Unintended Consequences of QE: Real Estate Prices and Financial Stability

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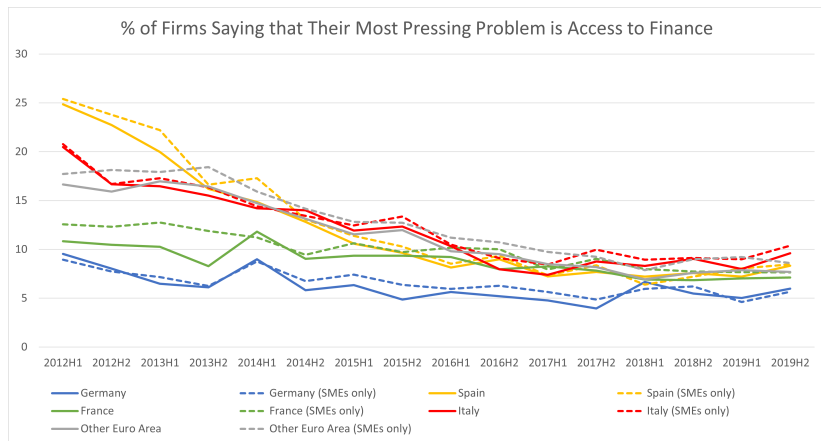[4]Goethe University Frankfurt & CAS LawFin

October 2024

Motivation: The Corporate Sector Purchase Programme

▶ Announcement in March 2016, start of purchases in June 2016. Complemented by PEPP since March 2020.

▶ Eurozone IG-rated non-financial corporate bonds are eligible

▶ Holdings amount to €350bn at peek in 2022
$\implies$ 31% of the eligible universe
$\implies$ 7% of Eurozone bank lending to non-financial corp.

▶ Rationale: Overcome credit supply frictions by providing credit directly to the real sector

▶ Similar programs: Japan (2011), UK (2016), and U.S. (2020)

Credit saturated economies

▶ What if the banking sector frictions these programs are supposed to address do not exist?

▶ Why important?
  $\implies$ Heterogeneity within currency area
  $\implies$ Unwinding of CSPP

▶ Our setting: Germany, 2012-2019
  $\implies$ Pre-CSPP (i.e. in 2015), only 5% of German firms considered access to finance a problem
  $\implies$ Unemployment rate low

▶ Method: Difference-in-difference, including Khwaja-Mian and Amiti-Weinstein estimators to isolate supply

Motivation: Germany as Credit-Saturated Market

% of Firms Saying that Their Most Pressing Problem is Access to Finance

Legend: Germany; Germany (SMEs only); Spain; Spain (SMEs only); France; France (SMEs only); Italy; Italy (SMEs only); Other Euro Area; Other Euro Area (SMEs only)

Source: ECB SAFE survey

Motivation: Literature

Literature: QE positively affects bank lending

- ▶ Examples with U.S. settings: Rodnyansky and Darmouni (2017), Kandrac and Schlusche (2021)

- ▶ Exception: Chakraborty et al. (2020) document unintended side effects. Banks benefiting from MBS purchases increase mortgage lending (as intended), but reduce commercial lending (unintended crowding out).

Literature: Corporate QE with favorable effects:

- ▶ Eligible bonds' yields decrease (Zaghini (2019)) ▸ Yields

- ▶ Eligible firms substitute bank debt with bond debt (Grosse-Rueschkamp et al 2019, Arce et al 2018, Ertan et al 2020, Todorov 2020, Abidi et al 2018) ▸ Issuances

- ▶ This gives rise to spillovers to ineligible firms (Grosse-Rueschkamp et al 2019, Arce et al 2018, Ertan et al 2020)

$\implies$ we explore unintended adverse effects in 'credit-saturated' markets (Germany) + cross-industry effects

Data

We combine several supervisory datasets by Deutsche Bundesbank

- ▶ The Credit Register contains all loans above €1m (before 2015: above €1.5m). We only keep Eurozone non-financial corporations and flag CSPP eligible firms by hand

