Liquidity transformation and Eurosystem credit operations

ECB Money Market Conference
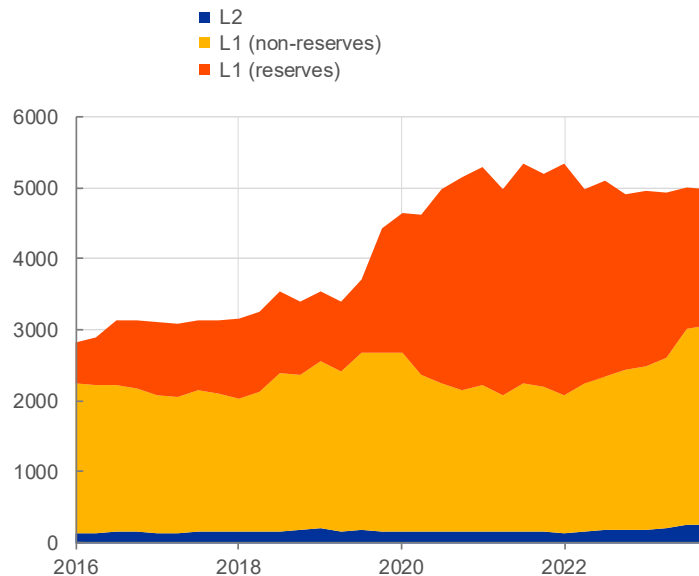
07/11/2024

Benjamin Hartung (ECB)

How do banks fulfill their LCR requirements?

- Basel III requires banks to hold minimum amount of **high-quality liquid assets (HQLA)** since 2015

- **Share of reserves** in HQLA portfolios **increased** with central bank balance sheet expansion

HQLA composition of Significant Institutions 2016-2024
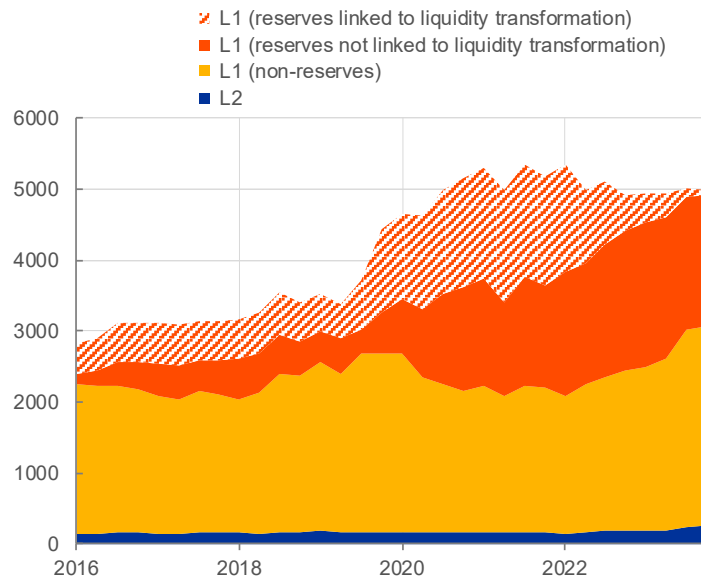
(in EUR billion)

Notes: Chart shows composition of HQLA held by euro area significant institutions. Reserves refer to excess liquidity holdings and L1 (non-reserves) is the residual when subtracting excess liquidity from L1 holdings.

How do banks fulfill their LCR requirements?

- Basel III requires banks to hold minimum amount of **high-quality liquid assets (HQLA)** since 2015

- **Share of reserves** in HQLA portfolios **increased** with central bank balance sheet expansion

- Banks can **generate HQLA** by borrowing from Eurosystem **against non-HQLA collateral**

- **Liquidity transformation** via Eurosystem collateral framework **substantial,** accounting for **32% of SI's HQLA** at the peak

- Important to understand underlying drivers for…
  - Monetary policy implementation
  - Financial stability implications

HQLA composition of Significant Institutions 2016-2024

(in EUR billion)

Legend:
- L1 (reserves linked to liquidity transformation)
- L1 (reserves not linked to liquidity transformation)
- L1 (non-reserves)
- L2

Notes: Chart shows composition of HQLA held by euro area significant institutions. Reserves refer to excess liquidity holdings and L1 (non-reserves) is the residual when subtracting excess liquidity from L1 holdings. Reserves linked to liquidity transformation are computed by calculating the amount of net HQLA generated via liquidity transformation through Eurosystem credit operations.

