

# Eurosystem's asset purchases and money market rates

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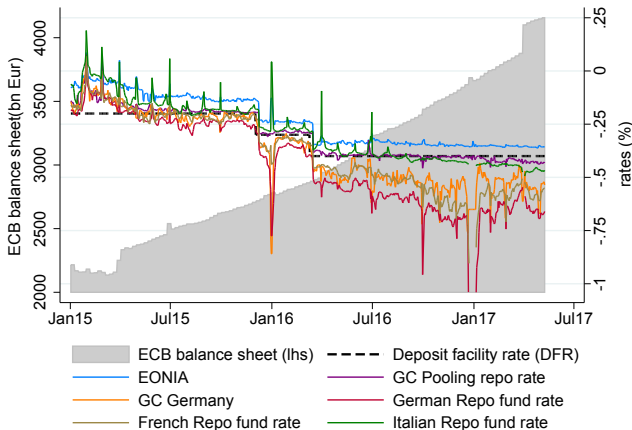
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The views expressed are those of the authors and do not necessarily reflect those of the BdF, the Eurosystem or the IMF.

# Money market rates in the Euro area



- ECB deposit facility rate ceased to be a floor for some money market rates since mid-2015, not long after the start of QE in Euro area
- Increased dispersion of MM rates: transmission issue? Same case in the US
- Country-specific dynamics for repo rates: fragmentation issue?

# Repo rates and asset purchases

Why did repo rates start to deviate since the start of the *Public sector purchase program* (PSPP) ?

- Two alternative explanations: 1) aggregate effects: such as excess liquidity pressuring down interest rates 2) bond-level effects: PSPP creates a shortage of collateral, which depresses some individual bonds' interest rate ("scarcity channel")
- This paper: we use the different repo rates to assess these two possible channels
- We exploit granular bond-level data on repo transactions and Eurosystem's PSPP purchases at daily frequency during 2,5 years

# Basics on repo market in EA

- Repo: counterparty A lends cash against a bond  $i$  (the collateral) in time  $t$ , counterparty B will repay cash  $\times (1 + \text{the repo rate})$  to A and recover its bond in time  $t + 1$
- Largest money market: quarterly turnover of 29 Trn Eur (ECB money market survey, Sept 15)
- Two segments, two motives to transact :

<p>“General collateral” market (GC)</p> <p>Collateral from a basket</p> <p>eg. any French German Italian or Spanish gov bond</p> <p><math>\implies</math> <i>a priori</i> liquidity-driven</p> <p>Borrowing and lending liquidity</p>	<p>“Specific collateral” market (SC)</p> <p>Predetermined security</p> <p>eg. “Bund 0.5% maturing the 25/08/2027”</p> <p><math>\implies</math> <i>a priori</i> security-driven</p> <p>Borrowing a collateral</p>
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- Spread between GC and SC provides a metric of an individual bond scarcity (Duffie, 1996)

# Literature

## Theoretical framework on the causes for low repo rates

- On the concept and source of specialness: Duffie (1996), Fisher (2002)
- Models on US money market and policy implications: Fleming et al. (2010), Bech and Klee (2011), Frost et al (2015), Duffie and Krishnamurthy (2016), Huh and Infante (2017)

## Effects of central banks' asset purchases on repo rates

- Empirical literature on APP and repo rates: D'Amico, Fan and Kitsul (2014), Ferrari et al. (2016), Corradin and Maddaloni (2017), [Arrata et al. \(2017\)](#)

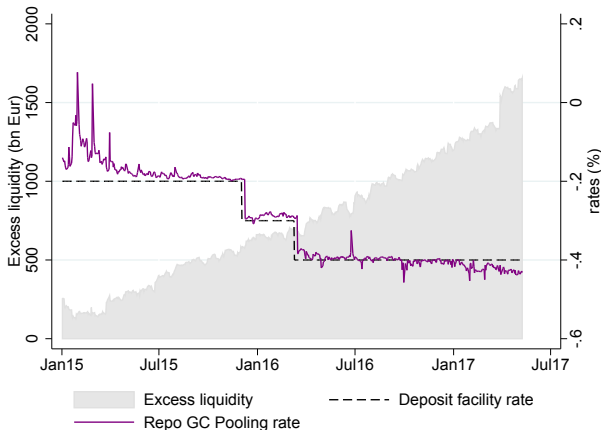
# Outline

We take advantage of the different information contained in the two types of transactions (GC/SC), allowing us to investigate aggregate and bond-level effects of the PSPP.

