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The Net Stable Funding Ratio: Neither Necessary nor Harmless

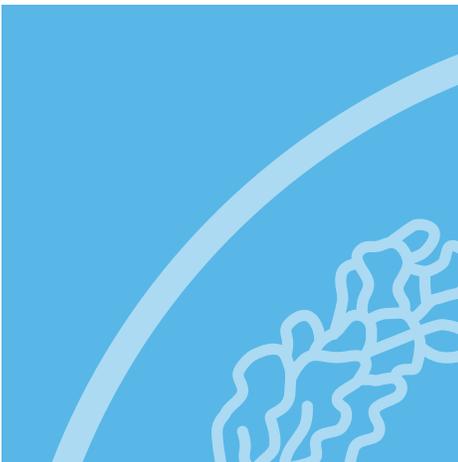# The Net Stable Funding Ratio: Neither Necessary nor Harmless

The U.S. Federal banking agencies recently published for public comment a proposal to establish a new liquidity-related regulatory requirement – the Net Stable Funding Ratio (NSFR). The NSFR is defined as the ratio of a bank's "available stable funding" to its "required stable funding," in each case as calculated under the proposed regulation. The ratio must be at least equal to 100 percent such that a banking organization's available stable funding always equals or exceeds its required stable funding. The NSFR is intended "to reduce the likelihood that disruptions to a banking organization's regular sources of funding will compromise its liquidity positions" and is purported to address a bank's liquidity condition over a longer time horizon than the Liquidity Coverage Ratio (LCR) requirement that was finalized by the Basel Committee on Banking Supervision (BCBS) in 2013 and the U.S. Federal banking agencies in 2014, which focuses on short-term liquidity across a hypothetical thirty-day window.[1] After first having been proposed in 2009, the NSFR was finalized as an international standard by the BCBS in 2014. It is the last of the post-crisis banking reforms that are collectively called Basel III to be considered for implementation in the U.S. In this note, we describe the NSFR, assess its potential impact on the banking system, and outline the risk that aspects of its design and calibration may result in substantial unintended and adverse consequences for the U.S. banking system and broader economy.

1   Federal Reserve System, 12 CFR Part 249. Net Stable Funding Ratio: Liquidity Risk Measure Standards and Disclosure Requirements, p.1.

PRINCIPAL OBSERVATIONS

1. Although many U.S. banks are likely able to comply with the NSFR in the *current* unusual financial environment without major adjustments, compliance is likely to become more challenging as the Federal Reserve's balance sheet and interest rates normalize over time.

2. As a result, in the future banks may need to reduce their provision of credit to nonfinancial businesses – including small businesses – and households and reduce their support of capital market intermediation in order to continue to comply with the NSFR.

3. It is impossible to assess whether these likely costs are outweighed by the NSFR's potential benefits because the regulation has no clear, specific, defining objective.

4. The lack of a coherent conceptual basis or corresponding calibration makes it likely that the NSFR, if implemented as currently proposed, will provide regulators and supervisors with unreliable information about a bank's true liquidity position. In addition, by providing banks with an incentive to pull back from their counterparties during periods of liquidity stress, the regulation could reduce financial resilience.

5. These foreseeable consequences and potential unintended consequences, in

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addition to the other regulatory changes that have made the NSFR redundant, call into question whether the NSFR should be adopted at all.

INTRODUCTION AND BACKGROUND

Asset-liability management is a core function of banking organizations. It determines how much liquidity transformation a particular bank is willing to perform – for example, the portion of its deposits and other liabilities that will be intermediated into loans and other sources of credit to consumers and businesses versus held as reserve balances at the Federal Reserve or in other liquid assets. A bank that engages in excessive liquidity transformation – e.g., investing its entire deposit base in longer-term illiquid loans – will be more susceptible to a run and subsequent liquidity failure. On the other hand, a bank that engages in too little transformation – e.g., by holding all or most of its deposit base in cash or similarly low-risk or risk-free assets – will fail to perform the critical function for which banks exist – to take deposits and use them to fund loans and other productive assets. Accordingly, at its most elemental level, asset-liability management involves assessing how likely

TABLE 1*

AVAILABLE STABLE FUNDING (ASF) FACTORS ASF (LIABILITIES AND CAPITAL)	
100%	Regulatory capital and funding >1 year (other than retail deposits)
95%	Stable retail deposits: entire amount insured and held in transactional account or where demonstrably established relationship
90%	Uninsured or non-transactional, non-brokered retail deposits, reciprocal brokered deposit or broker sweep deposit of controlled subsidiary where entire amount covered by deposit insurance or other non-transactional brokered deposit with a maturity > 1 year
50%	Securities with maturity 6-12m Funding from non-financials <1y Funding from financials 6-12m Operational deposits Retail brokered deposit (not reciprocal, not sweep, not transactional) 6-12m
0%	Funding from financials <6m Securities with maturity <6m Retail brokered deposit (not reciprocal, not sweep, not transactional) <6m Certain trade date payables Other liabilities <6m

REQUIRED STABLE FUNDING (RSF) FACTORS RSF (ASSETS)		
0%	Cash and central bank reserves Certain trade date receivables	
5%	Unencumbered level 1 liquid assets Undrawn committed credit and liquidity facilities (that can be drawn within 1y)	
10%	Repo <6m with a financial entity secured by rehypothecatable level 1 liquid assets	
15%	Unencumbered level 2A liquid assets Lending to financials <6m	
50%	Unencumbered level 2B liquid assets Lending to financials 6-12m Operational deposits at financial entities	GO Municipal securities Lending to non-financials <1y Lending to retail customers <1y
65%	Residential mortgages >1y, risk-weight<=50%: first lien secured and in accordance with prudent underwriting standards	Lending to non-financials and retail customers>1y, risk-weight<=20% (exposures to US government, GSEs, other sovereigns with an OECD Country Risk Classification of 0-2)
85%	Residential mortgages>1y, risk-weight>50% Lending to non-financials and retail customers>1y, risk-weight>20%	Non-HQLA publicly traded entities Commodities traded on U.S. exchange
100%	All assets encumbered>1 y Nonperforming assets Lending to financials>1y	

Table 1 presents the principal RSF and ASF factors included in the banking agencies' proposed NSFR rule.

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liabilities are to run and how quickly assets can be sold to meet such departing liabilities, and appropriately balancing the two.