Research question and contribution

Research questions

- **How large** is liquidity transformation via Eurosystem collateral framework?

- How much of the liquidity transformation is…
    - **coincidental** due to the differences between LCR- and Eurosystem-haircuts
    - **intentional**, i.e. related to banks selectively pledging less liquid assets

Literature

- Impact of LCR introduction 2015 on
    - reserve demand (Kedan & Venghazi, 2021)
    - Collateral pledging behavior (Schmidt, 2019)
- Aggregate estimates of HQLA generation (Grandia et al, 2019)
- Role of broad collateral framework for monetary policy implementation (e.g. Drechsler et al, 2016; Corradin & Sundaresan)

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Results

- Banks generate **EUR 0.92 of net HQLA** for every euro borrowed from the Eurosystem

- Banks **pledge least liquid assets first** and more liquid assets only at the margin

- **30-60%** of liquidity transformation is **intentional**

Contribution

- **LCR-dimension** of collateral pledging, taking into account LCR-value of encumbered collateral
- New measure (**liquidity transformation rate)** to quantify amount of HQLA generated
- **New empirical approach** to identify intentional liquidity transformation
- Disaggregated **bank-level** analysis

# Institutional background: LCR and Eurosystem collateral

- LCR requires banks to hold sufficient HQLA to cover net outflows in a 30-day stress scenario (min. 100%)

- HQLA universe comprises…
  - **L1:** reserves, government bonds
  - **L2a:** certain covered bonds, corporate and some regional government bonds
  - **L2b:** senior ABS tranches, less highly rated covered & corporate bonds

- **Eurosystem** accepts **broad range of collateral:**
  - HQLA securities
  - Marketable non-HQLA (retained CB/ABS)
  - Non-marketable non-HQLA assets (credit claims)

- LCR and Eurosystem apply **different haircuts and eligibility criteria**

➢ **Possible HQLA generation** when borrowing against collateral with higher LCR haircuts

**'Waterfall approach' to encumbrance of Eurosystem collateral in LCR framework**

■ non-HQLA (credit claims)   ■ non-HQLA (marketable)
■ L2B   ■ L2A (encumbered)
▨ L2A (not encumbered)   ▨ L1
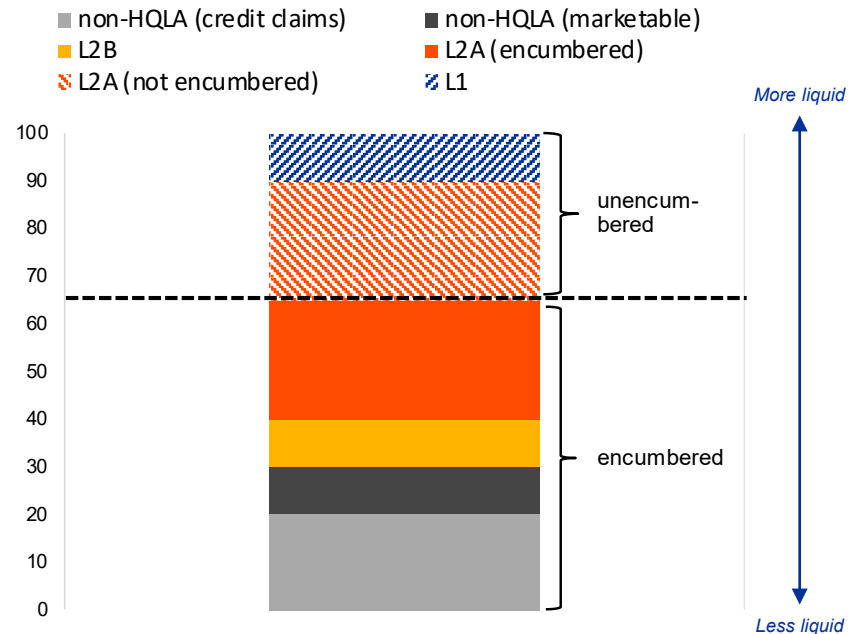
Composition and elasticity of collateral pools