- ▶ Banks report probabilities of default (PDs) for each borrower

- ▶ Bank balance sheet and P&L information

- ▶ We obtain information on firms (e.g. size) from Bundesbank and BvD Amadeus

- ▶ Sample Period: 2012-2019

Empirical Design

We estimate difference-in-differences regressions of the type

$$y_{bt} = \beta \times Treat_b \times After_t + Controls_{bt-1} + \gamma_b + \gamma_t + \varepsilon_{bt}$$

where

- y_{bt} is a bank portfolio composition or profitability measure

- $Treat_b$ is equal to one for banks whose share of lending to CSPP eligible firms (relative to total Eurozone corporate lending) in the two years before the CSPP is above the median

- $After_t$ is equal to one for quarters/years after 2015

- γ_b and γ_t are bank and quarter/year fixed effects

- Lagged control variables are Log Total Assets, Capital Ratio, Deposit Ratio, Off-BS Ratio and Share of Fee Income

- We cluster standard errors on the bank level

Descriptives

	Unit	Level	Treat				Control			
			n	Mean	SD	Median	n	Mean	SD	Median
Measure on bank affectedness										
Share Eligible (Static)	%	Bank	121	13.59	9.86	9.32	120	1.69	1.28	1.52
Quarterly measures on bank corporate loan portfolio composition										
Share Eligible	%	Bank x Quarter	3,567	13.05	9.85	9.79	3,539	2.23	2.22	1.80
Lending to Eligibles	€m	Bank x Quarter	3,567	372	1,459	75	3,539	35	98	13
Lending to Ineligibles	€m	Bank x Quarter	3,567	2,642	8,783	539	3,539	1,787	4,795	698
Total Corp. Lending	€m	Bank x Quarter	3,567	3,013	9,993	624	3,539	1,821	4,871	714
PD	%	Bank x Quarter	3,567	2.18	2.15	1.57	3,539	3.62	5.17	2.30
Share HY	%	Bank x Quarter	3,567	19.52	9.75	17.92	3,539	24.71	15.54	20.82
Share REAM	%	Bank x Quarter	3,567	17.43	9.16	17.09	3,539	22.86	11.74	21.70
RE Collateral	%	Bank x Quarter	3,528	51.27	18.89	53.84	3,524	52.88	21.05	56.12
Yearly measures on bank profitability										
NII / Toas	%	Bank x Year	910	1.82	0.45	1.90	910	1.91	0.44	1.90
Loan write-offs / Toas	%	Bank x Year	910	0.19	0.16	0.16	910	0.27	0.24	0.21
Rest / Toas	%	Bank x Year	910	-0.84	0.36	-0.88	910	-0.85	0.34	-0.86
RoA	%	Bank x Year	910	0.79	0.36	0.80	910	0.79	0.40	0.78
Yearly lagged control variables										
Capital Ratio	%	Bank x Year	910	17.14	3.81	16.65	910	16.14	3.68	15.51
Deposit Ratio	%	Bank x Year	910	48.89	12.53	48.75	910	49.88	12.44	48.79
Off-BS Ratio	%	Bank x Year	910	3.11	3.00	2.18	910	2.48	1.86	2.12
Share of Fee income	%	Bank x Year	910	18.70	9.89	17.32	910	18.37	8.65	17.58
Quarterly lagged control variables										
Total Assets	€bn	Bank x Quarter	3,567	13.38	39.55	3.38	3,539	7.41	13.16	3.67