The NSFR requirement is intended to establish a maximum safe amount of liquidity transformation that a bank can engage in by ensuring that banks have sufficient "sticky" liabilities to fund assets that it would be unable to liquidate easily over a one-year horizon. The NSFR is defined as the ratio of "available stable funding" (ASF) to "required stable funding" (RSF), and banks are required to maintain an NSFR ratio of at least 100 percent. ASF is determined generally by taking each bank liability and element of regulatory capital, multiplying it by an "ASF factor," and then adding up all the resulting, weighted numbers. The ASF factors, which vary between 0 and 100 percent, are meant to measure the stickiness of each liability – the less likely a liability is to run, the higher the assigned ASF factor should be. RSF is similarly determined by summing bank assets weighted by "RSF factors." The RSF factors are meant to measure the illiquidity of the asset and also vary from 0 to 100 percent, such that a less liquid asset should be assigned a higher RSF factor. The ASF and RSF factors are explicitly defined by the proposed NSFR regulation as set forth in Table 1 on page 3.[2]

When the NSFR was first proposed by the BCBS in December 2009 and then further elaborated in December 2010, the metric was designed to ensure that a bank with an NSFR greater than 100 percent would be able to weather a one-year episode of idiosyncratic liquidity stress. The NSFR was meant to be a complement to the LCR requirement,

which was designed to ensure that a banking organization could weather a 30-day period of severe idiosyncratic and market-wide liquidity stress. In those initial formulations of the NSFR, available stable funding was explicitly defined as "reliable sources of funds over a one-year time horizon under conditions of extended stress." The <u>original</u> definition included the specific characteristics of the idiosyncratic stress contained in the scenario that defined the metric.

"The objective of the standard is to ensure stable funding on an ongoing, viable entity basis, over one year in an extended firm-specific stress scenario where a bank encounters, and investors and customers become aware of:

» A significant decline in profitability or solvency arising from heightened credit risk, market risk or operational risk and/or other risk exposures;

» A potential downgrade in a debt, counterparty credit or deposit rating by any nationally recognised credit rating organisation; and/or

» A material event that calls into question the reputation or credit quality of the institution."[3]

Similarly, required stable funding was defined in these original releases as "the approximate amount of a particular asset that could not be

2   12 CFR Part 249, pp. 10-11.

3   "Basel III: International framework for liquidity risk measurement, standards, and monitoring," Basel Committee on Banking Supervision, par. 122-125, Dec. 2010. *See* also "International framework for liquidity risk measurement, standards and monitoring," Basel Committee on Banking Supervision, December 2009.

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monetized through sale or use as collateral… during a liquidity event lasting one year."[4] As such, the original BCBS proposals were based upon a cognizable goal and contained a coherent analytical approach for meeting this goal: funding stability over a one-year period of extended liquidity stress.

However, in the final BCBS standard published in October 2014, the underlying concept of a defined stress scenario was eliminated. Instead, the ASF factors are now subjectively defined as "the portion of capital and liabilities expected to be reliable over the time horizon considered by the NSFR, which extends to one year."[5] Similarly, required stable funding is defined as "the amount of a particular asset that would have to be funded, either because it will be rolled over, or because it could not be monetized through sale or used as collateral in a secured borrowing transaction over the course of one year without significant expense."[6] In both cases, the notion of a stress scenario is no longer part of the analytical underpinnings of the NSFR framework as it now stands, and nothing in the framework is tethered to any concept of the market circumstances in which funding stability is to be assessed.

There has been no public explanation by either the BCBS or the U.S. Federal banking agencies as to why the concept of a defining stress scenario was dropped. Absent some unexplained, fundamental change to the NSFR, it is difficult to understand how a stress scenario could serve as a central defining

concept in the original proposals and then be excluded from the final version entirely. It seems likely that the concept of a defining stress scenario was dropped from the October 2014 BCBS description of the NSFR to accommodate the changes put in place in the October 2014 revision. That revision included three main components:[7]

1. Reducing the RSF factors on loans to, and raising the ASF factors on deposits from, small businesses and retail customers in order to reduce the impact on those coun-terparties;

2. Increasing the RSF on short-term loans to financial firms, in particular so that there is a stable funding requirement for a matched-repo book; and

3. Adding RSF and ASF categories for instru-ments with maturities between 6 months and one year to reduce the cliff effect associated with having just a one-year and 30-day (LCR) metric; i.e., the incentive for banks to bunch their liabilities up just beyond the 30 day maturity horizon.

As discussed further below, the second and third changes set forth above made the earlier version of the NSFR inconsistent with its original objective of ensuring a bank could survive a one-year liquidity stress episode.

Thus, rather than being defined by a specific stress scenario, the final BCBS and current U.S. NSFR proposal state that the ASF and RSF factors are intended to reflect "all market conditions," and specifically states that they

4   BCBS (December 2010) par. 130.

5   Basel III: the net stable funding ratio," BCBS, October 2014, par. 9.

6   BCBS (October 2014) par. 28.

7   BCBS (October 2014) par. 7.

are not intended to be based on a market stress environment.[8] It is unclear what this is intended to mean. The NSFR proposal cannot possibly be based on ordinary market conditions, because in those conditions most liabilities are stable and therefore the assigned ASF factors would be higher than those included in the U.S. proposal. The U.S. proposal continues to state that the NSFR is defined based on the stability of the bank's liabilities and assets over a one-year time horizon; unfortunately, "stability" is not defined.

As a result, the final BCBS standard, and the NSFR described in the recently released U.S. proposal, provide no clear defining objective for the NSFR, and thus no standard by which the ASF and RSF factors are calibrated. The proposed rule only explains the relative *ordering* of the ASF and RSF factors (i.e., which liabilities are stickier than others, and which assets are more liquid), not their *levels*. As such, a liability is considered less stable, and so gets a lower ASF, if there is a greater likelihood that the bank will have to replace or repay it over the NSFR's one-year time horizon. Similarly, an asset requires less stable funding, and so gets a lower RSF, the greater the extent to which the bank can liquidate the asset over the NSFR's one-year time horizon. That rank ordering makes some logical sense as a general matter, *but does nothing to explain how particular weights were derived.* For example, the proposal requires banks to maintain "stable" funding equal to 15 percent of short-term loans to financial businesses and 50 percent of short-term loans to nonfinancial business. While the rule explains why the RSF for short-term loans to financial firms should

be lower than the RSF for short-term loans to nonfinancial businesses, it does nothing to address the more important question of *"why 15 percent and 50 percent, is more appropriate than, for example, 27.5 percent and 78 percent, for these purposes – whatever that may be."*[9] Simply put, both of these sets of factors appear to be equally arbitrary based on the information and rationale provided by the NSFR proposal.

