EUROPEAN CENTRAL BANK

EUROSYSTEM

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Flow effects of PSPP on sovereign bond yields:

Evidence from a natural experiment

Banca d'Italia workshop on unconventional monetary policy

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Motivation

Research question: do PSPP purchases generate **flow effects** on sovereign bond yields?

Basic approach: regress bond yields on central bank asset purchase volumes (e.g. Joyce and Tong, 2012 for UK; D'Amico and King, 2013, and Kandrac and Schlusche, 2013 for US)

Yield of ISIN *i* at time *t*

PSPP purchases of substitute *j* of ISIN *i* at time *t* *(in % of outstanding amounts)*

$$y_{it} = \beta_1 Q_{it}^{own} + \sum_{j=1}^{J} \gamma_1^j Q_{it}^{sub,j} + u_{1,i} + v_{1,t} + \varepsilon_{1,it}$$

PSPP purchases of ISIN *i* at time *t* *(in % of outstanding amounts)*

ISIN/time-fixed effects

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Identification problem: purchase volumes and prices/yields are probably **jointly determined**

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Upshot: if purchasing officers account for cheapness/dearness characteristics in selection of bonds to buy (*i.e.* $\beta_2 \neq 0$), then simple OLS estimation of $\hat{\beta}_1$ suffers from simultaneity bias

$$sign(asymptotic\ bias) = sign\left(\frac{\beta_2}{1-\beta_2\beta_1}\right)$$

β_2: >0

$\beta_2\beta_1$: <0

Identification approach

Basic idea: exploit temporary PSPP purchase restrictions during 'blackout periods' to identify exogenous variation in ISIN-specific PSPP purchase volumes (Q_{it})

Blackout period: *"(…) no purchases shall be permitted in a newly issued or tapped security and the marketable debt instruments with a remaining maturity that are close in time, before and after, to the maturity of the marketable debt instruments to be issued, over a period to be determined by the Governing Council ('blackout period')"*. Article 4(1) of PSPP Decision

Implication: variation in Q_{it} due to blackout periods results from purchasing restrictions hardwired into PSPP design, not from endogenous choice of purchase officers

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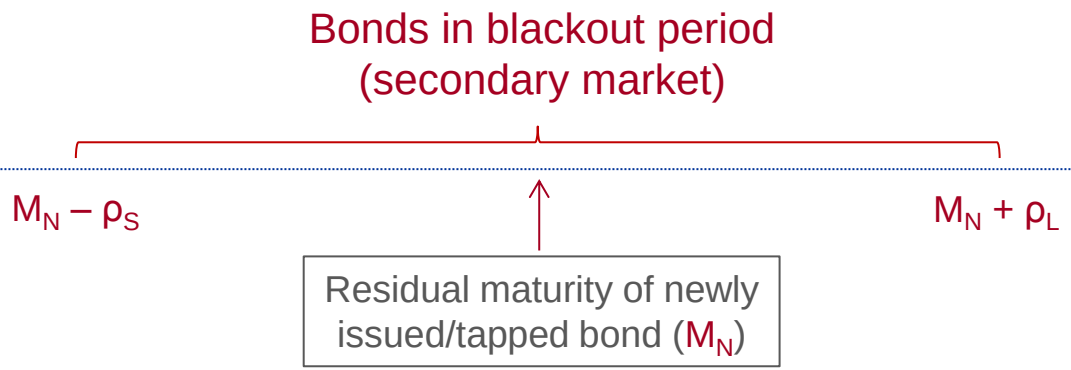

Specification – 2SLS IV regression with blackout dummy as excluded instrument

First stage regression:

$$Q_{it}^{own} = \delta_2 D_{it} + \sum_{j=1}^{J} \delta_2^j D_{it}^j + u_{2,i} + v_{2,t} + \varepsilon_{2,it}$$

$$where\ D_{it} = \begin{cases} 1 & \text{if ISIN } i \text{ is in blackout period on day } t \\ 0 & \text{otherwise} \end{cases}$$

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Second-stage regression:

