

## EBA REPORT ON LIQUIDITY MEASURES UNDER ARTICLE 509(1) OF THE CRR

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# Abbreviations

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<b>BCBS</b>	Basel Committee on Banking Supervision
<b>CCP</b>	central counterparty
<b>CET1</b>	common equity tier 1
<b>CIU</b>	collective investment undertaking
<b>CRR</b>	Capital Requirements Regulation
<b>DR</b>	Delegated Regulation
<b>EBA</b>	European Banking Authority
<b>ECB</b>	European Central Bank
<b>EHQCB</b>	extremely high-quality covered bonds
<b>EU</b>	European Union
<b>GDP</b>	gross domestic product
<b>G-SII</b>	global systemically important institution
<b>HQLA</b>	high-quality liquid assets
<b>LCR</b>	liquidity coverage ratio
<b>LTRO</b>	long-term refinancing operation
<b>NFC</b>	non-financial corporates
<b>NSFR</b>	net stable funding ratio
<b>O-SII</b>	other systemically important institution
<b>PSE</b>	public sector entity
<b>QE</b>	quantitative easing
<b>QIS</b>	quantitative impact study
<b>RCAP</b>	regulatory consistency assessment programme
<b>SME</b>	small and medium-sized enterprises

## Executive summary

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**The objective of the report is to assess banks' liquidity risk profiles in terms of their short-term resilience.**

This report is provided under Article 509(1) of the CRR. The objective of the report is to monitor and evaluate the data submitted by banks on the liquidity coverage requirements under Commission Delegated Regulation (EU) 2015/61. The analysis is based on the QIS data of December 2016.

**On average, LCR is well above the minimum requirements (both the minimum requirement of 80% in the interim phase and the minimum requirement of 100% under full implementation) and the upward trend in the LCR since June 2011 is driven by HQLA investment.**

The QIS data show that the average LCR across banks is 139% and that it has doubled since June 2011. The upward trend in the LCR is driven by an increase in HQLA, which more than doubled between June 2011 and December 2016, while net liquidity outflows have been fairly constant in the same period. The LCR level of Group 2 (169%) is higher than that of Group 1 (134%). At individual bank level, in December 2016 there was one Group 2 bank that was failing to comply with the 100% minimum requirement under full implementation, with a shortfall of EUR 115 million.

Banks are also well above the 100% requirement when analysed by their business models. There are, however, differences in the composition of LCR and in LCR parameters across business models.

**Level 1 assets (excluding covered bonds) form a large part of the liquidity buffer.**

The industry average liquid assets under the LCR regulation is approximately 14% of total assets. On average, liquid assets before the cap consisted of Level 1 assets (excluding covered bonds) (90%), including cash and central bank reserves (38%) and securities (53%). Central government assets make up over 36% of the total liquidity buffer. The contribution of Level 2 assets to banks' liquidity buffer is small.

**Outflows are 16% of total assets. Non-operational deposits continue to be the main component of banks' outflows. Inflows are more than 5% of total assets.**

Non-operational deposits, e.g. short-term unsecured funding from financial customers, continue to be the major component of total cash outflows. They make up approximately 6% of total assets and 40% of total cash outflows. The share of retail deposits relative to total assets is nearly the same in all bank groups and is 1.8% for all banks.

The composition of cash inflows is similar to the composition of outflows, but the former are smaller in size than the latter.

**Small and specialised banks benefit from EU-specific derogations in the calculation of the LCR.**

A comparative analysis of the EU framework and the Basel III standards shows that, on aggregate (i.e. including Group 1 and Group 2 banks), an increase in outflows leads to a decrease of 8.5 percentage points in the average LCR. This decrease is, to an extent, offset by an increase in HQLA (corresponding 2.5 percentage points increase in LCR) and in inflows (corresponding 4.2 percentage points increase in LCR). The average LCR increases for Group 2 banks and decreases for Group 1 banks with the implementation of the EU-specific derogations under the DR. At individual bank level, among eight banks that fall below the 100% level of LCR under the Basel III framework, seven benefit from EU-specific derogations and remain compliant under the DR.

**The LCR, together with the capital ratio and stable funding, is one of the main drivers of banks' share of retail and NFC lending in their balance sheet.**

Panel data analysis shows that liquidity regulation, together with capital standards and stable funding, has an impact on the share of retail and NFC loans in total assets. While the regulation may have a negative impact on lending before reaching the minimum requirements, and liquidity shortfall can have a negative impact on banks' lending, highly liquid banks tend to increase the share of retail and NFC loans in their balance sheet. The analysis shows that highly capitalised banks and banks that have a strong stable funding base also tend to increase lending to the real economy. The finding is in line with expectations; one interpretation is that holding a high level of liquid assets increases the resilience of banks' balance sheets and reduces liquidity risk. Funding markets reward highly liquid (and highly capitalised) banks, and the cost of funding decreases. This creates further lending opportunities for these banks.

**Investment in liquid assets improves banks' net interest income and profits until an optimum point beyond which holding additional liquid assets diminishes returns.**

Holding liquid assets, e.g. cash, central bank assets and central government assets, imposes an opportunity cost for banks. Panel data analysis shows that banks maximise their net interest income by holding liquid assets, but after an optimum level additional liquid assets diminishes returns. This finding is also valid for banks' after-tax profits; however, it is less significant. This finding is reasonable, as net interest income is directly related to returns from HQLA investment, while banks' after-tax profits include other income sources as well as net interest income.

# Introduction

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Article 509(1) of Regulation (EU) No 575/2013<sup>1</sup> (the CRR) mandates the EBA to monitor and evaluate the data reported under the liquidity coverage requirements pursuant to Article 415(1) on an annual basis and taking into account the potential impact of these requirements on the business and risk profile of institutions, on the stability of financial markets, on the economy and on the stability of the supply of bank lending. According to Article 509(1), the EBA, after consulting the relevant stakeholders, is mandated to communicate to the Commission a report on its findings. The European Parliament and the Council shall be given the opportunity to state their views on the report referred to in Article 509(1). The current report is the fourth publication of the EBA report under Article 509(1) and the second publication since the introduction of the minimum liquidity coverage standards in 2015.<sup>2</sup>

The objective of the report is to provide an assessment of the data submitted on liquidity coverage requirements under the provisions of Commission Delegated Regulation (EU) 2015/61.<sup>3</sup> For this purpose, it presents a detailed analysis of the short-term resilience of banks' liquidity risk profiles and the potential impact of the liquidity coverage requirements on banks' supply of lending to the real economy. The analysis is based on the QIS monitoring data of December 2016, reporting data provided by participating banks on a voluntary and confidential basis. The sample covers both large and small institutions, and in terms of total assets covers approximately EUR 23 trillion or 61% of the EU banking sector. A list of the 157 reporting banks (including subsidiaries) from 16 EU Member States is provided in the Annex.

The reporting covers the liquid assets held by the institutions, short-term liquidity outflows based on outstanding liability balances and off-balance sheet commitments, short-term liquidity inflows stemming from outstanding balances of contractual receivables and the calculation of the regulatory LCR. In addition, the QIS monitoring exercise includes detailed reporting on the balance sheets of the participating institutions from December 2011. This wider dataset on banks' balance sheets is used to investigate the potential impact of liquidity regulation on lending supply and banks' net interest income and profits.

The QIS monitoring data are, in general, reported on a consolidated basis. Aggregated figures and charts in this report are based on data reported at the highest level of consolidation, with the exception of the analyses with regard to banks' business models, which also include subsidiaries with an EU parent institution.

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<sup>1</sup> Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012.

<sup>2</sup> The EBA's previous reports: *Report on impact assessment for liquidity measures under Article 509(1) of the CRR* (December 2013), *Second Report on impact assessment for liquidity measures under Article 509(1) of the CRR* (December 2014) and *Report on liquidity measures under Article 509(1) and review of the phase-in of the liquidity coverage requirement under Article 461 of the CRR* (December 2016).

<sup>3</sup> Commission Delegated Regulation (EU) 2015/61 of 10 October 2014 to supplement Regulation (EU) No 575/2013 of the European Parliament and the Council with regard to liquidity coverage requirement for credit institutions.

# Analysis of the LCR and its components

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## Trends in the LCR

In accordance with Article 412 of the CRR and in line with Article 4(1) of the DR, institutions should hold liquid assets to cover net liquidity outflows over a stress period of 30 calendar days. Liquidity coverage requirements are intended to ensure institutions' short-term resilience to potential liquidity disruptions. Institutions should maintain an LCR of at least 100%. Pursuant to Article 460(2) of the CRR and in line with Article 38 of the DR, the LCR minimum requirement has been set at 60% from 1 October 2015 and will gradually increase to 100% in January 2018.

In December 2016, the average LCR across banks was 139%. On average, Group 2 banks have a higher LCR (169%) than Group 1 banks (134%). Medium Group 2 banks have a higher LCR than large and small Group 2 banks. The average LCR of G-SIIs and O-SIIs is below the average LCR for all banks (Figure 1).<sup>4</sup>

In the sample of 134 banks, all except one Group 2 bank already meet the 100% fully phased-in LCR minimum requirement, while all banks meet the current minimum requirement of 80%. The shortfall, corresponding to one Group 2 bank, is EUR 115 million at the minimum requirement of 100%. This represents 6% of the total assets and 18% of the current liquidity buffer of the bank.

The variation across Group 2 banks is greater than the variation across Group 1 banks. This is a result of the heterogeneity of banks in Group 2 in terms of their business models; Group 1 mostly comprises cross-border universal banks. The average LCR for Group 2 banks is driven largely by some banks in this category. The dispersion is more pronounced for medium Group 2 banks.

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<sup>4</sup> Group 1 banks are defined as internationally active banks with total Tier 1 capital equal to or above EUR 3 billion. All other banks are classified as Group 2 banks. Table 7 presents the grouping conventions used to classify the banks.

**Figure 1: LCR across bank groups**

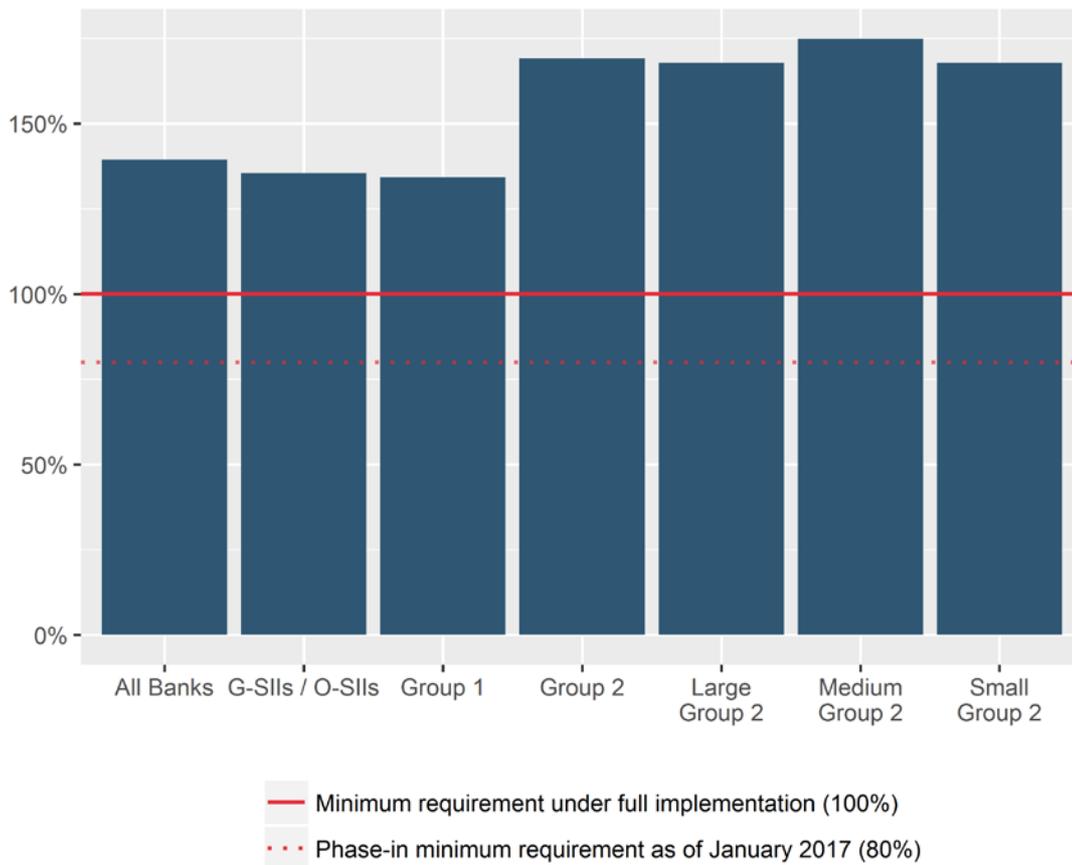
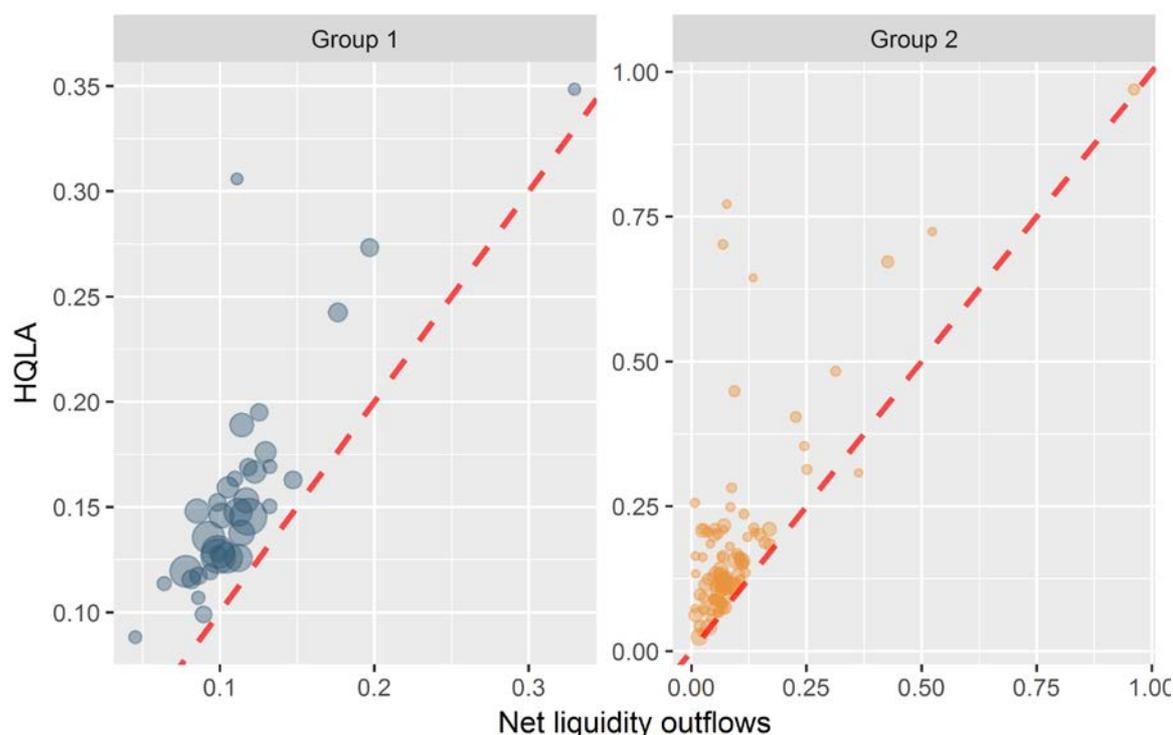


Figure 2 shows the interaction between HQLA and net liquidity outflows at individual bank level. In the analysis, the parameters are expressed as a share of total assets and the size of the bubble indicates banks' weights in the group averages in terms of their total assets. The bigger the bubble, the larger the bank is in terms of total assets and the greater the weight it takes in the weighted average values for bank groups. The dotted line indicates equality between HQLA and net liquidity outflows, i.e. when the LCR is 100%. Group 2 banks are identified with smaller bubbles, as by definition Group 2 is composed of smaller banks than those in Group 1. Furthermore, the dispersion across Group 2 banks is greater both in terms of the range banks cover (i.e. Group 2 has more outliers than Group 1) and in terms of their standing with respect to the dotted line (i.e. one Group 2 bank has an LCR ratio below 100%). This observation is in line with previous EBA liquidity coverage reports, showing greater sensitivity among smaller banks and specialised business models towards the LCR requirements.