Mobilised collateral by LCR category 2017-2023

(in EUR billion)
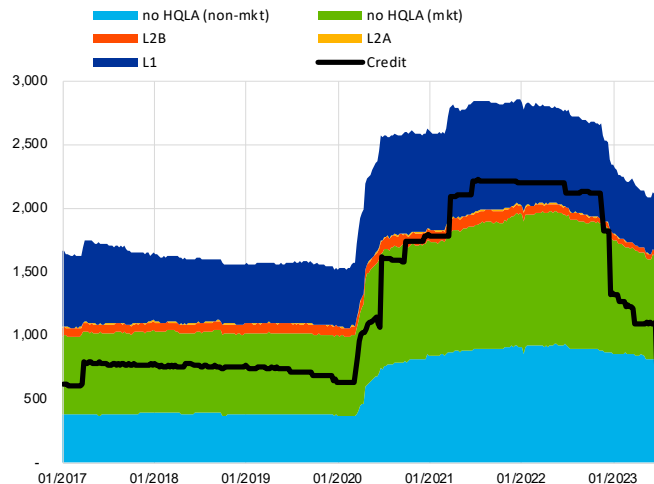
Notes: Left graph shows the composition of value after haircuts of mobilised collateral in EUR million by LCR liquidity category together with outstanding Eurosystem credit (black line).

➢ **74% of mobilised** and **92% of encumbered** collateral is non-HQLA

Elasticity of collateral to changes in outstanding credit
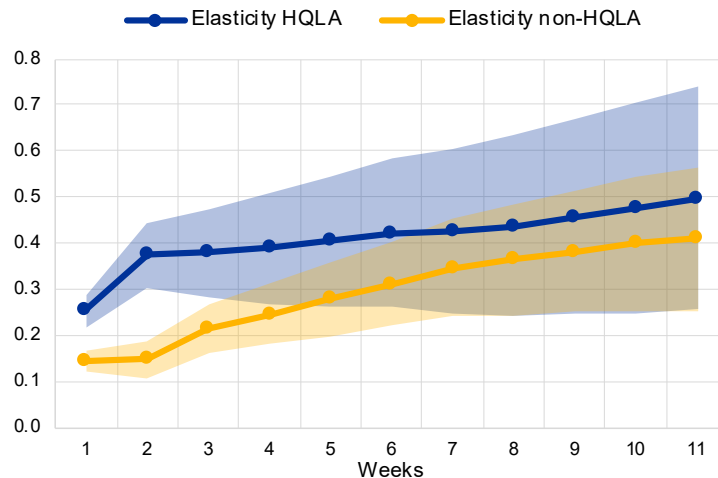
Notes: The chart shows the elasticity of HQLA vs non-HQLA mobilisation (before haircuts) with respect to a 1 percentage point change in outstanding credit in week zero. It is based on a local projection regression using weekly data from Jan 2017 to June 2023.

