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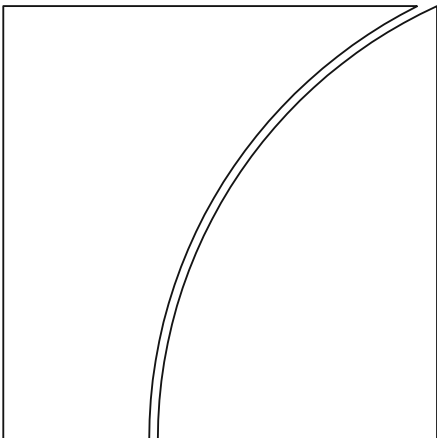
Occasional Paper
No 14

Basel III liquidity monitoring tools

Possible application of the additional tools

BANK FOR INTERNATIONAL SETTLEMENTS

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This publication is available on the BIS website (www.bis.org).

Contents

Executive summary[1]

While the introduction of the Liquidity Coverage Ratio and Net Stable Funding Ratio have made the measurement of liquidity across banks and jurisdictions significantly more comparable and consistent, the ratios in isolation do not capture all aspects of a bank's liquidity risk.

In January 2013,[2] the Basel Committee therefore published its "Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools" (LCR and Tools). This paper contains a number of additional metrics for use by supervisors and banks. At the same time, the Committee recognises that supervisors may need to supplement these by using additional tools and metrics to capture jurisdiction-specific issues.

The purpose of this document is to:[3]

- explain the five metrics presented in the LCR and Tools document as well as show how the data can be gathered;

- show how the data and trends in the metrics can be analysed; and

- outline the implications for supervision.

The paper also discusses data collection and design of liquidity reporting, to optimise the value of data for analysis and use by supervisors and banks.

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1. Introduction

Historically, the industry, academia and supervisors have placed a relatively greater emphasis on capital requirements than on liquidity and funding,[4] reflecting the general view that a solvent bank will be liquid.

That said, several jurisdictions have already required banks to hold a sufficient buffer of liquid assets. The Basel Committee provided guidance as early as 1992 in *A framework for measuring and managing liquidity*,[5] updated in 2000 as *Sound practices for managing liquidity in banking organisations*.[6] In setting expectations for liquidity risk management and measurement in banks, the publication of the Sound Practices reflected an awareness that the increasing reliance on wholesale funding posed a possible threat to banks.

The global financial crisis confirmed that a lack of liquidity and the funding risk arising from widening funding spreads remains an inherent risk throughout the banking sector. Reducing the risk of illiquid banks and interbank markets was the rationale for strengthening the quantitative and qualitative requirements on liquidity. The Basel Committee's Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR), the minimum requirements for internationally active banks, are among the key reforms for a more resilient banking sector.

The Committee's LCR and Tools document (Part 2) proposes the introduction of standardised liquidity monitoring tools.[7] While documents covering the implementation of the LCR and NSFR and the interaction of the above-mentioned metrics with capital requirements have been published, guidance on the use of the monitoring tools from a supervisor's perspective is scarce. Thus, this paper is designed as a reference source for supervisors on:

- the five metrics presented in the LCR and Tools document;

- how the data can be gathered; and

- the analysis of liquidity data and assessment of qualitative aspects of liquidity management with the aim of forming a view on bank's liquidity position and market vulnerabilities.

The LCR and the NSFR are accompanied by the Basel Committee's *Principles for sound liquidity risk management and supervision*[8] (Sound Principles), published in February 2008. The Sound Principles revised the 2000 Sound Practices and established a framework to ensure that banks are aware of the international expectations with respect to the proper governance, measurement and management as well as the disclosure of liquidity risk. For banks, the Sound Principles highlight the importance of internal stress testing, the need to define a liquidity risk appetite and the significance of appropriate funds transfer pricing, among other key elements. They also emphasise the role of supervisors in assessing banks' liquidity management and liquidity positions. The proposed US rules state that, with the data collected, "company's management and supervisors would be able to better assess the company's ability to meet its projected liquidity needs during periods of liquidity stress; take appropriate actions to address liquidity needs; and, in situations of failure, to implement an orderly resolution of the covered company".[9]

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[4] For a history of liquidity regulation, see also C Bonner and P Hilbers, "Global liquidity regulation – Why did it take so long", *DNB Working Paper*, no 455, 2015.

[5] www.bis.org/publ/bcbs10b.htm.

[6] www.bis.org/publ/bcbs69.htm.

[7] www.bis.org/publ/bcbs238.pdf.

[8] www.bis.org/publ/bcbs144.htm.

[9] *Federal Register*, vol 78, no 230, 29 November 2013, p 71822.

2. Basel III liquidity risk measurement and management

The following section outlines the two quantitative minimum standards, the LCR and NSFR, as well as the qualitative requirements contained in the Sound Principles.

2.1 Liquidity Coverage Ratio

The LCR is designed to ensure that banks hold sufficient high-quality liquid assets (HQLA) to survive a 30-day stress period. The 30-day period is assumed to be sufficient for bank management and for supervisors to take corrective action, or resolve the bank in an orderly way. The scenario implicitly assumed by the parametrisation is a combined idiosyncratic and market-wide shock. It factors in a partial run on retail and wholesale deposits and also elements to mitigate reputational risk such as debt buy-backs, or honouring non-contractual obligations.

The LCR is calculated by dividing the stock of HQLA by the net cash outflow. The ratio should be at least 100%, that is, the bank should hold at least as much HQLA to cover the net cash outflow for the next 30 days.

Composition floors and haircuts ensure that HQLAs can be liquidated even in times of stress:

- at least 60% of the HQLA must consist of Level 1 HQLA (cash, central bank holdings or substitutes such as bonds with a 0% risk weight). These may be fully included without any haircut (supervisors may, however, exercise national discretion to impose haircuts; see para 49 of the 2013 document);

- up to 40% of the HQLA can consist of Level 2A HQLA, which are claims on or guaranteed by sovereigns, central banks, public sector entities (PSEs) or multilateral development banks with a risk weight of 20% and highly rated corporate debt securities. However, a minimum haircut of 15% is applicable;

- national discretion may be exercised to allow Level 2B HQLA,[10] which are capped at 15% of the total HQLA[11] and are counted towards the 40% allowed for Level 2 HQLA. These consist of equities that are part of a defined main index, lower-rated plain vanilla senior corporate bonds and certain residential mortgage-backed securities. Haircuts of 25%, 50% or more apply.

The LCR's denominator, the total net cash outflow is calculated as the outflow minus the inflow whereby the inflow is restricted to 75% of the outflow, effectively placing a floor under the LCR so that HQLA must cover at least 25% of outflows.

Outflow and inflow are calculated by multiplying the liabilities, some off-balance sheet exposures and the assets with outflow and inflow rates, which have been calibrated according to the above-mentioned scenario.

$$LCR = \frac{Stock\ of\ HQLA}{Total\ net\ cash\ outflow} \geq 100\%$$

where

$$Total\ net\ cash\ outflow = outflow - min\{inflow; 75\% \times outflow\}$$

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[10] By national discretion within the Level 2 assets, 15% of the total HQLA may in addition consist of RMBS, lower-rated investment grade corporate bonds and equities.

[11] See paragraphs 47–48 of the 2013 document.

Implemented in January 2015, the LCR provides a relatively comparable measure of liquidity across banks and ensures that sufficient liquidity buffers are held. As a single measure, it obviously has some drawbacks and therefore needs to be complemented by additional measures and data.

The LCR's possible shortcomings are:

- the focus on the 30-day horizon, while a bank can encounter cliff effects beyond day 30;

- the restriction to one specific scenario;

- the focus on HQLA for liquidity generation; and

- that special one-off aspects such as FX market interruptions and intraday liquidity need not be taken into account.

2.2   Net Stable Funding Ratio

The NSFR's[12] purpose is to ensure that banks maintain a stable funding profile in relation to the composition of their assets and off-balance sheet activities. The NSFR also penalises short-term wholesale funding and therefore reduces reliance on it. As such, it compensates for one of the above-mentioned shortcomings of the LCR, ie that, while the LCR focuses on a 30-day horizon, the NSFR's time horizon is one year.

The NSFR is calculated by dividing the total available stable funding by the total required stable funding. The ratio's numerator and its denominator are calculated by summing up the weighted liabilities and assets, respectively, where the weighting factors are the pre-defined available stable funding (ASF) factors and required stable funding (RSF) factors, respectively.