Most banks in the sample, including the largest (Group 1) banks, are located at the bottom left of the figure, suggesting that the majority of banks have LCR levels adequately above the minimum standards, with HQLA levels mostly ranging from 12% to 15% of total assets.

**Figure 2: HQLA and net liquidity outflows (as a share of total assets)**



An analysis of the LCR and shortfall in liquid assets over time allows the identification of key measures that banks have taken so far to comply with the LCR requirement. When analysing the evolution of the LCR, it should be noted that the figures calculated from data reported before June 2015 are based on Basel III definitions, i.e. in addition to reflecting structural changes, some of the changes can also be attributed to the differences between the Basel III framework and the DR. In addition, some changes in the LCR between June and December 2012 may also have been driven by the recalibration of the Basel III framework published in January 2013. Nevertheless, banks have put significant efforts into increasing the level of the LCR and, on average, the LCR has been above the 100% level indicated by the dashed line in Figure 3. Since June 2011, banks have, on average, almost doubled their LCR levels. The efforts that banks have put into increasing their LCR levels are also reflected in the evolution of the liquidity shortfall (Figure 4). The liquidity shortfall has decreased to zero from over EUR 730 billion in June 2011, the first liquidity coverage reporting date.<sup>5</sup> Accordingly, the share of banks with an LCR above 100% at the latest reporting date increased significantly. While only 29% of banks met the LCR minimum requirement of 100% in June 2011, almost all banks reported an LCR above 100% in December 2016.<sup>6</sup>

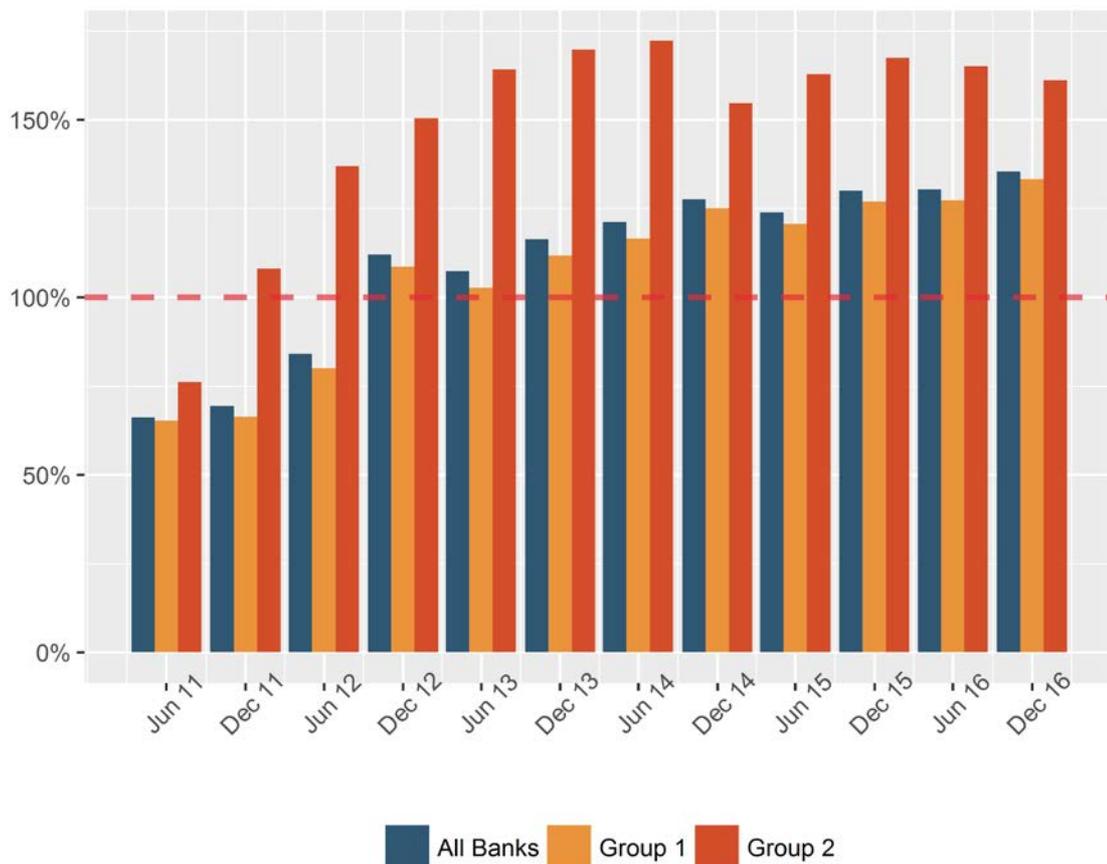
The shortfall calculated in this report is the gross value defined as the sum of the differences between the net liquidity outflows and the stock of HQLA for all banks with an LCR that falls

<sup>5</sup> Note that the time-series analysis is based on a consistent sample of banks that submitted data for all reporting dates. This differs from the cross-sectional analyses, which include all banks that submitted data on the latest reporting date.

<sup>6</sup> The time-series analysis is based on a consistent sample of 89 banks that reported on the June 2011 and December 2016 reporting dates.

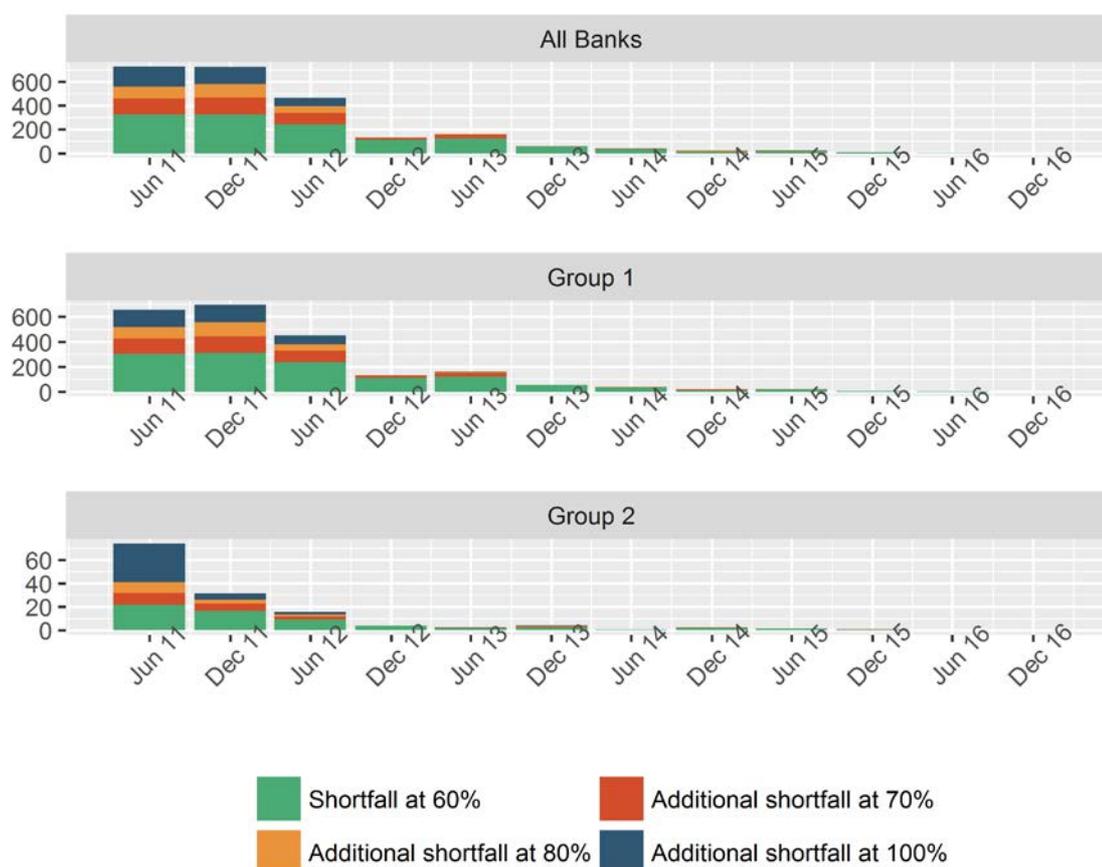
below the minimum threshold. In other words, the calculation of shortfall does not account for the offsetting effect of the aggregate surplus arising from those banks that already meet or exceed the minimum requirement. Therefore, the reported shortfall amount represents a conservative approximation of banks' actual shortfall, as it excludes any assumptions on the reallocation of liquidity between individual banks or within the system as such. Regarding the net shortfall in the overall system, since June 2012 banks have been reporting a liquidity surplus, which has been increasing up to December 2016, indicating that even those banks that were already compliant with the LCR minimum requirement in the past have further improved their liquidity profiles.

**Figure 3: Evolution of the LCR by bank group**



*Note: the time-series analysis is based on a consistent sample of (61) banks that reported liquidity coverage data for all reporting periods.*

**Figure 4: Evolution of the liquidity shortfall (EUR billion)**

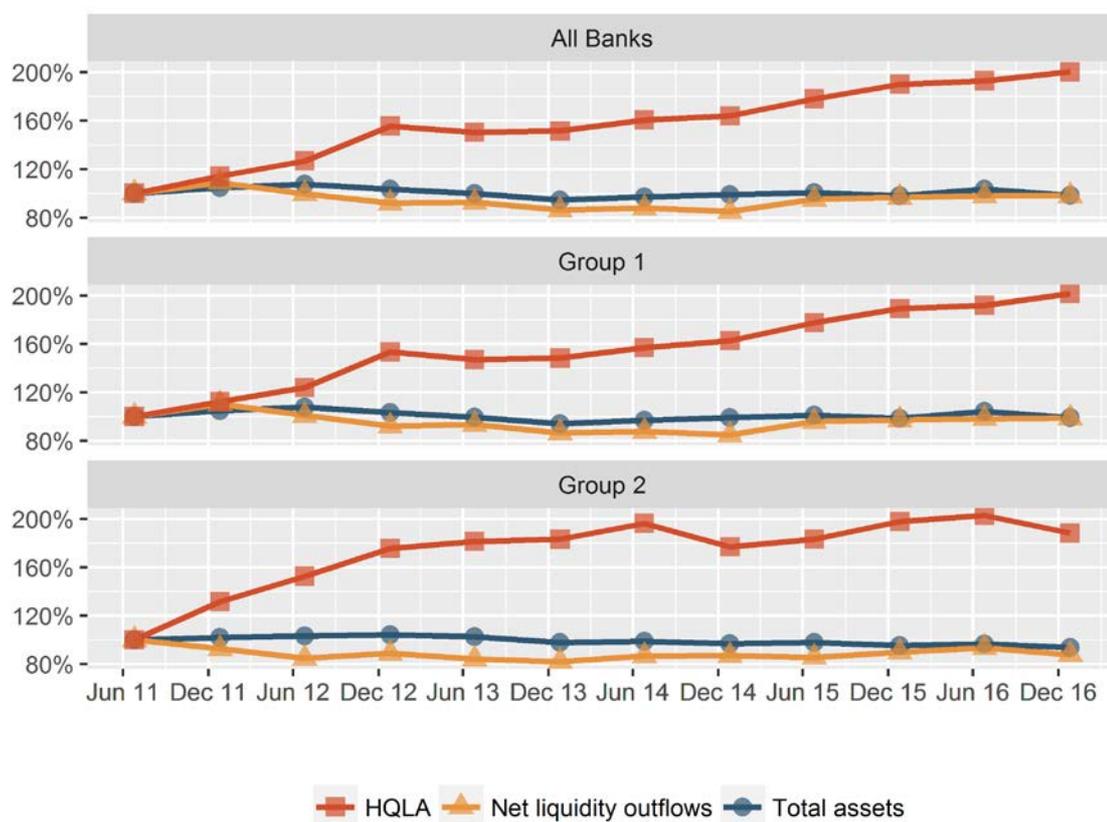


Note: the time-series analysis is based on a consistent sample of (61) banks that reported liquidity coverage data for all reporting periods.

The increase in the LCR can be attributed mainly to an increase in liquid assets (Figure 5). Since June 2011, banks have almost doubled their liquidity buffers. In contrast, net liquidity outflows have remained relatively stable. Since total assets have remained stable as well, it can be concluded that banks have improved their overall liquidity profile on the asset side. This finding is also in line with previous analyses,<sup>7</sup> which found that the most common strategy used by banks to comply with the LCR regulation is investing in liquid assets and, more precisely, replacing non-eligible assets with eligible liquid assets. Furthermore, while liquid assets have steadily increased since June 2011 (except for during the period between December 2012 and June 2013), cash outflows and inflows have been more volatile. However, some volatility has also been driven by the recalibration of the LCR in December 2012, including the introduction of a wider range of liquid assets and of lower outflow rates for non-financial wholesale deposits. As previously indicated, between December 2014 and June 2015, there was a move from the Basel III framework to the EU calibration, leading to higher levels of liquid assets and cash flows.

<sup>7</sup> The EBA's Report on impact assessment for liquidity measures under Article 509(1) of the CRR (December 2013) and Second Report on impact assessment for liquidity measures under Article 509(1) of the CRR (December 2014).