1. GC rates by jurisdiction and excess liquidity
2. The relationship between GC and SC rates
3. SC rates at the individual security-level:
  - PSPP individual purchases and trade-by-trade data
  - Standard panel regression methodology
4. Results: supporting both the existence of aggregate and bond-level effects of PSPP

# GC rate and excess liquidity

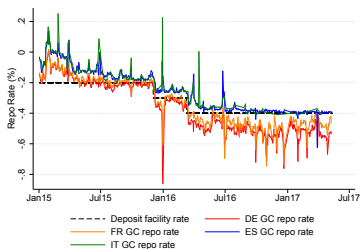
Figure 1: GC Pooling, deposit facility rate and excess liquidity



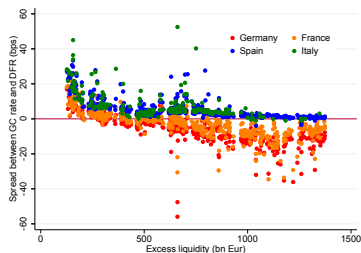
Note: Excess liquidity computed as (current accounts held at the Eurosystem + recourse to the deposit facility - reserve requirements - recourse to the marginal lending facility), source: ECB SDW and Bloomberg.

## Country-specific GC rates

- Some countries GC rates effectively floored by the DFR...
- ... but Core countries GC rates dropped -20bps below DFR



**Figure 2:** GC repo rates for selected countries. Weighted average of GC transactions rates passed on Brokertec by jurisdiction.

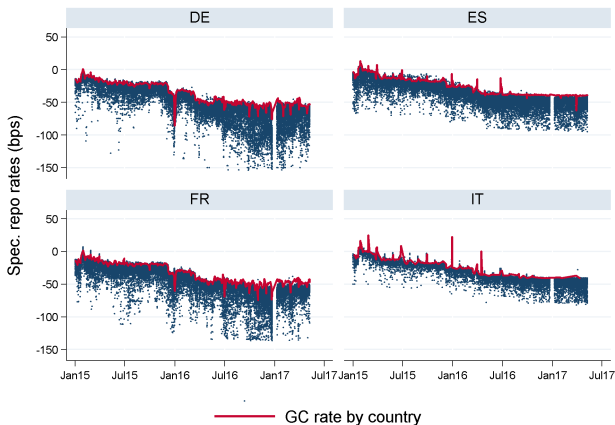


**Figure 3:** Spread of each GC repo rate against the deposit facility rate and excess liquidity. Data shown up to 1500 bn Eur of excess liquidity.



# Relationship between GC and SC repo rates

GC rates are in each country the upper envelope of SC rates (each blue dot in the graph below)  $\Leftrightarrow$  SC rates can be decomposed into one GC component common to all bonds issued by a given country + a bond-specific specialness premium



# Investigating the determinants of SC rates: data

- 7 largest EA countries: DE, FR, IT, ES, NL, BE, AT
- Repo market (Brokertec) trade-by-trade data (dates, bond used, rates and volumes) from January 2015 to May 2017. Raw data  $\approx$  5 millions of trades collateralized with 1282 different ISINs representative of either a basket (GC) or specific securities used as collateral (the vast majority, 87% on average).
- Most traded tenor (S/N), drop the 1st and 99th percentile and the period from 25 Dec 2016 to 7 Jan 2017
- Eurosystem PSPP purchases data at the security-level
- Securities characteristics from Bloomberg & EADB

Panel stats

# Methodology

1. Baseline panel regression:

$$\Delta Repo\ rate_{i,t} = \beta \Delta PSPP_{i,t} + FE_i + FE_{country,maturity,t} + \epsilon_{i,t} \quad (1)$$

where  $FE_i$  is a bond fixed effect,  $FE_{country,maturity,t}$  a country-maturity-time fixed effect.

2. We interact the PSPP variable with some time-varying bond characteristics of interest (being on the run, being cheapest-to-deliver, holding structure...)
3. We get rid of the country-time FE and try to assess the contribution of country and macro variables:

$$\Delta Repo\ rate_{i,t} = \beta_1 \Delta PSPP_{i,t} + \beta_2 Excess\ liquidity_t + \dots \gamma X_t \dots + \beta_6 SLF\ vs\ cash + \beta_7 End_{m,q} + FE_i + \epsilon_{i,t} \quad (2)$$

# Results

$$\Delta Repo\ rate_{i,t} = \beta \Delta PSPP_{i,t} + FE_i + FE_{country,maturity,t} + \epsilon_{i,t}$$

**Table 1:** Effect of PSPP purchases on SC repo rates

	(1) SC repo rate	(2) SC repo rate
PSPP	-0.765*** (0.138)	-0.781*** (0.145)
Bond FE	No	Yes
Country-Bucket-Time FE	Yes	Yes
$R^2$	0.509	0.512
Observations	201864	201855

