Design and pitfalls of Basel's new liquidity rules

By Philipp König, and David Pothier

Following the financial crisis of 2008/09, the Basel Committee on Banking Supervision introduced a new framework for banking regulation, commonly known as Basel III. For the first time since the inception of global banking regulation in 1988, Basel III contains explicit mandatory rules for liquidity regulation. The cornerstones of the new liquidity regulation are two balance sheet ratios that seek to reduce banks' liquidity transformation. While regulation addressing liquidity risk in the banking sector is clearly desirable, the new rules have several pitfalls. First, the two ratios rely on different definitions of liquidity and funding stability which makes the regulatory framework unnecessarily complicated and opaque. Second, it is unclear whether a ratio-based approach is the most effective and efficient way to rectify liquidity problems in the banking sector. Third, it is unclear how the new liquidity rules interact with existing monetary implementation frameworks of central banks and whether they hamper a smooth steering of policy interest rates.

A defining feature of banks is liquidity and maturity transformation. Banks invest in risky long-term and illiquid assets (e.g. loans to non-financial firms, household mortgages), and finance their operations using short-term and liquid liabilities (e.g. retail deposits). Liquidity and maturity transformation by banks is desirable as it creates economic efficiency gains. At the same time, since the duration of assets and liabilities are not perfectly matched, this subjects banks to *liquidity risk*. Thus, even if a bank is fundamentally solvent, it may not have enough cash at hand to meet funding outflows whenever too many of its short-term creditors reclaim their deposits at once.

A key objective of banking regulation is to make individual banks (micro-prudential) and the banking sector as a whole (macro-prudential) more resilient to sudden changes in economic and financial conditions. The first two rounds of concerted international banking regulation, Basel I and II, which came into effect in 1988 and 2007 respectively, largely centered around capital regulation, focusing primarily on credit risk and the solvency of banks. Liquidity risk and liquidity crises, it was believed, could be best addressed by a combination of banks' individual liquidity management, deposit insurance schemes and access to central bank discount windows.

The 2007–2009 Global Financial Crisis (GFC) clearly showed that this framework was insufficient to prevent systemic liquidity crises. In the decades preceding the GFC, banks progressively replaced retail deposits by other forms of short-term funding, including unsecured wholesale debt or bi-party or tri-party repurchase agreements (repos). Such *cash equivalent* instruments were widely perceived as a safe source of short-term funding by both banks and regulators, and they were consequently caught unprepared when many of these wholesale funding markets suddenly collapsed during the GFC. Policymakers since the GFC have consequently sought to revamp existing regulatory structures to reduce the degree of liquidity mismatch on banks' balance sheets.

An important new development in banking regulation since the GFC is the Basel III Accord, drawn up by the Basel Committee on Banking Supervision in 2010–11. This latest revision of the Basel Accords introduces two new minimum coverage ratios intended to regulate banks' liquidity risk. These changes significantly broaden the scope of global banking regulations, and constitute the first attempt to establish a global framework for liquidity regulation. The present bulletin discusses the pros and cons of these measures. In particular, it points out that while new liquidity regulation is needed in order to deal with the problem of excessive liquidity transformation in the banking sector, it is less clear whether the new Basel rules are the best possible policy instruments to deal with this problem.

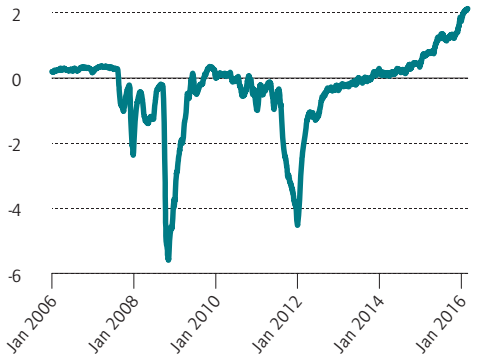
Why did banks build up excessive liquidity risks?

At its core, liquidity regulation seeks to rectify a perceived *market failure*: i.e. left unregulated, the banking sector is prone to engage in excessive liquidity transformation. This market failure is rationalized as resulting from *externalities* that distort banks' financing decisions. In other words, even though insufficient liquidity in the banking system may result in significant costs for the economy, these costs are rarely borne exclusively by banks.