➢ **Most liquid assets mobilised at the margin**

Empirical approach

1. Quantify liquidity transformation

- Compute amount of net HQLA generated for every euro borrowed
- Take into account opportunity cost of encumbering LCR-eligible assets
- **Liquidity transformation rate (LTR):**

$$LTR_{j,t} \quad = \quad 1 - \frac{\sum_i HQLA_{i,j,t}^{LCR}}{\sum_i CVAH_{i,j,t}^{ECB}}$$

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2. Marginal effect of ΔCollateral on average LTR

- If banks **intentionally** pledge less liquid collateral first, then **LTR drops** when mobilising additional assets.
- ➤ Compute marginal effect of changes in mobilised collateral on average LTR of collateral pool:

$$\Delta LTR_{j,t,t+h} = \beta_1 \Delta CVAH_{j,t,t+h} + \beta_2 \Delta MPO_{j,t+h,t}$$
$$+ \beta_3 \left(\Delta CVAH_{j,t,t+h} X \Delta MPO_{j,t+h,t} \right) + \beta_4 LTR_{j,t} + \gamma_t + \lambda_j$$

- **Advantage:** Covers all pledged assets
- **Disadvantage:** No quantification intentional vs coincidental liquidity transformation

3. Pledged securities vs banks' securities holdings

- If liquidity transformation would be purely **coincidental**, then banks would **pledge a representative sample** of their eligible securities.
- ➤ Test whether **LTR is significantly higher** for pool of **securities pledged** with Eurosystem than for banks' securities **portfolios**.

- **Advantage:** Allows to disentangle quantitatively intentional vs coincidental liquidity transformation
- **Disadvantage:** Covers only marketable assets

Data

1. Quantify liquidity transformation

- Asset-level information relevant for LCR haircuts (e.g. issuer, credit rating, issuance amounts, maturity)
- Mapping of retained vs non-retained covered bonds / ABS
- Eurosystem haircuts at asset level

2. Marginal effect of ΔCollateral on average LTR

- Mobilised collateral at bank- and asset level
- **Coverage**: All eligible counterparties
- **Frequency**: Weekly (Jan 2017 – Jun 2023)

## 3. Pledged securities vs banks' securities holdings

- **Securities Holdings Statistics (SHS-G):** ISIN-level information on banks' holdings of Eurosystem-eligible securities
- ISIN-level information on **marketable securities pledged** with Eurosystem
- **Coverage**: Significant Institutions (~80% of mobilised collateral)
- **Frequency:** Quarterly (2018q3 – 2023q2)

Results I: Liquidity transformation rate

Key take-aways:

- Liquidity transformation rate (LTR) is **higher for encumbered** than for mobilised assets due to 'waterfall approach' under LCR

- **LTR drops following large allotments** as banks mobilise very liquid assets first and replace them subsequently with less liquid assets

- For **encumbered assets, LTR co-moves negatively** with credit outstanding as banks do not adjust collateral pools one-for-one

Liquidity transformation rate and net HQLA generated through Eurosystem credit operations