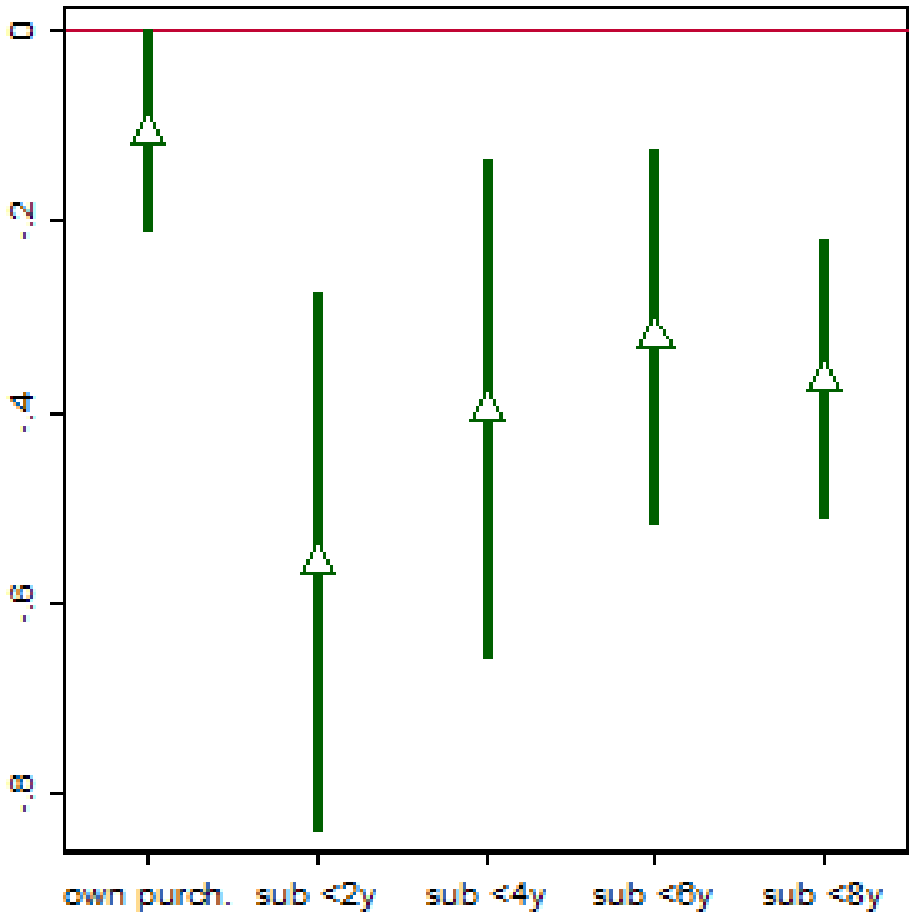
$$y_{it} = \alpha_1 + \beta_1 \widehat{Q}_{i,t}^{own} + \cdots + u_{1,i} + v_{1,t} + \varepsilon_{1,it}$$

(analogous procedure for substitutes)

Data

- Sample period: March 2015 – June 2016 (daily data)
- Number of ISINs: 3,025
- Observations: 878,680
- Sources: yields and outstanding amounts for sovereign bonds from Bloomberg; purchase volumes and blackout periods from proprietary ECB database

