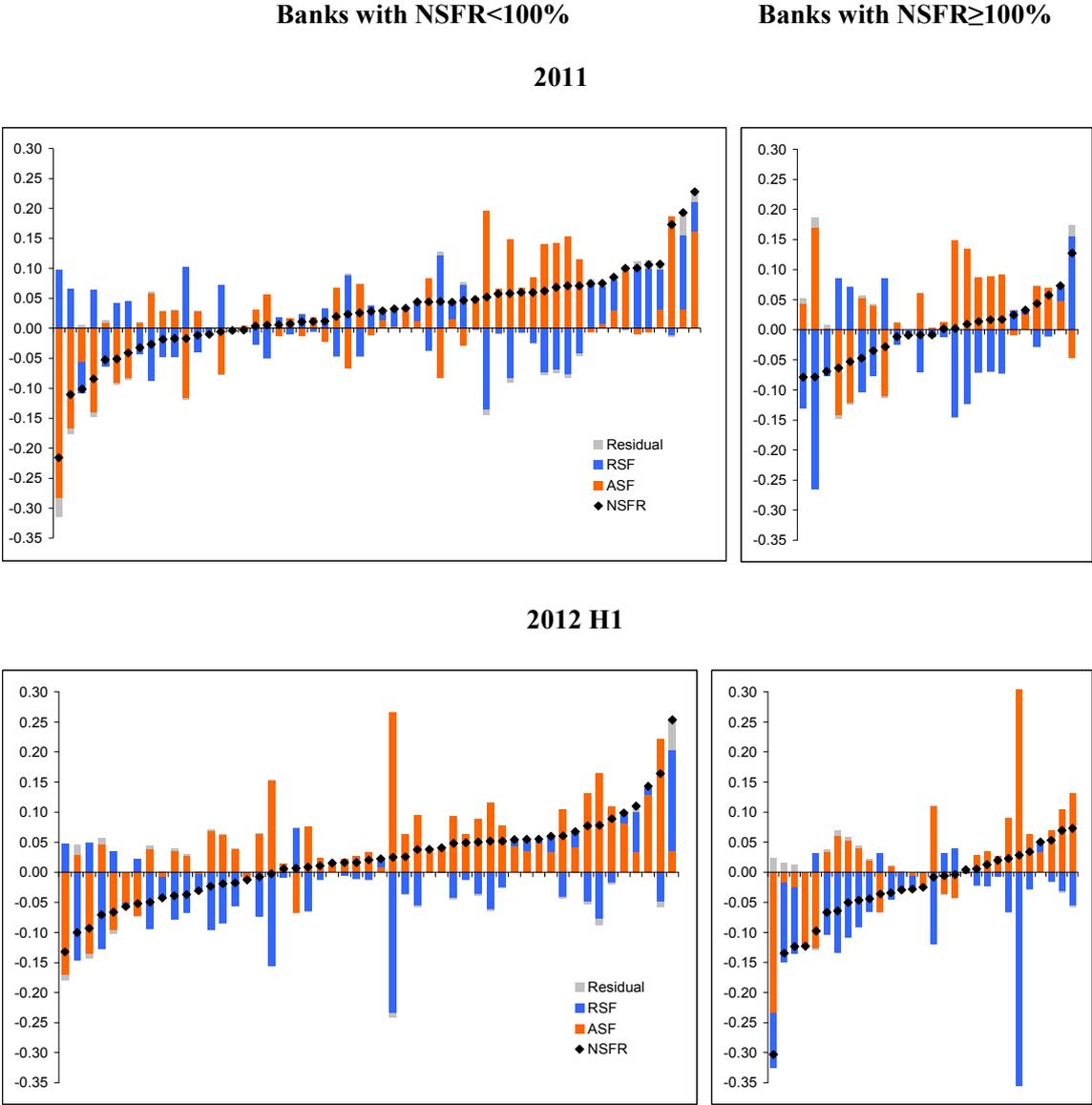
Further insight can be gained from the breakdown of the two main components of the RSF, namely loans to non-financial institutions and securities.[17] Figure 4 uses the four-frame structure of Figure 3 and shows the contribution of loans and securities to NSFR changes of individual banks in each group and period. Banks are ordered by the total NSFR change. The importance of each subcomponent can be appreciated by means of simple statistics. In particular, the frequency of banks with a shortfall that in 2011 made a total NSFR improvement with a contribution from a reduction in loans to the economy (displaying a blue bar above the *x* axis) was 29 per cent, as opposed to 17 per cent for banks above the threshold (Table 8). In 2012 H1 the corresponding frequencies were 34 per cent and 20 per cent. The