Standard errors in parentheses, clustered at the maturity bucket-country level.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Assuming we purchase 33% of each bond, variable PSPP would be equal to 33 and the effect on SC repo rate would be equal to  $33 \times -0.78 = -25\text{bps}$ . Results with interactions: quite intuitive, being on-the-run and cheapest-to-deliver commands lower repo rates

Table 2: Effect of PSPP purchases and excess liquidity on SC repo rates

	(1)	(2)	(3)
PSPP	-0.781*** (0.145)	-0.555*** (0.141)	-0.548*** (0.154)
Excess liquidity (excl. MRO and LTRO)		-0.0219*** (0.00265)	-0.0218*** (0.00267)
MRO and LTRO		-0.0539*** (0.00676)	-0.0530*** (0.00686)
End-of-month		-1.757*** (0.540)	-1.753*** (0.543)
End-of-quarter		-1.155** (0.436)	-1.211*** (0.437)
SLF cash dummy		0.352*** (0.106)	0.443*** (0.0867)
Bond FE	Yes	No	Yes
Country-Bucket-Time FE	Yes	No	No
$R^2$	0.512	0.047	0.049
Observations	201855	201580	201572

Standard errors in parentheses, clustered at the maturity bucket-country level.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

See full table in the paper

# Interpreting our results

- Direct and individual bond scarcity created by PSPP purchases: would account for around -25bps in the repo rate
- Indirectly (aggregate effect of the program), excess liquidity associated with -22 bps for every 1 trn
- Core countries repo rates more affected by such aggregated effects
- Period of implementation of Securities lending against cash (slf) associated with alleviated pressure on repo rates
- Additional exercises in the paper:
  - we look at the holding structure of the bonds, bonds held by “inelastic investors”, difficult to source, tends to be more special
  - we look at the differential impact of PSPP on the distribution of SC repo rates: explains more variance in the most special bonds repo rates

## Ongoing work - robustness

- Our results might be affected by the application of “market neutrality”: if PSPP buys less of the bonds most special eg. ECB Coeuré’s speech on avoiding bonds in high demand in the repo market such as the cheapest-to-deliver bond)
- In this case, OLS tends to downplay the impact of PSPP on repo rates
- We use an instrumental variable approach, similar to De Santis & Holm Hadulla (2018) using the technical rules applied to PSPP purchases: our results are preserved and PSPP coefficient roughly 10 times bigger, baseline effect is around 7bps for 1% purchased vs 0.78 bps for OLS.
- Difference between OLS and IV in the order of magnitude of what Corradin & Maddaloni (2017) find for the SMP
- Strongly suggests that the PSPP effects would have been bigger in absence of market neutrality

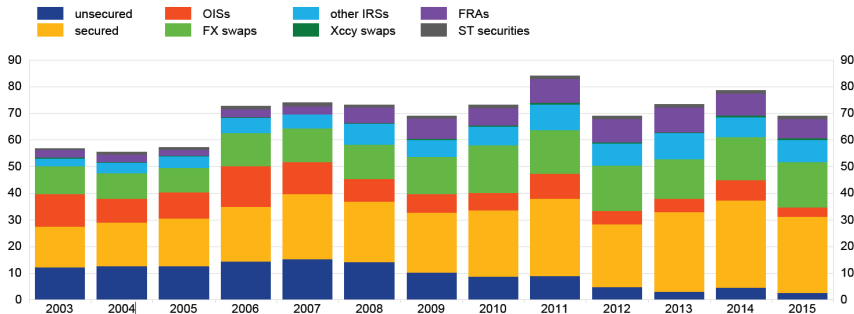
# Policy implications and issues for discussion

- What does it say about how QE works?
  - A possibility is that QE purchases are accommodated with short sales in the first place, covered by borrowing the security on the repo market
  - Trade-off btw controllability of short-term rates vs monetary accommodation? Are GC rates purely risk-free?
- Should low repo rates *per se* be a concern at all?
  - DFR less effective, less credible
  - Specialness reflects in yields: might reduce the monetary policy pass-through to money market but also to the yield curve
- What can central banks do about the low level of repo rates?
  - Securities lending (SLF) may (and seems) to help
  - Our results suggest that removing liquidity would contribute to rise repo rates. Examples abroad, ie. Fed ONRRP



# Appendix

Chart 1 Cumulative quarterly turnover in the euro money market  
(EUR trillion)