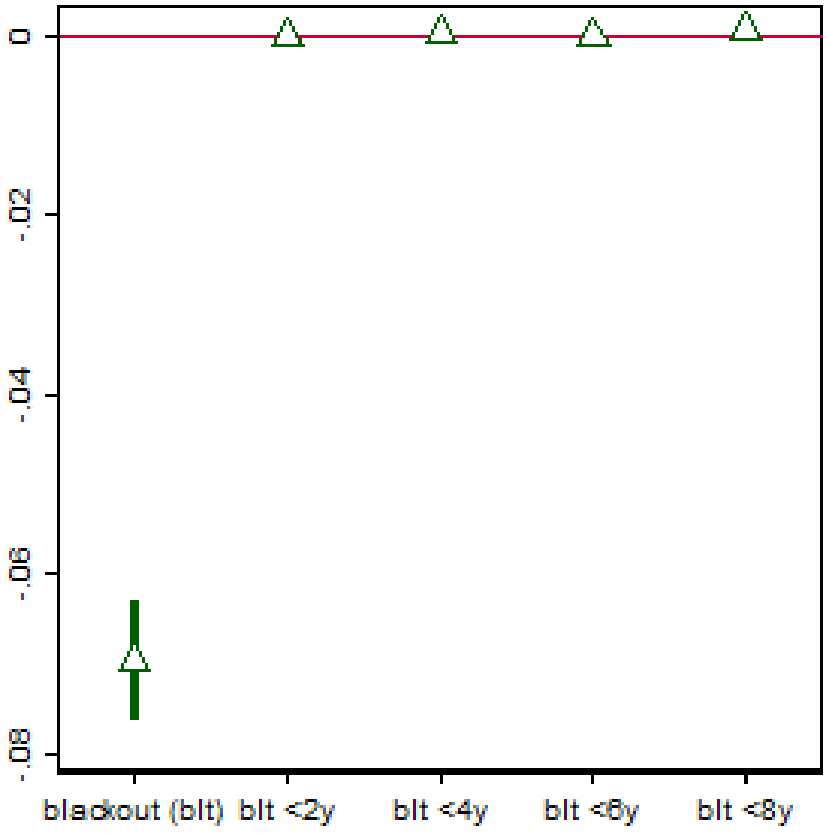
Estimated flow effects of PSPP on sovereign bond yields – baseline



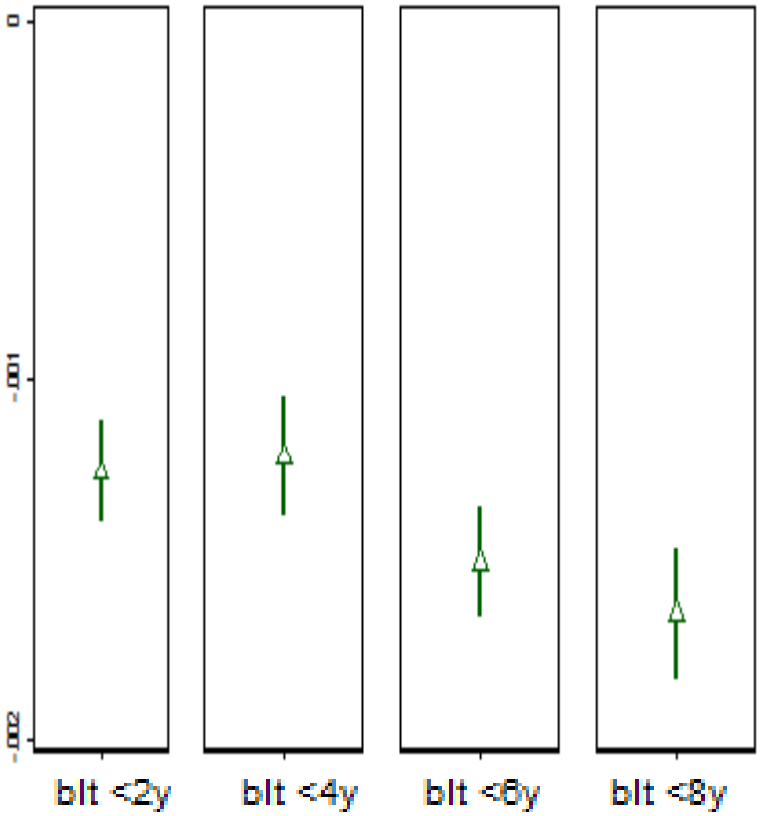
Markers give point estimates of yield impact of 1 percentage point increase in PSPP purchases (relative to outstanding amounts); bars denote 95% confidence intervals; estimates based on cluster-robust standard errors

Estimated flow effects of PSPP on sovereign bond yields – first stage regressions