Liability items attract a higher ASF factor the longer their maturity and/or the stickier they are (see Graph 1). Asset items also attract a higher required stable funding factor the longer their maturity and/or the lower their liquidity (see Graph 2). The NSFR, like the LCR, should be at least 100%, signalling that the available stable funding exceeds the required stable funding:

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

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[12] See www.bis.org/bcbs/publ/d295.htm.

Available stable funding factors
Graph 1

	Available stable funding (ASF)	ASF-factor
Stability of liabilities	Regulatory capital; further capital instruments; any liabilities maturing ≥ 1 year	100%
	"Stable" retail/SME deposits < 1 year (as defined for the LCR)	95%
	"Less stable" retail/SME deposits < 1 year (as defined for the LCR)	90%
	Funding from NFC, CB, PSE, sovereigns < 1 year; Funding from CB, FI, operational deposits > 6 months / < 1 year	50%
	All other liabilities not included above	0%

Source: Basel III: the net stable funding ratio; www.bis.org/bcbs/publ/d295.pdf

Required stable funding factors
Graph 2

	Required stable funding (RSF)	RSF-factor
Liquidity of assets	**"fully liquid"** (cash, central bank reserves, etc)	0%
	"highly liquid" (all other HQLA 1)	5%
	"very liquid 1" (loans to FI < 6 months secured with L1 assets)	10%
	"very liquid 2" (HQLA 2A)	15%
	"liquid" (HQLA 2B, encumbered HQLA, loans & assets >6m/<1yr, deposits held at other FI for operational purposes)	50%
	"less liquid" (unencumbered residential mortgages and loans >1yr, RW<35%,)	65%
	"almost illiquid" (all other unencumbered performing loans > 1yr with RW>35%, gold, unencumbered non HQLA securities)	85%
	"fully illiquid" (all encumbered assets >1yr, derivatives receivables net of derivatives payables if positive; all other assets (non-performing loans, intangibles, deferred tax assets, pension assets, retained interest etc)	100%

Source: Basel III: the net stable funding ratio; www.bis.org/bcbs/publ/d295.pdf

Like the LCR, the NSFR is not without drawbacks as a measure. These include:

- focus on a single time horizon of 12 months, albeit a longer one than the LCR's; and

- assumption of a single scenario, by the way the parameters are set, and ignoring elements such as FX market disruptions.

2.3   Principles for sound liquidity risk management and supervision

The *Principles for sound liquidity risk management and supervision* revised the *Sound practices for managing liquidity in banking organisations* (2000). The 17 principles establish a qualitative framework to ensure that banks and supervisors are aware of international expectations with respect to proper governance, measurement and management as well as the disclosure of liquidity risk. For banks, the Sound Principles highlight the importance of internal stress testing, the need to define a liquidity risk appetite and the significance of an appropriate funds transfer pricing, among other key elements. The Sound Principles also emphasise the role of supervisors in assessing banks' liquidity management and liquidity positions. Also underlined are the importance of supervisors in assessing the adequacy of a bank's liquidity risk management framework and its liquidity, and the steps that supervisors should take if these are inadequate. Furthermore, supervisors should require banks to periodically submit information. The Basel III liquidity monitoring tools presented in Part 2 of the 2013 document provide guidance.

In comparison with the Sound Practices, the Sound Principles offer extended guidance on the importance of establishing a liquidity risk tolerance, the necessity of allocating liquidity costs, benefits and risks to all significant business activities, the design and use of severe stress test scenarios, the need for a robust and operational contingency funding plan, the management of intraday liquidity risk and collateral and public disclosure in promoting market discipline. One of the most complex but also one of the most important requirements is the need to allocate costs and benefits to business activities, as this directly influences business activity and accordingly the risks taken by the bank.

3.   Liquidity monitoring tools

The liquidity monitoring tools consist of the five metrics published in *Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools* (2013). Intended to assist supervisors in the assessment of a bank's liquidity risk, they are designed to cover the above-mentioned shortcomings of the LCR and NSFR. The document recognises that these metrics may need to be complemented by additional bespoke tools and metrics to capture jurisdictional idiosyncrasies.

While paragraphs 141–143 of the Sound Principles outline what supervisors can do to address deficiencies in a bank's liquidity risk management processes or liquidity position, guidance on relevant data for the metrics and how they can be analysed is limited.

The five metrics are outlined below, and the subsequent section discusses how the relevant data can be interpreted, analysed and acted upon.

3.1   Description of the metrics

3.1.1   Contractual maturity mismatch

Contractual maturity mismatch refers to the gap between inflows and outflows of liquidity arising from long-term illiquid assets and liquid liabilities, respectively. Such mismatches are inherent to banks given their fundamental role in the wider economy of transforming liquid liabilities (eg deposits) into illiquid assets (eg longer-term loans).

The monitoring and analysis of maturity mismatches over defined time bands is one commonly used approach to monitoring and managing liquidity risk. Unlike the LCR and the NSFR measures, the cash flows used here are not weighted by factors reflecting the probability of withdrawal ie there are no

assumptions regarding behaviour. As such, maturity gaps give a bank a sense of how much liquidity it would potentially need to raise over time if all outflows were to take place at the earliest date.

By the nature of banks' role as intermediaries, they typically have asset-liability mismatches, particularly in the short-maturity buckets. Restricting this gap for all banks to zero would be sub-optimal as this would hinder banks from fulfilling their key functions. A potential unintended consequence would be to divert business into the shadow banking sector, as in most countries the supply of short-term deposits exceeds the demand for short-term credits, while the demand for long-term credits exceeds the supply of short-term deposits. Furthermore, restricting the gap to zero would not eliminate a bank's liquidity risk, as there is still the possibility of early withdrawals on term deposits and prolongation on assets. Finally, it should be considered, that a significant portion of the liquidity buffer held by a bank will usually not be part of the contractual short-term inflows as the part of the buffer which is held in (government) bonds with medium- and long-term maturities contractually causes inflows in those time buckets. Accordingly, this difference of the tool in comparison with the LCR will have to be considered when analysing the results.

3.1.2   Concentration of funding

In general, the more diversified is a bank's funding structure (with respect to counterparties, products/instruments and currencies), the less likely it is that a substantial portion of funding will be withdrawn at the same time. Accordingly Principle 7 of the Sound Principles requires banks to:

- diversify available funding sources in the short, medium and long term;

- consider correlations between sources of funds and market conditions; and

- include limits by counterparty, secured versus unsecured market funding, instrument type, securitisation vehicle, currency and geographic market.

The Sound Principles propose that concentration of funding with respect to the metric is interpreted and measured as follows:

- counterparties and instruments/products that account for more than 1% of a bank's total balance sheet are deemed significant; and

- where aggregate liabilities denominated in a particular currency amounting to 5% or more of a bank's total liabilities, that currency is deemed "significant"

over time horizons of less than a month, one to three months, three to six months, six to 12 months and beyond 12 months.

This should allow supervisors to identify those counterparties and sources of funding that are so significant that their withdrawal could lead to a liquidity problem for the bank. In principle, the tool mirrors the large exposure reporting performed on the asset side.[13]

Accuracy in measuring funding concentration may be challenging for banks with a complex group structure and which borrow from multiple lenders that may belong to one single consolidated counterparty. Roadblocks include deriving a comprehensive accurate "single funder view" of funding from a single source, and assessing the behaviour of the lenders, eg their propensity to withdraw funding in a concerted fashion.

3.1.3 Available unencumbered assets

While the LCR ratio already provides information on the available unencumbered assets under a pre-defined stress scenario, the available unencumbered assets metric offers further insight into the nature of the available unencumbered assets, including:

- currency denomination;

- location; and

- eligibility for use as collateral for secured borrowing with central bank(s) or in secondary markets.

Thereby, HQLA requirements of the LCR concept, such as the need for an asset to be treasury-controlled or the exclusion of assets with past price declines that exceed the limits required by the LCR, can be reliefed. Furthermore, the bank should show the prearranged or currently relevant haircuts for unencumbered assets that make them eligible for secured funding with central banks or in secondary markets. Collateral from customers that can be delivered or re-pledged should also be reported.