Results: Substitution

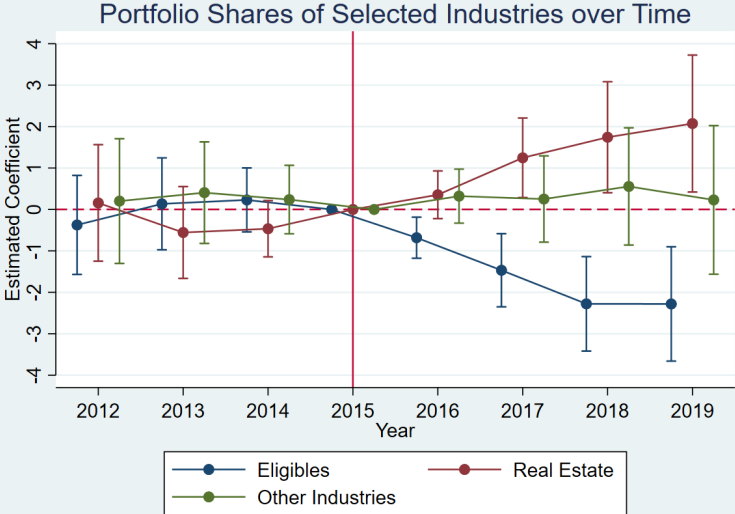| Dependent variable:	Share Eligible		Ln(Total Corp Lending)	
	(1)	(2)	(3)	(4)
Treat x After	-1.5608***	-1.6420***	0.0075	0.0014
	(-3.00)	(-3.24)	(0.27)	(0.06)
Controls	no	yes	no	yes
Quarter FE	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes
Observations	7,106	7,106	7,106	7,106

▶ Fraction of lending to eligible firms decreases by 1.64 pp (represents 12% of the pre-event share of eligible lending at treated banks)

▶ No impact on total lending (i.e. banks fully substituted)
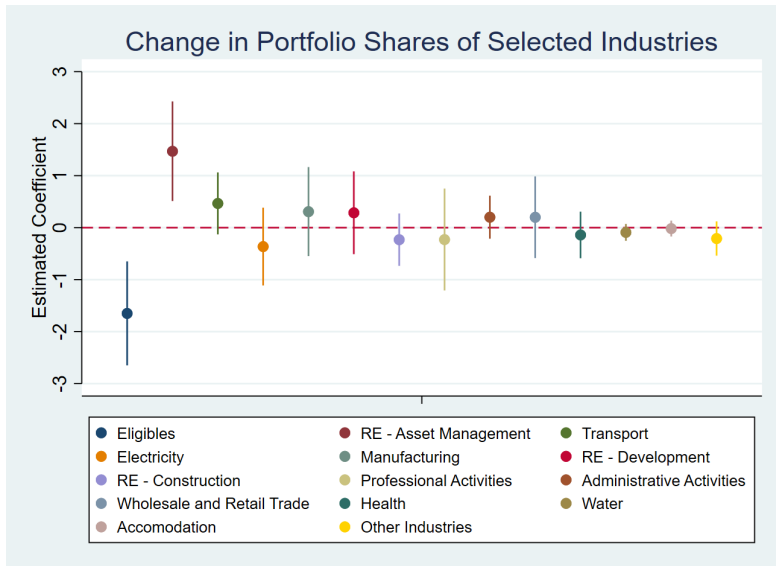
Results: Capital Allocation

Dependent variable:	Portfolio Share per Industry			Portfolio Share per Real Estate Subindustry		
	Eligibles	Real Estate	Other	Construction	Development	Asset Man.
Treat x After	-1.6420***	1.4822**	0.1597	-0.2381	0.2748	1.4455***
	(-3.24)	(2.21)	(0.24)	(-0.93)	(0.68)	(2.97)
Controls	yes	yes	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes	yes	yes
Quarter FE	yes	yes	yes	yes	yes	yes
Observations	7,106	7,106	7,106	7,106	7,106	7,106
Sample Mean in %	7.63	36.66	55.72	4.72	12.78	19.16

▶ Lending share of eligibles is shifted to real estate sector

▶ No impact on other industries

▶ Within real estate sector funds go to RE asset managers (no impact on supply). These are rather small, highly levered private firms

Results: Substitution

Portfolio Shares of Selected Industries over Time

Results: Substitution

Change in Portfolio Shares of Selected Industries

Legend:
- Eligibles
- Electricity
- RE - Construction
- Wholesale and Retail Trade
- Accomodation
- RE - Asset Management
- Manufacturing
- Professional Activities
- Health
- Other Industries
- Transport
- RE - Development
- Administrative Activities
- Water

Results: Robustness

- ▶ Results robust to within-firm estimate (Khwaja-Mian or Amiti-Weinstein)
  $\rightarrow$ suggest supply side explanation

- ▶ Results robust to matching on bank size and profitability
  $\rightarrow$ not due to pre-existing observable differences across banks

- ▶ Results robust to region x time fixed effects
  $\rightarrow$ not due to spatial variation in post-CSPP economic development

Discussion: Why Real Estate Asset Managers?

