



EUROPEAN CENTRAL BANK

EUROSYSTEM

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**The Implications of Liquidity  
Regulation for Monetary Policy  
Implementation and the Central  
Bank Balance Sheet Size: An  
Empirical Analysis of the Euro Area**

The views expressed here do not necessarily represent those of the Eurosystem or European Central Bank.

# Outline

- Introduction
- Methodology & data
- Estimation strategy & results
- Policy implications

## Motivation

- Bindseil (2016)
  - Regulation raises a number of questions that need to be considered in evaluation & design of post-crisis operational frameworks, e.g. **possible structural increase in banks' demand for reserves**
- BoE Monetary Policy Committee minutes (June 2012)
  - “...**liquidity requirements might in effect be operating to increase the demand for reserves**, offsetting to some extent the impact on the economy of the Bank's increased supply of reserves...”
- FOMC minutes (November 2018)
  - “interest rate control might be difficult to achieve in an operating regime of limited excess reserves in view of the **potentially greater unpredictability of reserve demand resulting from liquidity regulations...**”

## Liquidity coverage ratio

- What is the liquidity coverage ratio (LCR)?
  - Basel III standard announced in 2010

$$LCR = \frac{\text{Stock of HQLA} \text{ Central bank reserves are level 1 HQLA}}{\text{Total expected net cash outflows over next 30 calendar days}}$$

## Methodology

**A quasi-natural experiment:** by exploiting cross-country heterogeneity in treatment of reserves for purposes of fulfilling LCR prior to introduction of common understanding

- CRR (2013):
  - Reserves are HQLA for purposes of fulfilling LCR “to the extent that these exposures can be **withdrawn at any time in times of stress**”
  - “...a common understanding regarding the extent to which minimum reserves can be withdrawn in times of stress” should be reached between competent authority and central bank
- 27 July 2015:
  - German financial regulator announced the treatment on its website
- 30 September 2015:
  - ECB formally announced a common understanding for the Eurosystem

## Methodology

- Internal survey is used to define control and treatment groups which will be used in difference-in-difference estimation
  - National treatment of reserves differed in terms of the LCR numerator and/or denominator
  - For other countries, the regulatory value of reserves increased with the harmonised treatment → treatment group
  - For some countries, the harmonised treatment was the same as the national treatment → control group

## Hypothesis

- Treatment group banks, on average, will have increased their reserve holdings by more in the post-treatment period, ceteris paribus

## Summary of dataset

- Bank level data at quarterly frequency (86 banks, 2014 to 2016)
- Systemically important institutions supervised by the SSM
- Variables:
  - Excess liquidity (i.e. reserve holdings in excess of minimum reserve req.)
  - Dummy variable classifying national treatment of reserves
  - LCR
  - Control for APP liquidity provision
    - Cumulative amount of reserves flowing to bank during APP settlement
  - Control for bank size
    - Minimum reserve requirements
  - Control for banks' leverage ratios
  - Control for yields on alternative HQLA
    - 1yr sovereign spread to deposit facility rate

### Estimation strategy (1/2)

- The LCR is likely to only affect behaviour **when it binds or nearly binds** (Bech and Keister, 2015 and Duffie and Krishnamurthy, 2016), or if a bank's LCR is **low relative to its peers** (Lindquist, 2004 and Baldo et al., 2018).
- Triple differences
  - Estimate the impact of the treatment conditional on degree of compliance with the LCR
- Lowest quartile of our sample in 2015Q2 = 130%
  - We classify banks with an LCR below 130% as low LCR banks and banks with an LCR greater than or equal to 130% as high LCR banks

## Estimation strategy (2/2)

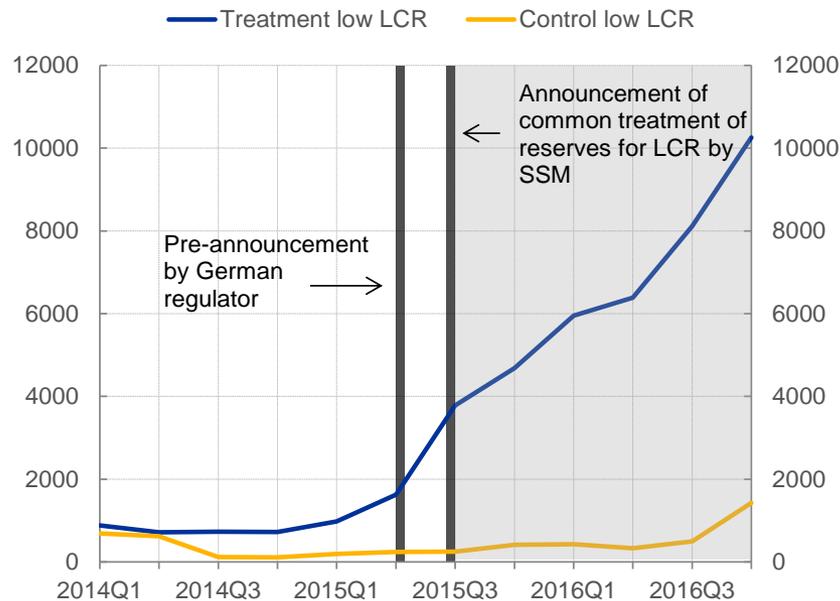
$$EL_{ijt} = \alpha + \beta_1(TREAT_j \times POST_t) + \beta_2(TREAT_j \times LCR_i) + \beta_3(POST_t \times LCR_i) + \beta_4(TREAT_j \times POST_t \times LCR_i) + \mu X_{it} + \eta Z_{jt} + \gamma_i + \vartheta_t + \varepsilon_{it}$$