Figure 5: Evolution of the components of the LCR, June 2011 = 100%



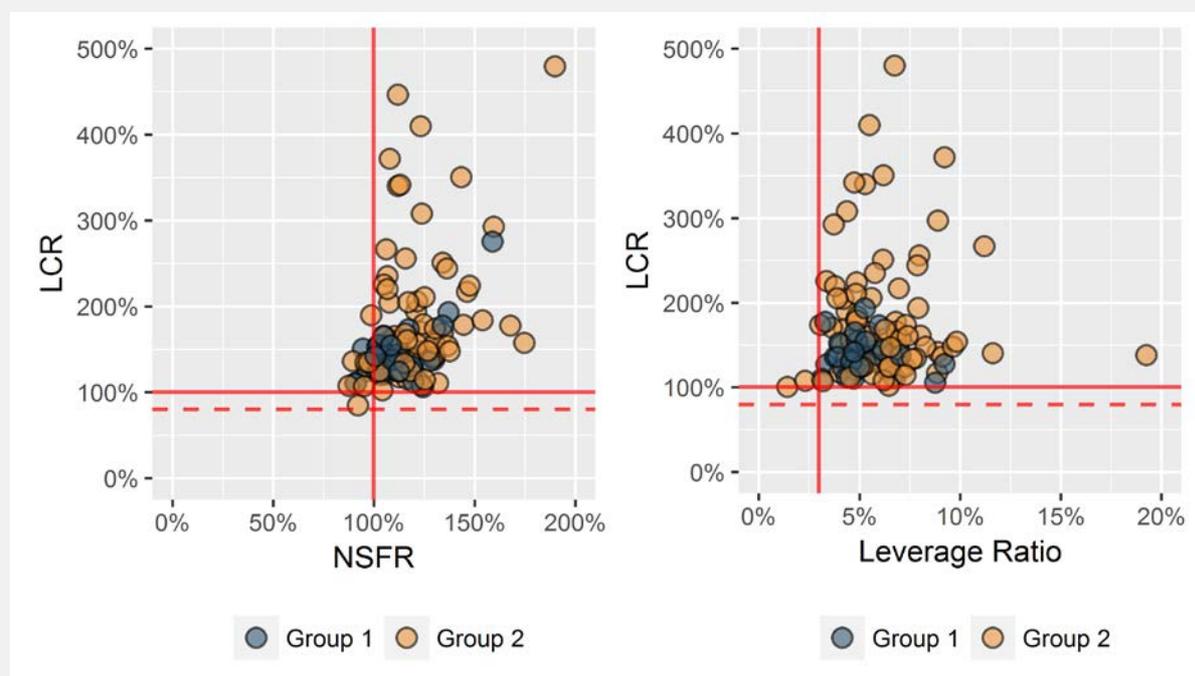
Note: the time-series analysis is based on a consistent sample of (61) banks that reported liquidity coverage data for all reporting periods.

## Interaction between the LCR and the leverage ratio and the NSFR

Banks' funding structures and investment strategies can have an impact on the LCR and the NSFR simultaneously.<sup>8</sup> For example, a bank may receive long-term stable funding, e.g. nine-month stable term deposits, and may invest it in LCR-eligible Level 1 assets. In this case, the numerator of the LCR increases, as Level 1 HQLA are weighted at 100%, and the denominator remains constant, as long-term funding has no impact on outflows. As a result, the LCR position of the bank improves. With the investment, the bank also improves its NSFR position because the increase in the numerator due to long-term funding weighted at 95% dominates the increase in the denominator due to additional HQLA weighted at 5%. This indicates a (positive) correlation between the two ratios, which implies that compliance with the LCR regulation may have a direct positive impact on compliance with the NSFR. In December 2016, approximately 9.8% of the banks that were compliant with the LCR regulation at the 100% requirement had an NSFR below 100%, and the only bank that had an LCR below 100% also had an NSFR below the minimum requirement (Figure 6).

<sup>8</sup> For this analysis, the calculation of the NSFR was based on the Basel III definition.

**Figure 6: Interaction between the LCR and other regulatory ratios**



*Note: solid lines indicate the minimum requirements for the regulatory ratios, including the LCR under full implementation (100%), the NSFR under full implementation (100%) and the proposed minimum requirement for the leverage ratio (3%). The dashed line indicates the LCR phase-in requirement as of January 2017 (80%).*

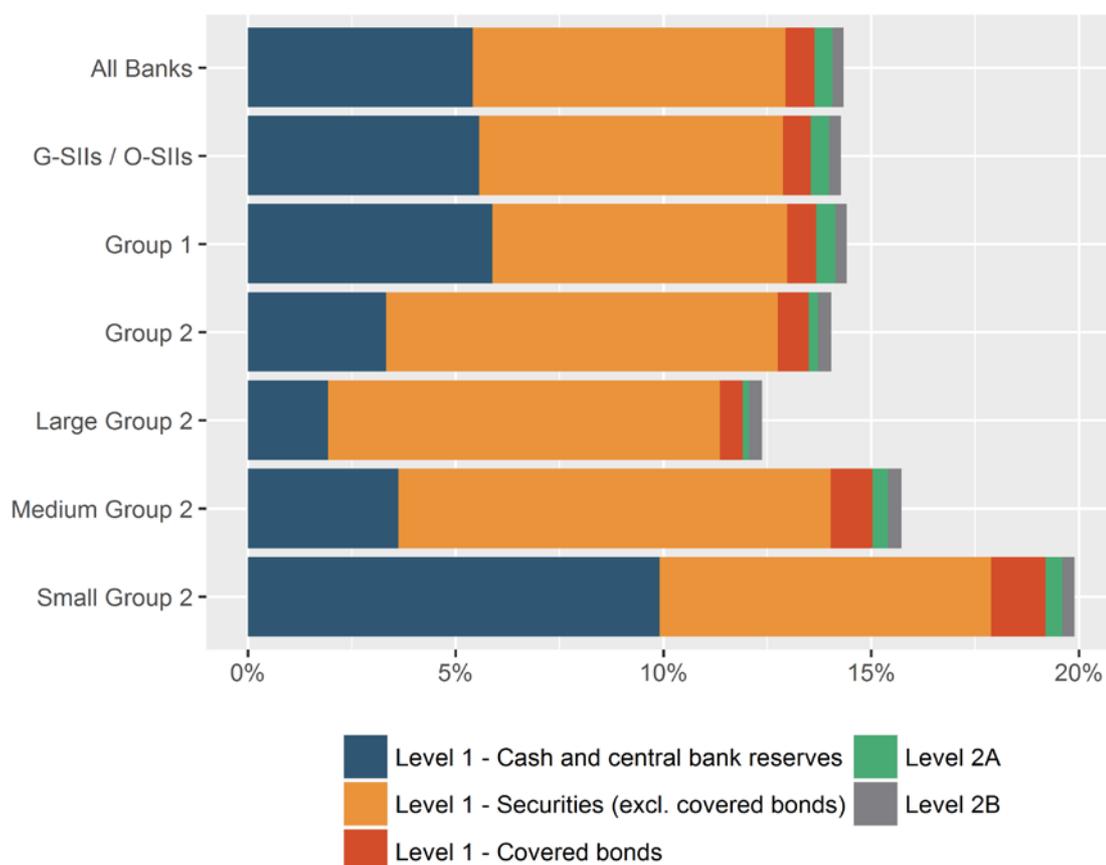
Unlike the relationship between LCR and NSFR, the relationship between LCR and leverage ratio is not reinforcing. Depending on bank's strategy, leverage ratio can only remain constant or decrease. However, such correlation between LCR and the leverage ratio is not observed in the data and it is reasonable to argue that the two regulatory ratios are complementary. In December 2016, no LCR non-compliant bank fell below the 3% leverage ratio requirement and 2.4% of the LCR-compliant banks were also non-compliant with the leverage ratio minimum requirement.

## Composition of liquid assets, outflows and inflows

The DR differentiates between assets of extremely high liquidity and credit quality (or Level 1 assets), and assets of high liquidity and credit quality (or Level 2 assets). The latter is divided into Level 2A and Level 2B assets, which is consistent with the Basel III framework. Level 1 assets may comprise, inter alia, cash and central bank reserves, as well as securities in the form of assets representing claims on or guaranteed by central or regional governments, local authorities or PSEs. Unlike the Basel III framework, the DR also considers promotional banks' assets in the Level 1 liquidity buffer. In addition, the DR provides for greater recognition of EHQCB, which may be included in Level 1 assets, subject to a higher, under the EU framework, allows Level 2 assets, inter alia, to include exposures in the form of high-quality covered bonds, certain non-RMBS securitisations, as well as units or shares in CIUs.

The majority of liquidity buffers comprise Level 1 assets in the form of cash and central bank reserves and securities. Larger banks, on average, tend to hold higher shares of central bank reserves. However, the composition of the liquid assets depends to a large extent on the business models of the institution.<sup>9</sup> Overall, the liquidity buffer (before the application of the cap on liquid assets<sup>10</sup>) was approximately 14% of total assets. The current data show that, for smaller banks, liquid assets make up a greater proportion of total assets than they did in the past, approximately 14% at the reporting date of December 2016 (Figure 7).

**Figure 7: Composition of liquid assets (post-weight and before the cap) relative to total assets**



On average, liquid assets before the cap consisted of Level 1 assets (excluding covered bonds) (90%), including cash and central bank reserves (38%) and securities (53%). Central government assets make up over 36% of the liquidity buffer. The share of covered bonds classified as Level 1 assets is 4.9%. Eligible securities in Level 2A and Level 2B assets make up 4.9% of the total liquidity buffer. While the share of Level 1 assets in the total liquidity buffer is similar for Group 1 banks and Group 2 banks, the share of cash and central bank reserves is considerably higher for the former. For Group 1 banks, the share of Level 1 assets is 95% and the share of cash and central bank reserves is 41%, while for Group 2 banks these figures are 97% and 24% respectively.

<sup>9</sup> Similarly, the composition of outflows and inflows also depends on banks' business models.

<sup>10</sup> See below for a detailed description of the cap on liquid assets.

While central government assets make up 33% of the liquidity buffer for Group 1 banks, they make up 49% for Group 2 banks, and this is mainly driven by large Group 2 banks (approximately 55% of the total liquidity buffer).

Article 17 of the DR sets the minimum requirements for the composition of the liquidity buffer by asset level. According to this Article, aggregate Level 2 assets should not account for more than 40% and Level 2B assets should not account for more than 15% of a bank's total stock of HQLA. A minimum of 30% of the liquidity buffer is to be composed of Level 1 assets excluding EHQCB, as specified in point (f) of Article 10(1) of the DR.

Overall, the cap on liquid assets has not had an impact on the calculation of the LCR for the participating banks. In total, eight (Group 2) banks have been affected by the application of the cap on liquid assets. For these banks, EUR 3.3 billion has been deducted from the stock of liquid assets, which equals 7.9% of their liquidity buffers before the cap. None of the banks affected by the cap on liquid assets reports an LCR below 100%. This finding is different from the analysis presented in the previous EBA report on liquidity coverage requirements<sup>11</sup> using the data from December 2015, where two Group 2 banks that were impacted by the cap on HQLA also had a shortfall at the 100% minimum requirement, and for both banks the inclusion of capped liquid assets would have helped them achieve compliance with that requirement.

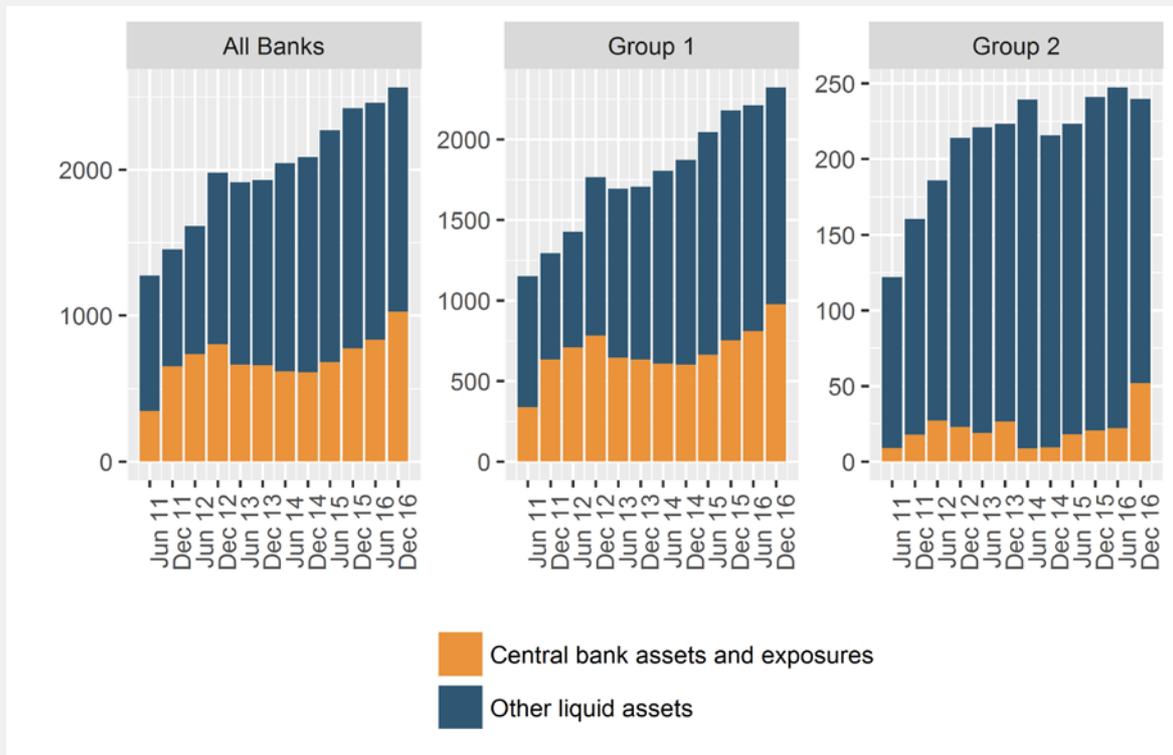
### Assessment of non-standard central bank policy measures and the LCR liquidity buffer

Central bank assets and exposures are one of the major components of banks' liquidity buffers and have been increasing over the past five years (Figure 8). Central bank policies have direct implications for banks' liquid asset holdings. The LTROs of the ECB in 2011 and 2012, and other favourable central bank transactions, are reflected to a certain extent in the evolution of the liquidity buffer. Indeed, the current monetary policy environment has increased liquidity in the markets and has grown in parallel with the increasing demand from banks' for assets that count the most towards the LCR requirements and reduced demand for assets that count less. For example, in some cases, banks have had the opportunity to invest central bank funding in profitable Level 1 assets, such as sovereign bonds with high yields, especially during the European sovereign crisis.

In addition, QE or asset purchase programmes initiated by central banks since 2015 have potentially increased the stock of liquid asset holdings and the price of these assets. The potential impact of these unconventional central bank policies is also fairly visible in the evolution of central bank assets and exposures in banks' liquidity buffers.

Major questions now relate to the sustainability of this trend, and the way the level of liquid assets and the composition of banks' portfolios may be affected by changes in central bank policies in the future.

<sup>11</sup> The EBA's *Report on liquidity measures under Article 509(1) and the review of the phase-in of the liquidity coverage requirement under Article 461 of the CRR* (December 2016).

**Figure 8: Evolution of central bank assets and exposures over time (EUR billion)**


First, a reduction in full allotment processes would require banks to replace central bank funding with other funding resources and result in a decline in the overall amount of central bank assets. Second, a winding down or phasing out of asset purchase programmes might further shrink money supply and central bank assets. And, thirdly, a tightening of the eligibility criteria for repo transactions would reduce opportunities to increase the LCR by carrying out repo transactions with central banks where those transactions are backed by non-liquid assets.