- ▶ Supply based argument: Attractive for banks to lend to due to high collateralization, i.e. low risk weight:

Average Loan Collateralization per Industry
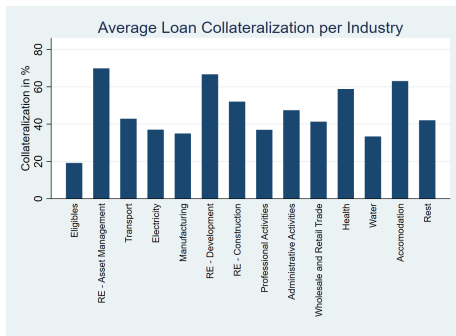
- ▶ Demand based argument: Real Estate asset managers can scale up their business easily (as opposed to e.g. project developers who depend on the construction industry)

- ▶ Other industries (i.e. construction industry) in Germany were operating at full capacity already prior to the CSPP

Results: Impact on the Real Estate Sector

- ▶ Now examine the impact of increased real estate lending on a geographical level

- ▶ Data on firms' total assets per county from BvD Amadeus, real estate price data from Bulwiengesa

- ▶ Define treated counties as those with above-median share of firms that lend from affected banks pre-CSPP (see e.g. Huber 2018 AER)

- ▶ Control for GDP per capita and GDP per hour worked

Results: County Level Descriptives

	Unit	Level	Treat				Control			
			n	Mean	SD	Median	n	Mean	SD	Median
Measure on county affectedness										
Share County (Static)	%	County	200	10.23	2.35	9.45	201	6.01	1.24	6.18
Yearly measures on county real estate firms										
Toas RE	€bn	County x Year	1,594	1.35	5.26	0.33	1,545	1.38	6.16	0.46
Toas Non-RE	€bn	County x Year	1,594	14.28	32.97	4.68	1,545	10.39	32.32	3.81
Frac Toas RE	%	County x Year	1,594	8.18	8.07	5.96	1,545	11.91	8.23	9.89
Yearly measures on county real estate prices and economic strength indicators										
Price Existing Apartments	€/m²	County x Year	1,594	1,845	845	1,650	1,545	1,660	732	1,488
Rent Existing Apartments	€/m²	County x Year	1,594	6.82	1.81	6.50	1,545	6.59	1.62	6.20
Price to Rent Ratio		County x Year	1,594	21.72	4.55	21.16	1,545	20.30	4.46	19.67
Price to Income Ratio		County x Year	1,594	5.16	2.11	4.68	1,545	5.24	1.92	4.77
GDP per Cap.	€	County x Year	1,594	37,819	16,366	33,003	1,545	33,031	14,658	29,313
GDP per Hour	€	County x Year	1,594	49.21	8.47	47.84	1,545	45.95	8.61	44.90

Results: Real Estate Debt Growth in Treated Districts

	Ln(Debt RE)		Ln(Debt Non-RE)	
	(1)	(2)	(3)	(4)
Treat x After	0.0670**	0.0605**	0.0009	-0.0039
	(2.49)	(2.33)	(0.04)	(-0.20)
Controls	no	yes	no	yes
County FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Observations	3,139	3,139	3,139	3,139

▶ Real estate firms' debt increase by 6.05%

▶ Not associated with districts whose firms experience higher debt growth as such

Results: Real Estate Prices and (Over-)Valuation

	Ln(Price Exist. Apartments) (1)	Ln(Rent Exist. Apartments) (2)	Price to Rent Ratio (3)	Price to Income Ratio (4)
Treat x After	0.0313***	0.0166***	0.4370**	0.1480**
	(2.74)	(3.29)	(2.09)	(2.02)
Controls	yes	yes	yes	yes
County FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes
Observations	3,139	3,139	3,139	3,139