Legend:
- net HQLA created (RHS)
- Liquidity transformation rate (mobilised coll.)
- Liquidity transformation rate (encumbered coll.)
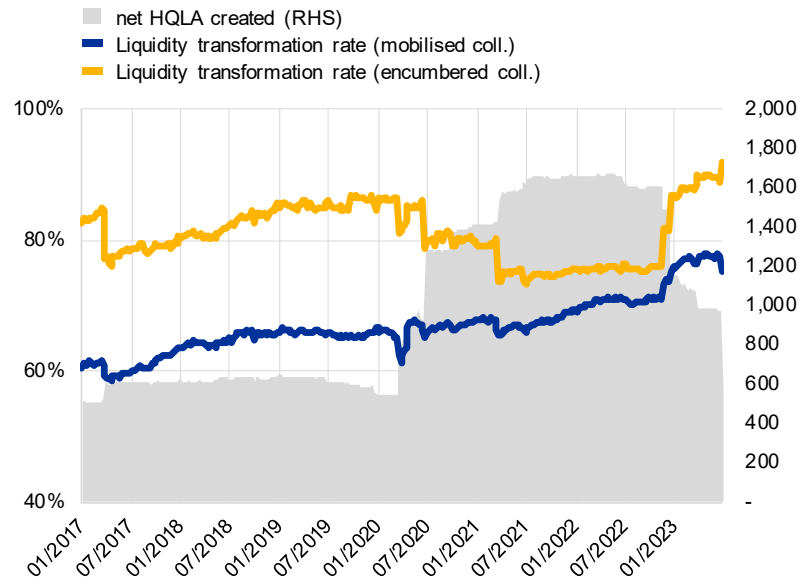
Notes: The blue (yellow) line displays the liquidity transformation rate based on the composition of mobilised (encumbered) collateral (left axis). Mobilised collateral refers to collateral that banks have pledged with the Eurosystem. Encumbered collateral refers to assets that are actually used for outstanding credit following the LCR rules on counting assets as encumbered, starting with the least liquid assets mobilised. The liquidity transformation rate denotes how much net HQLA is generated at the bank level via collateral transformation. The grey area shows the absolute amount (in EUR million) of net HQLA generated through the Eurosystem collateral framework based on encumbered collateral.
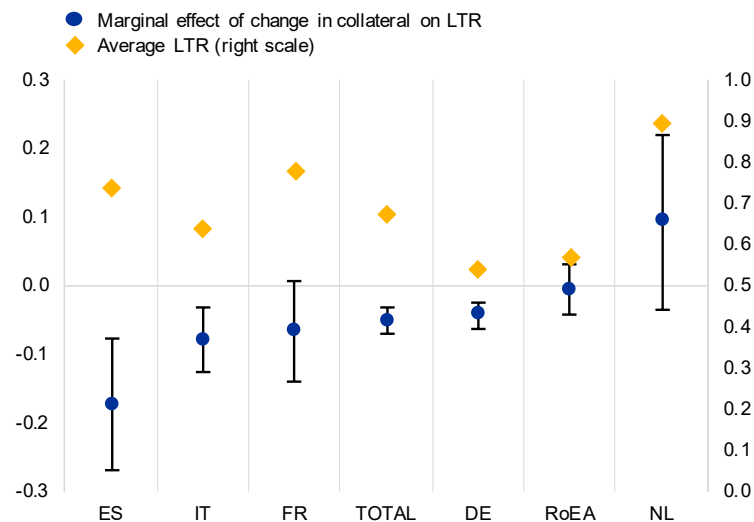
Results II: Marginal impact of changes in collateral on average LTR

Changes in liquidity transformation rate (LTR) vs changes in mobilised collateral (CVAH)

	(1) Δ LTR	(2) Δ LTR	(3) Δ LTR	(4) Δ LTR	(5) Δ LTR
Δ CVAH	-0.034***	-0.034***	-0.034***	-0.051***	-0.051***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
LTR (T=0)			-0.021***	-0.024***	-0.024***
			(0.001)	(0.002)	(0.002)
Δ credit				0.000	0.000
				(0.000)	(0.000)
Δ Credit x Δ CVAH				0.007	0.007
				(0.008)	(0.008)
Bank FE	NO	YES	YES	YES	YES
Time FE	NO	NO	NO	NO	YES
Observations	435,412	435,412	435,412	289,198	289,198
Adjusted R^2		0.009	0.019	0.030	0.034

Notes: Panel regression across counterparties and weeks of changes in the liquidity transformation rate (ΔLTR) on changes in mobilised collateral ($\Delta CVAH$, i.e. collateral value after haircuts). Both the LTR and CVAH are based on mobilised collateral and changes refer to one-week changes (h=1). ΔLTR denotes percentage point changes whereas $\Delta CVAH$ refers to percent changes. Asterisks *,** and *** denote significance at the 10%-, 5%- and 1%-significance levels respectively. The negative coefficient on $\Delta CVAH$ indicates that a 1 percent increase in collateral reduces the average liquidity transformation rate of a bank by 0.051 percentage points in the baseline regression which controls for the initial level of liquidity transformation, as well as changes in credit and bank- and time-fixed effects.