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[17] The contributions are calculated via the total differential of the RSF. The components other than Loans to non-banks and Securities are included in the residual term, which shows relatively large values.

downsizing of securities contributed more widely to NSFR convergence in 2011, with a frequency of 45 per cent for banks with a shortfall.

From a macroeconomic standpoint, the evidence on loan reduction in the fulfilment of NSFR may provide new insight into the phenomenon of contraction of credit to the real economy. This finding, which merits further investigation, has potential implications for the regulatory review planned by the BCBS, as well as for the evaluation of long-term refinancing by the Eurosystem within the context of non-standard monetary policy measures.

Figure 4 – Components of RSF change

Banks with NSFR<100%   **Banks with NSFR≥100%**

2011

2012 H1

25
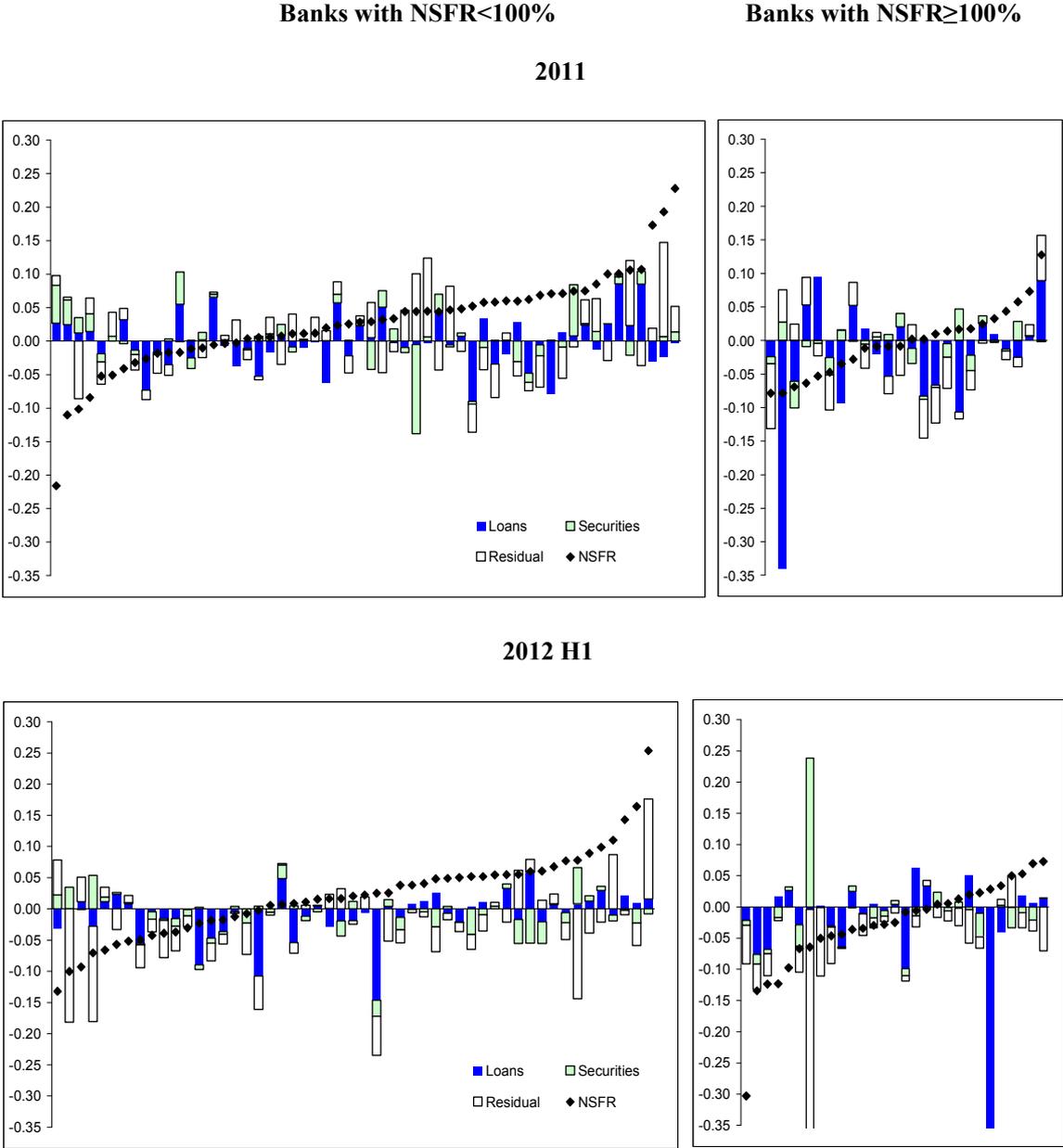
Table 8 – RSF components

Percentage frequency of banks in each group/period that a) increased the NSFR and b) reduced the relative subcomponent

	Banks with NSFR<100%				Banks with NSFR≥100%	