Without a sound conceptual basis that has been fully disclosed to the public, there is no way for interested participants to provide constructive input on the design and calibration of the U.S. Federal banking agencies' proposed NSFR. By contrast, when the LCR and the stress scenario to which it was calibrated were published for consultation by the BCBS and when the U.S. Federal banking agencies requested public comment, the public provided information on how specific bank assets and liabilities actually behaved during past stress periods with the characteristics specified, and the calibration of the regulation was adjusted in response.[10] While the current NSFR notice of proposed rulemaking (NPR) requests comment on the reasonableness of the calibration of the NSFR, and in some cases even asks for possible alternative specifications "supported by data," without a clear defining objective for the NSFR, it is unclear on what basis any potential alternative calibration would be based.[11]

8   12 CFR Part 249, p. 46.

9   As described in the appendix "Empirical analysis in the NPR," the U.S. NPR does include a few references to empirically based calibration of the RSF and ASF factors. But, as described in the appendix, these references are vague and do not apply a clear calibration standard.

10   See, for example, "Assessing the Liquidity Coverage Ratio," The Clearing House, November 2, 2011.

11   *See* for example 12 CFR Part 249 p. 116.

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TABLE 2: AGGREGATE BALANCE SHEET OF BANKS SUBJECT TO THE NET STABLE FUNDING RATIO

ASSETS	$ IN BILLIONS	ESTIMATED RSF (%)	LIABILITIES	$ IN BILLIONS	ESTIMATED ASF (%)
Loans	4,546	75	Deposits:		
Balances due from Fed	944	0	Retail	3,270	90
Cash	455	0	Wholesale	3,270	50
Securities	3,494	25	Other Liabilities	4,175	30
Trading Assets	1,466	50	Equity	1,361	100
Other Assets	1,171	100			
	12,076	**51**		**12,076**	**60**

NOTE: Includes all BHCs with assets above $250 billion or $10 billion or more in on-balance sheet foreign exposure.
Source: Federal Reserve.

Moreover, the seemingly *ad hoc* design of the NSFR makes it impossible to weigh the costs and benefits of the proposal because the measure of benefits depend on the objective. Put another way, there is no way to measure potential benefits when the underlying objective is not readily apparent because we don't know what the benefit is supposed to look like, which is necessary in order to measure it. Against those vague benefits are costs that, as we discuss in the next section, are likely to be considerably greater in the long run than they currently appear.

PROJECTION OF BANK HOLDING COMPANIES' NSFR

This section begins by providing an estimate of the current aggregate NSFR of bank holding companies subject to the regulation based on a simplified version of their combined balance sheets. Next, it forecasts key components of the balance sheet over the next six years to analyze how the aggregate NSFR will be affected by the projected reduction in the level of central bank reserves associated with the normalization of the Federal Reserve's balance sheet, as well as an expected rise in the share of wholesale deposits held by large banks. Assessing NSFR compliance in the current environment of abundant central bank reserves, which require no stable funding, and deposits, which provide substantial stable funding, likely understates significantly the

balance sheet changes that large banks will eventually need to undertake in order to come into compliance. Note that the empirical analysis is meant to be an approximation to the aggregate NSFR ratio of the banks subject to the more stringent NSFR requirement, instead of an accurate assessment of the current or future NSFR shortfall at those banks.

Table 2 presents a simplified aggregate balance sheet of U.S. bank holding companies subject to the more stringent U.S. NSFR requirements. In order to estimate the RSF amount, banks' assets are divided into six subcomponents: loans, balances due from the Federal Reserve, cash, securities, trading assets and other assets. The first column of Table 2 reports the outstanding amounts of the six asset subcomponents at the end of 2015. Loans account for less than 40 percent of total assets, securities about 30 percent and central bank reserves approximately 8 percent. The second column of Table 2 reports the estimated RSF factors for those six subcomponents. Monteleone et al (2016) estimate the RSF factor of total loans to be 75 percent, which takes into account the maturity and risk of the loans.[12] Both cash and central bank reserves receive an RSF factor of 0 percent. Banks' holdings of securities are primarily Agency MBS and U.S. Treasury securities which have RSF factors

12   *See* Monteleone, Brian, Jeffrey Meli and Daniel Lang, "NSFR: Implications for Loans and Liquidity," Barclays/Credit Research, May 19, 2016.

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equal to 15 percent and 5 percent, respectively. The third most important category is other debt securities, which have RSF factors between 5 percent for some types of sovereign debt and up to 50 percent for other debt securities. Taken all together, the RSF factor for securities is estimated to be 25 percent. The composition of trading assets is similar to that of securities except that the share of Agency MBS and U.S. Treasury securities (versus "other debt securities" and "other trading assets") is lower. Thus, the RSF for trading assets is estimated to be 50 percent, in part reflecting an RSF factor of 100 percent for other trading assets. Finally, the RSF factor of other assets is assumed to be 100 percent due to the large share of goodwill and other intangibles in other assets. Under these assumptions, the average RSF factor for the aggregate bank is estimated to be 51 percent at the end of 2015.

In terms of the ASF, the liability side of the balance sheet is divided into three subcomponents: deposits, other liabilities, and equity. As of the end of 2015, approximately half of deposits were wholesale deposits which have an ASF factor of 50 percent, while the other half are retail deposits that have an ASF factor of 90 percent following Monteleone et al (2016). Other liabilities are composed mostly of long-term debt and securities sold under agreements subject to repurchase, and its ASF factor is estimated to be 30 percent, reflecting in part an ASF factor of 100 percent for long-term debt with remaining maturity greater than 1 year. Finally, equity has an ASF factor of 100 percent. Under these assumptions, the ASF factor for the aggregate bank is estimated to be 60 percent at the end of 2015.

Thus, the average NSFR of all bank holding companies subject to the more stringent NSFR is estimated to be 116 percent at the end of 2015. As a result, the average bank will be in compliance with the NSFR as proposed.