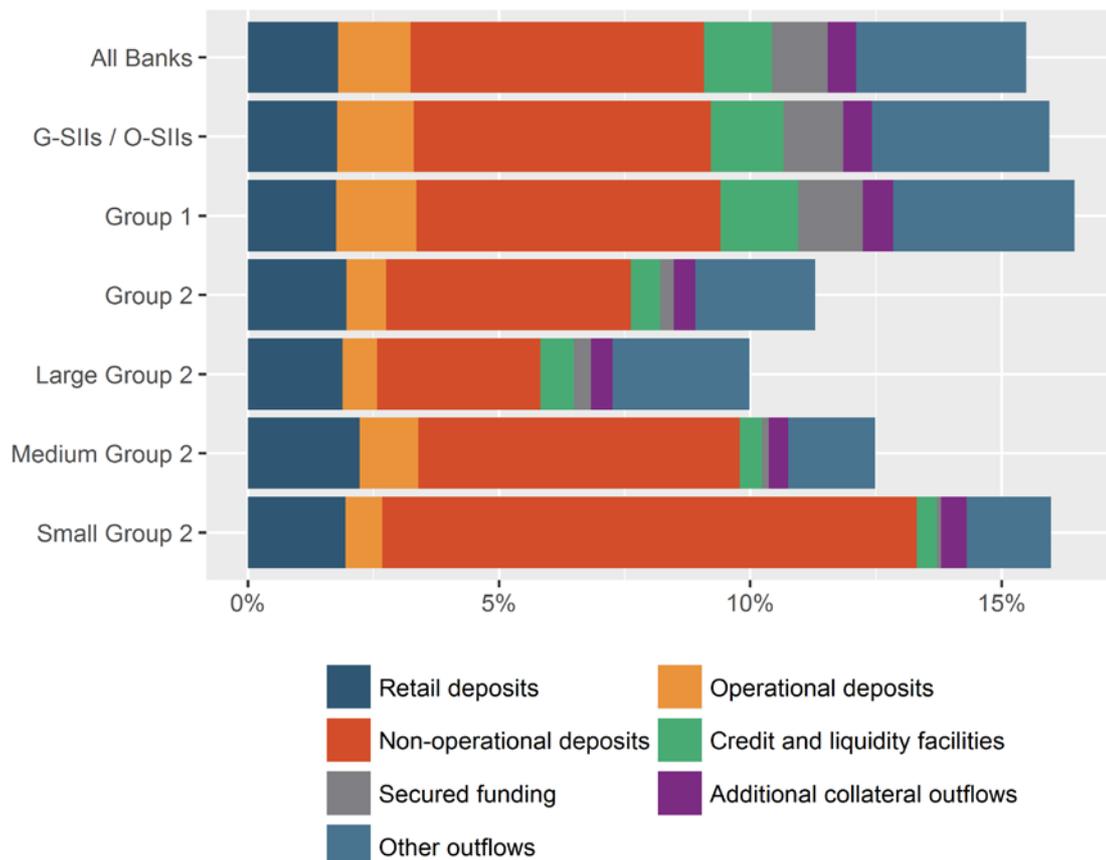
Furthermore, the low interest rate environment in recent years may have increased the value of liquid assets held by banks. In general, it is an expected (and intended) consequence of the shift in central banks' monetary policies that overall interest rates will rise (this effect would be further amplified by an increase in refinancing rates). Increased interest rates would affect the liquidity buffer via revaluation of the assets.

In accordance with Article 20 of the DR, net liquidity outflows are defined as the sum of liquidity outflows reduced by the sum of liquidity inflows, but are not to be less than zero. In addition, inflows may be subject to a cap as defined in Article 33 of the DR. Liquidity outflows are calculated by multiplying the outstanding balances of various categories or types of liabilities and off-balance-sheet commitments by the rates at which they are expected to run off or be drawn down, as defined in Article 22(1) of the DR. In accordance with Article 32(1) of the DR, liquidity inflows are assessed over a period of 30 calendar days. They comprise only contractual inflows

from exposures that are not past due and for which credit institutions have no reason to expect non-performance within 30 calendar days.

Liquidity coverage data show that outflows make up approximately 16% of total assets for Group 1 banks and 11% for Group 2 banks, with average outflow rates of 23 and 20.4 for these groups, respectively. The share of outflows from retail deposits in total assets is nearly the same in all groups. The average value is 1.8% for all banks. Medium Group 2 banks report higher shares of outflows in total assets. As expected, in all groups, the main component of the outflows is non-operational deposits (e.g. short-term deposits from financial customers), which tend to have higher run-off rates, from 20% up to 100%. In the case of medium and small Group 2 banks, non-operational deposits have a significant impact on cash outflows (Figure 9). The analysis suggests that those banks that report an LCR shortfall and a large share of non-operational deposits may reduce non-operational deposits and increase stable funding (e.g. retail deposits) to achieve a more stable outflow composition and to increase the LCR.

**Figure 9: Composition of cash outflows (post-weight and before the cap) relative to total assets**



Furthermore, in line with Article 423(3) of the CRR and Article 30(3) of the DR, credit institutions should add an additional outflow corresponding to the collateral needs that would result from the impact of an adverse market scenario on credit institutions' derivatives transactions and other

contracts, if material. Figure 9 shows the share of additional collateral outflows in total assets. The analysis does not indicate any group-specific pattern in the variation of these outflows. However, a further bank-level analysis (not shown) indicates that the variation of these outflows across institutions is significant. When measured relative to liquidity buffers, the values of the indicator (additional collateral outflows over HQLA) vary from 0% to 15% for Group 1 banks and from 0% to 30% for Group 2 banks. It is, however, unclear whether these variations are due to differences in the portfolios of the institutions or to differences in the methodologies applied to calculate these additional outflows.

Finally, another main component of cash outflows is other outflows, which are mainly derivative outflows. Larger banks tend to have higher shares of such outflows than small banks, as they have larger volumes of derivative activities.

In accordance with Article 33 of the DR, credit institutions should limit the recognition of liquidity inflows to 75% of total liquidity outflows. With the approval of the competent authority, specialised credit institutions may be subject to a cap of 90% on inflows, and these banks may be fully exempt from the cap on inflows if their main activity is leasing and factoring business. In this sample, nearly all inflows are limited to a 75% cap. Only less than 0.5% of the inflows, corresponding to three banks, is limited to 90% of total liquidity outflows or is fully exempt from the cap.

### Assessment of secured funding transactions with central banks

As most (if not all) central bank-related funding transactions have to be backed by eligible collateral, they are considered secured funding transactions that may affect the LCR if the remaining maturity is less than 30 calendar days. However, unlike in the case of interbank secured funding transactions, no cash outflows will be assigned to transactions where the lender is a central bank (see point (a) of Article 28(3) of the DR). The underlying rationale behind the treatment is the assumption that, in times of stress, the central bank will roll over any secured funding transactions as long as the relevant collateral is central bank eligible, disregarding the LCR liquidity quality of these assets. Still, these transactions affect the calculation of the unwinding of secured funding and lending transactions, which is relevant for the calculation of the cap on liquid assets (see Annex I of the DR).<sup>12</sup>

At the December 2016 reporting date, there were 83 banks that reported secured funding transactions with any type of counterparty, of which 30 reported secured funding transactions with a central bank. These were 19 Group 1 banks and 11 Group 2 banks. The central bank funding that banks received through these transactions makes up approximately 1% of total (unweighted) outflows. This observation is in line with the high market liquidity that currently allows banks to use predominantly the interbank repo markets to generate liquidity.

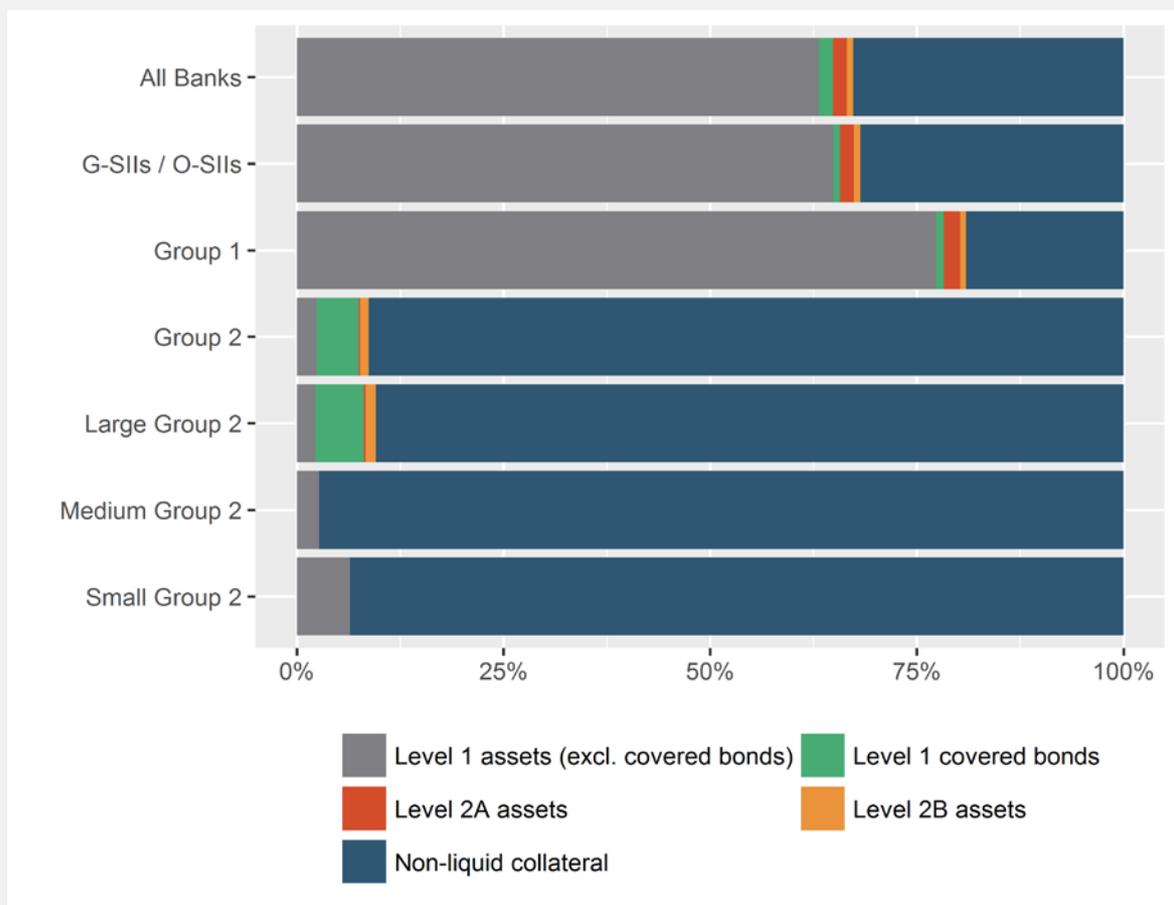
Given the preferential treatment of secured funding transactions with central banks under the

<sup>12</sup> The cap on liquid assets (as defined in Annex I to the DR) may be relevant if the bank is conducting a significant amount of short-term central bank operations, if the bank is providing less liquid collateral and if the bank has reinvested the cash received into illiquid assets.

DR, some banks may benefit from the difference between the list of central bank eligible assets for collateral and liquid assets in terms of liquidity coverage requirements. In other words, banks that benefit from this treatment are those that use some amount of non-liquid assets so as to draw central bank funding. While an outflow rate of 0% is applied to those transactions with central banks, an outflow rate of 100% of the amount due is calculated in the case of transactions with other counterparties (as defined in point (g) of Article 28(3) of the DR). On the other hand, transactions backed by Level 1 assets (excluding covered bonds) receive an outflow rate of 0%.

According to the banks that reported secured funding transactions with central banks, a large part of the collateral posted for these transactions by Group 2 banks was made up of non-liquid assets, while the figure was approximately 20% for Group 1 banks (Figure 10).

**Figure 10: Composition of collateral posted for secured funding transactions with central banks**



Consequently, these banks would report higher cash outflows if they were to conduct secured funding transactions via interbank repo markets. However, as the total amount of repo transactions relative to total liabilities is small, the overall impact of such a change would still be limited.

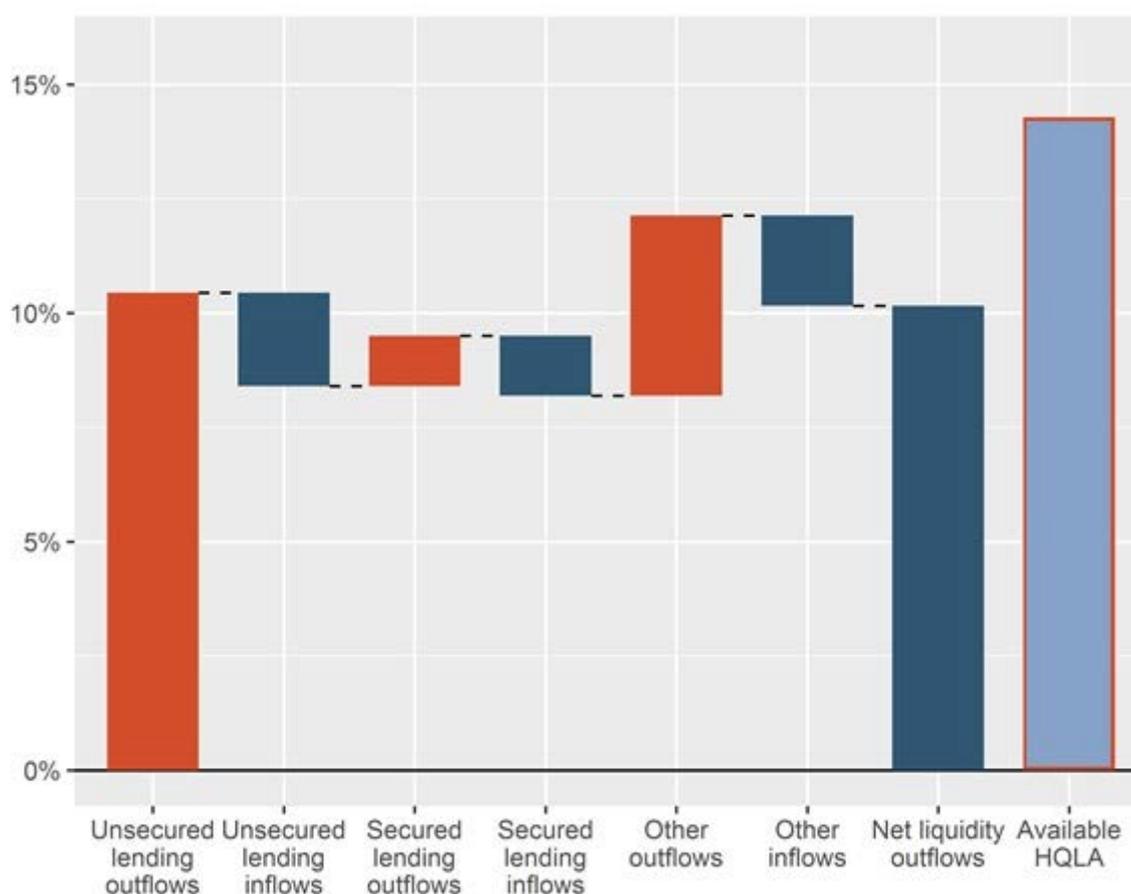
With regard to the amount of cash inflows, there is a significant difference between bank groups. Cash inflows relative to total assets for Group 1 banks are approximately 45% higher than they are for Group 2 banks (Figure 11). The analysis shows that the composition of cash inflows is similar to the composition of outflows, but the former are smaller in size than the latter. This is an indication that some banks are affected by the cap on inflows. In fact, nine (Group 2 banks) out of 134 banks are affected by the cap, but none of them has an LCR below 100%.