Own purchases

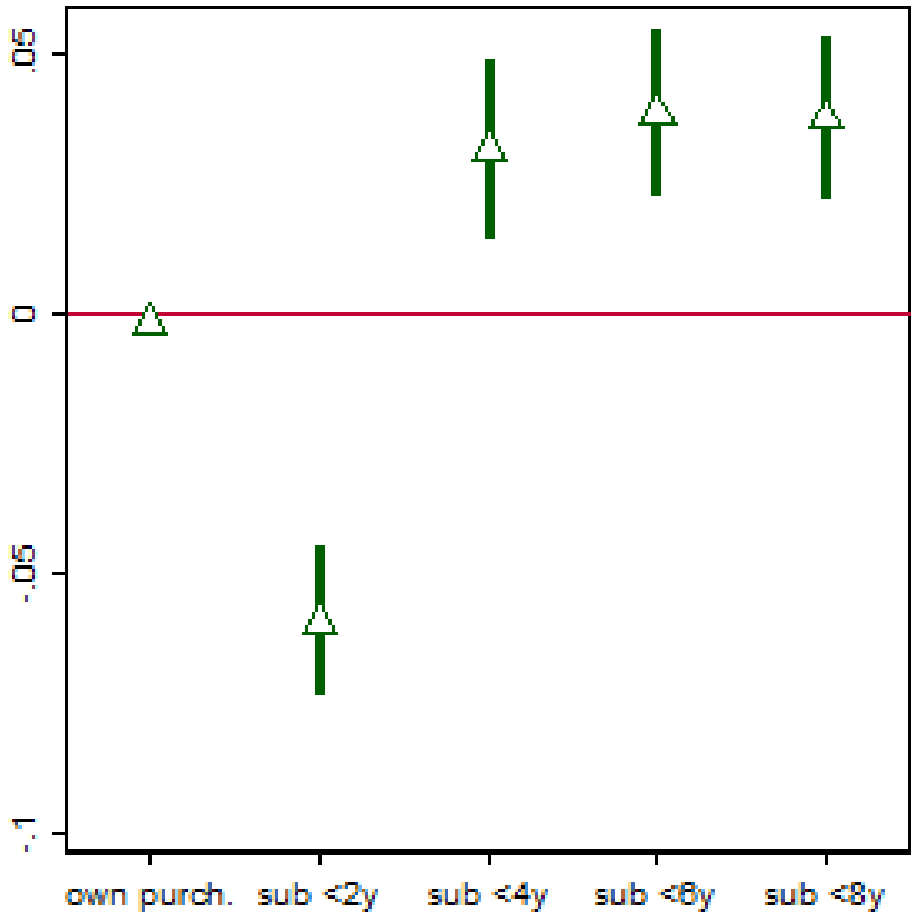


Substitute purchases



For own purchases, markers (bars) show point estimates (95% confidence intervals) of the coefficient on the blackout period dummy. For substitutes, the estimates refer to the impact of a 1 percentage point change in the share of ISINs in blackout period on purchase volumes as a percent of outstanding amounts in the respective maturity segment