- ▶ Control for GDP/capita and GDP/hour worked

- ▶ In CSPP-affected counties apartment prices increase relative to control counties by 3.13% following CSPP

- ▶ Real estate purchasers have to invest an additional 14.8% of annual income compared to unaffected counties
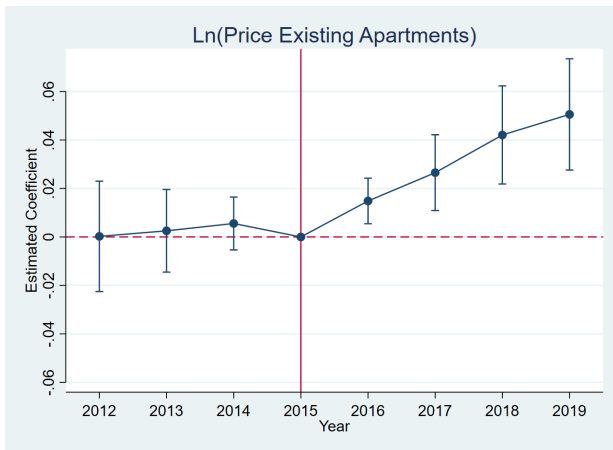
Results: Real Estate Prices and (Over-)Valuation
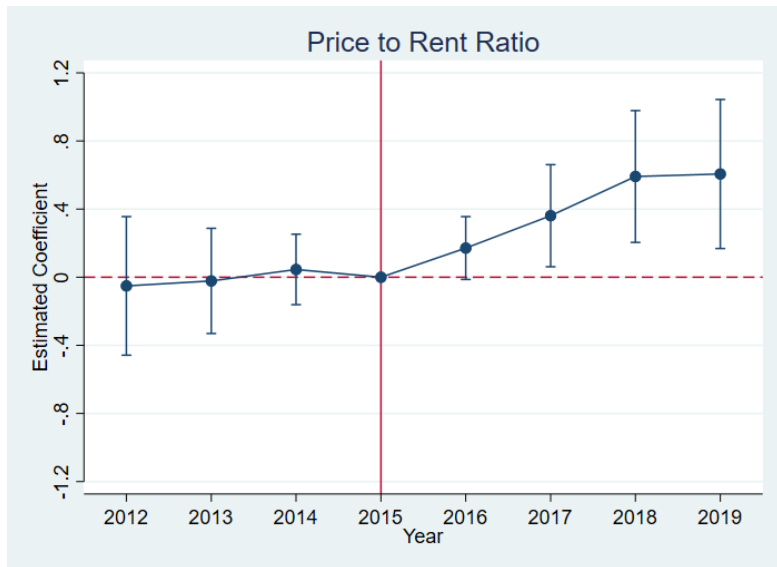
Results: Real Estate Prices and (Over-)Valuation

Results: Magnitude

Ln(Price Existing Apartments)
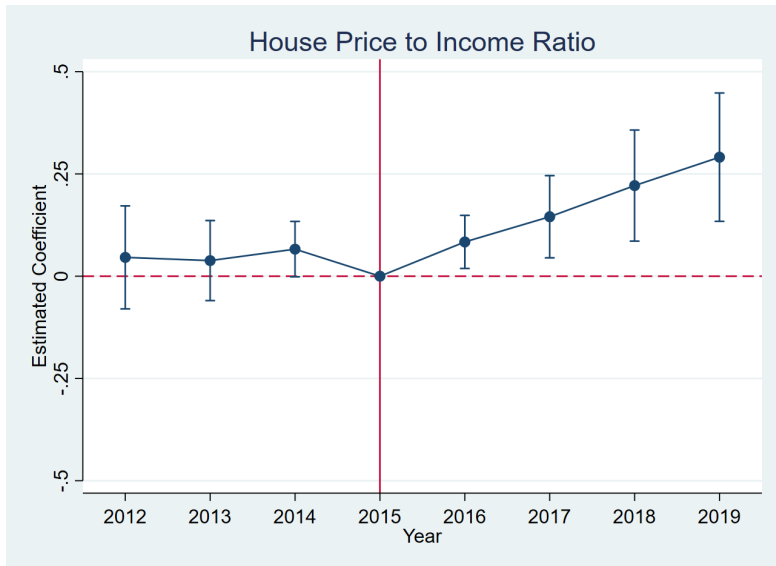
▶ increase of around 5% from 2015 to 2019 $\implies$ represents 17% (=5%/29%) of growth in residential real estate in that period