3.1.4 LCR by significant currency

Several BCBS publications stress the importance of assessing and supervising mismatches in foreign currencies. In addition to Principle 5 of the Sound Principles, which states that the bank should determine acceptable currency mismatches, the *Core principles for effective banking supervision* also mention that the supervisor should identify banks that carry out significant foreign currency liquidity transformation. Moreover, supervisors should require the bank to undertake a separate analysis of its strategy and monitor its liquidity needs separately for each such significant currency.[14] LCRs by significant currencies are used to identify potential currency mismatches under the LCR scenario. This is especially so for banks in emerging countries, where the convertibility of the home country currency into major currencies can more often be a problem. But it is also the case in jurisdictions where FX markets are not highly liquid or can become illiquid (which is the case for every market as historic experience proofs) and where, or wherever the bank cannot fund itself in the currency of any outflows that materialise.[15] Furthermore, for countries with insufficient HQLA in the home currency LCR, the metric reveals to what extent the bank has to rely on foreign currency-based HQLA. Implementing an Alternative Liquidity Approach (ALA) option[16] without a separate LCR in the home currency, for example, would not seem to be possible, as the lack of HQLA in the home currency can hardly be monitored, so that the extent to which a bank is relying on the ALA option could not be established.

LCRs by significant currencies, when analysed together with the available unencumbered assets metric, may provide additional insight by highlighting the fungibility of assets and liquidity across borders.

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[15] On 12 December 2007, during the Great Financial Crisis, the Federal Reserve announced the establishment of FX swap lines with the European Central Bank and the Swiss National Bank to provide up to $24 billion in dollars for use in their jurisdictions. Furthermore, a Term Auction Facility was established under which depository institutions that were judged to be in generally sound financial condition by their local reserve bank and that were eligible to borrow under the primary credit discount window programme were able to borrow against a wide variety of collateral. Both measures were taken due to interruptions in the unsecured interbank markets and to ensure that the foreign banks remained dollar liquid. See www.federalreserve.gov/newsevents/press/monetary/20071212a.htm.

[16] The alternative liquidity approaches (ALA) consist of three predefined options for countries with insufficient HQLA in their home currency. In these countries, contractual committed liquidity facilities from the central bank, consideration of foreign currency HQLA and/or consideration of additional Level 2 assets above the usual cap can be granted to banks. See www.bis.org/publ/bcbs238.pdf, p 55ff and p 50 ff.

3.1.5 Market-related monitoring tools

This refers to the monitoring of market data as early warning indicators of any potential liquidity difficulties at banks. Market data have little or no time lag, giving them an advantage over other monitoring tools, which, due to data availability and consolidation restrictions at banks, are usually still lagged by several days. Market-related monitoring tools can thus focus on market-wide information, information on the financial sector and bank-specific information.

Data include market-wide information (eg equity prices, bond markets, FX markets, government debt, economic growth rates, inflation rates etc) and information on the financial sector (eg financial sector specific equity indices, repo market volumes etc). While market-wide information can be collected by the supervisor itself and does not need to be reported by multiple banks, bank-specific information should be collected on an individual basis and accordingly requires a standardised reporting tool (eg for CDS, money-market trading prices, rollovers, yield of bank subordinated debt in the secondary market etc).

3.2 Application of the tools

3.2.1 Contractual maturity mismatches

Definition

Contractual maturity mismatches monitor the whole time horizon, as distinct from the LCR and NSFR, which focus on time periods of 30 days and one year, respectively. As such, they can reveal cliff effects, for example, as a consequence of LCR/NSFR optimisation. Such effects could be produced if banks seek to optimise their LCR and NSFR in a cost-efficient way by, for instance, imposing withdrawal restrictions for 31 days or extending maturities in other ways slightly above the relevant maturity for outflows and slightly below the relevant maturity for inflows. Nevertheless, the metric has its weaknesses: delays in payments/settlements, payments on off-balance sheet commitments or new business etc are usually not factored in.

The trade-off between the benefits of more granularity in reporting – ie the number of time buckets reported and the data-processing efforts required from reporting entities and supervisors – needs careful consideration. Up to now, practices vary among supervisors: the European Union and Switzerland require 22 and 14 time buckets,[17] respectively, whereas US banks, reporting according to FR 2052a, must populate up to 75 time buckets.[18]

Based on the data received, a funding gap can be calculated for each time bucket or a cumulative funding gap can be calculated. The latter signals the liquidity necessary up to that point in time, if all payments come contractually due, and is calculated as the sum of Net Funding Gaps over time, as follows:

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[17] See
www.eba.europa.eu/documents/10180/531016/ITS+on+Additional+Monitoring+Metrics+%28Annex+1%29%20rev1.xls/c50b0f05-95f2-408d-b35b-5a5319005f6c and
www.finma.ch/de/~/media/finma/dokumente/dokumentencenter/8news/20150818-erhebungsbogen_test-reporting_beobachtungskennzahlen.xlsx?la=de.

[18] See www.federalreserve.gov/reportforms/forms/FR_2052a20151231_f.pdf, p 75.

$$CFG_T = \sum_{t=0}^{T} NFG_t$$

where

$$NFG_t = TOF_t - TIF_t$$

with:

CFG =   Cumulative funding gap

NFG =   Net funding gap

TOF =   Total outflow

TIF =   Total inflow

By analysing contractual maturity mismatches, supervisors may gain insights into:

- cliff effects beyond the LCR and NSFR horizons;

- mismatch risks for time horizons shorter than 30 days;
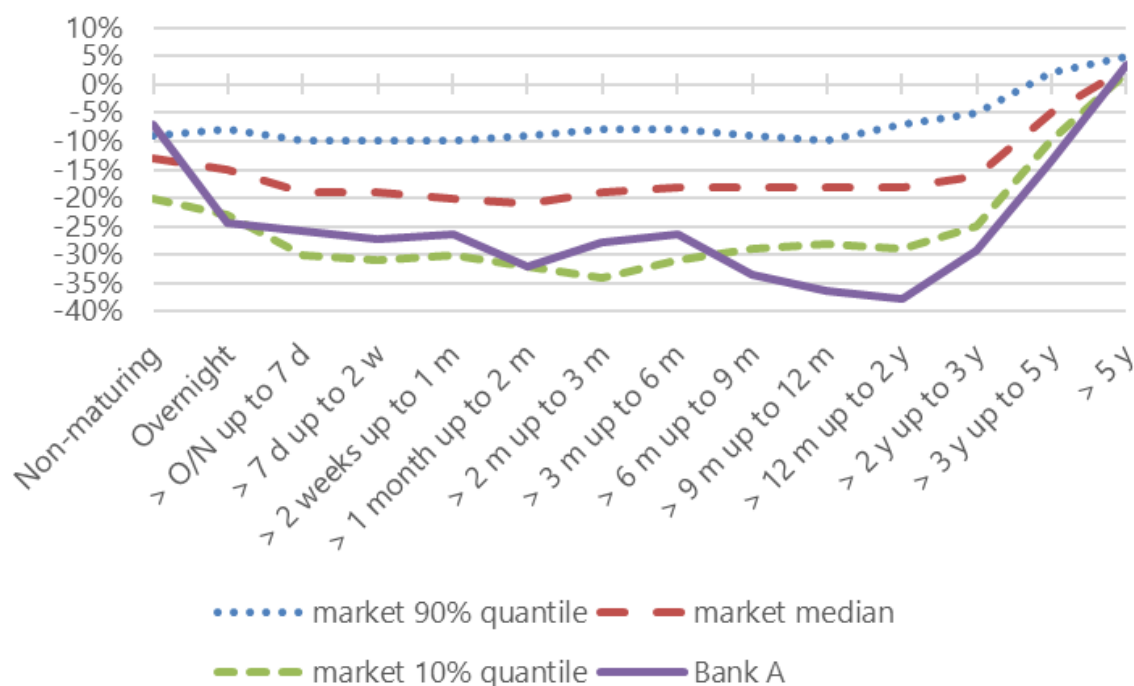
  Supervisors can then also:

- conduct peer analysis;

- calculate LCR- and NSFR-like liquidity ratios for additional time horizons;

- estimate survival periods and compare these with their bank's internal calculations;

- simulate the impact of specific liquidity scenarios on banks in countries that have recently experienced bank runs or bank failures; and

- assess liquidity profiles of their banks against those of banks that have failed or encountered difficulties.