Estimated flow effects of PSPP on sovereign bond yields – OLS specification



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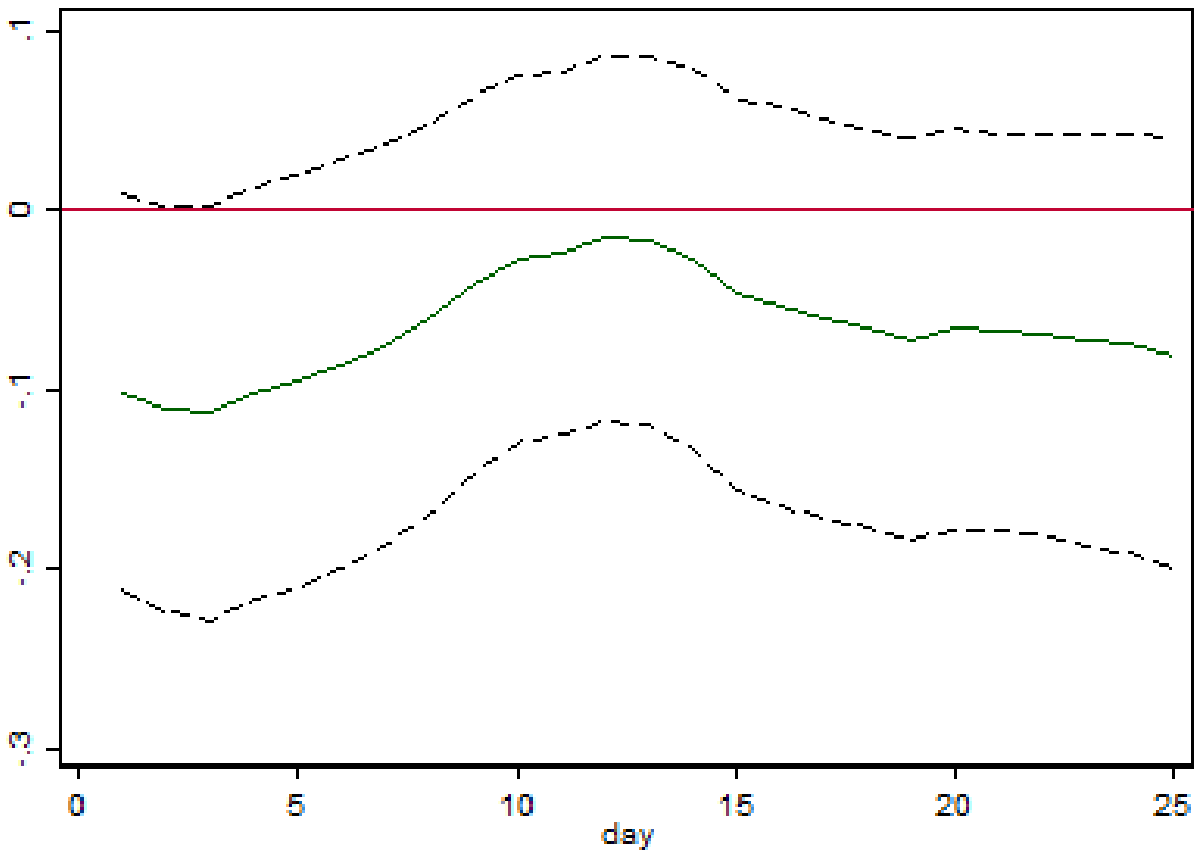
Evolution of flow effects over time – own purchases



Solid line shows evolution of point estimates from separate regressions lagging the explanatory variables by as many days as indicated by the respective tick on the x-axis. Dashed lines show upper and lower bounds of 95% confidence interval.