A key challenge of liquidity regulation is that there is no unique definition of liquidity.[1] That being said, one can distinguish between three broadly interrelated dimensions of liquidity.[2] First, *market liquidity* refers to the ease with which financial assets can be traded close to their fundamental price. Second, the closely related concept of *funding liquidity* refers to the ready availability of cash and the ease with which financial intermediaries can obtain funding. A distinctive feature of the GFC was the pronounced deterioration in market liquidity, especially after the bankruptcy of Lehman Brothers in September 2008 (See Figure 1). The sudden drop in market liquidity can partly be explained by the adverse price effects caused by systemic deleveraging in the banking and financial sectors.[3] This worsened funding liquidity conditions, as measured by the haircuts applied to a wide class of marketable assets (See Table 1). In particular, investors became reticent to provide short-term funding to banks due to underlying uncertainty about the quality of assets being posted as collateral, leading liquidity-strained banks to further selling assets outright and putting additional downward pressure on prices. A key objective of the new liquidity regulation is to prevent such *fire sales* by limiting the extent of liquidity transformation that can be performed by banks.

Figure 1

Financial market liquidity
Composite indicator, index



Source: ECB, Statistical Data Warehouse.

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Market liquidity deteriorated markedly in the euro area in the wake of the Lehman crisis.

The third liquidity dimension is *central bank liquidity*, which refers to banknotes, coins and reserves held with the central bank. Being the monopoly supplier of legal tender and since banks' liabilities must be convertible into legal tender at par, the central bank exerts considerable influence over market and funding liquidity. By buying up assets or by lending to banks, it can affect market prices and provide cash to banks suffering from deposit outflows. But unlimited access to central bank money can also potentially exacerbate the liquidity mismatch of banks' balance sheets.[4] More specifically, the widely held belief that central banks stand ready to inject cash into the banking sector may reduce banks' incentives to self-insure against future liquidity shocks. Hence, another key objective of liquidity regulation is to avoid this potential moral hazard problem by reducing banks' reliance on central bank liquidity in times of crisis.

Liquidity regulation after the crisis

The cornerstones of liquidity regulation under the Basel III Accord are two new regulatory ratios. First, the *liquidity coverage ratio* (LCR) requires banks to hold

1 Tirole, Jean. "Illiquidity and All Its Friends." *Journal of Economic Literature* (2011): 287-325.

2 Foucault, T., Pagano, M. and Röell, A. (2013): Market Liquidity, Oxford University Press, New York.

3 Brunnermeier, Markus K. "Deciphering the Liquidity and Credit Crunch 2007-2008." *Journal of Economic Perspectives* 23.1 (2009): 77-100.

4 Goodhart, Charles AE. "The regulatory response to the financial crisis." *Journal of Financial Stability* 4.4 (2008): 351-358.

Table 1

Changes in haircuts on term securities
In percentage points

	Prime	Non-Prime	Unrated
G7 Government Bonds			
Short-Term	0.5	1	1.5
Medium-Term	1	2	2.5
US Agencies	0	0	0
Short-Term	0	0	0
Medium-Term	1	3	4
Prime MBS	0	0	0
AAA-Rated	6	14	20–90
AA- and A-Rated	92	88	75
Asset-Backed Securities	15	30	80
Structued Products (AAA)	90	85	80
Investment Grade Bonds	0	0	0
AAA- and AA-Rated	7	10	10
A- and BBB-Rated	6	8	10
High-Yield Bonds	7	8	20
Equity	0	0	0
G7 Countries	5	8	5
Emerging Economies	5	5	5

Increase of typical haircut on term securities used for financing transactions (difference June 2007–June 2009).

Source: Committee on the Global Financial System.

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Haircuts on marketable securities used for funding purposes increased dramatically at the height of the GFC.

a buffer of sufficient high-quality liquid assets (HQLA) to cover their total net cash outflows over a 30 day stress scenario. Second, the *net stable funding ratio* (NSFR) requires banks' amount of stable funding to exceed a required minimum amount. Ideally, the LCR and NSFR seek to lower liquidity risk by forcing banks to reduce their maturity mismatch, thereby making it easier for them to meet their liabilities when they come due.

The LCR was officially introduced in October, 2015, but will be phased-in gradually over a four year period. Banks are currently required to hold high quality liquid assets (HQLA) that amount to only 70% of their 30 calendar day liquidity needs (under a stress scenario). This minimum requirement will increase by 10% each year, until the phase-in of the LCR is completed in January, 2019. The LCR effectively serves as a mandatory self-insurance against unexpected liquidity shocks. Under the LCR, both assets and liabilities are categorized in terms of their liquidity. Liabilities are ranked in terms of the ease with which they can be rolled over in financial markets. Similarly, assets are ranked in terms of the haircut that must be incurred in case they must be liquidated in a stress scenario (See Box 1). Since the size of the liquidity buffer depends on banks' liability structure – in particular, the volume of funds that can be withdrawn over 30 days – the LCR is intended to incentivize banks to rely less on debt securities with very short maturities.