The next step projects the major subcomponents of the balance sheet of the aggregate bank until 2021, in order to assess how the NSFR requirement will change as economic conditions continue to improve and the Federal Reserve's balance sheet normalizes. Under the baseline case, the assumptions are as follows:

» On the asset side, all asset categories grow at the rate of nominal GDP taken from the Survey of Professional Forecasters, with the exception of central bank reserves and goodwill and other intangibles.

• The forecast of central bank reserves is based on the baseline projections for the Federal Reserve's securities portfolio provided in the 2015 System Open Market Operation's annual report.[13]

• The share of reserves held by banks subject to a stable funding requirement remains around the current level of 43 percent.

• Goodwill and other intangibles remain unchanged throughout the projection period given the penalty under Basel III and lack of acquisitions likely to be undertaken by large banks.

13   See **"Domestic Open Market Operations During 2015," Federal Reserve Bank of New York, April 2016**. Currency is assumed to grow at the same rate as nominal GDP. Consistent with the projections provided on page 30 of the SOMA annual report, the steady state level of reserves, defined at a level of $100 billion, is reached at the end of 2021 under these assumptions.

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- Total assets will grow at a slower rate than nominal GDP because holdings of central banks reserves are declining.

» On the liability side, other liabilities and equity are assumed to grow at the rate of nominal GDP, with the exception of deposits.

- Deposits are chosen such that the balance sheet identity for the aggregate bank is satisfied at the end of each year in the projection. Roughly, deposits are increased by the projected growth in assets but are reduced by the projected decline in reserve balances.

- In addition, consistent with the behavior of wholesale deposits in prior expansions, the share of wholesale deposits is projected to rise from the current level of 50 percent to 65 percent at the end of 2021, remaining below the average share during the 10 years prior to the financial crisis.[14]

Figure 1 shows the projection of the aggregate NSFR between 2016 and 2021 under these assumptions. Under the baseline scenario, as shown by the blue line, the aggregate NSFR is projected to decline from 116 percent in 2015 to 101 percent at the end of 2021.[15] Because there will be variation across banks, many banks would be out of compliance with the

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14 Wholesale deposits are not available on call reports prior to the first quarter of 2014. The longer-term average is approximated using the reported levels of large time and foreign deposits.

15 While the estimates presented here are intended to be only approximate, they are broadly consistent with the results presented in the NPR. The NPR estimates the total aggregate shortfall of the banks covered by the NSFR requirement had an aggregate shortfall (not net of the excess funding of the banks in compliance) of $39 billion on June 30, 2015 and that nearly all would be in compliance.

FIGURE 1: PROJECTIONS OF THE AGGREGATE NET STABLE FUNDING RATIO
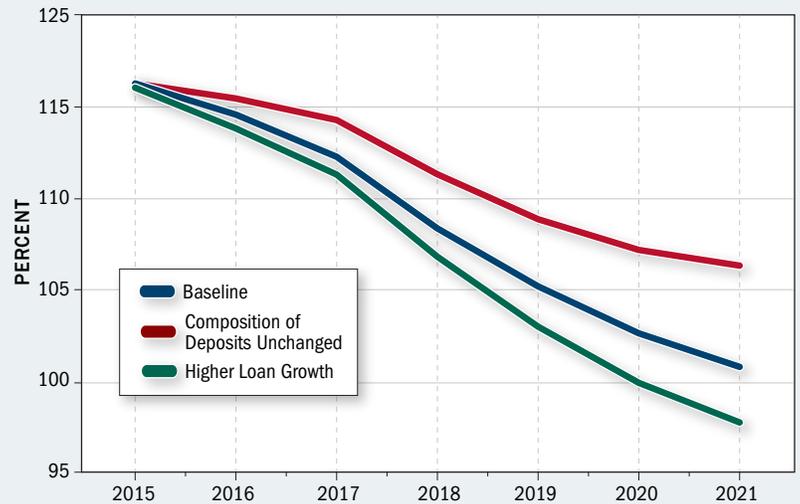
NSFR if the aggregate NSFR fell to 101 percent, and those banks would have to adjust their balance sheets accordingly.

The decline in the NSFR is driven both by the decline in reserves and deposits (as the Federal Reserve's securities holdings decline) and by the increase in the share of wholesale deposits. The solid red line in Figure 1 shows the decline in the aggregate NSFR in response to only the decline in reserves and deposits, keeping the share of wholesale deposits at the current level of 50 percent. Such an outcome could occur, for example, if banks competed more aggressively in the future for retail deposits than they have in the past. Under this scenario, the NSFR still declines considerably, but by 5 percentage points less than under the baseline scenario.

Under the baseline scenario, the ratio of loans to deposits rises from the current level of 70 percent to 82 percent at the end of 2021. By contrast, loan-to-deposits have reached levels higher than 90 percent during past expansions. Under an alternative scenario depicted by the green line, loans are assumed to grow 1½ percentage points faster than nominal GDP, about the margin observed during past expansions, leaving the loan-to-deposit ratio at the end of the projection period just below 90 percent. In this scenario, the growth rate of securities is adjusted downward so that the

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ALGEBRAIC EQUIVALENCE BETWEEN THE NSFR AND LCR

Even though regulators refer to the LCR as a "stress" metric and the NSFR as a "structural" metric, the two measures are algebraically equivalent.* To see this, consider a bank that makes loans, L, and holds HQLA, H, funded with equity, E, and deposits, D. Assume that over the interval used by the metric, d is the runoff rate for deposits, e is the runoff rate for equity (zero), l is the fraction of loans that the bank can liquidate, and h the amount of HQLA that the bank can liquidate.

The LCR requirement is that the amount of HQLA (after applicable haircut) exceed the projected net cash outflow, or

$$LCR: \quad \frac{hH}{Dd + Ee - Ll} > 1$$

The NSFR requirement is that available stable funding exceeds required stable funding. The ASF factors equal the amount of funding left after projected outflows, so (1-d) for deposits and (1-e) for equity (e is zero). The RSF factors equal the amount of the asset left after any liquidation so (1-l) for loans and (1-h) for HQLA. The NSFR requirement can thus be expressed as

$$NSFR: \quad \frac{(1 - d)D + (1 - e)E}{(1 - h)H + (1 - l)L} > 1$$

To see the equivalence, first, manipulate the LCR expression to yield

$$-Dd - Ee > -hH - Ll$$

Then, taking advantage of the fact that liabilities plus equity equals assets, add deposits plus equity to the left side of the inequality and loans plus HQLA to the right side:

$$D - Dd + E - Ee > H - hH + L - lL$$

Collecting terms and dividing yields the NSFR expression above.