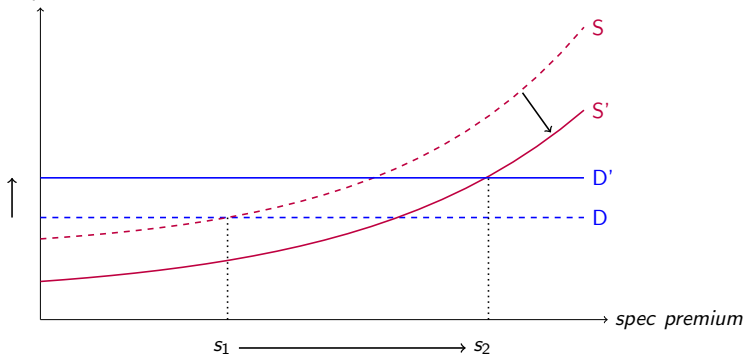


Note: The panel comprised 98 credit institutions.

Source: ECB money market survey, Sept 2015

# Supply, demand and SC repo rates: Duffie's model (1996)

quantity available  
in the repo market

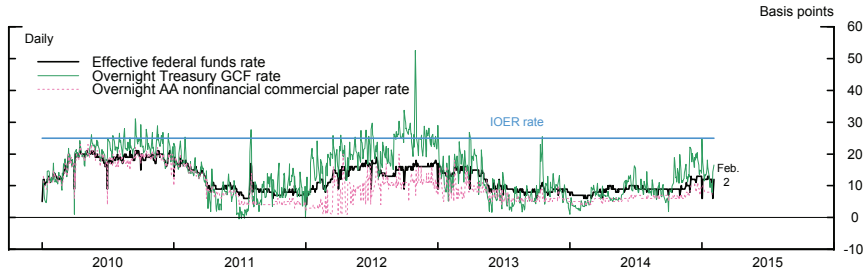


Fisher (2002) *"To attract additional collateral, the marginal holders require larger and larger spreads. (...) The fact that the supply curve rises at all indicates that some holders forgo repo spreads of smaller magnitudes. In fact, there are some holders who do not offer their collateral at any spread."*

# Money market rates in the US

Both unsecured and secured rates below the rate of remuneration of reserves (IOER)

Figure 5: Selected US money market rates



Source: Frost et al. (2015)

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# Descriptive Statistics

Table 3: Cleaned sample 2nd Jan 2015 - 9th May 2017

Variable	mean	min	max	sd	obs
Repo rate (bps)	-40.48	-153.79	10.00	20.42	203203
Share held PSPP	0.06	0.00	0.33	0.08	203203
Time-to-maturity (yr)	6.99	0.01	70.05	8.59	203203
Nom. outstanding (bn Eur)	14.52	0.00	43.19	8.26	203203
Share held by inelastic investors	0.21	0.00	0.90	0.17	199885
ISIN-Daily volume in Repo (mn Eur)	294	1.00	7571	453	203203
Credit rating (1=AAA)	2.96	1.00	8.00	2.64	203203

Average repo rate is -0.405%, slightly below the DFR

Inelastic investors refer to holdings by insurances and pension funds, households, non-financial corporations and governments, in the spirit of Kojen et al. (2016) and using Securities holdings statistics data.

# Repo market and financial regulation

- **Demand for high quality collateral:** Some regulations (LCR, NSFR, Solvency II, UCITS V) increase demand for holding certain assets (eg. High Quality Liquid Assets, HQLAs), and discourage lending them in the repo market
- **Leverage cost :** incentivize financial institutions to reduce repo exposure or repo intermediation (eg. SLR)
- **Window dressing:** US banks reporting on periods averages, European banks reporting at end-of-period (month-ends for LCR ratios, quarter-ends for SLR ratios, year-ends for Single Resolution Fund). See Munyan (2015) CGFS Paper n59 on repo market functioning (2017)

**Table 4: Securities lending facilities (SLF) against collateral conditions**

Country	SLF cost, to borrow a specific security	Limits
Germany	GC rate minus some fixed (confidential) spread	200 mln EUR/security
Netherlands	GC rate minus 10 to 25 basis points	200 mln EUR/security
France	GC rate minus 10 to 25 bps	200 mln EUR/security
Italy	The special repo rate for that security minus an additional penalty of 10 basis points	200 mln EUR/security
Spain	The most penalizing of these two rates: special repo market rate for that security or the GC rate minus 10 basis point	200 mln EUR/security
US	Minimum bid rate of 5 basis points	90% limit on holdings

**Table 5: Securities lending facilities (SLF) against cash conditions**

Country	SLF cost, to borrow a specific security	Limits
Eurosystem	-30 bps below the ECB deposit facility rate	50bn Eur in total

Source: central banks' respective websites