The NSFR, in contrast to the LCR, aims to reduce banks' funding risk over a longer time horizon (up to one year). Its implementation is scheduled to start in January, 2018. Stable funding in this context refers to liabilities such as retail deposits, long-term wholesale funding and equity. Available stable funding (ASF) – the numerator of the NSFR – is based on the characteristics of banks' funding sources, including the maturity of their liabilities and the ease with which creditors can withdraw funds. As for the LCR, liabilities are ranked according to their perceived stability. A similar procedure is applied to calculate bank's required stable funding (RSF), in this case using its assets instead of its liabilities. The NSFR then requires that total available stable funding exceeds total required stable funding over a one year time horizon (See Box 1).

The rationale behind such ratios can be traced back to different approaches that have been proposed in the banking literature to manage liquidity risk.[5] The so-called "golden rule of banking" seeks to eliminate liquidity risk by proposing a perfect congruence of maturities of assets and liabilities. This, however, would imply that it is impossible for banks to perform their key function of maturity transformation.[6] Addressing this shortcoming, deposit base theory points to the difference between formal and *de facto* maturities, and the importance of a sticky deposit base that is implicitly continuously prolonged. When *de facto* maturities are taken into account, there remains sufficient leeway to perform maturity transformation even when liquidity risk is low.[7] The run-off factors in the weighting scheme of the LCR are reminiscent of this theory as they put a lower weight on liabilities that are considered more "sticky", such as customer deposits. Finally, shiftability theory acknowledges the close relationship between variations in asset prices and liquidity risk. Reflecting this, the weighting schemes of the LCR and NSFR take into account that some types of assets are more difficult to trade than others and therefore render the holding bank more illiquid.

A key challenge in the design of the LCR was determining what constitutes HQLA. The required feature of these assets is that they can be converted into cash at little or no loss of value (See Table 2). These assets must therefore

5 For a general overview, see Hartmann-Wendels, T., Pfingsten, A. and Weber, M. (2010): Bankbetriebslehre, 5th Edition, Springer.

6 Hübner, O. (1854): Die Banken.

7 Wagner, A. (1857): Beiträge zur Lehre von den Banken.

Box 1

The Basel III liquidity ratios

The liquidity coverage ratio

The LCR is defined as the ratio of HQLA over the total net cash outflows in the course of 30 calendar days.[1] The new regulatory rules stipulate that, when fully implemented by the end of 2018, the LCR should exceed 100%,

$$LCR \equiv \frac{stock\ of\ unencumbered\ HQLA}{cash\ outflows\ over\ 30\ day\ stress\ scenario} \times 100 \geq 100\,\%$$

To calculate a bank's HQLA, its assets are broadly categorized into one of two liquidity groups: Level 1 assets are not subject to a haircut, and include highly liquid assets such as central bank reserves and government debt. Level 2 assets, on the other hand, are subject to a variable haircut (ranging from 15% to 50%) applied to the market value of the assets, and include, for example, covered bonds and corporate debt. Banks must satisfy their LCR with a sufficiently high contribution of Level 1 assets, i.e. Level 2 assets are only allowed to cover up to 40% of HQLA (or up to 2/3 of Level 1). Thus, the numerator of the LCR is given by

$$HQLA \equiv Level\ 1 + min\left\{\sum_i (1 - haircut_i) \times Level\ 2\ asset_i, \frac{2}{3} \times Level\ 1\right\}$$

The net cash outflows during a stress scenario in the denominator of the LCR are calculated based on a partial loss of retail deposits, a relatively larger loss of wholesale funding, contractual outflows from derivative contracts and off-balance sheet exposures. For each of these liability items, so-called run-off rates are defined (based on experience and stress simulations). National banking supervisors have some discretion in fixing these run-off rates. Projected cash outflows are then calculated by multiplying liability positions by run-off rates. To derive the projected net cash outflows that enter the LCR's denominator, estimated cash inflows over the next 30 days are subtracted from cash outflows. However, inflows are allowed to cover only at most 75% of outflows. Thus, the denominator of the LCR is given by