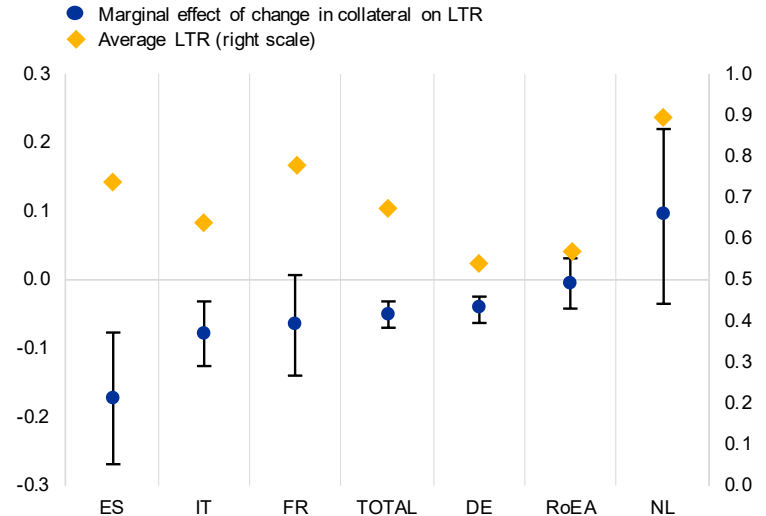## Average LTR by country and coefficient β_1 of regressing ΔLTR on $\Delta CVAH$

- ● Marginal effect of change in collateral on LTR
- ◆ Average LTR (right scale)

Notes: The blue dots display the coefficient of regressing ΔLTR (liquidity transformation rate) on $\Delta CVAH$ (collateral value after haircuts) for each jurisdiction separately at a one-week horizon (h=1), controlling for changes in credit as well as bank- and time-fixed effects. They provide an indication how much *intentional* liquidity transformation banks are doing. The yellow diamonds indicate the unweighted average liquidity transformation rate in each country over the estimation horizon 2017-2023 (right scale) which is a combination of intentional and coincidental liquidity transformation. LTR and CVAH are based on mobilised collateral and whiskers denote the 95% confidence intervals. RoEA stands for the rest of the euro area, i.e. all countries except the 5 countries shown in the figure.

Results II: Marginal impact of changes in collateral on average LTR

Key take-aways:

- Banks **pledge more liquid assets at the margin** when mobilising additional collateral (and remove them first when repaying credit)

- **1% increase** collateral related to **0.05 ppt drop** in liquidity transformation rate

- **Heterogenous** pattern across countries

- **No clear link** between **average and marginal** liquidity transformation across countries

Average LTR by country and coefficient β_1 of regressing ΔLTR on $\Delta CVAH$

Legend:
- ● Marginal effect of change in collateral on LTR
- ◆ Average LTR (right scale)

Notes: The blue dots display the coefficient of regressing ΔLTR (liquidity transformation rate) on $\Delta CVAH$ (collateral value after haircuts) for each jurisdiction separately at a one-week horizon (h=1), controlling for changes in credit as well as bank- and time-fixed effects. They provide an indication how much *intentional* liquidity transformation banks are doing. The yellow diamonds indicate the unweighted average liquidity transformation rate in each country over the estimation horizon 2017-2023 (right scale) which is a combination of intentional and coincidental liquidity transformation. LTR and CVAH are based on mobilised collateral and whiskers denote the 95% confidence intervals. RoEA stands for the rest of the euro area, i.e. all countries except the 5 countries shown in the figure.
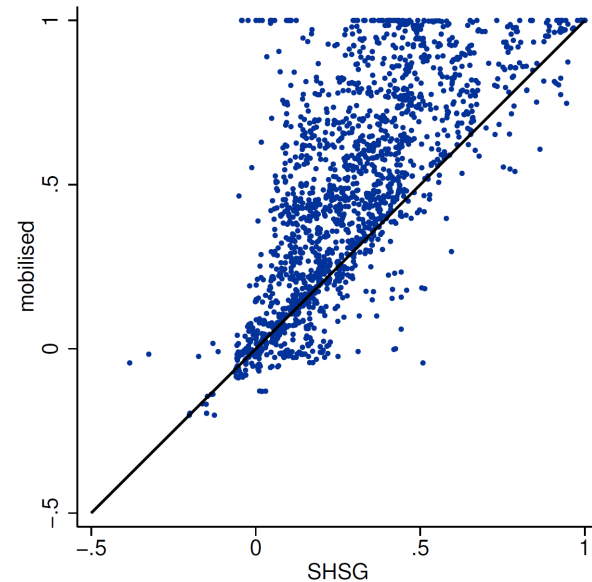
Results III: Selective pledging of less liquid marketable assets