Elasticities

▶ Elasticity of real estate prices to credit supply: 0.84
(1% increase in debt of real estate firms increases real estate prices by 0.84%)

▶ Semi-elasticity of real estate prices to interest rates: between 5.1-20.4 (depending on assumptions)

▶ Considerably higher than prior estimates in the literature (Adelino et al. (2024), Favara and Imbs (2015), Di Maggio and Kermani (2017)).

▶ Why? Credit saturated economy: increase in credit supply fully materializes in higher prices

▶ Implications: Real estate booms can materialize in credit saturated economies even with relatively modest expansionary shocks to credit supply

Results: Why Care?

▶ Same issues in multiple credit-saturated Eurozone economies:

23 September 2019

The European Systemic Risk Board (ESRB) has today published a set of country-specific warnings and recommendations on medium-term vulnerabilities in the residential real estate sector. The ESRB has a mandate to issue warnings when significant systemic risks are identified and to provide recommendations for remedial action to address such risks. The warnings were sent to the competent ministers of the following five countries: the 📄 Czech Republic, 📄 Germany, 📄 France, 📄 Iceland and 📄 Norway[1]. Similarly, the recommendations were sent to the compenent ministers of the following six countries: 📄 Belgium, 📄 Denmark, 📄 Luxembourg, 📄 the Netherlands, 📄 Finland and 📄 Sweden[2].

▶ ECB very concerned about real estate prices (e.g. TLTRO series did not allow for lending to real estate sector)

Results: Financial Stability

Dependent variable:	Ln(PD)		Ln(HHI)		Fraction RE Collateral	
	(1)	(2)	(3)	(4)	(5)	(6)
Treat × After	0.2531***	0.2520***	0.0310	0.0341*	2.1179***	2.2927***
	(4.11)	(4.11)	(1.53)	(1.73)	(2.71)	(3.09)
Controls	no	yes	no	yes	no	yes
Quarter FE	yes	yes	yes	yes	yes	yes
Bank FE	yes	yes	yes	yes	yes	yes
Observations	7,106	7,106	7,106	7,106	7,052	7,052

Results: Financial Stability

Dependent variable:	Loan Write-offs / Toas		NII / Toas		Rest / Toas		RoA	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat × After	0.0504***	0.0478***	0.0202	0.0172	-0.0190	-0.0224	-0.0492*	-0.0530**
	(3.03)	(2.95)	(0.82)	(0.75)	(-0.79)	(-1.02)	(-1.94)	(-2.12)
Controls	no	yes	no	yes	no	yes	no	yes
Bank FE	yes	yes	yes	yes	yes	yes	yes	yes
Quarter FE	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,819	1,819	1,819	1,819	1,819	1,819	1,819	1,819

▶ "Rest" sums up fee income, trading income and operational income

▶ ROA decreases by 6-7% of sample mean

Conclusion

Unintended side effects of ECB's Corporate Sector Purchase Program (CSPP) in credit-saturated economies