$$Net\ cash\ outflows \equiv Outflows - min\{0.75 \times Outflows, Inflows\}$$

The net stable funding ratio

The NSFR is defined as the ratio of the available amount of stable funding (ASF) over the required amount of stable funding (RSF).[2] The new regulatory rules stipulate that the NSFR should exceed 100%,

$$NSFR \equiv \frac{ASF}{RSF} \times 100 \geq 100$$

In the calculation of the NSFR different liabilities will be ranked according to their perceived stability. For example, regulatory capital is given a 100% factor weight, while demand deposits are given a 95% factor weight. A bank's total ASF is then determined as the sum of its capital and other liabilities, weighted by these factors. A similar procedure is applied to calculate a bank's RSF, in this case using its assets instead of its liabilities. RSF factors are assigned to various classes of assets, depending on the ease with which they can be liquidated or used as collateral to secure borrowing. The RSF therefore measures the portion of banks' assets that are perceived as being illiquid and that should be backed by stable funding sources. For example, central bank reserves are given a RSF factor weight of 0%, while corporate debt securities with a credit ranking at least equal to AA– are given a 15% factor weight.

1 See Basel Committee on Banking Supervision (2013): Basel III – The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools, par. 14: http://www.bis.org/publ/bcbs238.pdf

2 See Basel Committee on Banking Supervision (2014): Basel III – The Net Stable Funding Ratio and Liquidity Risk Monitoring Tools, par. 5: http://www.bis.org/bcbs/publ/d295.pdf

be: (1) low risk, (2) easy to valuate, (3) have a low correlation with other risky assets, and (4) be listed on a recognized exchange.[8] Importantly, these assets must also be *unencumbered*. Thus, high quality liquid assets used as collateral to secure lending from the central bank do not count towards the LCR. This has potentially important consequences for the implementation of monetary policy.

Since the GFC, banks have significantly adjusted their balance sheets in order to increase the stability of their funding sources. A 2011 survey by the Basel Committee provides a rough estimation of the magnitude of the adjustment that banks will have to make in order to satisfy the LCR. The survey of 209 banks suggested a HQLA

8 Basel Committee on Banking Supervision. "The Liquidity Coverage Ratio and liquidity risk monitoring tools." *Bank for International Settlements* (2013).

shortfall of 1.8 trillion euros under a 100% LCR, which corresponds to approximately 3% of their total assets.[9] Similarly, by applying the NSFR weighting procedure to data from 27 Global Systemically Important Banks (G-SIBs), calculations by the International Monetary Fund (IMF) show that 55% of these had net stable funding ratios below the future mandatory level of 100% in 2008.[10] By the second quarter of 2013, this fraction had decreased to 18%. Most of this change can be attributed to an increase in available stable funding (ASF), suggesting that adjustments have primarily taken place on the liability-side of banks' balance sheets.

Pitfalls of the new liquidity regulation

Evaluating the utility of Basel III's liquidity rules requires answering two key questions. The first is whether the banking and financial sector engage in excessive liquidity transformation? As discussed above, there are good reasons to believe that, left unregulated, banks tend to expose themselves to too much liquidity risk. The second, more difficult, question to answer is whether the proposed regulatory measures are the most appropriate policy tools to reduce the occurrence of systemic liquidity crises? Indeed, a well-known concern surrounding quantity-restriction is the difficulty involved in determining the appropriate regulatory minima. Set too low, the liquidity requirements may fail to provide the desired level of insurance. Set too high, the banking sector may reduce lending intended to finance productive investments.

An important question that can be raised concerning Basel III's new liquidity requirements is: why do we need both? On one hand, the LCR requires banks' liquid assets to exceed its unstable funding. On the other hand, the NSFR requires banks' stable funding to exceed its illiquid assets. At the most basic level, one of these two requirements must be redundant, since the balance sheet identity requires assets to equal liabilities. If the two differ in practice, it is because different weighting schemes are used (See Box 3). No clear rationale has been provided in the documents accompanying the new rules as to why this should be the case, aside perhaps from the fact that the two ratios are meant to be applied to different time horizons (30 days versus one year). At best, these discrepancies run the risk of increasing uncertainty with regards to the implementation of the new liquidity requirements. At worst, they open the door to regulatory arbitrage.