**Figure 11: Composition of cash inflows (post-weight and before the cap) relative to total assets**



Figure 12 summarises the dynamics of the parameters of the LCR relative to total assets and for all banks. It first presents offsetting between outflows (indicated in red) and inflows (indicated in blue) and then illustrates the extent to which the liquidity buffer covers or exceeds the level of net liquidity outflows. The largest element that reduces the LCR is outflows stemming from unsecured lending. This is expected, since unsecured funding, especially in the form of non-operational deposits, is a large part of banks' outflows, and outflow rates are high for these financial products. Outflows stemming from unsecured lending amount to over 10% of total assets and, in the calculation of net liquidity outflows, about 2 percentage points of unsecured lending as a share of total assets are offset by inflows in the same category.

**Figure 12: Dynamics of the liquidity buffer, outflows and inflows (as a share of total assets)**



Outflows from secured lending are a small part of total outflows, corresponding to 1.1% of total assets, and they receive lower weights than unsecured lending. In the calculation of outflows, if the counterparty is a central bank, the LCR calculation assumes no outflow, hence the column in Figure 12 for outflows from secured lending represents secured transactions in the interbank market. Liquidity coverage data show that banks exhibit a positive net position in secured funding transactions, which then further offsets total outflows. Finally, other outflows (4% of total assets) are greater than other inflows (2% of total assets) for all banks. Net liquidity outflows are just over 10% of total assets for the QIS-participating banks.

The final column represents the liquidity that buffer banks hold to meet their net liquidity outflows and shows that banks hold an excess liquidity buffer of 4% of their total assets.

## Comparison between the EU Delegated Regulation and the Basel III framework

The DR takes into account the specificities of the EU banking sector and differs from the Basel III framework in a number of aspects affecting all three components of the LCR, including liquidity

buffer, outflows and inflows.<sup>13</sup> The QIS data show that, in December 2016, the average LCR had fallen for Group 1 banks and increased for Group 2 banks under the provisions of the DR. On aggregate, liquidity shortfall is smaller under the DR for all bank groups considered (Table 1).<sup>14</sup> Among the eight banks that do not reach the 100% level under the Basel III framework, seven benefit from EU-specific derogations and remain compliant. These institutions are mainly Group 2 banks but one is a Group 1 bank. One bank that fails to comply with the EU framework also fails to meet the Basel III standards. In December 2016, there was no bank in the sample that was not compliant under the DR but compliant under the Basel III framework.

**Table 1: LCR and liquidity shortfall**

	LCR (%)		LCR shortfall (EUR billion)	
	Basel III	DR	Basel III	DR
All banks	140.32	138.52	6.02	0.12
G-SIIs/O-SIIs	138.76	135.69	4.41	0.00
Group 1	138.34	134.55	1.61	0.00
Group 2	152.32	164.03	4.40	0.12
Large Group 2	154.70	168.02	4.04	0.00
Medium Group 2	160.67	166.75	0.00	0.00
Small Group 2	135.49	146.20	0.37	0.12

Change in the definition of liquid assets, and that of L1 assets in particular, is a major driver of the increase in the LCR under the EU framework. According to point (e) of Article 10(1) of the DR, assets issued by credit institutions, including promotional lenders, can be included in the stock of Level 1 assets and, according to point (f) of Article 10(1) of the DR, EHQCB may qualify as Level 1 assets and receive a lower haircut of 7% than the 15% that would be applied under the Basel III framework. Furthermore, in aggregate, the stock of Level 2A assets decreases as the stock of eligible covered bonds migrates from Level 2 to Level 1 assets. However, banks can also include eligible high quality covered bonds in the stock of Level 2A assets (point (c) of Article 11(1) of the DR). The definition of HQLA under the DR is also broader, and a broader scope of Level 2B securitisations (Article 13 of the DR) and CIUs (Article 15 of the DR) can be categorised as HQLA, depending on their quality. Level 2B assets decrease for Group 1 banks but increase for Group 2 banks under the DR.<sup>15</sup>

<sup>13</sup> This analysis is not intended to evaluate the consistent implementation of the Basel III framework. Such assessment of the LCR regulation is outside the scope of the current report and is conducted within the RCAP under the BCBS (July 2017), which has found the EU LCR regulation to be 'largely compliant'.

<sup>14</sup> The analysis presented in this section is based on a consistent sample of banks that submitted both EU-specific LCR data and data under the Basel III framework (Table 10).

<sup>15</sup> DR also gives preferential treatment to assets representing claims on or guaranteed by the central government of a Member State, as those assets can be included as Level 1 assets on an unlimited basis and are not subject to any haircut in the calculation of the liquidity buffers (point (c) of Article 10(1) of the DR). On account of data limitations, the analysis presents the difference at the aggregate HQLA level only.

For all banks, HQLA increase by over EUR 53 billion under the DR. The increase is EUR 29 billion (or 1%) for Group 1 banks and EUR 24 billion (or 24%) for Group 2 banks. A large share of this increase is due to the treatment of promotional banks' assets (EUR 45 billion) and covered bonds (EUR 31 billion). The overall change in the liquidity buffer increases the LCR for all banks by an average of 2.5 percentage points (Table 2).

Outflows are the major factor behind the negative change for Group 1 banks. The decrease in the LCR due to increasing outflows for Group 1 banks is greater in magnitude than the increase in HQLA and inflows. For Group 2 banks, although the impact of outflows under the DR is negative, the increase in HQLA more than offsets the decrease due to outflows.

Under points (a) and (b) of Article 25(3) of the DR, higher outflow rates are applied to retail deposits that are not classified as stable retail deposits, and Article 23 introduces a specific treatment for other products and services, especially mortgages that have been agreed but not yet drawn down. Furthermore, Article 16 of the DR specifies the treatment of liquid assets that are covered by a cooperative network or an institutional protection scheme, and Article 27 of the DR sets out the treatment of outflows related to these operations. The overall increase of EUR 130 billion in total outflows from Basel III framework to the DR can be attributed to differences in the treatment of operational deposits (EUR 61 billion), retail deposits (EUR 38 billion) and non-operational deposits (EUR -11 billion). Most of this increase in outflows can be attributed to Group 1 banks. In fact, while the decrease in the average LCR due to the increase in outflows is 10.4 percentage points for Group 1 banks, Group 2 banks, on average, benefit from the provisions of the DR (Table 2).

**Table 2: Breakdown of the main drivers behind the change in the LCR (percentage points)**

	LCR change under DR	Which can be attributed to		
		HQLA	Outflows	Inflows
All banks	-1.80	2.50	-8.50	4.20
G-SIIs/O-SIIs	-3.07	1.79	-8.44	3.58
Group 1	-3.79	1.58	-10.44	5.08
Group 2	11.71	8.41	5.34	-2.04
Large Group 2	13.32	7.83	13.16	-7.67
Medium Group 2	6.08	10.48	-19.60	15.20
Small Group 2	10.70	8.66	-1.13	3.18

Finally, the main differences between the two frameworks in relation to inflows are the differences in the weights for unsecured transactions (Article 32 of the DR) and the exemptions to the cap on inflows (Article 33 of the DR). The overall increase in inflows for all banks is EUR 56 billion. This is due to differences in the scope of assets with undefined maturity (EUR 68 billion), trade financing (EUR 48 billion) and other changes resulting in differences in the rates on other inflows (EUR -65 billion). The provisions of the DR on inflows increase the average

LCR for Group 1 banks by over 5 percentage points and decreases the average LCR for Group 2 banks by over 2 percentage points.

## Analysis of the LCR by business models

The LCR regulation was introduced as a universal standard to be applied to all credit institutions. However, its impact on banks may differ on the basis of these banks' specific business models. While some EU-specific derogations, such as that specified in Article 33 of the DR, are in place to account for these business model-related characteristics, there is still a wide dispersion in the LCR across different business models in the EU banking sector.

A sample of 157 banks was used to analyse the impact of the LCR requirement on a number of business models. Unlike in other sections of this report, subsidiaries with an EU parent institution are included in the analysis. The expansion of the sample to subsidiaries aims to take into account the diversity of business models within the overall banking groups and follows the condition that generally all banks have to comply with the LCR minimum requirement on an individual basis. One caveat to the analysis is the representativeness of the sample. The sample is unbalanced, with a high concentration of banks in three business models<sup>16</sup> and the others underrepresented. The QIS sample broken down by business model category is shown in Table 8 in the Annex. Results should be interpreted cautiously and should be checked against the sample size of the relevant business model category. The definitions of the business models are presented in Table 9 in the Annex.

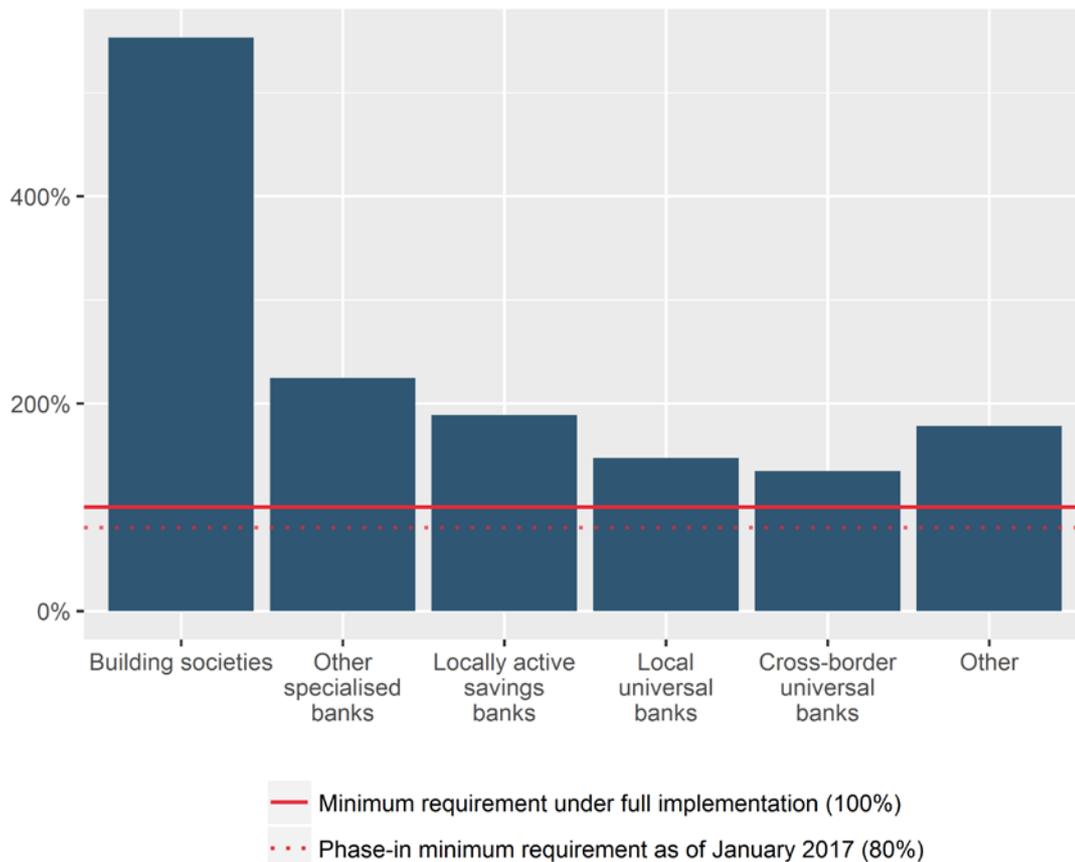
As of December 2016, the average LCR of QIS-participating banks exceeds the minimum requirement of 100% when the analysis is carried out by the business models of these banks. Building societies have an average LCR of 553%.<sup>17</sup> Other specialised banks have the second highest LCR, 225%, while cross-border universal banks, composed of large banks, have an average LCR of 135% (Figure 13). In Figure 13 (and Figure 14), the category 'Other' refers to business model categories where the corresponding sample contains less than eight banks. These categories include automotive and consumer credit banks (LCR of 146%), CCPs (102%), custody banks (169%), leasing and factoring banks (267%), merchant banks (588%), mortgages banks, including pass-through financing mortgage banks (190%), private banks (151%) and public development banks (236%).

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<sup>16</sup> These are (i) cross-border universal banks, (ii) local universal banks and (iii) locally active savings and loan associations, cooperative banks. In aggregate, these banks make up 73% of the total sample.

<sup>17</sup> The average is driven by four banks, the LCRs of which range between about 1350% and 3500%.

**Figure 13: LCR across business models**



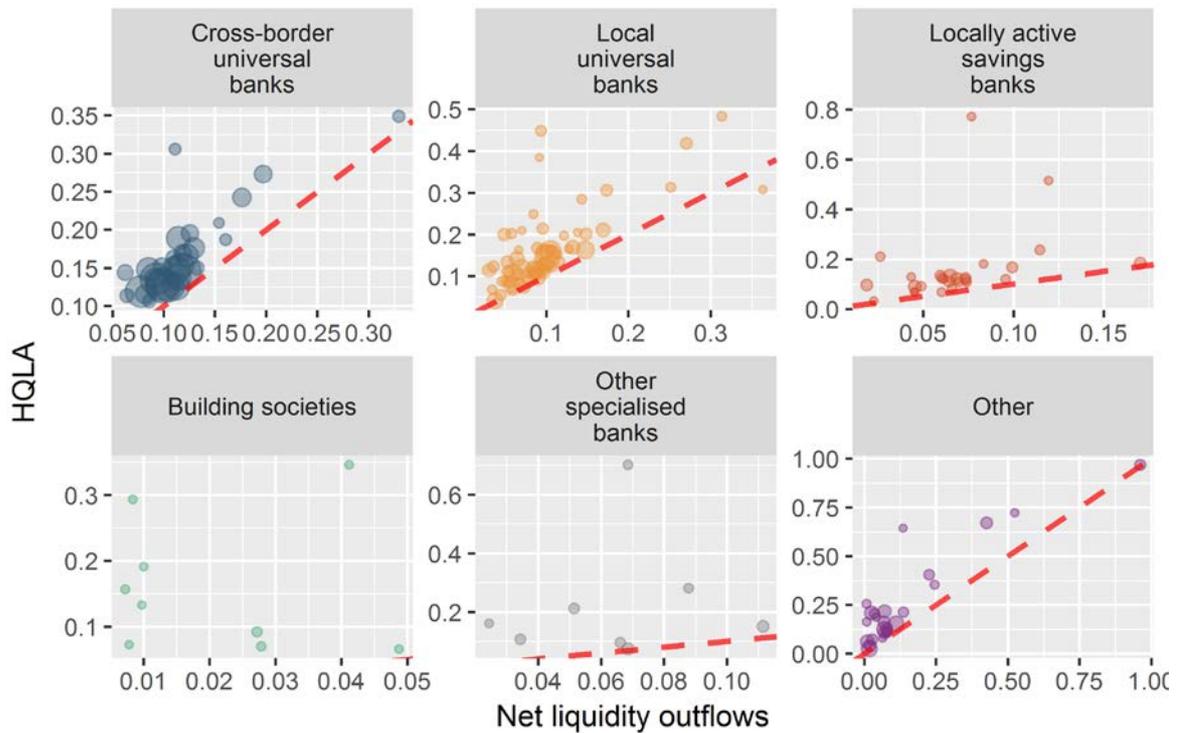
The increase in HQLA raised the LCR of the institutions above 100%. A comparison of HQLA and net liquidity outflows as proportions of total assets shows that, throughout the different business models, the level of HQLA seldom exceeds 20% of total assets and is highly concentrated at the industry average of 14% for cross-border universal banks and local universal banks. The results of the other business models show a similar pattern, differing only in the level of net liquidity outflows. All banks in the business model categories, except one local universal bank, fall on the left-hand side of the 45-degree line (the dashed line) that indicates equality between HQLA and net liquidity outflows, i.e. only local universal banks exhibit a shortfall in the liquidity buffer at the 100% requirement (Figure 14).<sup>18</sup>

Following recent trends, the gradual increase of the stock of HQLA, together with relatively constant total assets and net liquidity outflows, pushed banks on a vertical development path and over the dashed line representing the target LCR of 100%. Other than some business models with extreme values, such as CCPs and custody banks, which show HQLA to net liquidity outflows ratios of close to 100%, there is no clear indication that different business models lead to different HQLA to net liquidity outflows ratios. The only (local universal) bank failing to meet the fully fledged

<sup>18</sup> Note that in Figure 14 the 45-degree line is scaled in some business model categories for visual convenience.

minimum LCR requirement of 100% shows the highest outflow rate among its peers in the corresponding business model category.