Based on these insights, supervisors can discuss with their banks as to how they intend to address the gaps in their contractual maturity profiles.

Peer analysis

Graph 3 shows the cumulative funding gap of a bank (Bank A) relative to its balance sheet volume. The 10% and 90% quantile as well as the median of all banks in the market are also shown. By comparison with the market, Bank A has a relatively high contractual gap – especially in the time bands above 12 months, where it exceeds the gap of 90% of all banks. On the other hand, the bank has only a few non-maturing liabilities, as the cumulative funding gap is less negative than for 90% of all banks. Furthermore, the gap increases for the time bands directly above one month and above 12 months, just beyond the LCR and NSFR horizons.[19] The funding gap's increase also exceeds that of more than 90% of the market within these time buckets. This could signal possible cliff effects and should be discussed with the bank, as the funding gap increase is also higher than the increase for the whole market within these time buckets.

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[19]   For the time horizons, the supervisor has to decide whether it is more valuable to align the monitoring tool to the 30-day or the one-month horizon. While the first approach covers cliff effects for each month no matter whether it has 30 or 31 days, the latter can give additional insight into the impact of activities that are rolled over at the end of the month for another month.

Cumulative funding gap relative to balance sheet
Graph 3

Source: Example by the author

Gaps relative to actual buffer and stress tests

With respect to the market comparison, supervisors should decide whether it makes more sense to compare banks with the whole market or rather with banks that have a comparable business model. In this case the importance of picking an appropriate peer group or bank(s) cannot be understated, as liquidity profiles differ between banks, depending on operations/business models (ie a distinction between retail banks, custody banks, universal banks and investment banks can be useful).Ddifferent business models lead to quite different liquidity and maturity patterns.

In a second step, the supervisor can compare the actual liquidity buffer of the bank with the calculated gaps. In reference to Graph 3, if Bank A has a liquidity buffer above 30% of the total balance sheet, even under the extreme scenario when all positions mature as contractually due, Bank A will not be short on liquidity within the first month as the gap only exceeds 30% of the balance sheet in the time bucket between one and two months. Depending on the granularity of the time buckets, a "survival period" for the bank can be calculated under different scenarios.

With respect to cash flow mismatches in the very short time horizon, in this case it can be seen that the cumulative gap after two weeks is more negative than after one month (see Graph 3). This indicates that the LCR probably underestimates the liquidity risk within the first month, as the peak short-term liquidity risk falls not on day 30 but rather on day 14.[20]

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[20] In the US LCR regulation, this issue is addressed by requiring the banks to calculate a "maturity mismatch add-on", which is defined as the difference between the net cumulative peak day amount for any of the 30 calendar days following the calculation date and the net cumulative outflow amount on day 30. See Regulation WW, *Federal Register*, vol 79, no 197, 10 October 2014,

Beside the cliff effects for LCR and NSFR and cash flow mismatch risks for shorter horizons, both the LCR and the NSFR favour retail deposits over wholesale deposits by assuming significantly lower outflow rates and higher ASF factors. Therefore, a scenario where retail deposits suddenly are not as sticky or stable as assumed[21] could lead to overly optimistic estimation of a bank's liquidity and funding position. The contractual maturity mismatch measure can therefore be used as a backstop, in a similar way to the leverage ratio, to reduce the risk of using inappropriate factors for some scenarios. For example, banks can be ranked by their LCRs and their respective contractual maturity mismatch gaps. Table 1 shows an excerpt from the rankings of 300 banks with comparable business models. Bank J would warrant closer investigation, to seek reassurance that the bank is not optimising its structure for a good LCR outcome at the expense of ignoring an increase in liquidity risk for other scenarios.

Comparison of LCR and contractual maturity mismatch rank		Table 1
	Rank in LCR	Rank in 30-day contractual maturity mismatch
Bank A	1	7
Bank B	2	16
…	…	…
Bank J	9	188
Bank K	10	12
…	…	…
Source: Example by the author		

Furthermore, a supervisor can use the contractual maturity mismatch to calculate the impact of modified (stress-)factors – for the 30 day and the one-year horizon of the LCR and NSFR as well as for other time horizons. These modifications can include higher retail outflow rates, lower inflow rates from performing loans, or higher outflow rates for secured funding transactions backed by HQLA, among others.

Where there are embedded options, supervisors and the LCR conservatively assume the longest "effective" maturity for assets and the shortest maturity for liabilities. In most cases, it would seem most appropriate to conduct an evaluation of the triggering probability of each trigger point in the future for different scenarios, and to allocate a portion of the asset or liability to the maturity buckets in accordance with the triggering probability.

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p 61531. The Bank of England also proposed a comparable approach as part of their Pillar 2 liquidity consultation paper. See www.bankofengland.co.uk/pra/Documents/publications/cp/2016/cp2116.pdf, p 14.

[21] In the case of Northern Rock, for example, during the six months from June 2007 to December 2007, retail deposits fell by roughly the same portion as wholesale liabilities. See H S Shin, "Reflections on modern bank runs: a case study of Northern Rock", *Journal of Economic Perspectives*, vol 23, no 1, Winter 2009. In the event, it was the short-term wholesale counterparties who were the first to act. See also R Huang and L Ratnovski, "The dark side of bank wholesale funding", *ECB Working Paper Series*, no 1223, July 2010, p 4. As the media coverage increases, it can be assumed, that wholesale customers will react within the first few days and that retail customers will follow suit within a month.

3.2.2 Concentration of funding

The 2013 LCR and Tools document defines:

- a "significant counterparty", "significant instrument/product" generally as a single counterparty or group of connected/affiliated counterparties/single instrument/product or group of similar instruments/products accounting in aggregate for more than 1% of a bank's total balance sheet;

- a "significant currency" as currency in which the aggregate liabilities denominated in that currency amount to $\geq$ 5% of the bank's total liabilities;

To measure concentration of funding, the document suggests that the above be reported for the following time buckets based on contractual maturity:

- < one month;

- one to three months;

- three to six months;

- to 12 months; and

- >12 months.

During a crisis, the bank and its supervisor would be interested if the "significant" counterparties were providing:

- long- or short-term funding; or

- wholesale or retail.

Other considerations for supervisors are whether:

- the 1% threshold is suitable; and

- the granularity of the time buckets needs to be increased.

The following example includes both institutional and retail funding and more granular time buckets.

The short horizon of up to one month is expanded by adding two additional buckets with durations of overnight and up to seven days. This short-term focus requires a sufficiently high reporting frequency. According to the Basel III Monitoring Report for the December 2015 data for Group 2 banks, the total outflow in the LCR, for example, amounts to 12.1% of the total balance sheet liabilities and total inflows to 3.5%.[22] The net outflow is accordingly 8.6% of the total balance sheet liabilities. If the large counterparties provide predominantly short-term funding, the 1% threshold can thus be relatively high, as the withdrawal of even one natural person just reaching the 1% threshold would reduce the LCR by almost 11% even if the deposits had been considered as non-stable.[23]

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[22] See Basel III Monitoring Report, March 2016, www.bis.org/bcbs/publ/d354.pdf, p 25.

[23] In the case that the withdrawal of HQLA reduces them by 1% of the balance sheet, while the net outflow only declines by this 1% multiplied with the outflow rate for non-stable deposits by natural persons, which is 10%, if no higher outflow rates are assumed for high-value deposits due to national discretion.