*The LCR and NSFR are, of course, much more complicated than the stylized versions used in this illustrative example.

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balance sheet identity is satisfied at the end of each year of the projection. In this scenario, the aggregate NSFR declines from 116 percent at the end of 2015 to 98 percent at the end of 2021. Thus, more rapid loan growth, consistent with the behavior in previous expansionary periods, would lead to an NSFR shortfall in aggregate, all else being equal.

COHERENCE OF DESIGN AND CALIBRATION

As described above, as of the most recent revision, the calibration of the NSFR appears to be based simply on the subjective judgement and negotiations of the BCBS rather than on a well-specified conceptual basis. As a result, there is no way that the assumed levels of the ASF and RSF factors that define the NSFR can be empirically evaluated. Instead, we evaluate the NSFR using a less satisfactory approach of considering whether the ASF and RSF factors are consistent with the calibration of the LCR and whether they are internally consistent. The answer to both of these questions is clearly "no." These inconsistencies may lead to significant adverse unintended consequences and even make the NSFR an unreliable measure of a bank's liquidity position.

Inconsistency between the NSFR and LCR

As noted above, the LCR and NSFR were initially defined in the same BCBS document, and at that point, they were designed to be consistent.[16] Although the two metrics seem quite different, they are really just two equivalent ways of

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16   The LCR and NSFR were both defined in BCBS December 2010.

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TABLE 3: LCR AND NSFR TREATMENT OF SELECTED SHORT-TERM LOANS TO FINANCIAL INSTITUTIONS (FIs)

As a percentage of outstanding loan amounts available as a source of liquidity

SHORT-TERM LOAN TO FI*	NSFR TREATMENT	LCR TREATMENT
Treasury repo	90 percent (10 percent of loans still outstanding at the end of the 1y NSFR time horizon)	100 percent (100 percent outstanding at the end of the 30-day LCR horizon, but 100 percent of Treasuries included in HQLA)
Agency repo	85 percent (15 percent still outstanding at the end of the 1y NSFR time horizon)	100 percent (85 percent outstanding at the end of the 30-day LCR horizon, but 85 percent of Agencies included in HQLA)
Other repo backed by level 2b collateral (equity)	85 percent (15 percent still outstanding at the end of the 1y NSFR time horizon)	100 percent (50 percent outstanding at the end of the 30-day LCR horizon, but 50 percent of securities included in HQLA)
Repo backed by non-HQLA	85 percent (15 percent still outstanding at the end of the 1y NSFR time horizon)	100 percent (All loans repaid by the end of the 30-day LCR horizon)
Unsecured	85 percent (15 percent still outstanding at the end of the 1y NSFR time horizon)	100 percent (All loans repaid by the end of the 30-day LCR horizon)

*For the NSFR, the indicated treatment applies to all loans to FIs that mature within 6 months; for the LCR, the indicated treatment applies to all loans to FIs that mature within 30 days.

ensuring that a bank has sufficient liquid resources to meet its obligations. At least as initially defined, the LCR ensured that a bank had enough liquidity to sustain a severe 30-day stress episode, while the NSFR ensured that a bank had enough liquidity to sustain a less severe but longer one-year stress episode. The difference in horizon and defining stress scenario led to differences in calibration, but algebraically, the two regulations are equivalent (see the box "Algebraic equivalence between the NSFR and LCR").

Given their equivalence, for the two regulations to be consistent, the one-year stress scenario that defined the NSFR had to be less intense than the 30-day episode that defined the LCR. Otherwise, the NSFR would have made the LCR redundant and unnecessary. And, indeed, compared with the original NSFR stress scenario, the LCR stress scenario includes greater idiosyncratic deterioration (e.g., a three-notch credit-rating downgrade) as well as a market-wide shock.[17]

17 "Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring", the Basel Committee on Banking Supervision, January 2013, par. 19.

While the regulators have since dropped the concept of a stress scenario for the NSFR, it is still possible to ask whether the two regulations are mutually consistent. At a minimum, for consistency, it should not be the case that a bank is assumed to be able to take a liquidity-providing action over the LCR's 30 day episode of severe stress, but unable to take the same action over the NSFR's one year horizon (during which the assumed financial conditions are no longer clear, but, as discussed in the previous paragraph, cannot be more severe than the LCR). If the bank can do something within a month when conditions are extremely poor, then it should certainly be able to do the same thing within a year under better conditions.

In the current proposal, however, there are several instances where the NSFR counterintuitively treats assets and liabilities in a manner that is different from, and more onerous than, their treatment in the LCR. For example, Treasury securities have an RSF of 5 percent in the NSFR, indicating that only 95 percent of the securities could be sold or

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repoed over one year, but the LCR assumes that 100 percent of such Treasury securities could be sold or repoed *over 30 days.*

The most consequential inconsistencies, however, concern the treatment of loans to financial institution counterparties with maturities of less than six months. Such loans make up virtually all interbank and inter broker-dealer lending. Table 3 summarizes the treatment of short-term loans to financial institutions in the NSFR and in the LCR.

As described in the table, the LCR assumes that all overnight or other short-term loans to financial institutions are completely available as a source of liquidity. Put another way, the LCR assumes that all the loans have been repaid, or, equivalently, that some have been repaid and the collateral backing the remainder can be liquidated. Prior to the October 2014 BCBS final revision to the NSFR, all the RSF factors for loans to financial firms that mature within one year were zero, the same as the RSF for central bank reserves. When all the RSF factors on these loans were zero, their treatment was equivalent to the treatment in the LCR. In each case, and for each regulation, it was assumed that the loans could be fully utilized as a source of liquidity.

The increases in the RSF factors in the October 2014 BCBS final revision were designed to impose a tax on matched repo books, i.e., portfolios of repos and matched reverse repos.[18] The LCR does not require banks to hold any high-quality liquid assets (HQLA) for a matched repo portfolio, no matter how

large. Prior to the October 2014 BCBS final revision, the NSFR similarly required no stable funding for such a portfolio. As a result of the increased RSF factors applied in the October 2014 BCBS final revision, however, the bank would be required to maintain some amount of stable funding (depending on the collateral) against the repo book. As we discuss further below this change may lead to some material unintended consequences.