Table 2

Weighting scheme for calculation of LCR
In percent

High Quality Liquid Assets (HQLA)	Factor
Level 1 Assets	
Coins and bank notes	100
Securities from sovereigns, CBs and PSEs with 0% risk weight	100
Central bank reserves	100
Domesitc sovereign or central bank debt with non-0% risk weight	100
Level 2A Assets	
Securities from sovereigns, CBs and PSEs with 20% risk weight	85
Corporate debt securities rated AA- or higher	85
Covered bonds rated AA- or higher	85
Level 2B Assets	
Qualifying RMBS	75
Corporate debt securities rated between A+ and BBB-	50
Qualifying common equity shares	50
Cash Outflows	**Factor**
Retail deposits	
Demand deposits and terms deposits (less than 30 days maturity)	3–10
Term deposists with residual maturity greater than 30 days	0
Unsecured wholesale funding	
Demand and term deposits (less than 30 days maturity) provided by SMEs	5–10
Operational deposits	5–25
Cooperative banks in an institutional network	25
NFC, sovereigns, CBs and PSEs	20–40
Secured funding	
Central bank counterparty or backed by Level 1 Assets	0
Backed by Level 2A Assets	15
Backed by non-Level 1 or non-Level-2A Assets with domestic sovereigns	25
Backed by RMBS eligible for inclusion in Level 2B Assets	25
Backed by other Level 2B Assets	50
Cash Inflows	
Backed by Level 1 Assets	0
Credit or liquidity facilities	0
Operational deposits held at other financial institutions	0
Backed by Level 2A Assets	15
Backed by Level 2B Assets	25–50
Marginal lending backed by all other collateral	50
Net derivative cash inflows	100

Source: Bank for International Settlements.

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A common criticism of minimum liquidity requirements is the "Goodhart Critque," according to which mandatory liquidity holdings are, in fact, not liquid.[11] To make his point, Goodhart tells the story of a traveler that arrives at a train station late at night, and sees a single taxi parked outside. He hails the taxi, but the driver tells him that he cannot take him to his destination because local by-laws require that there must always be a taxi at the sta-

9 Committee on the Global Financial System. "Asset encumbrance, financial reform and the demand for collateral assets." *Bank of International Settlements* (2013).

10 Gobat, Jeanne, Mamoru Yanase, and Joseph Maloney. "The Net Stable Funding Ratio: Impact and Issues for Consideration." *International Monetary Fund* (2014).

11 Goodhart (2011): *Ibid.*

Box 2

The difference between LCR and NSFR and the impact of the weighting scheme

The definitions of LCR and $NSFR$ each rely on a certain definition of asset liquidity and funding stability.[1] Assuming that, in contrast to the Basel III rules, a consistent weighting scheme of assets and liabilities is employed across both ratios, one ratio becomes redundant. Let A_i denote a bank's assets in category $i = 1,2,\ldots I$ (e.g. loans to households, government bonds etc.) and L_j its liabilities in category $j = 1,2,\ldots J$ (e.g. retail deposits, bank bonds, equity etc.). As in the Basel III requirements, funding stability and liquidity are measured through a weighting scheme: numbers α_i signify the liquidity of an asset of type i (ranging from 0 when the asset is completely illiquid to 1 when the asset is perfectly liquid), and λ_j that measure the stability of funding type j (ranging from 0 when the funding is unstable (e.g. overnight interbank deposits) to 1 when the funding is stable (e.g. long-term debt with maturity greater one year)). The LCR and the $NSFR$ can then be written as

$$LCR \equiv \frac{\sum_i \alpha_i A_i}{\sum_j \lambda_j L_j} \quad and \quad NSFR \equiv \frac{\sum_j (1-\lambda_j) L_j}{\sum_i (1-\alpha_i) A_i}$$

To see that one ratio is redundant, given the consistent weighting scheme, assume $LCR \geq 1$. Then, using the balance sheet identity $\sum_i A_i \equiv \sum_j L_j$, it follows that $NSFR \geq 1$. Hence, the only reason why one ratio can hold while the other fails to hold is due to a different definition of liquidity and stability in the design of the ratios.[2] This is further elaborated on in Table on page 257 where a stylized balance sheet with key asset and liability categories is shown. Using the LCR and $NSFR$ weights (Table 2 on page 255 and Table 3 on page 259), the LCR is satisfied at a level of roughly 1.15, while the $NSFR$ requirement is violated at a value of 0.95. If a consistent weighting scheme were used, the $NSFR$ would hold at a value of 1.11.

As an example for the different weightings, bank debt with a maturity between 30 days and one year has a weight of zero in the LCR scheme, but a weight of 50% in the NSFR scheme. This is entirely due to the different definition of funding stability and the underlying time horizon that is applied.