		increased NSFR				increased NSFR
reduced RSF components	2011	2012 H1		reduced RSF components	2011	2012 H1
Loans	29	34		Loans	17	20
Securities	45	24		Securities	17	13

3.4 Role of LTROs

To shed light on the contribution of the 3-year LTROs, the graphs in Figure 5, complementary to the previous figure, plot the breakdown of each ASF component together with the distribution of total

Figure 5 – Components of ASF change

Banks with NSFR<100%   **Banks with NSFR≥100%**

2011

2012 H1
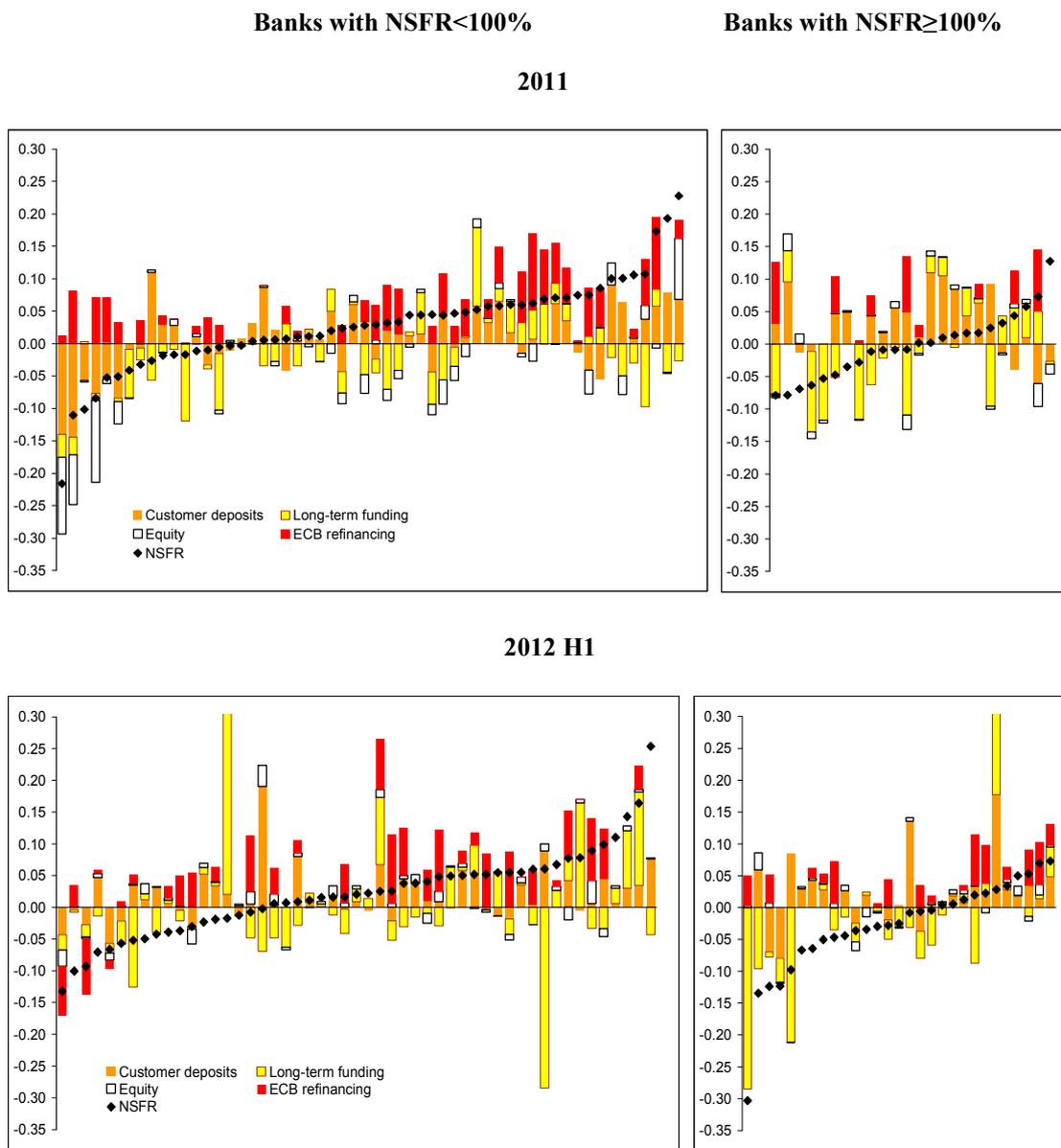
NSFR changes.[18] The 3-year LTRO effect is shown by the red bars. Visual inspection reveals that in both periods banks with an NSFR shortfall made more frequent and greater recourse to the ECB's long-term refinancing compared with banks above the threshold.[19] Around one half of the banks in the first category had a total NSFR increase in 2011 (also) as an effect of participation in the first 3-year LTRO (48 per cent as opposed to 17 per cent for banks already fulfilling the NSFR; Table 9). In the first half of 2012, when the second operation took place, this frequency remained substantial (38 per cent).