**Figure 14: HQLA and net liquidity outflows (as shares of total assets)**

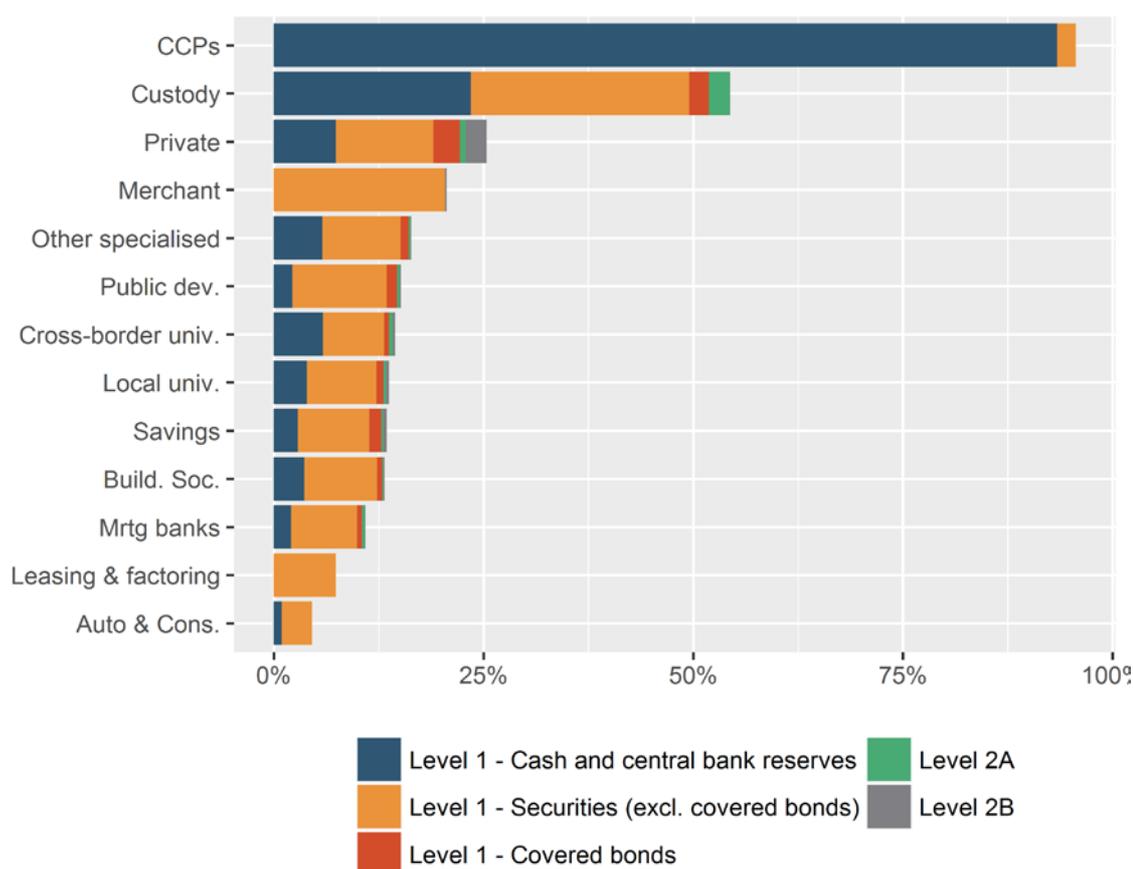


*Note: 'Other' includes automotive and consumer credit banks, CCPs, custody banks, leasing and factoring banks, merchant banks, mortgage banks (including pass-through financing mortgage banks), private banks and public development banks.*

The present composition of liquid assets (Figure 15) and the overall high level of the LCR confirm the observation made in the previous section, i.e. that the liquidity buffer, as defined in the CRR, is of high quality. The composition of HQLA shows a high share of Level 1 assets in all defined business models, and HQLA constitute a similar share of total assets across most business models.

The outliers are CCPs, custody banks and private banks, which have significantly higher shares of liquid assets relative to their total assets. On the one hand, CCPs hold a large amount of central bank reserves to cover short-term funding. A similar effect can be observed for custodian banks, which use liquid assets in the form of central bank reserves and eligible securities in order to cover a larger share of short-term funding relative to total assets. On the other hand, for automotive and consumer credit banks the share of liquid assets relative to total assets is small. This finding was one reason for the introduction of the 90% cap on inflows for banks involved in these business activities.

**Figure 15: Composition of liquid assets (post-weight and before the cap) relative to total assets**

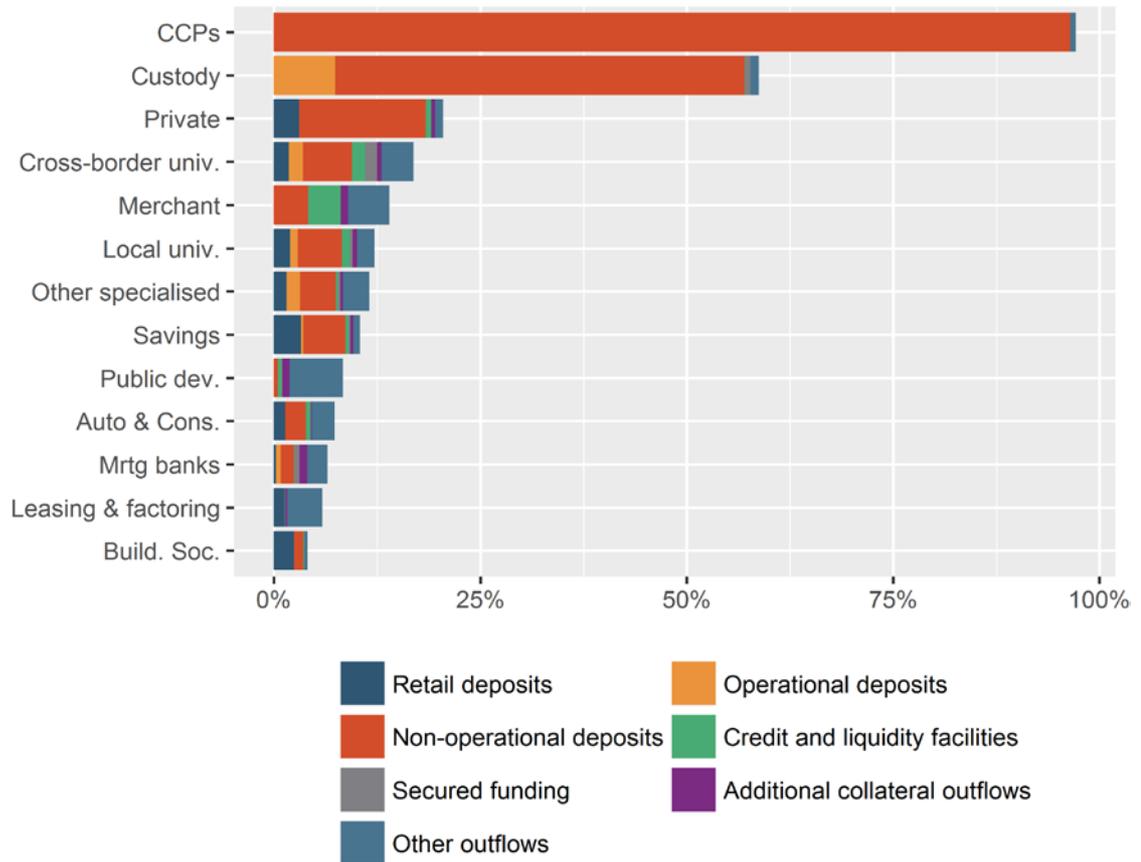


In contrast to the observations regarding the structure of liquid assets, business models show greater disparity in the structure of liquidity flows, reflecting the inherent differences in the various business strategies (Figure 16 and Figure 17). CCPs and custodian banks report higher shares of short-term liabilities arising from non-operational interbank deposits, which result in high cash outflows due to higher run-off rates for financial non-operational deposits.

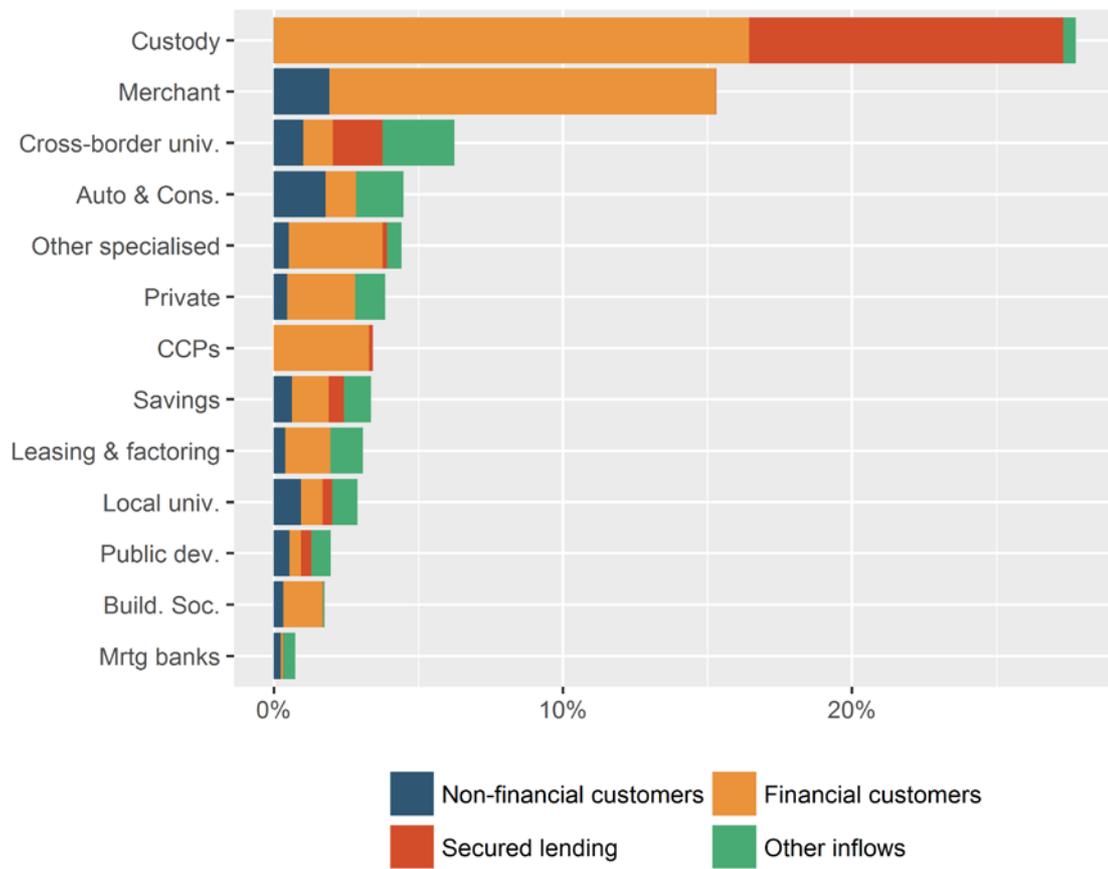
The share of inflows relative to total assets is less than 10% across business models, except for security trading houses, custodian banks and merchant banks. For those banks, the higher share is caused by inflows from financial customers, and this can again be attributed to specific characteristics of their business models.

The main driver for most of the business models is net liquidity outflows from unsecured lending (Figure 12), while transactions based on secured lending are a negligible factor for the calculation of net liquidity outflows. 'Other outflows' have a significant impact on net liquidity outflows for automotive and consumer credit banks (2.8% of total net liquidity outflows), leasing and factoring banks (4.2% of total net liquidity outflows), mortgage banks (2.5% of total net liquidity outflows), other specialised banks (3.2% of total net liquidity outflows) and public development banks (6.5% of total net liquidity outflows).

**Figure 16: Composition of cash outflows (post-weight and before the cap) relative to total assets**



**Figure 17: Composition of cash inflows (post-weight and before the cap) relative to total assets**



# LCR regulation and lending

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## Rationale

The impact of the liquidity coverage requirements on banks' lending to the real economy has been an important aspect of the regulation, both in the calibration stage and during the monitoring phase. Binding liquidity standards led to changes in banks' balance sheet structures and, in some cases, their business strategies. Banks, while being subject to binding regulatory minimum liquidity standards, continue to provide credit to the real economy – thus pioneering economic growth – and need to remain financially viable in competitive EU markets. It is therefore crucial that the regulation strengthening the resilience of the banking sector does not impede credit supply and continues to provide appropriate business conditions for the industry. To this end, the objective of this section is to investigate whether the liquidity coverage requirements have had an impact on the real economy and on banks' financial viability. More precisely, the analysis aims to estimate the potential impact of the LCR regulation first on banks' share of retail and NFC loans in total assets and then on their net interest income and profits.

Several analyses measuring the potential interaction between the LCR regulation and credit supply have been carried out in recent EBA liquidity reports. At the latest reporting date, the QIS monitoring exercise provided a comprehensive dataset to carry out an analysis of the potential impact of the liquidity standards on banks' lending and profitability. The sample includes 82 banks from 14 EU countries and covers 10 QIS reporting dates, from June 2012 to December 2016.

Investing in eligible liquid assets is the main strategy that banks have adopted to comply with the LCR regulation and at December 2016 90% of the liquidity buffer of banks was composed of Level 1 assets (excluding covered bonds).<sup>19</sup> In following this strategy banks have two main approaches available to them: first, they can extend their asset side with additional eligible liquid instruments (e.g. central bank assets and government bonds) and, second, they can replace non-liquid assets (e.g. loans) with HQLA, keeping the balance sheet constant. Under the latter approach, it is reasonable to expect a trade-off between HQLA investment and loans provided to the real economy. This substitution effect implies that banks have to reduce their investment in some types of assets that are not eligible for the liquidity buffer and, at the same time, invest in more liquid assets.