Internal consistency

There are also elements of the ASF and RSF factors within the NSFR that appear to be internally inconsistent. Like the inconsistencies with the LCR, these internal inconsistencies were introduced in the October 2014 BCBS final revision and have been incorporated into the U.S. proposal, but in this case, the changes were intended to address the potential cliff effects of having nothing between the LCR, with its 30-day horizon, and the NSFR, with its one-year horizon. In particular, some liabilities with maturities between six months and one year are now assigned an ASF of 50 percent, while some assets with maturities between six months and one-year or, in some cases, with maturities of less than one year, are now assigned RSFs of 50 percent.
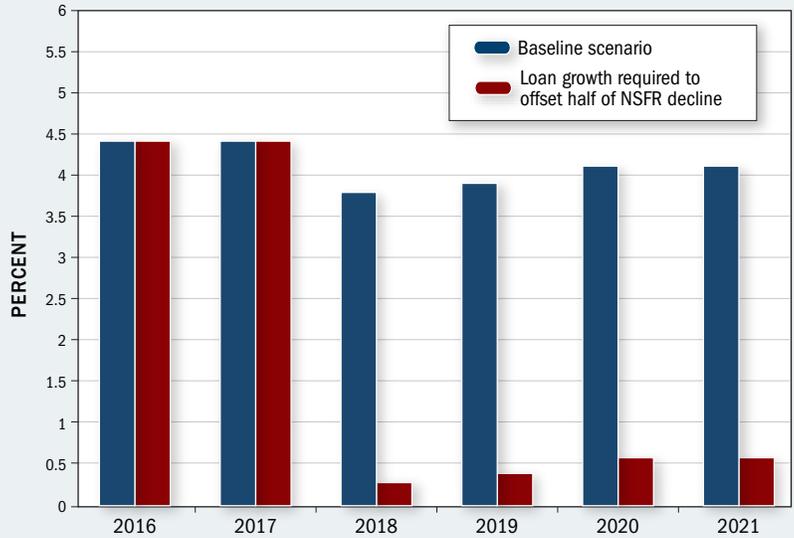
While the general principle of applying 50 percent weights to instruments of intermediate maturities may seem reasonable, the weights cannot be rationalized. Simply put, there is no scenario under which the 50 percent weights make sense. For example, as noted above, a bank is assumed to be able to monetize 95 percent of its unencumbered Treasury securities. But the RSF factor for Treasury securities that are encumbered

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for between six months and one year is 50 percent. Presumably, the bank can monetize none of the securities while they are encumbered and 95 percent of them once they become unencumbered, but in no case can the bank monetize 50 percent. It might seem that the 50 percent RSF or ASF factors could make sense as an approximate average of the required stable funding or available stable funding across the one-year horizon. For instance, in the example of encumbered Treasury securities, the appropriate RSF factors for the securities would seem to be 100 percent at just before 6 months and 5 percent at one-year, which averages to essentially 50 percent. However, if "averaging" is the rationale for the 50 percent, to keep the regulation internally consistent, all the other ASF and RSF factors should have also been redefined as averages over the year as well.

At least in some cases, it might seem that another way to rationalize the 50 percent weights could be that half the assets or liabilities are expected to be rolled over when they mature. However, the U.S. proposal specifically states that this is not the rationale. For example, the asset category "All other assets" includes assets assumed to be illiquid. But assets within this category that mature in less than one year are assigned a 50 percent RSF factor because the bank has access to the funds for part of the "NSFR's one-year time horizon."[19] Similarly, the 50 percent ASF factors for liabilities that mature after 6 months but before one year are not meant to reflect an expectation that the liabilities

would provide a stable funding in that amount for the entire year, but rather that the liabilities would not need to be replaced in their entirety until later in the year.[20]

INTENDED AND UNINTENDED CONSEQUENCES

These problems with the design and calibration of the NSFR would be less consequential if the regulation were not likely to bind for most institutions. However, as shown by the NSFR projections provided above, the regulation is likely to bind considerably more tightly over time as the Federal Reserve's balance sheet, and the financial situation generally, normalize, which will intensify both the foreseeable consequences as well as the potential unintended consequences of the regulation.[21]

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19 The NPR states "[t]he shorter maturity of an asset in this category reduces its liquidity risk, since it provides for cash inflows upon repayment during the NSFR's one-year time horizon." 12 CFR Part 249 p.85.

20 The NPR states "Funding with a remaining maturity of less than six months or an open maturity would generally be treated as the least stable, because a covered company would need to roll it over in the short term. The proposed rule would generally treat funding that matures in six months or more but less than one year as partially stable, because a covered company would not need to roll it over in the shorter term, but would still need to roll it over before the end of the NSFR's one-year time horizon." 12 CFR Part 249 p.43.

21 A similar conclusion is reached concerning the impact of the Basel III regulations on monetary policy by a working group established by the Committee on the Global Financial System and the Markets Committee of the BIS. See "Regulatory change and monetary policy," CGFS papers No. 54, May 2015, p.39 http://www.bis.org/publ/cgfs54.pdf

Reduction in lending to households and nonfinancial businesses

As the NSFR binds more tightly, banks will need to adjust their assets and liabilities to remain in compliance. While banking organizations subject to the NSFR will no doubt take steps to increase their stable funding – for example, by bidding more aggressively for deposits – they will also shift away from those assets that require the most stable funding and toward those that require less. As shown in table 1, the major asset categories are assigned the highest RSF factors are longer-term loans to non-financial firms and households.

In the projection presented above, loans are assumed to grow at the same rate as the projection for nominal GDP in the Survey of Professional Forecasters. If banks, in aggregate, were only willing to tolerate roughly half of the projected reduction in the NSFR, they could accomplish that objective by expanding their loan portfolio more slowly and instead holding securities, which are assigned lower average RSF factors. Specifically, as shown in Figure 2, the resultant annual loan growth would be about 3.5 percentage points lower after 2018 relative to the projection assumed under the baseline scenario. In short, as monetary policy normalizes and interest rates rise above their current low levels, we expect a decrease in the supply of credit to households and nonfinancial businesses, including small businesses, as banks struggle to comply with the NSFR.