Concentration of funding reporting

Table 2

	Funding as % of total liabilities	Funding as % of liabilities within time bucket						
		Overnight	> O/N up to 7d	> 7d up to 1m	> 1m up to 3m	>3m up to 6m	>6m up to 12m	>12m
Bank A	6.10%	13.56%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Fund A	3.24%	5.04%	0.00%	0.00%	9.72%	0.00%	0.00%	0.00%
Bank B	2.37%	3.16%	0.00%	7.90%	0.00%	0.00%	23.70%	1.39%
Bank C	2.28%	5.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Natural Person A	2.01%	0.45%	0.00%	0.00%	0.00%	0.00%	0.00%	5.32%
Corporate A	1.92%	1.71%	0.00%	12.80%	7.68%	0.00%	0.00%	0.00%
Fund B	1.84%	2.25%	7.36%	15.33%	0.00%	0.00%	0.00%	0.00%
Fund C	1.60%	1.42%	0.00%	0.00%	9.60%	0.00%	0.00%	0.00%
Natural Person B	1.49%	0.99%	0.00%	0.00%	4.47%	0.00%	0.00%	1.75%
Bank D	1.43%	1.91%	0.00%	0.00%	5.72%	0.00%	0.00%	0.00%
Corporate B	1.26%	1.26%	0.00%	4.20%	5.04%	0.00%	0.00%	0.19%
Corporate C	1.22%	1.22%	0.00%	0.00%	3.66%	9.15%	0.00%	0.36%
Bank E	1.18%	1.57%	0.00%	0.00%	2.36%	0.00%	0.00%	0.69%
Bank F	1.14%	1.01%	0.00%	1.90%	1.71%	0.00%	0.00%	1.34%
Bank G	1.09%	1.94%	1.09%	1.82%	0.00%	5.45%	0.00%	0.00%
Natural Person C	1.03%	0.46%	0.00%	0.00%	0.00%	0.00%	0.00%	2.42%
Total	31.20%	43.01%	8.45%	43.95%	49.96%	14.60%	23.70%	13.47%

Source: Example by the author

Table 2 above shows that the 16 largest counterparties provide 31.2% of total funding. However, close scrutiny reveals that these 16 large counterparties provide 43.0% of overnight funding. As such, it appears that the short-term counterparty concentration risk caused by these largest counterparties is much higher than the risk with respect to the overall funding.

Further, a concentration measure such as the Herfindahl-Hirschmann-Index (HHI) can be used for peer analysis. The HHI is the sum of the squared proportion of funding from each major counterparty and is mathematically expressed as follows:

$$HHI = \sum_{i=1}^{n} \left(\frac{x_i}{\sum_{i=1}^{n} x_i} \right)^2$$

with:

x_i = funding as percentage of total liabilities

The HHI's denominator can either be the sum of the x_i of all significant counterparties or all counterparties (which sums up to unity). The latter has the advantage that the HHI is not influenced by the relative share of funding posted by counterparties exceeding the reporting threshold (eg 1%, as per the 2013 LCR and Tools document).

The HHI varies between zero and unity, with concentration decreasing as the index moves towards zero. As the HHI is a "standardised" measure, it is useful for benchmarking a funding profile against that of another bank or industry averages.

For the example displayed in Table 2, the HHI covering only the 16 significant counterparties would add up to 0.08678, whereas the result of the HHI which considers one as the sum of the x_i would add up to 0.00845. Thus, the comparison of the results over time and with other banks to identify outliers

is of greater importance than the result itself. Grouping the significant counterparties in Table 3 by counterparty types such as banks, financial counterparties, corporates and natural persons can provide additional insight on the impact of highly correlated actions between counterparty types (for example the withdrawal of all overnight deposits by banks) and the consequential impact on the LCR can be analysed. While, for banks and other financial institutions (FI), the LCR (except for operational deposits) already takes into account a 100% outflow rate, and a withdrawal only would impact the LCR marginally for retail customers, which have an outflow rate of 10% for non-stable deposits, the withdrawal would significantly reduce the LCR as shown above.

Breakdown of significant counterparties by counterparty type   Table 3

Funding…	Funding as % of total liabilities	Funding as % of liabilities within time bucket						
		Overnight	> O/N up to 7d	> 7d up to 1m	> 1m up to 3m	>3m up to 6m	>6m up to 12m	>12m
by banks	15.59%	28.21%	1.09%	11.62%	9.79%	5.45%	23.70%	3.43%
by other FI	6.68%	8.71%	7.36%	15.33%	19.32%	0.00%	0.00%	0.00%
by corporates	4.40%	4.19%	0.00%	17.00%	16.38%	9.15%	0.00%	0.54%
by natural persons	4.53%	1.90%	0.00%	0.00%	4.47%	0.00%	0.00%	9.50%

Source: Example by the author

However, supervisors should be open to the idea that the effects of concentration need not be entirely negative with respect to funding. During times of stress, for example, high-level communication and retention measures may be easier to assure with a small number of key counterparties than with a host of them. This can be particularly advantageous if a key funding provider is also the key shareholder.

If the largest depositor is also the bank's major shareholder, this would reduce the probability of withdrawals significantly below the LCR assumptions under certain circumstances.

Another important consideration is the extent to which the bank also provides funding to its funding counterparties and on what maturities. Dependent on the interconnectedness of these activities, a high volume of funding received can be much less risky. Accordingly, it can make sense to ask the banks to provide information on lending to these counterparties and corresponding maturity information, although this is not usually part of the large exposure reporting. Table 4 below suggests a possible reporting template showing funding concentration on a net basis.

Concentration of net-funding reporting

Table 4

	Net-funding as % of total liabilities	Net-funding as % of liabilities within time bucket						
		Overnight	> O/N up to 7d	> 7d up to 1m	> 1m up to 3m	>3m up to 6m	>6m up to 12m	>12m
Bank A	4.10%	11.33%	0.00%	-13.33%	-6.00%	0.00%	0.00%	0.00%
Fund A	3.24%	5.04%	0.00%	0.00%	9.72%	0.00%	0.00%	0.00%
Bank B	0.87%	-0.17%	0.00%	7.90%	0.00%	0.00%	23.70%	1.39%
Bank C	0.49%	2.68%	0.00%	-11.93%	-3.58%	0.00%	0.00%	0.00%
Natural Person A	2.01%	0.45%	0.00%	0.00%	0.00%	0.00%	0.00%	5.32%
Corporate A	0.00%	1.71%	0.00%	12.80%	7.68%	0.00%	-76.80%	-3.39%
Fund B	1.84%	2.25%	7.36%	15.33%	0.00%	0.00%	0.00%	0.00%
Fund C	1.55%	1.42%	0.00%	0.00%	9.60%	0.00%	0.00%	-0.15%
Natural Person B	-1.56%	0.99%	0.00%	0.00%	4.47%	0.00%	0.00%	-7.22%
Bank D	0.56%	-0.03%	0.00%	0.00%	5.72%	0.00%	0.00%	0.00%
Corporate B	-3.56%	1.26%	0.00%	4.20%	-9.42%	0.00%	-48.20%	-8.32%
Corporate C	1.22%	1.22%	0.00%	0.00%	3.66%	9.15%	0.00%	0.36%
Bank E	1.18%	1.57%	0.00%	0.00%	2.36%	0.00%	0.00%	0.69%
Bank F	-2.07%	-3.27%	0.00%	-19.50%	-1.50%	0.00%	0.00%	0.40%
Bank G	-0.14%	-0.80%	1.09%	1.82%	0.00%	5.45%	0.00%	0.00%
Natural Person C	-1.07%	0.46%	0.00%	0.00%	0.00%	0.00%	0.00%	-3.75%
Total	8.66%	26.12%	8.45%	-2.72%	22.71%	14.60%	-101.30%	-14.66%

Source: Example by the author

As can be seen in Table 4, on a net basis, funding by the same 16 counterparties as in Table 2 falls from 31.2% to 8.7% of total liabilities, but 26.1% of the overnight funding could dissipate if these counterparties were to withdraw all their funding. In this case, the funding received by the significant counterparties has a considerably shorter maturity than the loans issued to these customers. For the six to 12-month bucket, for example, the loans issued to significant counterparties even exceed the total funding the bank has raised from all its counterparties within this maturity bucket.

Hence, for a net view, the maturity breakdown is even more important, as it can be assumed that any customer who fears that a bank will become insolvent would withdraw his short-term deposits irrespective of any long-term borrowing from the same bank.

A breakdown by counterparty type, as presented in Table 5, can show whether the maturity mismatches are concentrated in certain counterparty type(s). In this case, especially natural persons and corporates could withdraw within the first 30 days, which is not fully covered by the LCR outflow rates, even though both counterparty types are net lenders if all time buckets are considered.