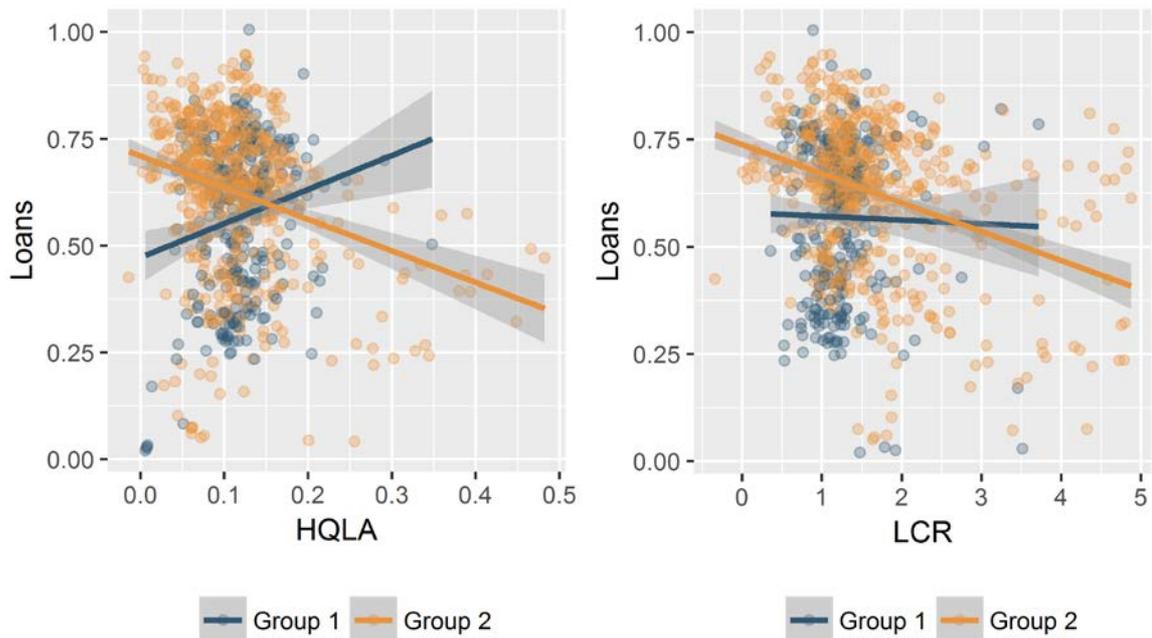
The QIS data show a positive correlation between client loans (retail and NFC loans as a share of total assets) and HQLA (as a share of total assets) for Group 1 banks, while the relationship is negative for Group 2 banks (Figure 18, left-hand panel). For Group 1 banks, a trade-off between HQLA investment and lending is not verified in the data. One potential explanation for this finding is that Group 1 banks are mostly large cross-border universal banks (78% of the Group 1 sample) and some local universal banks, and banks in these business model categories have been able,

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<sup>19</sup> See Figure 5 and Figure 7. In addition, see the EBA's liquidity reports under Article 509(1) of the CRR, December 2013 and December 2014, for a more in-depth analysis.

more than any other category, to diversify their business activities by investing in a wider range of assets. It is possible that these banks have met the LCR minimum requirement not only by expanding the asset side through increasing HQLA holdings but also by reducing their holdings of types of non-liquid assets other than retail and NFC loans.

**Figure 18: Correlation between lending supply and liquidity standards**



The picture is different for the Group 2 category, which is driven by locally active banks, loans associations and cooperative banks (29% of the Group 2 sample)<sup>20</sup>. The main business activity of these banks is lending to the retail sector and SMEs. It is therefore reasonable to assume that it is more difficult for these banks than for universal banks to diversify their asset side.

Another potential explanation for the different directions of the correlation coefficients are the levels of compliance with the LCR regulation. While almost all Group 1 banks in the sample had an LCR above the minimum requirement throughout the period considered, a large number of banks with an LCR below the minimum requirement (before the introduction of the minimum standard in 2015) were Group 2 banks. Therefore, Group 2 banks, on average, may have faced a trade-off between investing in eligible liquid assets and investing in more profitable loans.

The correlation between loans and LCR is negative for Group 2 banks and slightly negative for Group 1 banks (Figure 18, right-hand panel). This suggests that net liquidity outflows put a stronger constraint on Group 1 on average more than liquidity assets expressed as a share of total assets.

<sup>20</sup> There is no Group 1 bank that is also categorised under this business model.

## Model specifications for panel data analysis

The empirical specification is designed to test whether the introduction of the LCR regulation has had an impact on banks' lending to the real economy. The focus of the analysis is retail and NFC lending and it excludes interbank lending. Banks' loans to retail and NFC clients are defined as a function of individual bank-level indicators and a set of macroeconomic parameters.<sup>21</sup> A static fixed effects panel data model is used for the regression analysis. The choice of a fixed effects model is justified for three reasons: first, unobserved time-invariant individual effects such as bank-specific characteristics are likely to be correlated with other regressors and may lead to omitted variable bias; second, the focus of interest is banks' lending behaviour over time as a response to LCR regulation and not cross-sectional variations; and, third, the panel sample for the analysis includes very large to very small banks with great variations in their business models, which in turn implies that differences among banks are not random.

The baseline regression equation takes the following form:

$$L_{ijt} = \alpha_0 + X_{ijt}^k \alpha_1 + M_{jt}^q \alpha_2 + u_{ijt}$$

with  $u_{ijt} = c_i + \tilde{u}_{ijt}$

where:

$L_{ijt}$	=	dependent variable
$X_{ijt}^k$	=	$(1 \times K)$ vector of individual bank-level regressors
$M_{jt}^q$	=	$(1 \times Q)$ vector of macroeconomic explanatory variables
$\alpha_0$	=	the intercept of the regression equation
$\alpha_1$	=	$(K \times 1)$ vector of parameters to be estimated
$\alpha_2$	=	$(Q \times 1)$ vector of parameters to be estimated
$c_i$	=	time-invariant unobservable individual effect
$\tilde{u}_{ijt}$	=	idiosyncratic error terms

$$i = 1, \dots, 82; t = 1, \dots, 10; j = 1, \dots, 14; k = 1, \dots, 5; q = 1, \dots, 5.$$

Table 3 presents the definitions of the variables and the expected signs for the estimated coefficients.

<sup>21</sup> This approach is different from the models presented in other EBA reports, which treat change in LCR levels or compliance with the LCR as the dependent variable while retail and NFC loans are included as explanatory variables together with other balance sheet items.

**Table 3: Definitions of the regression variables**

#	Variable	Definition	Explanation
	$L_{ijt}$	Sum of retail and NFC loans over total assets in period $t$ for bank $i$ headquartered in country $j$ . Exposures data are used to proxy loans.	Dependent variable of the regression equation.
$X_{ijt}^1$	$hqla_{ijt}$	Ratio of HQLA to total assets in period $t$ for bank $i$ headquartered in country $j$ .	Potential trade-off and substitution effect between investment in HQLA and in other assets would imply that the expected sign for the estimated coefficient is negative.
$X_{ijt}^2$	$shortfall_{ijt}$	Dynamic LCR shortfall over total assets in period $t$ for bank $i$ headquartered in country $j$ . Dynamic shortfall is defined as the shortfall in the liquidity buffer corresponding to the minimum LCR requirement for time $t$ . <sup>22</sup>	The parameter captures the relationship between LCR and lending in terms of compliance level. Shortfall is expected to have a negative impact on lending.
$X_{ijt}^3$	$stable\_deposits_{ijt}$	Share of stable deposits (as defined in liquidity regulation) in total liabilities in period $t$ for bank $i$ headquartered in country $j$ .	The higher the stable funding is, the more lending banks are expected to supply. The expected sign is therefore positive.
$X_{ijt}^4$	$cet1\_ratio_{ijt}$	Current CET1 ratio in period $t$ for bank $i$ headquartered in country $j$ .	CET1 ratio is a key parameter that controls for banks' behaviour in the regulatory framework and has an impact on lending.
$X_{ijt}^5$	$(cet1\_ratio)_{ijt}^2$	Square of current CET1 ratio in period $t$ for bank $i$ headquartered in country $j$ .	The squared term tests for a non-linear relationship. Banks with capital above the regulatory minimum are more likely to expand their lending.
$M_{jt}^1$	$GDP\_growth_{jt}$	GDP growth in period $t$ and in country $j$ .	Positive GDP growth is expected to be positively correlated with lending.
$M_{jt}^2$	$Unemployment_{jt}$	Unemployment rate in period $t$ and in country $j$ .	Employment is a driver of economic activity, production and further lending. The relationship between unemployment rate and lending is expected to be negative.
$M_{jt}^3$	$R_{jt}^s$	Short-term (three-month interbank) interest rate in period $t$ and in country $j$ .	Low interest rates are expected to increase money supply in the economy and promote lending.
$M_{jt}^4$	$R_{jt}^l$	Long-term interest rates (for a 10-year government bond) in period $t$ and in country $j$ .	Long-term interest rates represent the opportunity cost of market investment. This was particularly valid during the sovereign debt crisis. The expected sign for the coefficient is negative.
$M_{jt}^5$	$Investment_{jt}$	Gross fixed capital formation growth rate in period $t$ and in country $j$ .	An increase in investment is expected to be positively correlated with bank lending.
	$hqla_{ijt}^2$	Squared term of the HQLA variable.	The variable aims to capture the income/profit maximisation behaviour of banks.
	$lcr_{ijt}$	LCR.	The LCR variable replaces the HQLA variable in the secondary analysis.
	$lcr_{ijt}^2$	Squared term of the LCR variable.	The parameter tests for a non-linear relationship between LCR and lending.

<sup>22</sup> For the reporting dates before the introduction of the first LCR minimum standard in 2015, the shortfall is calculated with respect to the 60% level. For the purpose of the current analysis, this approach accounts for banks' reactions to the LCR standards as published by the BCBS for the first time in December 2010 and in a revised version in January 2013.

The analysis investigates the potential impact of the LCR regulation on loans to retail and NFC clients. The variable on HQLA is expected to capture the extent to which banks face a trade-off between allocating their funding to HQLA and lending, and to show in particular how banks are affected by the HQLA reserve requirements under the LCR regulation. The liquidity shortfall variable ( $shortfall_{ijt}$ ) further investigates whether holding an insufficient level of liquid assets to cover net cash outflows has an impact on banks' lending. However, the coefficient for the shortfall variable should be interpreted with caution. In theory, the actual shortfall can be expressed after the introduction of the minimum standards in 2015; however, the current analysis calculates the LCR shortfall, before the implementation date, against (planned) minimum standards as published in BCBS LCR documents, first in December 2010 and then in January 2013.<sup>23</sup> In other words, while the LCR regulation became legally binding in 2015, banks were aware of the upcoming LCR rules before the implementation date.

The model also includes bank-level control variables. The CRR came into force in June 2013 and it applied across jurisdictions from January 2014. The regulatory framework introduced a set of requirements, and the regulatory capital ratio is a key element of this framework. The model includes the CET1 ratio as a bank-level control variable and an important parameter to explain changes in banks' lending behaviour around the implementation of the CRR. The share of stable deposits in total liabilities ( $stable\_deposits_{ijt}$ ) is used as a control variable for the funding side of banks and  $M_{jt}^q$  is a vector of macroeconomic control variables to account for macroeconomic conditions and thus for aggregate credit demand. The model specifications also test for time-fixed effects to control for shocks to banks' credit supply occurring during the period considered, such as the European sovereign debt crisis, unconventional central bank monetary policies and other regulatory developments.

In the next step, the analysis includes a secondary equation where  $hqla_{ijt}$  is replaced with the LCR itself ( $lcr_{ijt}$ ); it then includes a quadratic term for the LCR variable ( $lcr_{ijt}^2$ ) to test for a non-linear relationship between LCR and lending.

Finally, the potential impact of banks' HQLA holdings on their net interest income and profits is investigated. The analysis of banks' net interest income and profits follows the same model specifications as the static fixed effects panel regression, as described above.

## Findings

Table 4 summarises the estimation results for the impact of the LCR regulation on the share of banks' retail and NFC loans in total assets. When the model controls for other bank-level and macroeconomic parameters, the substitution effect between HQLA and loan assets investment is not statistically significant. In the sample, on average, banks do not cut lending to invest in HQLA. However, the picture is different for banks with a liquidity shortfall. Findings show that, other things being equal, banks with a higher liquidity shortfall of one percentage point have on average

<sup>23</sup> In practice, if the analysis excludes pre-implementation dates, there was one bank in the sample with a liquidity shortfall on the December 2015 reporting date and there was no bank with a shortfall at later reporting dates.

one percentage point lower share of client loans in total assets. This is the case in all models presented. This suggests that banks cut their lending when they were short of HQLA to comply with the LCR regulation; otherwise, a trade-off between HQLA investment and lending is not evident. When the model controls for time effects, the variable on the share of stable deposits in total liabilities becomes statistically significant, showing that higher stable funding contributes to lending. One explanation for this is that the model with time-fixed effects captures post-crisis market conditions and isolates the impact of stable funding on banks' lending.<sup>24</sup>

Another important finding is the impact of the CET1 ratio on lending. The QIS data reporting dates for the analysis cover the period around the introduction of the CRR and when LCR regulation came into effect together with other regulatory rules. One of these rules is the CET1 minimum requirement. The findings suggest that the CET1 ratio has a significant explanatory power on lending. The CET1 ratio variable and its quadratic term are both statistically significant.<sup>25</sup> The variables indicate that, at lower values, the CET1 ratio has a negative impact on lending, but then, as banks comply with the minimum capital requirements and the CET1 capital ratio increases, its (negative) impact on lending decreases and becomes positive. This is reasonable because banks put significant efforts into complying with the minimum standards and, while this may have resulted in a trade-off initially, once banks become compliant with the regulation, higher capital levels facilitate funding (potentially as a result of reduced funding costs for banks with resilient balance sheets) and in turn allow more lending to the real economy.

Models (3) and (4) replace the HQLA variable with the LCR itself. LCR has a negative and statistically significant coefficient, suggesting that a unit increase in LCR leads to a decrease in lending. However, the impact is small in magnitude and possibly driven by banks with a shortfall before the introduction of the legally binding standards in 2015. Models (5) and (6) add the squared term of the LCR variable into the equation. The non-linear relationship can be explained by banks' behaviour in relation to the introduction of the liquidity standards under the CRR. At lower values of LCR, banks cut their lending to comply with the minimum standards. Then, once compliant, highly liquid banks are more likely to expand credit supply. The estimated coefficient for the quadratic term is small in magnitude. Under models (4) and (6), the introduction of time-fixed effect reduces the impact as well as the statistical significance of the LCR variable.

Under models (3)–(6), the shortfall variable has a significant explanatory power on banks' lending dynamics. Other variables (*deposits*, *cet1\_ratio*,  $(cet1\_ratio)^2$ ) are significant in explaining variations in lending for the QIS-participating banks between the periods June 2012 and December 2016. Most of the macroeconomic control variables have the expected sign, but they are all statistically insignificant, with the exception of the variable on long-term interest rates in models (1), (3) and (5). A potential explanation for the finding is that a number of banks in the sample have significant cross-border activities, hence country-specific macroeconomic indicators may have a negligible impact on these banks.