1 This discussion follows Repullo, R. (2010): The New Regulatory Architecture – A Critical Assessment of Basel III, Presentation held at London School of Economics, ftp://ftp.cemfi.es/pdf/papers/repullo/Repullo%20FMG%20October%202010.pdf

2 To be precise, another reason why the two ratios can differ, even if a consistent weighting scheme is applied, is the fact that Level 2 liquid assets can make up at most 40% of the LCR's numerator.

tion. Analogously, high quality liquid assets should not be considered to be liquid when liquidity requirements become binding. Another potential shortcoming of quantity restrictions is that, for fear of being penalized for violating the minimum coverage ratios, banks may opt to hoard liquidity during times of financial stress. Such cash hoarding may lead to lower asset prices (e.g. due to asymmetric information about asset returns), implying that banks' desire to maintain a certain level of funding liquidity may perversely lead to a substantial reduction in market liquidity. [12] To be fair, these criticisms are to some extent taken into account in the design of the LCR, as the minimum requirement of HQLA may be allowed to fall below net cash outflows during periods of financial stress. The exact modalities of this flexibility are, however, far from clear in the existing documentation published by the Basel Committee.

These criticisms of minimum coverage ratios nonetheless raise the question of whether there exist other, more efficient, instruments that can be used to reduce banks' liquidity risk? An obvious alternative to quantity-based restrictions are price-based mechanisms that seek to penalize banks that heavily rely on short-term unstable funding.[13] A clear advantage of such price-based mechanisms is that they, by construction, incorporate a structured system of sanctions that penalize banks when their liquidity ratios fall. Price-based mechanisms are already implicitly permitted under the Basel III Accord, as Committed Liquidity Facilities (CLF) can count towards banks' HQLA.[14] A CLF allows central banks to provide committed liquidity lines toward banks' stocks of liquid assets in exchange for an up-front fee. This effectively acts as a tax on liquidity since banks have to pay a fixed fee for

12 Malherbe, Frédéric. "Self-Fulfilling Liquidity Dry-Ups." *The Journal of Finance*69.2 (2014): 947–970.

13 Perotti, Enrico, and Javier Suarez. "A Pigovian Approach to Liquidity Regulation." *International Journal of Central Banking* (2011).

14 Stein, Jeremy C. "Liquidity regulation and central banking." *Speech at the "Finding the Right Balance" 2013 Credit Markets Symposium sponsored by the Federal Reserve Bank of Richmond, Charlotte, North Carolina*. 2013.

Table

Stylized example of LCR and NSFR calculation

Assets					Liabilities				
	Asset Value	LCR Liquidity Weights	NSFR RSF Factor	RSF Factor based on LCR Weights		Liability Value	LCR Run-off Rate	NSFR ASF Factor	ASF Factor based on LCR Run-off rates
Central Bank Reserves	10	100%	0%	0%	Retail Deposits	15	5%	95%	95%
Sovereign Bonds	30	100%	5%	0%	FX-Deposits	10	10%	90%	90%
Corporate Bonds	15	85%	15%	15%	Short-term interbank debt	50	100%	0%	0%
RMBS[1]	40	25%	65%	75%	Long-term debt	30			
Stocks	5	50%	50%	50%	of which maturity >1 year	20	0%	100%	100%
Commercial Loans	40	0%	85%	100%	of which maturity <1 year	10	0%	50%	100%
					Central Bank credit	20	25%	0%	75%
					Equity	15	0%	100%	100%
Total	**140**				**Total**	**140**			

LCR		NSFR		NSFR using LCR weighting	
HQLA	65.25	RSF	66.25	RSF*	74.75
NCO	56.75	ASF	63.25	ASF*	83.25
LCR = HQLA/NCO	1.15	NSFR = ASF/RSF	0.95	NSFR* = ASF*/RSF*	1.11

1 Residential mortgage backed securities.

Source: Authors' calculations.

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When the different weighting schemes are applied, only the LCR is met. However, when the weighting schemes are consistent, both ratios are satisfied.

every euro of liquidity obtained through the CLF. Such a mechanism was originally introduced in order to allow banks operating in economies with a shortage of HQLA to participate in the LCR. This includes economies with small sovereign debt markets, such as South Africa and Australia. But it could potentially be used more extensively in the future if the global supply of available HQLA were to decrease significantly.