Asset composition of mobilised marketable collateral vs SHSG security holdings

Legend:
- L1
- L2A
- L2B
- no HQLA (mkt)
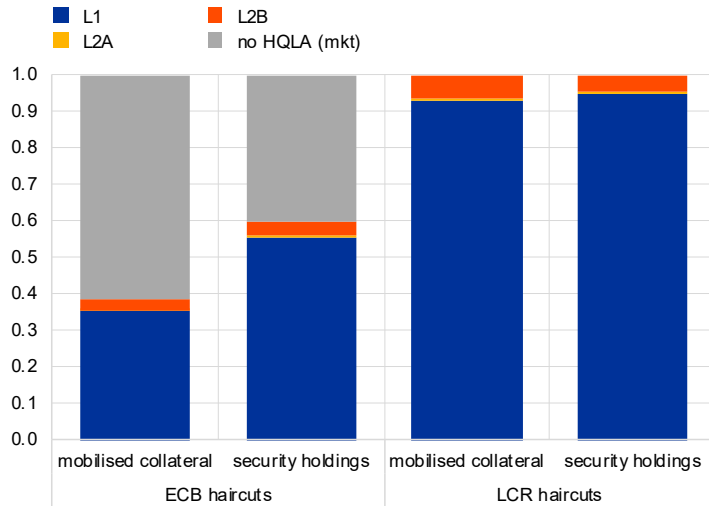
Notes: The chart shows the composition of marketable assets in the pool of mobilised collateral and their security holdings based on SHS-G data. Observations are aggregated at the euro area level and refer to Q2-2023. The left-hand side bars apply valuation haircuts according to the Eurosystem collateral framework. The RHS bars apply haircuts laid down in the LCR regulation. The grey area shows marketable non-HQLA assets, such as own-used covered bonds or retained ABS, that do not count towards the LCR (i.e. the LCR haircut is 100%).

Liquidity transformation rate of mobilised marketable collateral vs SHS-G security holdings
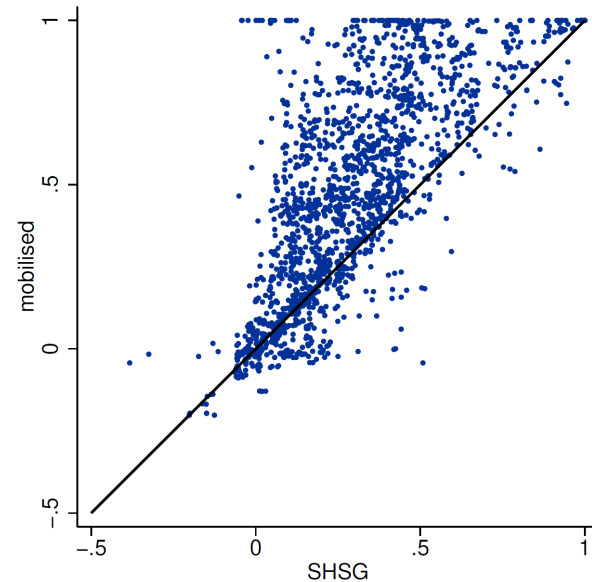

Notes: The scatter plot shows the average liquidity transformation rate (LTR) of banking groups' mobilised marketable collateral pool (vertical axis) vis-a-vis their Eurosystem eligible security holdings (horizontal axis) for 566 bank-quarter observations. Dots above the 45-degree line indicate that banks mobilise less liquid assets with the Eurosystem than a representative sample of their holdings of Eurosystem eligible securities would suggest.