$EL_{ijt}$	Excess liquidity of bank $i$ , country $j$ , time $t$
$TREAT_j$	Dummy = 1 for banks in treatment group
$POST_t$	Dummy = 1 from 2015Q3 onwards
$LCR_i$	Dummy = 1 if bank $i$ had an LCR < <i>threshold</i> in 2015Q2 (i.e. quarter prior to German announcement of harmonisation of treatment)
$\mu X_{it}$	Controls for bank $i$ , time $t$ including APP liquidity provision, bank size and lagged leverage ratio
$\eta Z_{jt}$	Control for opportunity cost of reserves in country $j$ , time $t$
$\gamma_i$	Bank fixed effect
$\vartheta_t$	Time fixed effect

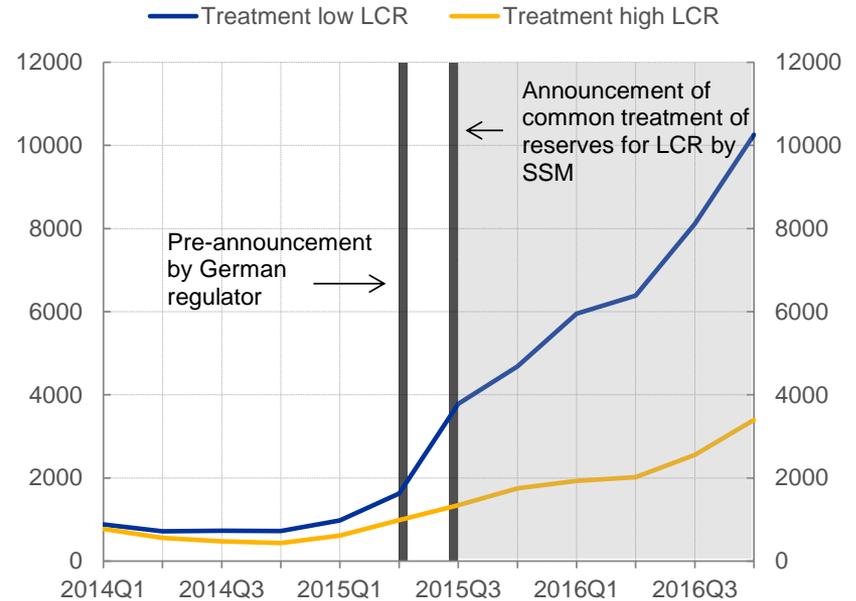
→ Change in EL of low vs. high LCR banks in the treatment group relative to the change in EL of low vs. high LCR banks in the control group

# Average excess liquidity in both groups

Quarterly average excess liquidity in treatment and control groups for banks with low LCRs in 2015Q2 (€ mn)



Quarterly average excess liquidity in treatment group for banks with low vs. high LCRs in 2015Q2 (€ mn)



Source: Kedan and Ventula Veghazy (2018).

Notes: The shaded region shows the period during which the minimum LCR requirements were phased in. The formal announcement of a common treatment of central bank reserves for the purposes of the LCR in the euro area was announced on 30 September 2015 by the SSM. The German regulator pre-announced the common treatment in July 2015.

## Estimated impact of the LCR on demand for reserves conditional on the LCR being below 130% in 2015Q2 (6Q before and 6Q after treatment)

$Y = EL_{it}$	(1)	(2)	(3)	(4)	(5)
Treat x Post x LCR	6803.9** (3268.5)	4817.6** (2480.0)	5712.6* (3239.2)	4873.5* (2588.3)	4699.6** (2203.2)
APP		0.503*** (0.108)	0.500*** (0.084)	0.378*** (0.099)	0.485*** (0.135)
Opportunity cost of reserves			-33.36 (24.09)	-48.26* (28.85)	-128.0** (52.48)
Bank size				15.92*** (5.668)	8.31 (9.366)
Leverage ratio (one period lag)					-3674.2 (35575.0)
Constant	633.4*** (142.1)	633.4*** (126.1)	1830.5** (938.9)	-8578.4* (4637.5)	-3077.2 (7380.0)
Simple interaction terms	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	1032	1032	900	900	590
Banks	86	86	75	75	75
Within R-squared	0.148	0.587	0.593	0.647	0.672

Notes: Country-clustered bootstrap standard errors in parentheses. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels. Significance levels remain broadly unchanged with country-clustered or bank-clustered robust standard errors. The pre-treatment period runs from 2014Q1 to 2015Q2. The post-treatment period runs from 2015Q3 to 2016Q4. As no benchmark one-year sovereign bond yields are available for Cyprus, Estonia, Latvia, Luxembourg and Slovakia, banks located in these countries drop out of the sample when controlling for the opportunity cost of reserves.

- The results are robust to:
  - Narrowing the length of the treatment window or collapsing the sample into two periods
  - Using alternative standard errors
  - Artificially shifting the treatment period ahead by one quarter (“placebo regression”)
  - Lowering the LCR threshold to 120% (excluding controls)

- LCR may induce demand for reserves amongst banks with low liquidity buffers relative to peers
  - Our results point to a regulatory demand of **€148bn - €214bn** for the whole euro area banking sector (i.e. around 48% of pre-crisis liquidity deficit)
- A return to pre-crisis tender procedures and lean balance sheet could lead to more aggressive bidding behaviour and upward pressure on money market rates
- Central bank operational framework should remain flexible enough to respond to potential regulatory demand for reserves
  - Treat regulatory demand as a new autonomous factor (...hard to forecast);
  - FRFA

**Thank you**