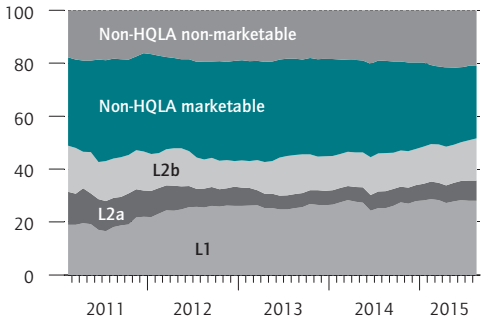
Consequences of liquidity regulation for monetary policy

The introduction of Basel III's liquidity requirements is expected to significantly affect banks' liquidity management practices. Even though banks have already gone some way since the GFC to meet the criteria set by the LCR and NSFR, the regulatory ratios will nonetheless restrict their ability to freely manage their balance sheets going forward. *Inter alia*, this may affect banks' demand for funds from the interbank market. Since standard monetary policy is generally operationalized through steering some benchmark interest rate on the interbank

Figure 2

Eurosystem collateral composition

In percent of total collateral after haircuts



Source: ECB, taken from Bucalossi, A. et al. (2016): Basel III and recourse to monetary policy operations. European Central Bank Occasional Paper No. 171. 37.

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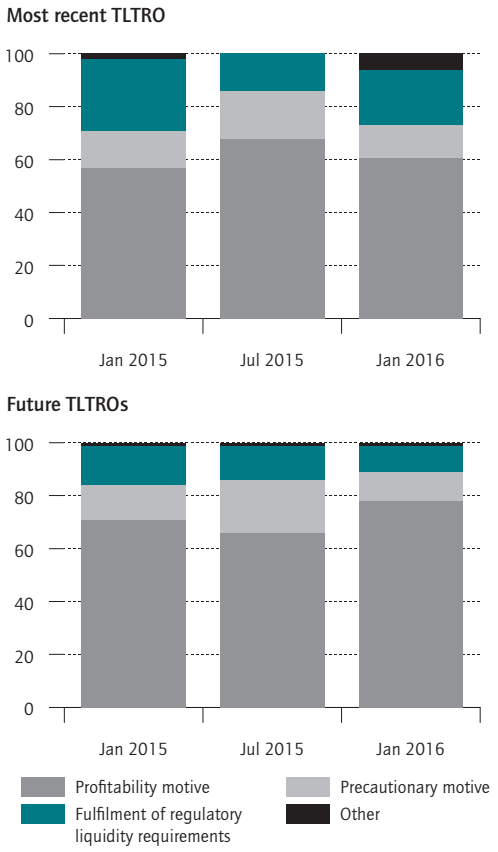
The introduction of the LCR does not seem to have changed the composition of assets used as collateral in aggregate.

Figure 3

Reasons for participating in TLTRO
In percent of banks participating
in the ECB's bank lending survey



Source: ECB Bank Lending Survey.

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For 10–30% of the banks, the new liquidity regulation is the main reason for participating in the ECB's TLTRO program.

market, changes in banks' demand for interbank funds may affect monetary policy implementation. In particular, if the LCR becomes a binding constraint for banks, central banks may have a harder time controlling overnight interest rates through open market operations.[15] This is because the LCR should increase demand for central bank money, thereby pushing short-term interest rates down towards the floor of the central bank's corridor.

In addition to limiting the ability of the central bank to steer overnight rates, the new liquidity ratios may also affect the composition of assets used to secure funding from the central bank. Since assets must be unencumbered in order to qualify for the LCR, the share of non-HQLA collateral posted at the central bank may increase if the set of eligible collateral is larger than the set of HQLA assets. This is the case for a number of central banks, including the European Central Bank. Thus far, recent data published by the ECB show no aggregate reduction in the quantity of HQLA assets posted by banks as collateral (See Figure 2). This aggregate data, however, masks considerable heterogeneity across banks: according to ECB calculations the share of non-HQLA assets pledged as collateral increased significantly between 2011 and 2015 for banks with more than 70% non-HQLA in their asset pools.[16]

Finally, Basel III's new liquidity regulation may also affect the effectiveness of recent unconventional monetary policy measures. The latest round of the ECB's Bank Lending Survey, carried out in January 2016, suggests that regulatory liquidity requirements played an important role in explaining banks' decision to participate in the ECB's 2015 targeted long-term refinancing operations (TLTRO). While this increase partially reflected a reduction in participation due to "precautionary motives," it was also accompanied by a decrease in participation driven by "profitability motives" (see Table 2). Survey results show that this trend is unlikely to continue in the new wave of TLTROs offered in 2016, even though regulatory motives still explain between 10% and 15% of banks' participation decisions. It remains to be seen, however, whether the future introduction of the NSFR will dampen long-term refinancing operations' ability to direct funds towards new productive investments.