Net-funding…	Net-funding as % of total liabilities	Net-funding as % of liabilities within time bucket						
		Overnight	> O/N up to 7d	> 7d up to 1m	> 1m up to 3m	>3m up to 6m	>6m up to 12m	>12m
by banks	4.99%	11.32%	1.09%	-35.05%	-3.00%	5.45%	23.70%	2.49%
by other FI	6.63%	8.71%	7.36%	15.33%	19.32%	0.00%	0.00%	-0.15%
by corporates	-2.34%	4.19%	0.00%	17.00%	1.92%	9.15%	-125.00%	-11.35%
by natural persons	-0.62%	1.90%	0.00%	0.00%	4.47%	0.00%	0.00%	-5.65%

Net funding breakdown of significant counterparties by counterparty type — Table 5

Source: Example by the author

Supervisors should also consider if any of the significant counterparties are members of the financial group to which the bank belongs. Depending on the structure and possible jurisdiction-specific requirements and liquidity trapping, funding from these sources can be either more or less stable than third-party funding.

In addition to the concentration of funding from significant counterparties, the concentration of funding by significant products/instruments should also be covered. It is therefore crucial to identify products where a high correlation of the actions taken by the counterparties during stress can be assumed. An example could be funding via debt issuance or securitisation. Concentrations are of special importance in this area, as issuances are usually not covered as part of the counterparty concentration due to a lack of traceability (ie who is the actual owner of the debt instrument). Furthermore, in comparison to the total net outflow, such issuances are often in significant amounts, all of which falls due on one date.[24]

In most cases the product type granularity can be aligned with the LCR reporting, which already distinguishes retail from wholesale funding, and subdivides the wholesale category by counterparty type (especially non-financial versus financial). Finally, the reporting is comparable to the counterparty type aggregation in Tables 3 and 5 but with a higher granularity and not restricted to the significant counterparties but the whole population of counterparties.

Finally, the third concentration of funding tool should cover currency concentrations but, as explained in the following paragraphs, with a focus on mismatches. For each currency in which the aggregate liabilities in that currency amount to 5% or more of the bank's total liabilities, the assets and liabilities should be reported according to maturity buckets. In the example (see Table 6), four currencies exceed the 5% threshold, so that the bank relies to a large extent on USD funding – especially in the horizon above one year but also in the overnight bucket, where currency market disruptions could have a big impact.

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[24]   The need to cover concentrations in special products and instruments always depends on the granularity of the contractual maturity mismatch tool. If the granularity is already high, the concentration of the funding tool will probably produce redundant information. The HKMA, for example, plans to ask banks to provide information on capital instruments, certificates of deposit, debt securities (senior, unsecured, not structured), convertible securities, asset-backed securities and other capital or debt instruments. This level of granularity can cover these uncertainties (see www.hkma.gov.hk/media/eng/doc/key-functions/banking-stability/basel-3/return_on_liquidity_monitoring_tools_mabs23/MA(BS)23_templates_(2nd_consultation_draft).pdf).

Funding breakdown by significant currencies								Table 6
Liabilities	Liabilities as % of total liabilities	Liabilities as % of liabilities within time bucket						
		Overnight	> O/N up to 7d	> 7d up to 1m	> 1m up to 3m	>3m up to 6m	>6m up to 12m	>12m
BRL	37.3%	42.3%	78.1%	62.1%	46.3%	71.5%	20.4%	18.3%
USD	36.4%	34.2%	9.3%	6.0%	18.7%	8.3%	63.1%	52.1%
EUR	16.4%	18.3%	2.4%	9.9%	27.1%	4.9%	12.1%	14.3%
CHF	5.4%	3.4%	1.5%	2.8%	2.0%	11.5%	0.0%	9.6%

Source: Example by the author

To address the risk of imbalances, it would be meaningful to calculate the excess liabilities, by deducting the assets of the liabilities for each currency (see Table 7 below). In this case, it is obvious that the bank relies to a significant extent on USD overnight- and long-term-funding, whereas the assets are mainly long-term assets in BRL (Brazilian real).

Funding breakdown by significant currencies								Table 7
Excess of liabilities	Excess of liabilities as % of total liabilities	Excess of liabilities as % of liabilities within time bucket						
		Overnight	> O/N up to 7d	> 7d up to 1m	> 1m up to 3m	>3m up to 6m	>6m up to 12m	>12m
BRL	-45.6%	-3.9%	12.8%	8.9%	-12.9%	-2.7%	-77.6%	-124.9%
USD	22.7%	25.5%	0.4%	-0.3%	4.8%	-2.8%	44.4%	30.8%
EUR	13.0%	18.0%	-0.1%	9.5%	16.8%	1.2%	5.8%	10.4%
CHF	4.3%	3.0%	-2.2%	1.5%	0.1%	10.3%	-2.1%	7.9%

Source: Example by the author

The ultimate purpose of the tool should be to enable an informed discussion with the bank about how it manages its FX risks with respect to liquidity impacts.

All three concentration tools can serve as an input for the bank rating, if the supervisory activities are based on a CAMELS-like rating system.[25]

3.2.3   Available unencumbered assets

While the HQLA in the LCR reporting are defined in such a way that it can be assumed that the bank is able to liquidate them (by selling or by repo) for the scenario assumed, in the unencumbered asset tool the assets covered by the reporting can be defined more broadly. The two most important elements are, on the one hand, the operational requirements and the additional HQLA definitions required under the LCR (especially the requirement that assets are controlled by the treasury but also elements as the requirement of a maximum historic price decline of the asset).[26] On the other hand, the general HQLA definition can also be relaxed. For example, assets that the bank can use for repo in normal times can also

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[25]   Ratings comparable to the CAMEL (Capital adequacy, Asset quality, Management capability, Earnings quantity and quality, the adequacy of Liquidity) approach, as introduced by the US regulators, are now applied by many supervisors.

[26]   With respect to the operational requirements and the definition of HQLA see www.bis.org/publ/bcbs238.pdf.

be included in the reporting, even if they do not fulfil the HQLA criteria with respect to the asset quality. Also, assets such as precious metals, which, depending on the scenario, can diverge from the LCR scenario, can be used to generate cash and form part of the reporting.

But the available unencumbered asset metric not only provides information on additional liquid assets not covered by the HQLA. As liquidity risk can increase due to concentrations of the assets, the available unencumbered asset metric – like the concentration of funding tool – can be used to assess the level of concentration within the available unencumbered assets. Another useful aspect is the ability to receive information on liquid assets more often and/or with a shorter time lag than in the case of the LCR reporting.

During the financial crisis, for instance, the ABCP market suddenly dried up, although it had formerly been highly liquid. Accordingly, reliance on a single product or a single issuer can cause problems even if they have been liquid in the past. Also "flight to quality" tendencies, which are usually the case in a crisis, are contingent on what is considered as being high-quality in the future. The concentration issue is partially addressed in the LCR by capping Level 2b assets at 15% of the net outflow, Level 2a and 2b assets in sum by 40% of the net outflow and the qualitative requirement that the stock of Level 2 assets should be diversified. Nevertheless, a regulator should aim to gain a deeper understanding of the asset pool that the bank considers to be liquid.

As explained for the concentration of funding tool, the HHI can be used with respect to unencumbered assets by asset class or, if more granular data is collected, on counterparty and/or ISIN to identify concentrations. In the case of the reporting on monitoring tools issued by the European Commission, banks are required to report their top 10 counterbalancing capacities, which can be either assets the bank holds or liquidity lines granted to the institution.
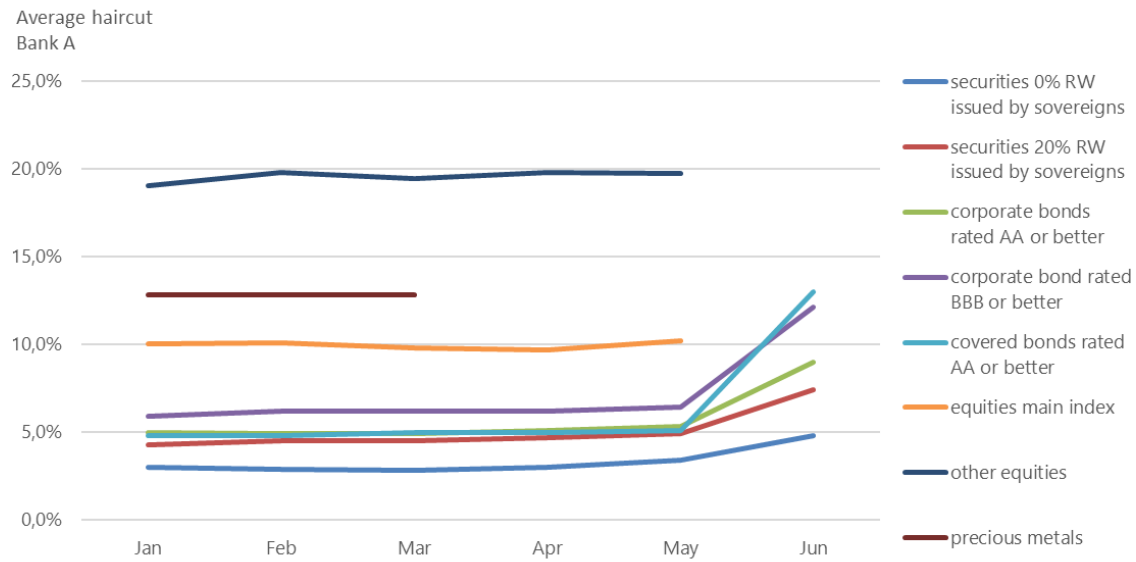
Another relevant reporting element is information on the location of the asset. The impact of restrictions on convertibility, which is also partly covered by the LCR by currency, but also in transferability and usability, due to the location, where the assets are booked, can be simulated. Accordingly the impact of asset trapping in diferent jurisdiction can be calculated.