Reduction in financial resilience

As described above, under the LCR, a bank that makes a short-term loan to a financial firm is assumed either to receive a corresponding cash inflow or a compensating amount of HQLA. As a result, a bank cannot improve its LCR by cutting off its short-term lending to other financial firms. For example, a bank that ceased rolling over a $100 repo backed by an agency security would receive $100 in additional HQLA (cash), but it would have to give up $85 in HQLA (the agency securities) and a $15 net cash inflow. A benefit of this feature is that the LCR does not build in an incentive for banks to pull away from each other during periods of financial stress and so does not contribute to an important channel of contagion.

By contrast, the NSFR requires that short-term loans to financial firms, including in the form of overnight Treasury repo and overnight federal funds loans, be backed in part by stable funding, but requires no stable funding for cash. As a result, a bank that ceases to lend to other financial firms and instead holds cash is required to have less stable funding and so improves its NSFR. Consequently, the NSFR builds in incentives that would amplify episodes of illiquidity. [22]

As noted, prior to the October 2014 BCBS final revisions, in the preliminary drafts of the NSFR, all loans to financial entities with maturities of less than one-year were assumed to be repaid in full and not rolled over. Such treatment was consistent with the LCR and would not have reduced financial resilience.

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22 Although the RSFs for short-term loans to financial institutions were raised to make matched repo books more costly, the increase applied to all such loans, not just loans associated with matched repo books, including uncollateralized loans, broadening the potential risk to financial resiliency.

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Potential degradation of financial market functioning

One of the design objectives of the BCBS revisions to the NSFR in October 2014 was to ensure that banks would be required to hold some stable funding for a matched repo book. A perceived shortcoming of the LCR is that a bank subject to the LCR need not hold any HQLA against a matched repo book – that is, a portfolio that consists of maturity and collateral matched repos and reverse repos – no matter how large.[23] As discussed above, in the case of Treasury repo, for example, in the LCR, repos that mature within 30 days are all assumed to roll over. Similarly, reverse repos of Treasuries are also assumed to all roll over. Consequently, there is no projected net cash outflow against which the bank would need to hold HQLA.

By requiring that banks fund reverse repos in part with stable funding but attributing no stable funding value to repos, the NSFR imposes a tax on matched repo books. Two other recent regulatory changes have also increased the cost of a matched repo book considerably.[24]

First, the enhanced supplementary leverage ratio requirement (SLR) requires large U.S. banks and bank holding companies to maintain a substantially higher leverage ratio than banks in other countries. While risk-weighted capital requirements put low weights on reverse repos because of their very low risk, leverage ratio requirements treat all assets equally. Consequently, the SLR requires banks to fund their reverse repos with a substantial amount of capital.

Second, the GSIB common equity surcharge as implemented in the United States is calculated in part based on the extent of short-term wholesale funding – a feature not currently included in the final Basel GSIB surcharge. Consequently, a U.S. bank with a large matched repo book will have a higher GSIB surcharge both as an absolute matter and relative to a non-U.S. GSIB. There is accumulating, albeit mixed, evidence that the SLR and GSIB surcharge have already led to a sharp reduction in banks' intermediation in financial markets and a significantly reduced ability of financial market participants to engage in arbitrage.[25] These changes, in turn, have reportedly led to a deterioration of market liquidity and increased likelihood of market volatility, as well as to the reduced efficiency of market pricing and greater likelihood of substantial deviations of asset prices from fundamental values.

There is reason to be concerned that the NSFR could further exacerbate these consequences. A recent industry study concluded that the NSFR would add considerably to the cost of holding the securities inventories necessary to make markets as well as to the cost of providing repo financing. Consequently, they saw "…negative implications for market liquidity as dealers pull back their balance sheets further."[26]

Each of the three regulatory changes – the SLR, the GSIB surcharge, and now the NSFR – have far-reaching consequences. If the regulatory

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23 "Liquidity regulation," Daniel Tarullo, November 20, 2014.

24 *See* Abate, Joseph, "NSFR: Not suitable for repo," Barclays/Interest Rates Research, April 14, 2016.

25 See, for example, "Market and Funding Liquidity: An Overview," William C. Dudley, Remarks at the Federal Reserve Bank of Atlanta 2016 Financial Markets Conference, Fernandina Beach, Florida, May 1, 2016. https://www.newyorkfed.org/newsevents/speeches/2016/dud160501

26 "NSFR: Implications for loans and liquidity," 19 May 2016, Barclays Credit Research.

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NSFR MALFUNCTIONS

The following three examples illustrate instances where the NSFR appears to be an unreliable guide to the funding condition of a target bank over a one-year horizon. In the first two examples the bank would pass the NSFR and yet default. In the third example the bank would fail the NSFR but not default.

EXAMPLE 1 – NSFR >1, BUT DEFAULT WITHIN 1 YEAR					
ASSETS	**AMOUNT ($)**	**RSF (%)**	**LIABILITIES**	**AMOUNT ($)**	**ASF (%)**
Cash	7	0			
Loan to FI w/ mat. = 2 years	3	100	Borrow from FI w/ mat. = 7 months	$10.00	50
Required Stable Funds: $3.00			Available Stable Funds: $5.00		
NSFR = 5/3					

OUTCOME: Even though the bank has an NSFR above 1, it would default at 7 months when its borrowing comes due because it would only have $7 in cash to repay a $10 loan.

EXAMPLE 2 – NSFR >1, BUT DEFAULT WITHIN 1 YEAR					
ASSETS	**AMOUNT ($)**	**RSF (%)**	**LIABILITIES**	**AMOUNT ($)**	**ASF (%)**
Loan to FI w/ mat. = 7 months	10	50	Equity	$6	100
			Borrow from FI w/ mat. = overnight	$4	0
Required Stable Funds: $5.00			Available Stable Funds: $6.00		
NSFR = 6/5					

OUTCOME: Even though the bank has an NSFR above 1, it would default the next day because it would have no cash with which to repay the $4 in loans that come due.