<sup>24</sup> While most reporting periods have shown negative signs in time-fixed effects, the June 2014 reporting date under the baseline regression is the only period that is also statistically significant at the 5% level.

<sup>25</sup> The *p*-value for the variable on the CET1 ratio in model (2) in Table 4 is 10.1%; it therefore falls just outside the 10% level.

**Table 4: Impact of the LCR regulation on banks' retail and NFC loans**

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Dependent variable: retail and NFC loans as a share of total assets</b>	<b>Baseline regression</b>		<b>Secondary regressions</b>			
<i>hqla</i>	-.1088 (.1495)	-.0580 (.1804)				
<i>lcr</i>			-.0022** (.0008)	-.0015* (.0009)	-.0060** (.0028)	-.0055* (.0029)
<i>lcr</i> <sup>2</sup>					.0001* (.0000)	.0001* (.0000)
<i>shortfall</i>	-1.023** (.4637)	-1.018** (.4289)	-1.005** (.4825)	-1.010** (.4487)	-1.068** (.4754)	-1.070** (.4452)
<i>stable_deposits</i>	.0406 (.0426)	.1077** (.0510)	.0488 (.0426)	.1137** (.0499)	.05133 (.0420)	.1143** (.0488)
<i>cet1_ratio</i>	-.6418** (.3166)	-.5794 (.3488)	-.7465** (.3105)	-.6433* (.3601)	-.7609** (.3049)	-.6548* (.3503)
<i>(cet1_ratio)</i> <sup>2</sup>	.7442*** (.2673)	.6525** (.2890)	.8616*** (.2803)	.7299** (.3047)	.9170*** (.2861)	.7821** (.3042)
<i>GDP_growth</i>	.0021 (.0046)	.0053 (.0048)	.0023 (.0046)	.0054 (.0048)	.0022 (.0045)	.0053 (.0047)
<i>Unemployment</i>	-.0060 (.0041)	-.0033 (.0047)	-.0054 (.0040)	-.0031 (.0047)	-.0052 (.0040)	-.0031 (.0047)
<i>R<sup>s</sup></i>	.0068 (.0142)	.0102 (.0224)	.0072 (.0139)	.0102 (.0219)	.0067 (.0138)	.0104 (.0218)
<i>R<sup>L</sup></i>	.0126** (.0063)	.0058 (.0096)	.0130** (.0064)	.0061 (.0094)	.0130** (.0064)	.0063 (.0093)
<i>Investment</i>	-.0013 (.0012)	-.0009 (.0012)	-.0014 (.0012)	-.0010 (.0012)	-.0013 (.0011)	-.0009 (.0012)
<i>constant</i>	.7232*** (.0519)	.6939*** (.0570)	.7184 (.0481)	.6929*** (.0584)	.7232 (.0478)	.6974*** (.0587)
<i>Time – fixed effects</i>	No	Yes	No	Yes	No	Yes
Within R-squared	12.9%	20.2%	13.2%	20.4%	13.7%	20.7%
No of observations	780	780	780	780	780	780

Static fixed effects panel estimation. Period covers 2012H2–2016H4 QIS reporting dates.  
Heteroscedasticity-consistent robust standard errors are reported in parentheses.  
\* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .  
*k*, the number of bank-level regressors, as indicated in the equation, is 6 for models (5) and (6).

Liquid assets such as cash, central bank assets or government assets generally have relatively low returns, and holding these assets imposes an opportunity cost on banks. In the absence of

liquidity regulation, banks may hold, among other investment products, liquid assets to the extent that such investments maximise returns. In other words, in the absence of regulation, the level of liquid assets that banks hold may not be sufficiently prudent. The analysis of the QIS data indicates a non-linear relationship between HQLA holdings and banks' net interest income. Banks tend to hold an optimum level of HQLA so as to maximise their interest income and their profit. After this level, net interest income and profit start falling with additional investment in HQLA (Table 5). The results show that the impact of HQLA holdings on net interest income is statistically more significant than the overall profit after tax. This is reasonable, as net interest income<sup>26</sup> is directly related to returns from HQLA investment, while banks' after-tax profits include other income sources as well as net interest income.<sup>27</sup> That is, while returns on HQLA investment can directly affect net interest income, net interest income is only a subset of banks' profits after tax.

**Table 5: Impact of HQLA investment on banks' net interest income and profit**

Explanatory variables	(7)	(8)
	Dependent variable: net interest income over total assets	Dependent variable: profit after tax over total assets
<i>hqla</i>	.0116* (.0059)	.0878 (.0572)
<i>hqla</i> <sup>2</sup>	-.0369*** (.0109)	-.1867* (.1101)
<i>stable_deposits</i>	.0016** (.0007)	.0106** (.0040)
<i>cet1_ratio</i>	-.0017 (.0063)	.0452* (.0253)
<i>GDP growth</i>	.0001* (.0001)	.0026* (.0013)
<i>R<sup>L</sup></i>	-.0002 (.0001)	-.0006* (.0004)
<i>constant</i>	.0067*** (.0005)	-.0105* (.0061)
<i>Time – fixed effects</i>	Yes	Yes
Within <i>R</i> -squared	8.9%	17.0%
No. of observations	701	779

Static fixed effects panel estimation. Period covers 2012H2–2016H4 QIS reporting dates.

*hqla*<sup>2</sup> is the quadratic term for the variable *hqla*.

Heteroscedasticity-consistent robust standard errors are reported in parentheses.

\**p* < 0.1, \*\**p* < 0.05, \*\*\**p* < 0.01.

<sup>26</sup> Interest income is based on all financial assets and other interest income such as from loans and advances, assets available for sale and assets held to maturity, while expenses result from all financial liabilities and other interest expenses such as interest expenses from deposits and debt securities issued.

<sup>27</sup> In addition to net interest income, profit (or loss) after tax includes other types of income (expenses), such as dividend income, net financial and operating lease income, net fee and commissions, and net profit (loss) on financial operations (trading book).

## Conclusions

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Liquidity coverage standards are an important aspect of the EU regulatory framework. The LCR, together with the capital ratio and stable funding, is one of the major drivers of lending to the real economy. The analysis shows that highly liquid banks are more likely to expand the supply of retail and NFC loans while banks with liquidity shortfall may need to change the composition of their assets by reducing the share of loans in their balance sheet. The analysis also suggests that net interest income and profits increase for banks that hold some liquid assets; however, there is an optimum point beyond which holding liquid assets diminishes banks' net interest income and profits. This finding is in line with expectations: holding high-quality liquid assets increases the resilience of banks' balance sheets and reduces liquidity risk. Funding markets reward highly liquid (and highly capitalised) banks and the cost of funding decreases. This creates further lending opportunities for these banks.

The QIS data show that banks have significantly increased their HQLA holdings since June 2011 and that both the average and bank-level LCR of the QIS-participating banks is well above the minimum requirement of 100% under full implementation. In December 2016, in the sample of 134 banks, all except one Group 2 bank had already met the 100% fully phased-in LCR minimum requirement, while all banks met the minimum requirement of 80%. The level of shortfall, corresponding to one Group 2 bank, is EUR 115 million at the minimum requirement of 100%. The average levels of LCR across different business model categories are also above the minimum requirements and, as expected, there are significant differences across business models in the composition of LCR and LCR parameters. Some variations can also be observed within categories.

Liquid assets holdings of banks on their balance sheets make up 14% of total assets. Level 1 assets make up 90% of the total liquidity buffer of banks. This is mainly divided into cash and central bank reserves and securities, excluding covered bonds. Central bank reserves have a share of 37% and central government assets have a share of 36% in the liquidity buffer. Reliance on these liquid assets has been a feature of the financial crisis and still plays a role in banks' liquidity risk profiles. Banks will have to find alternatives to maintain sustainable liquidity buffers to cover net outflows after the completion of unconventional central bank policies and a shift to a high interest rate environment. In this case, the opportunity cost of holding liquid assets is expected to increase for banks, having direct implications for liquidity buffers.

Finally, non-operational deposits continue to have the largest share in banks' outflows, while retail deposits make up, on average, 1.8% of total assets. Since the implementation of the current EU liquidity coverage standards under the DR, small and specialised banks in particular have benefited from EU-specific derogations, and this is reflected in the liquidity coverage profiles of these banks. An analysis comparing the DR and the Basel III framework shows that seven of the eight banks that were not compliant with the 100% minimum requirement under the Basel III framework became compliant under the EU framework.

# Annex

**Table 6: Number of banks submitting liquidity coverage data (by country)**

	All banks	G-SIIs/ O-SIIs	Group 1	Group 2	Large Group 2	Medium Group 2	Small Group 2
Austria	<b>8</b> (9)	4	2	6	1	1	3
Belgium	<b>11</b> (13)	6	2	9	–	2	7
Czech Republic	<b>7</b> (21)	–	–	7	–	1	6
France	<b>7</b> (7)	6	5	2	1	–	1
Germany	<b>36</b> (38)	10	7	29	6	5	18
Hungary	<b>2</b> (2)	1	1	1	–	–	1
Ireland	<b>8</b> (12)	4	3	5	–	3	2
Italy	<b>14</b> (14)	3	2	12	6	6	–
Luxembourg	<b>1</b> (1)	1	–	1	–	1	–
Malta	<b>3</b> (3)	2	–	3	–	–	3
Netherlands	<b>9</b> (9)	5	4	5	1	2	2
Norway	<b>2</b> (2)	1	1	1	–	1	–
Poland	<b>5</b> (5)	3	–	5	1	–	4
Portugal	<b>5</b> (5)	4	2	3	–	1	2
Spain	<b>11</b> (11)	6	2	9	7	2	–
Sweden	<b>5</b> (5)	4	4	1	–	–	1
<b>Total</b>	<b>134</b> (157)	<b>60</b>	<b>35</b>	<b>99</b>	<b>23</b>	<b>25</b>	<b>50</b>

*Note: Number of banks including subsidiaries is indicated in brackets.*

**Table 7: Definition and classification of bank groups**

	<b>Tier 1 capital amount (at reporting date)</b>
Group 1 banks	≥ EUR 3 billion and internationally active
Large Group 2 banks	≥ EUR 3 billion
Medium Group 2 banks	≥ EUR 1.5 billion but < EUR 3 billion
Small Group 2 banks	< EUR 1.5 billion

**Table 8: Number of banks submitting liquidity coverage data (by business model)**

Business model	All banks	G-SIIs/ O-SIIs	Group 1	Group 2	Large Group 2	Medium Group 2	Small Group 2
Automotive and consumer credit banks	4	2	–	4	1	1	2
Building societies	9	–	–	9	–	–	9
CCPs	2	–	–	2	–	–	2
Cross-border universal banks	30	30	26	4	3	1	–
Custody banks	4	2	–	4	–	2	2
Leasing and factoring banks	1	–	–	1	–	1	–
Local universal banks	58	26	8	50	18	11	20
Locally active savings and loan associations, cooperative banks	27	3	1	26	1	6	19
Merchant banks	1	–	–	1	–	1	–
Mortgage banks including pass-through financing mortgage banks	4	–	–	4	–	2	2
Other specialised banks	8	1	–	8	–	4	4
Private banks	2	–	–	2	–	–	2
Public development banks	7	2	–	7	4	–	3
<b>Total</b>	<b>157</b>	<b>66</b>	<b>35</b>	<b>122</b>	<b>27</b>	<b>29</b>	<b>65</b>

**Table 9: Definition of business models**

Name	Description
Automotive and consumer credit banks	Banks specialising in originating and/or servicing consumer and/or automotive loans to retail clients.
Building societies	Banks specialising in the provision of residential loans to retail clients.
CCPs	Banks specialising in setting trading accounts, clearing trades, collecting and maintaining margin monies, regulating delivery and reporting trading data.
Cross-border universal banks	Cross-border banking groups engaging in several activities including retail, corporate, investment banking and insurance.
Custody banks	Banks specialising in offering custodian services (i.e. they hold customers' securities in electronic or physical form for safe keeping so as to minimise the risk of loss). These banks may also provide other services, including account administration, transaction settlements, collection of dividends and interest payments, tax support and foreign exchange.
Local savings banks	Banks focusing on retail banking (payments, savings products, credit and insurance for individuals or SMEs) and which operate through a decentralised distribution network, providing local and regional outreach.
Local universal banks	Banks specialising in originating and/or servicing consumer loans to retail clients and SMEs.
Merchant banks	Banks engaging in financing domestic and international trade by offering products such as letters of credit, bank guarantees and collection and discounting of bills.
Mortgage banks	Banks specialising in directly originating and/or servicing mortgage loans.
Other specialised banks	Other specialised banks such as promotional banks and ethical banks.
Private banks	Banks providing wealth management services to high net worth individuals and families.
Public development banks	Banks specialising in financing public sector projects and/or the provision of promotional credit or municipal loans.
Security trading houses	Banks facilitating trading done in derivatives and equities markets by guaranteeing the obligations in the contract agreed between two counterparties and/or by holding securities and other assets for safe keeping and record keeping on behalf of corporate or individual investors.

**Table 10: Number of banks submitting EU-specific liquidity coverage data under the DR and under the Basel III framework**

	All banks	G-SIIs/ O-SIIs	Group 1	Group 2	Large Group 2	Medium Group 2	Small Group 2
Austria	3	1	1	2	0	0	2
Belgium	5	4	2	3	0	1	2
France	7	6	5	2	1	0	1
Germany	36	10	7	29	6	5	18
Hungary	2	1	1	1	0	0	1
Italy	14	3	2	12	6	6	0
Luxembourg	1	1	0	1	0	1	0
Malta	1	1	0	1	0	0	1
Netherlands	9	5	4	5	1	2	2
Norway	2	1	1	1	0	1	0
Poland	5	3	0	5	1	0	4
Portugal	2	2	1	1	0	1	0
Spain	8	6	2	6	6	0	0
Sweden	5	4	4	1	0	0	1
<b>Total</b>	<b>100</b>	<b>48</b>	<b>30</b>	<b>70</b>	<b>21</b>	<b>17</b>	<b>32</b>

**Table 11: Banks included in the analysis of the LCR regulation and lending**

	All banks	G-SIIs/ O-SIIs	Group 1	Group 2	Large Group 2	Medium Group 2	Small Group 2
Austria	4	2	1	3	0	1	2
Belgium	2	2	0	2	0	1	1
France	6	6	5	1	1	0	0
Germany	20	4	4	16	0	4	12
Ireland	7	4	3	4	1	2	1
Italy	13	3	2	11	6	5	0
Luxembourg	1	1	0	1	0	1	0
Malta	3	2	0	3	0	0	3
Netherlands	7	5	4	3	1	1	1
Poland	3	2	0	3	1	0	2
Portugal	3	3	2	1	0	1	0
Spain	5	4	2	3	3	0	0
Sweden	4	4	4	0	0	0	0
United Kingdom	4	4	3	1	1	0	0
<b>Total</b>	<b>82</b>	<b>46</b>	<b>30</b>	<b>52</b>	<b>14</b>	<b>16</b>	<b>22</b>



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