Finally, the information on agreed or current haircuts gives insights, if the LCR and bank-internal stress tests are calibrated reasonably conservatively. Changes in the haircuts can furthermore be used as an early warning indicator. As soon as they rise for one bank while the other banks in the market do not report increases, it can indicate a name-specific problem. If otherwise haircuts only increase for one asset class, it can signal a decrease of market confidence in that asset class.

As an example, the development of a bank's haircuts bank over six months is displayed in Graph 4. While the bank does not report haircuts for some categories of its assets, this is likely due to the fact that counterparties have stopped accepting some assets for securitisations with this bank. However, it might also be the case that the bank has decided to withdraw from this market. On the other hand, the increase in the haircuts for high-quality assets in June should trigger further enquiries from the supervisor. In the example at hand, the supervisor would probably already have asked the first questions in April but should become active at latest after receiving the June report.

Increase in haircuts for one bank

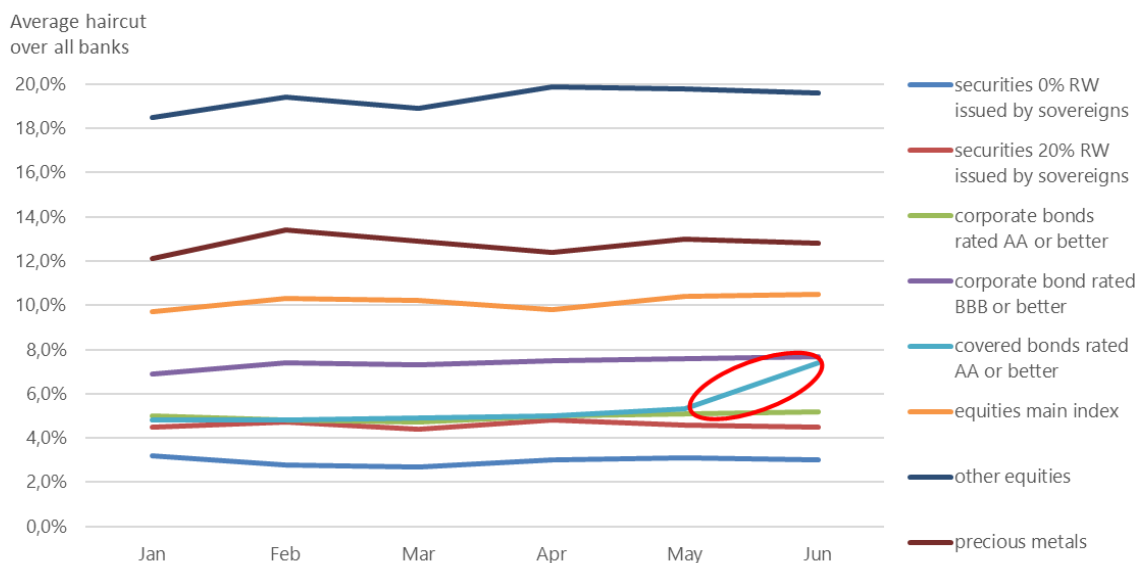Graph 4

Average haircut Bank A

Source: Example by the author

When analysing the average haircut over all banks, Graph 5 shows that confidence in covered bonds seems to have suddenly retreated in June, as reflected in the haircuts (circled). This could be a trigger for supervisors to revisit the appropriateness of the regulatory and the bank's internal haircuts for covered bonds as used for liquidity stress tests and to assess which banks hold a large proportion of covered bonds in their liquidity buffer.

Increase of haircuts in one asset category

Graph 5

Average haircut over all banks

Source: Example by the author

3.2.4 LCR by significant currency

In general, the LCR by currency is calculated as for the overall LCR by dividing the stock of HQLA in the respective currency by the net outflow. Nevertheless, distortions can arise from the unwind mechanism, which projects the HQLA for day 30 to calculate the caps for Level 2 and Level 2B assets thereafter, and the inflow cap which only allows banks to cover 75% of the outflows with inflows. The inflow cap in particular can cause unintended consequences and difficult-to-interpret results. If a bank, for example, relies to a large extent on short-term FX swaps, creating inflows in the foreign currency but holds almost no HQLA, the LCR will be extremely low, even though over the 30-day horizon the bank is sufficiently liquid.

As an example, a bank with FX HQLA of 100, an outflow of 1000, an inflow without FX swaps of 400 and FX swap inflows of 700 is assumed. Even though the inflows exceed the outflows due to the cap, only 750 of the inflows can be considered. Accordingly, the net outflow is 250 and the LCR 40% (= 100/250). In this case, the supervisor has to consider the maturity profile of the outflows – where the contractual maturity mismatch profile in this currency, if the time buckets are sufficiently granular, can deliver crucial information. If the outflows occur later than the inflows from the FX swaps the requirement to hold additional FX HQLA would not reduce the liquidity risk but instead in certain cases exacerbate it by requiring the bank to hold FX assets in a currency where it has limited knowledge of bond quality or that may expose the bank to the vulnerability of having liquidity "trapped" in another currency and/or location.

Accordingly, the question of how to set limits and triggers for the LCR by significant currency is not a trivial one. The same is true of the question whether the inflow cap should also hold for FX swaps and the LCR by foreign currency overall. Limits could be set depending on supervisors' assumptions of convertibility across currencies during times of stress. For currencies where the supervisor assumes strong restrictions in convertibility or funding restrictions for the bank, the limit should be at or close to 100%, whereas for currencies with high convertibility or where restrictions in the convertibility – in the supervisor's opinion – will last significantly less than 30 days, the limit can be lower than 100%. The bank's size and its net outflow in comparison with the size of the FX market should also be considered. For emerging country exposures, for example, the level of currency substitution (eg dollarisation) is also a relevant factor. In some countries, requiring banks to hold HQLA in the local currency could not only distort the prices of these securities and cause problems when several foreign banks suddenly try to liquidate their portfolio, but this liquidity would also be created in a currency the customers do not want to receive when withdrawing their money.

3.2.5 Market-related monitoring tools

As mentioned in Section 3.1.5, the market-related monitoring tools can be broadly classified as market-wide information, financial sector data and bank-specific information. Only the latter has to be collected from the banks in a specific reporting template; the other types of information are usually available to supervisors as a matter of course.