EXAMPLE 3 – NSFR <1, BUT NO DEFAULT					
ASSETS	**AMOUNT ($)**	**RSF (%)**	**LIABILITIES**	**AMOUNT ($)**	**ASF (%)**
Loan to FI w/ mat. = 2 years	9	100	Retail deposits (less stable)	$10	90
Nonfin CP w/ mat.= overnight	1	50			
Required Stable Funds: $9.50			Available Stable Funds: $9		
NSFR = 9/9.5					

OUTCOME: Even though the bank has an NSFR less than 1 it would have no problem meeting the assumed $1 in deposit outflows over the course of the year using the cash from the maturing overnight commercial paper.

objective is simply raising the cost of matched repo books, a more direct and tailored approach could result in less collateral damage.

Potential mismeasurement

Because the newly added 50 percent RSF and ASF factors are inconsistent with the other RSF and ASF factors used in the proposal, they will cause the NSFR to provide an inaccurate picture of the reporting bank's funding condition. It is difficult to demonstrate that the NSFR will not perform its objective, because its objective is unclear. But it seems likely that, at a minimum, it should not be the case that a bank could have an NSFR above one and yet have scheduled payments that would lead it to default before the end of the year, or have an NSFR below one and be projected to be fine.

The simple examples in the box entitled "NSFR malfunctions" illustrate that these outcomes are entirely possible.

Banks' balance sheets are, of course, much more complicated than those included in the examples above. But that additional complexity only serves to increase the importance of defining the RSF and ASF factors consistently so that the regulation is a reliable guide for a bank's liquidity position.

Moreover, as illustrated in the projection of the aggregate NSFR, changing financial conditions are likely to lead to substantial shifts in the relative NSFRs across types of banking institutions. If, unfettered by a clear conceptual basis, regulators have chosen the RSF and ASF factors simply to achieve NSFR levels that currently seem reasonable across bank types, that ad hoc calibration is likely to be an unreliable guide to determining how the NSFR will bind in the future and therefore how the regulation is likely to influence bank behavior.

CONCLUSION

The NSFR is likely to impose substantial costs on the economy, especially as the national financial situation normalizes from its current unusual state. As a result, the NSFR will become increasingly difficult for banks to meet, leading them to provide less credit to households and nonfinancial businesses in order to comply. The regulation will also make it more costly for banks to provide short-term credit to other financial institutions, contributing to the ongoing deterioration in financial market liquidity and functioning. Moreover, the regulation may reduce financial resilience as it will build in an incentive for banks to pull back from lending to each other if liquidity conditions become stressed.

All regulation measures have costs, but the benefits of the NSFR are doubtful. The regulation is intended to ensure that banks have stable funding over a one-year time horizon, but because of inconsistencies in the design of the regulation, it is likely to be an unreliable guide to supervisors. Furthermore, the Federal Reserve already requires large banks to be subject to the NSFR (or a modified version thereof) to conduct monthly liquidity stress tests across overnight, 30-day, 90-day and one-year horizons.[27] For the largest banks, these tests are complemented by the Federal Reserve's own supervisory liquidity stress testing program, the "Comprehensive Liquidity Assessment and Review." The NSFR has also been designed to make it costly for banks to maintain large matched repo books, but the experience with the SLR and GSIB surcharge to date, each of which also make matched repo books less costly but appear to have had more widespread consequences, suggest a new regulation more narrowly targeted on limiting the size of matched repo books may be superior to addressing this matter in the NSFR.

With substantial costs and doubtful benefits, a natural question is whether the NSFR is still needed. That question is especially pertinent because the regulation is likely to become increasingly impactful over time, reducing credit availability and economic growth. ∎

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27   *See* 79 Fed. Reg. 17240 (March 27, 2014) (final rule); 12 C.F.R. § 252.35.

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Appendix: Empirical Analysis in the NPR

Calibration of RSF Factor for Undrawn Amount of Committed Credit and Liquidity Facilities

The NPR includes a justification for the 5 percent RSF factor on undrawn amount of committed credit and liquidity facilities. The NPR states that the calibration is based on a Federal Reserve Board staff working paper by Jose Berrospide, Ralf Meisenzahl, and Briana Sullivan entitled "Credit Line Use and Availability in the Financial Crisis: The Importance of Hedging." The NPR asserts that this research "found increases in drawdowns of as much as 10 percent of committed amounts over a 12-month period from 2006-2011."[28]

We were unable to find the 10 percent drawdown result in the working paper. The largest drawdown we could find is 8 percent: "Large firms accelerated drawdowns of their credit lines and the share of drawn commitments increased from about 24 percent during 2008:Q1 to about 30 percent in the fall of 2008, when financial markets experienced a severe disruption following the failures of Lehman and AIG, and the conservatorship of the Government-Sponsored Enterprises (GSEs). The use of credit lines for large firms reached a peak of 32 percent in the first quarter of 2009, and then declined steadily." (p.10). Granting that 8 percent is nearly 10 percent, it remains unclear exactly what standard is being applied to calibrate the RSF.

Volatility of Collateral Inflows and Outflows Associated with Derivative Valuation Changes

There is a justification in the NPR for the proposed RSF for derivatives portfolio potential valuation changes as based on a review of "public and supervisory information on the volatility of derivatives assets and liabilities and the associated value of collateral received and provided." According to this review, the proposed 20 percent factor "falls within the range of observed volatility."[29]

Since there is no published document that describes the findings of this agency review process, TCH is unable to assess the accuracy of this justification.

Relative stability of liabilities from different types of counterparties

The NPR cites empirical analysis conducted to support the approach taken within the NSFR to differentiate ASF factors by liability counterparties:

"The agencies' analysis of available public and supervisory information found that, during 2008, funding from financial sector entities exhibited less stability than funding provided by non-financial wholesale counterparties, which in turn exhibited less stability than retail deposits. For example, Call Report data on insured deposits, deposit data from the FFIEC 002, and broker-dealer liability data reported on the SEC FOCUS Report showed higher withdrawals in wholesale funding than retail deposits over this period. The agencies' analysis of supervisory data from a sample of large depository institutions that the FDIC placed into receivership in 2008 and 2009 also indicated that, during the periods leading up

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28 12 CFR Part 249, p. 75

29 12 CFR Part 249, p. 115.

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to receivership, funding provided by wholesale counterparties can be significantly less stable, showing higher average total withdrawals, than funding provided by retail customers and counterparties."[30]

The analysis establishes no clear standard applied to determine the ASF factors. Moreover, the NPR only indicates that the unshared empirical analysis was used to support the relative rankings of the ASF factors, not their absolute levels.

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30   12 CFR Part 249, p. 47.

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