Summary and conclusion

Key takeaways

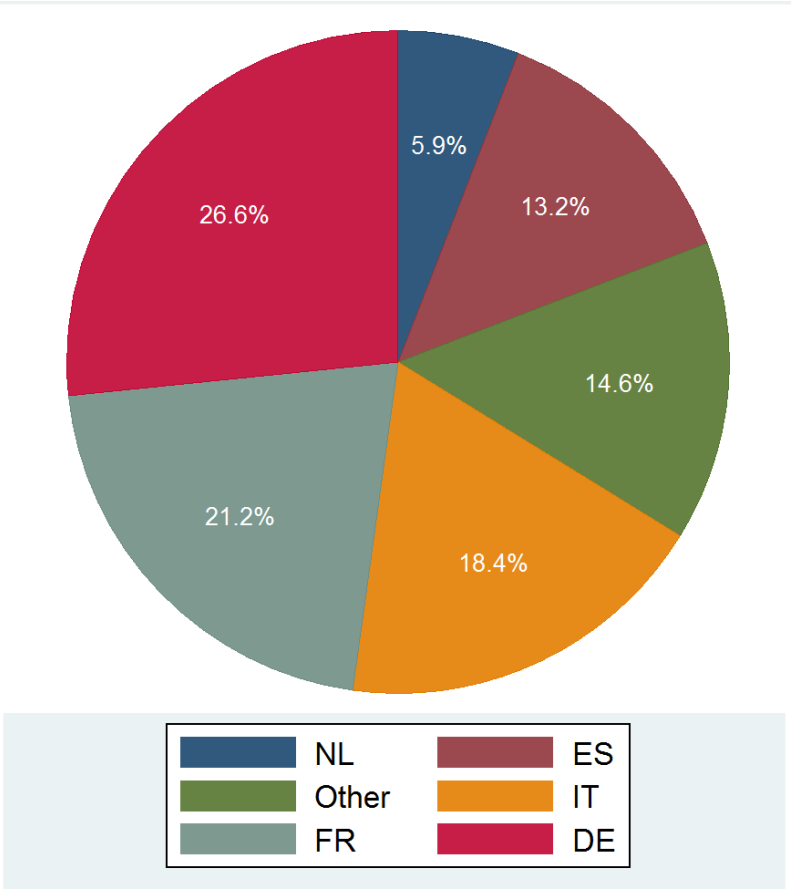
- Standard OLS regressions of bond yields on central bank asset purchases suffer from **simultaneity bias**
- The **blackout period** hardwired into the design of PSPP offers a potential avenue to address this issue
- We exploit this design feature in a 2SLS **IV-regression model to obtain exogenous variation in central bank asset purchases** at ISIN-by-ISIN level
- We find that – in contrast to the biased OLS estimates – the **IV approach generates statistically significant effects** of asset purchases on bond yields
- The estimates are **higher than those found for other economies** in the related literature (which, thus far, has not addressed simultaneity bias)
- Overall, the **effects remain small**, however, thus confirming the consensus in the related literature that central bank asset purchases mainly work via stock effects

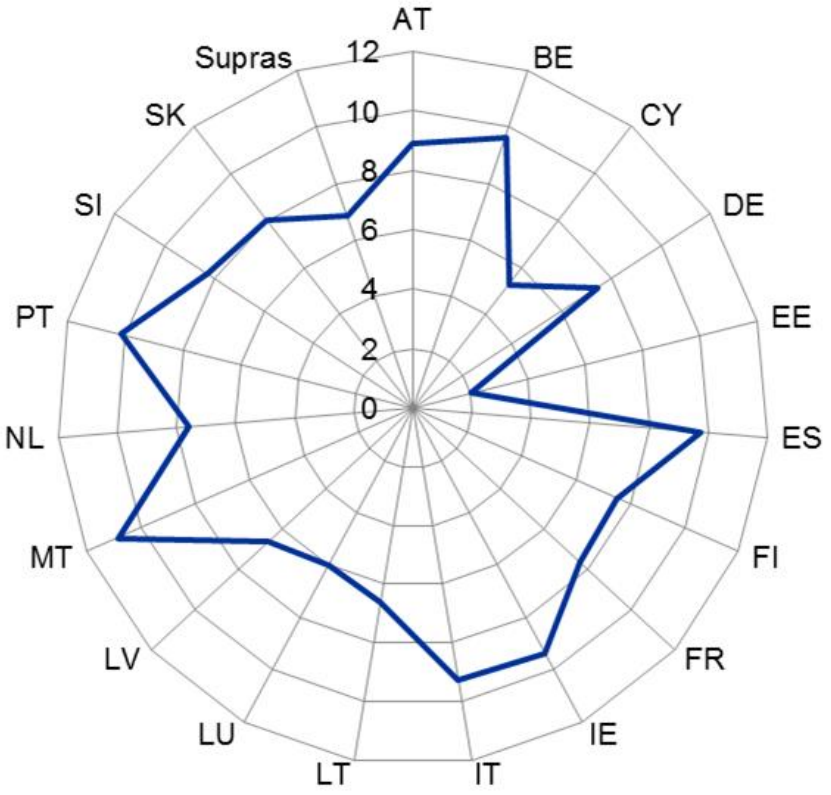
Background

Monthly purchase volumes (LHS, €bn) and weighted average maturity (RHS, years)

Source: ECB

Cross-country allocation of purchases (LHS, %) and WAM by country (RHS, years)





Source: ECB