Supervisors should monitor market-wide information that has a possible bearing on the liquidity situation of the banks. The relevant information will relate to the value and marketability of the HQLA and include interest rate changes, CDS of all relevant HQLAs (for example, all central bank-eligible HQLAs), equity prices (especially, when equities are part of the L2B HQLA), FX market information (exchange rates but also bid-ask spreads as an indicator of liquidity of the currency) and general information or expectations such as inflation rates, economic growth rate and consumer confidence. While the impact of the latter on the short-term liquidity situation of the banks is less important that the other factors, it can affect funding possibilities for the banks in the future. Furthermore, these factors can also have an impact on in- and outflows. For example, changes in equity prices and the account balances of customers may be correlated.
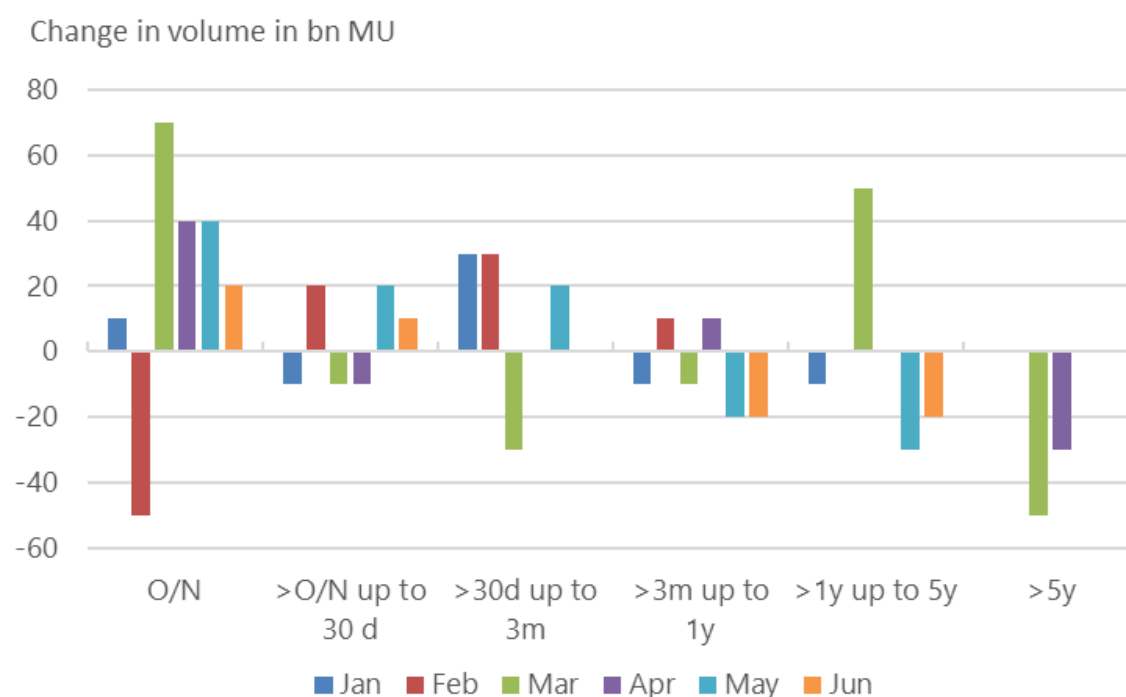
Relevant financial sector-specific data include for example repo market volumes, average repo rates, financial sector-specific equity indices and average price-to-book ratios. Focus should be placed on measures which have an impact on the funding possibilities of the banking sector.

The suggested bank-specific information which the supervisor can require from banks may include banks' CDS for different maturities, equity prices and price-to-book ratios, as well as detailed information on funding rollovers and average initial maturity of funding, allowing changes in maturities and rates to be analysed. Changes in rates that are bank-specific and not caused by interest rate changes for the whole banking sector would warrant further scrutiny and follow-up action. Accordingly, all information collected should always be analysed in parallel, which can be difficult if it is collected by different departments or agencies.
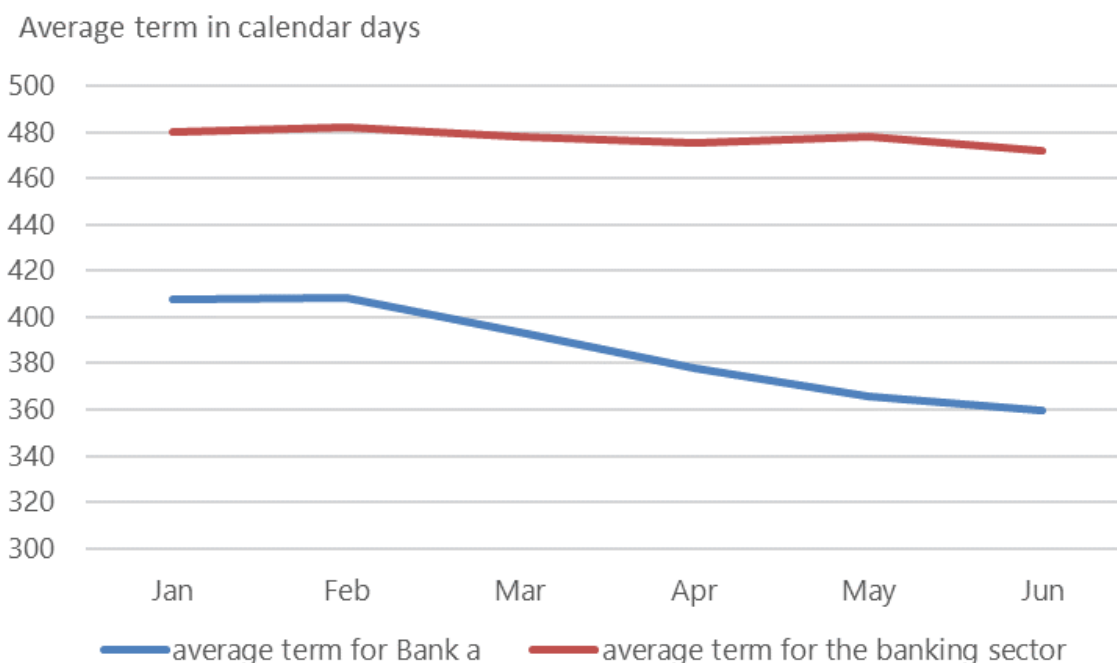
Graph 6, for example, shows the change of volume in billion monetary units (MU) for each maturity bucket by initial maturity over the last six months. It shows that an increase in overnight funding coincides with decreases in the long-term funding volume for March to June. This becomes more obvious, when the average term to maturity is analysed and – as in Graph 7 – for example, is compared with the average term to maturity for all banks. Such changes should also be compared with the bank's funding strategy. A shortening of maturities is a particular issue in cases where the bank has communicated a funding strategy to the supervisor that assumes a constant or even extended maturity profile.

Change in maturities by initial term to maturity   Graph 6

Change in volume in bn MU

Source: Example by the author

Graph 7

Average term in calendar days

Source: Example by the author

Besides volumes, price changes for funding or issuances can also be a valuable early warning indicator. Again, the timeliness and frequency of this information are important.

At the same time, supervisors should be wary when interpreting data from markets with low market liquidity, as the significance of any price changes may be overestimated.

4.   Conclusion

The five metrics introduced in the 2013 LCR and Tools document complement the LCR and NSFR as measures of liquidity risk. As the necessary data are often simpler to collect than calculate the LCR and NSFR, supervisors can also consider using the monitoring tools to monitor banks that are not in the scope of the national LCR and/or NSFR implementation. Supervisors can thus gain additional insights into the vulnerabilities of their banking sector and specific banks. This is all the more important in the light of the fact that liquidity issues often arise at small and medium-sized banks. Even in non-LCR and non-NSFR jurisdictions, the metrics are useful for the assessment and analysis of liquidity risk.

In particular, the contractual maturity mismatch tool provides information on cliff effects, to which banks may have become more susceptible since the introduction of LCR or NSFR and related optimisation techniques. Furthermore, the analysis can be extended for time buckets in addition to the 30-day and one-year horizon as well as for the calculation of survival horizons. It also provides the opportunity to stress LCR results. In times of stress, the concentration of funding tool will be extremely important. Thereby, the distinction of a gross and a net view is of high importance and has to be enriched by a granular maturity split. Beside the counterparty concentration, the breakdown by currency also delivers important insights. This is especially the case if, in times of stress, there are doubts whether FX markets are sufficiently liquid

or the implementation of payment restrictions is highly probable. By calculating concentration measures, a comparability across banks can be assured, which can also become part of a bank rating if the supervisor has an established rating process. The unencumbered assets metrics goes beyond HQLA in terms of what is available for sale and repo. Any haircuts imposed by banks' counterparties on these unencumbered assets may be an important early indicator of adverse market perception or the bank's challenges perceived or otherwise in raising secured funding.

Careful analysis and consideration are needed to set, implement and interpret the LCR by significant currency, especially with respect to the impact of the inflow cap. The same applies to limit-setting. Otherwise, the unintended consequence might be to increase the bank's risk profile.

Finally, the market-related monitoring tools as early warning indicators should be split into general information such as market-wide and sector-specific information gathered by the supervisor and bank-specific information, which should be gathered by means of a separate reporting tool. There, the main focus should be the term and price information of the funding.