Table 9 – ASF components

Percentage frequency of banks in each group/period that a) increased the NSFR and b) increased the relative subcomponent

Banks with NSFR<100%			Banks with NSFR≥100%		
	increased NSFR			increased NSFR	
increased ASF components	2011	2012 H1	increased ASF components	2011	2012 H1
3yr LTRO	48	38	3yr LTRO	17	30
Equity	32	44	Equity	29	30
Deposits	52	44	Deposits	33	40
Long-term funding	36	32	Long-term funding	33	27

The growth in customer deposits is the ASF component which has most frequently contributed to total NSFR improvement in both periods and for both bank groups. In particular, in 2011 52 per cent of banks with a shortfall improved their total NSFR with the contribution of deposits. In the presence of heightened difficulties in market access in 2011, banks with a shortfall did not have significant access to long-term private funding. Recourse to new equity became more widespread in the first half of 2012.

Figure 6 further specializes the analysis, by looking separately at banks in core countries vis-à-vis banks in non-core countries. The graphs portray a well-known phenomenon, namely the concentration of recourse to long-term refinancing in non-core countries for both operations. One fact is also notable: considering in particular banks with a shortfall and on the periphery, in many instances their recourse to LTROs has a greater impact than total NSFR improvement, indicating that the additional stable funding is partly employed to increase RSF (securities holdings, loans, etc.).

One may conjecture that the early repayment of the 3-year LTROs since January 2013 is related, among other factors, to individual banks' fulfilment of their NSFR. To check for this hypothesis we examine the early redemptions by the 80 banks in our sample between 30 January (the first exercise date of the option) and the end of April 2013. We are obliged to use the June 2012 value as the estimator of the NSFR at the beginning of 2013. This choice may involve a non-negligible error. The improvement in market confidence that occurred in the course of 2012 and early 2013 has enabled

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[18] For simplicity the figure does not show the (negligible) residual term of the ASF total differential.