Results III: Selective pledging of less liquid marketable assets

Key take-aways:

- Marketable securities mobilised with Eurosystem **tilted towards non-HQLA** compared to banks' eligible holdings

- **LTR differs** substantially between…
  - Banks total holdings of eligible securities **(29%)**
  - Securities mobilised with Eurosystem **(45%)**

Liquidity transformation rate of mobilised marketable collateral vs SHS-G security holdings


Notes: The scatter plot shows the average liquidity transformation rate (LTR) of banking groups' mobilised marketable collateral pool (vertical axis) vis-a-vis their Eurosystem eligible security holdings (horizontal axis) for 566 bank-quarter observations. Dots above the 45-degree line indicate that banks mobilise less liquid assets with the Eurosystem than a representative sample of their holdings of Eurosystem eligible securities would suggest.

Results IV: Intentional vs coincidental liquidity transformation

Key take-aways:

- SHS-G analysis allows to estimate **how selective banks are** when choosing collateral for Eurosystem pool

- **Intentional** liquidity transformation accounts for **60% of total liquidity transformation** before pandemic

- Importance of **coincidental liquidity transformation rises when Eurosystem credit expands** as banks encumber more liquid assets

Quantifying intentional vs coincidental liquidity transformation

Legend:
- Intentional liquidity transformation
- Coincidental liquidity transformation
- % of intentional LT (right scale)
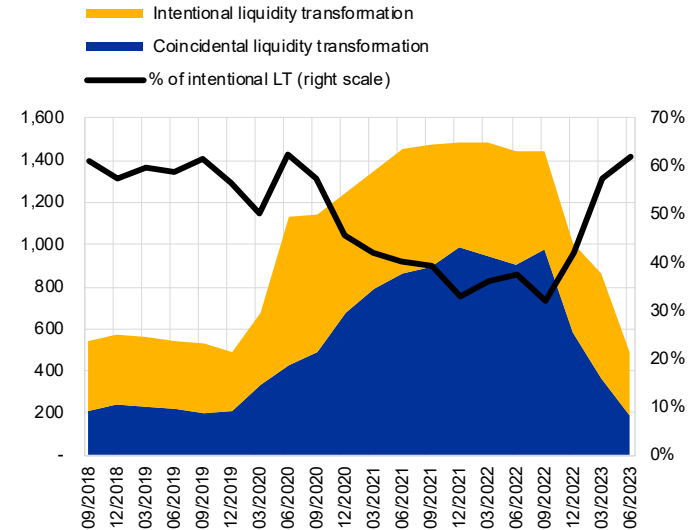
Notes: Decomposition between coincidental and intentional liquidity transformation for marketable assets is identified by comparing the actual liquidity transformation of each bank with the hypothetical liquidity transformation if the bank were to pledge a representative sample of its eligible marketable securities. For non-marketable collateral it is assumed that the split between intentional and coincidental liquidity transformation is the same as for marketables at the bank level.

Conclusion

What this paper does

- Banks can generate HQLA by borrowing reserves from the Eurosystem against non-HQLA collateral

- **New measure to quantify** extent of liquidity transformation based on granular asset- / bank-level data

- Two empirical approaches to **identify intentional from coincidental** liquidity transformation

What this paper finds

- ➤ **Liquidity transformation is substantial** – banks generate 0.92 EUR of HQLA for every euro borrowed from the Eurosystem

- ➤ Banks **mobilise less liquid assets first** and select less liquid securities in their portfolios as collateral

- ➤ This **intentional liquidity transformation accounted for ca. 60%** of total liquidity transformation before the pandemic.

Thank you!