(1) Increase in real estate lending, fueling prices and overvaluation

(2) Banks' profitability decreases

Central banks' unconventional monetary policy programs have the potential to contribute to banking sector instability and real estate bubbles.
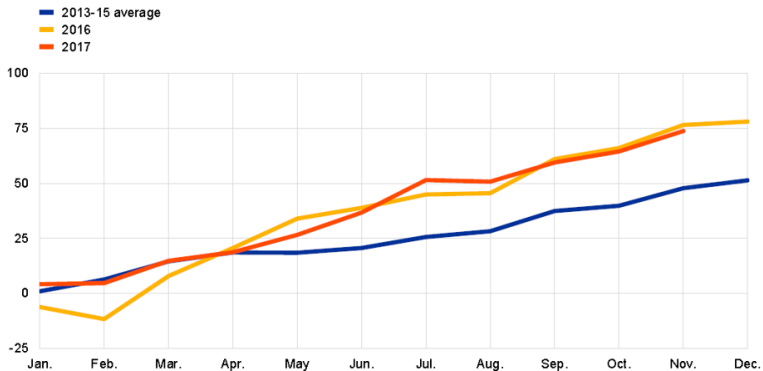
First Order Effects: Eligible Bonds' Spreads
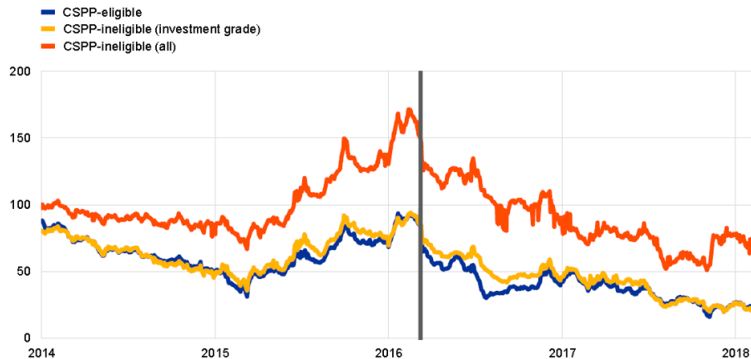
(Source: ECB Economic Bulletin 3/2018)
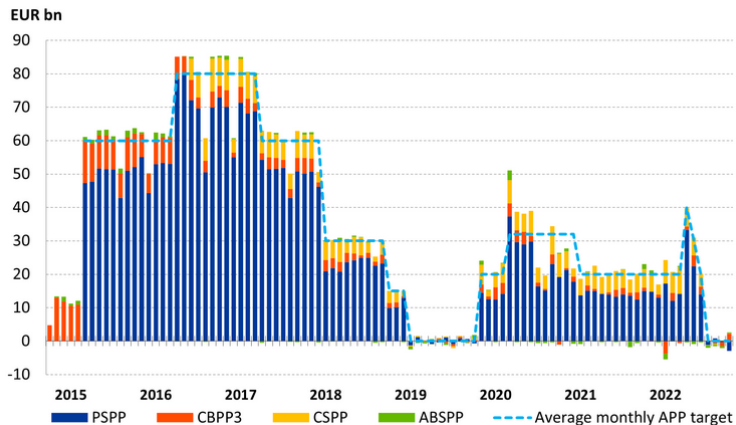
▸ back

First Order Effects: Issuances

(EUR billions; cumulative monthly flows)

- 2013-15 average
- 2016
- 2017

(Source: ECB Economic Bulletin 3/2018)

back

Appendix: The ECB's Asset Holdings

Loan Level Results: Amiti/Weinstein (2018 JPE) Setup

▶ Aggregate firm level to location x size clusters, then estimate bank-specific supply shock

	Bank Supply Shock (%-Change in Lending)	
	Treated Banks	Control Banks
Constant	0.0701***	0.0243
	(2.77)	(1.02)
Observations	115	118

Loan Level Results: Khwaja/Mian (AER 2008) Setup

Dependent variable:	Δ Ln(Loan Amount)			Entry			Exit		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treat	0.0854**	0.0679**	0.0994*	0.0599***	0.0646***	0.0532**	-0.0359	-0.0347	-0.0222
	(2.03)	(2.03)	(1.79)	(4.44)	(4.71)	(2.57)	(-1.07)	(-1.20)	(-0.70)
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Size × Location FE	no	yes	-	no	yes	-	no	yes	-
Firm FE	no	no	yes	no	no	yes	no	no	yes
Observations	7,424	7,395	1,950	22,595	22,548	6,705	20,167	20,126	5,675

▶ Treated banks increase loan supply to real estate asset managers

▶ Both intensive and extensive margin matter