[19] The bottom left graph shows a negative contribution from the LTRO in three cases in 2012 H1. These refer to Greek banks which had to make early repayment.

Figure 6 – ASF change and country regions

<center>

Banks with NSFR<100%   **Banks with NSFR≥100%**

</center>

2011 - Core countries

2011 - Non core countries

2012 H1 - Core countries

2012 H1 - Non core countries
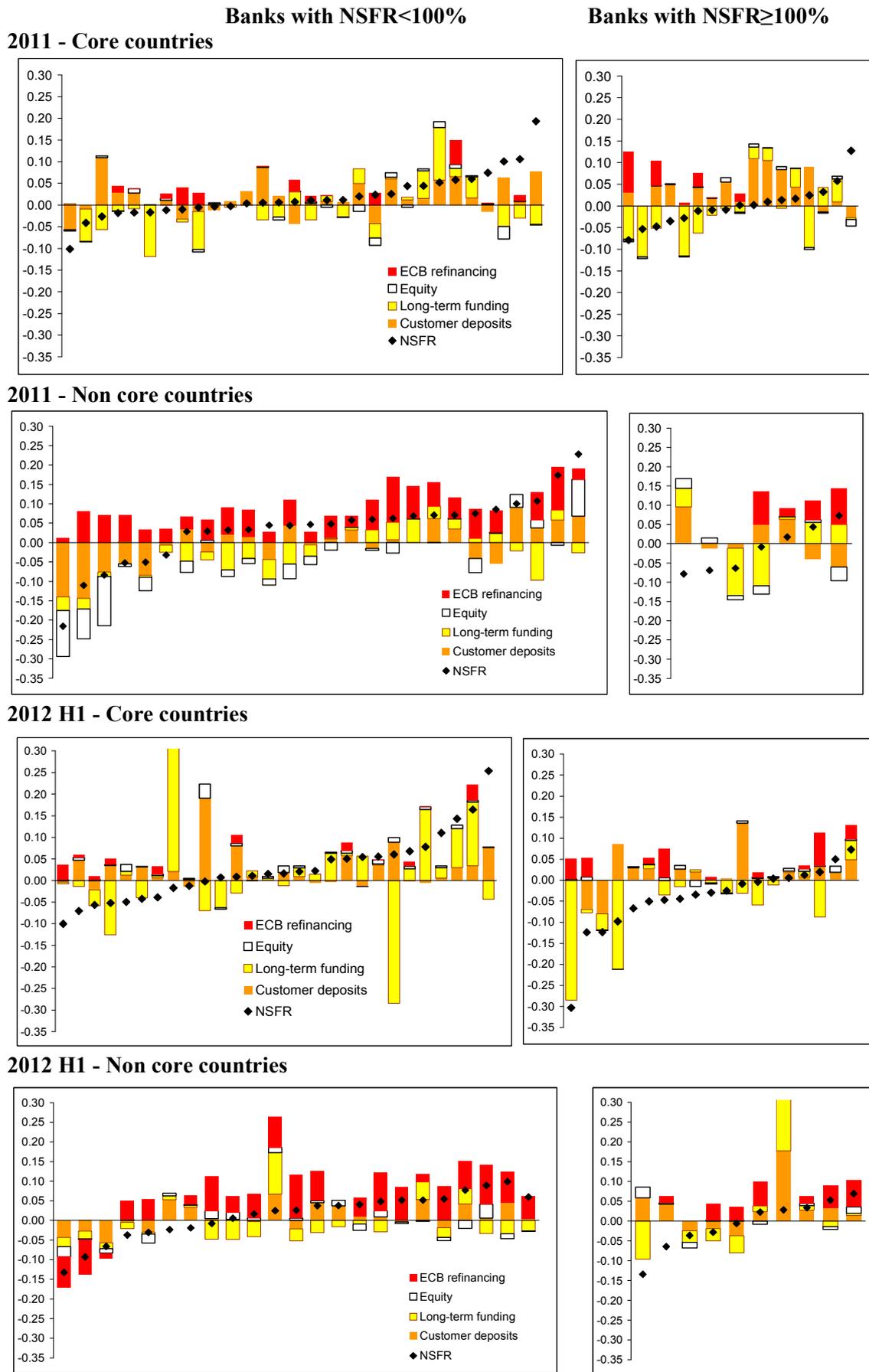
banks to expand their recourse to long-term funding from the private sector with a wave of bond issuance, even in non-core countries. This may have significantly improved the NSFR values at the beginning of 2013 relative to the middle of the previous year.