Conclusion

The events during the GFC, in particular the market turmoil that followed the default of Lehman Brothers in Autumn 2008, laid bare the banking sector's excessive exposure to liquidity risk. Against this background, the initiative of the G-20 in 2008 to improve liquidity risk management in the financial sector,[17] eventually culminating in the new Basel III liquidity rules, accommodates the need for better practices to reduce the risk of future liquidity crises like the GFC. That being said, it is questionable whether the new Basel III liquidity rules live up to these expectations.

15 Keister, Todd, and Morten L. Bech. "On the liquidity coverage ratio and monetary policy implementation." *BIS Quarterly Review December* (2012).

16 Bucalossi, A. et. al. "Basel III and recourse to Eurosystem monetary policy operations." *ECB Occasional Paper* (2016).

17 See the declaration oft he G20 in 2008: http://www.g20.utoronto.ca/2008/2008declaration1115.html

First, it is unclear why the two new regulatory ratios (LCR and NSFR) are based on different (implicit) definitions of funding stability and liquidity. A coherent definition would result in a consistent weighting scheme and make one of the two ratios redundant. The current design of these ratios is rather *ad hoc* and the incentives it creates are uncertain. This is problematic as liquidity regulation should be concerned with steering incentives of banks *ex ante* in order to prevent them from relying too heavily on central bank liquidity provision during times of financial stress. A more simplified and transparent approach would foster the effectiveness of the new liquidity regulation in terms of incentive provision and prevent the risk of regulatory arbitrage.

Second, not enough attention has been paid to the potential interaction between the new liquidity rules and existing bank capital regulations. The weighting schemes of the ratios take into account that some assets cannot be liquidated immediately for their full value. However, such fire-sales produce losses that cut into the capital base of a financial institution. Using up its liquidity in case of stress may therefore ultimately threaten a bank's solvency. In addition, funding liquidity, i.e. the ease with which a bank can borrow to meet liquidity shortfalls, clearly depends on the solvency of the borrower. Hence, it would clearly be desirable to deal with liquidity risk, at least partially, via additional capital charges.[18]

Third, the present state of Basel III leaves open what will happen in case a bank repeatedly fails to meet the minimum coverage ratios. Here, an automatic sanction procedure that enforces compliance with the rules would be desirable. For example, by way of mandatory rights offerings, banks that do not meet the liquidity rules for a certain period of time would be forced to issue equity and use the resulting cash proceeds to increase their liquidity buffers. As this would penalize existing shareholders, it would improve incentives for compliance.

Table 3

Weighting scheme for calculation of NSFR
In percent

ASF Category	ASF Factor
Total regulatory capital	100
Other capital instruments and liabilities with effective residual maturity of one year or more	100
Stable demand depoists and term deposits with residual maturity of less than one year	95
Less stable non-maturity deposits and term deposits with residual maturity of less than one year	90
Operational Deposits	50
Funding with residual maturity of less than one year provided by NFCs, sovereigns and PSEs	50
Other funding with residual maturity of not less than six months and less than one year, including funding provided by CBs	50
All other liabilities and equity, including liabilites without a stated maturity	0
Net payable derivatives	0
RSF Category	**RSF Factor**
Coins and banknotes	0
Central bank reserves	0
Unencumbered loans to banks with residual maturities of less than six months	0
Other unencumbered Level 1 Assets	5
Unencumbered Level 2A Assets	15
Unencumbered Level 2B Assets	50
HQLA encumbered for a period of six months or more and less than one year	50
Loans to banks with residual maturities six months or more and less than one year	50
Deposits held at toehr financial institutions	50
All other assets with residual maturity of less than on year, including loans to NFC, sovereigns and PSEs	50
Unencumbered residential mortgages with a residual maturity of one year or more and risk weight less than or equal to 35%	65
Other unencumbered loans	65
Other unencumbered performing loans with risk wieghts greater than 35% and residential mortgages of one year or more	85
Unencumbered securities that are not in default	85
Traded commodities, including gold	85
All assetsthat are encumbered for one year or more	100
Net receivable derivatives	100
All other assets, including non-performing loans, non-exchange-traded equities, fixed assets, pension assets, etc.	100

Source: Bank for International Settlements.

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18 On the relationship between liquidity and capital regulation, see König, P. (2015): Liquidity Requirements – A Double-Edged Sword. International Journal of Central Banking. 11(4), 129–168.

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