With the above caveat, the evidence shows in the first place some prevalence of early repayment by banks with an NSFR shortfall as of June 2012, in terms of the share of initial amounts (37 per cent against 20 per cent for compliant banks; Table 10).

Table 10 - LTRO early repayment until April 2013

No. of banks that repaid as % of no. of banks that took funds in the 3yr LTROs in each category				Funds that were repaid as % of those taken in the 3yr LTROs by banks in each category			
	NSFR (June 2012)				NSFR (June 2012)		
Country	<100%	≥100%	All	Country	<100%	≥100%	All
Core	87	90	88	Core	57	44	51
Non-core	47	38	43	Non-core	26	5	18
All	67	61	64	All	37	20	30

The second observation is that banks in non-core countries display a smaller frequency/share of early repayment vis-à-vis banks in core countries. For instance, the share of repaid funds out of the initial allotment is 18 per cent in non-core countries as opposed to 51 per cent in core countries.

One possible interpretation of the first finding is that the expectation of a more gradual implementation of the Basel III liquidity standards may have lessened the tendency of banks to converge towards the NSFR threshold. Checking this conjecture would involve estimating the actual NSFR values based on banks' financial statements for December 2012.

4. Conclusions

Based on a review of the analytical underpinnings for the effects of the Net Stable Funding Ratio (NSFR) on banks' choices, this paper makes a first attempt to relate their strategies to developments in the value of the ratio in the euro area. In spite of a not-so-near implementation date, the evidence is that the NSFR already matters for banks' choices, and it might be more relevant as a decision variable than alternative indicators, such as the leverage ratio and the loans/deposits ratio. This would not be surprising, since the BCBS has specified a quantitative threshold for the NSFR and runs the quantitative impact exercise every six months.

The empirical analysis confirms the dual hypothesis that, in the course of 2011 and the first half of 2012, banks with a ratio below 100 per cent (a) attempted to increase the NSFR and (b) they did so mainly via the growth of available stable funding. Deposits were a widely used source of this increase. In the presence of heightened difficulties in market access in 2011, banks with a NSFR shortfall did

not make significant recourse to long-term private funding, although their issue of new equity increased in the first half of 2012.

The two main predictions on the effects of the NSFR for Eurosystem operations concern the active use of 3-year refinancing and the increase in the share of less liquid securities plus credit claims in collateral pools. We find support for the first prediction: the two 3-year LTROs raised the available stable funding for the sample banks below the threshold by €429 billion, although this was partly offset by the growth of required stable funding due to the large collateral pledge. This evidence indicates that, other things being equal, over the coming two years these banks will have to perform a gradual substitution of ECB funds with market funding, if they intend to preserve their current NSFR ratios. This paper has not addressed the relationship between the NSFR and the use of collateral, which might be a subject for further investigation.

From a macroeconomic perspective, we have found some evidence that banks with a low NSFR value have improved it also by means of a reduction in loans to the real economy. This finding seems noteworthy and merits further investigation. Indeed, so far the main focus of analysts and regulators in charge of the Basel III liquidity rules has been the LCR; the NSFR has remained to some extent in the background. Our findings show that, in spite of a rather long observation phase, banks have been taking the NSFR into account for two years. In the literature the hypothesised effects of the Basel III liquidity standards mainly concern the *price* of credit after their implementation. In the current interim phase, the results given in this paper indicate that convergence toward the NSFR may also have contributed to adjustments in credit *supply*.

In view of the phasing-in of the Basel III liquidity standards, the evidence suggests that, when evaluating non-standard monetary policy measures, central banks should also take into account their impact on the fulfilment of the NSFR and the possible cliff effects related to their expiration.

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