

Firm-level Consequences of Corporate Quantitative Easing

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Motivation

- ▶ Central banks' policy rates have approached the Zero Lower Bound after 2008, resulting in central banks to experiment with novel **unconventional measures**
- ▶ In 2016, the ECB launched its **Corporate Sector Purchase Programme** (CSPP), directly buying bonds from the corporate sector (*Corporate Quantitative Easing*)
- ▶ Aim: Reducing financing costs for firms bypassing the banking sector

This paper

- ▶ What are the effects of the CSPP on **economic decisions of targeted firms**?
 - ▶ Exploit ECB's eligibility criteria (only bonds that are "investment grade", i.e. not risky)
 - ▶ Difference-in-Differences estimation
 - ▶ Data on firm balance sheets augmented with detailed bond ratings data
- ▶ **Results:**
 - ▶ No effect on **employment** or **profit margins**
 - ▶ Positive & back-loaded effect on **investment**
 - ▶ Driven by **financially constrained** firms

Institutional Background

- ▶ **Various interventions** by ECB, targeted banks to provide cheap long-term funding or stabilize banks' balance sheets
- ▶ March 2016: ECB announced the **CSPP** to increase the effectiveness of its monetary policy
- ▶ As of September 2023, the CSPP holdings amount to 334 Billion Euro
- ▶ Corporate bond purchases also part of **pandemic emergency purchase programme** (PEPP)
- ▶ No more net purchases from March 2023 onwards

Institutional Background

CSPP Eligibility of corporate bonds:

- ▶ Issuer Euro Area resident (parent can be from outside)
- ▶ Remaining maturity of 6 months to 31 years
- ▶ No minimum issuance volume
- ▶ Only non-banks
- ▶ Yield to maturity larger than the ECB's deposit facility rate (-0.4%)
- ▶ **Minimum first best credit assessment of credit quality step 3 (BBB- or equivalent) - "Investment Grade" as opposed to "High Yield"**
- ▶ If bonds loose eligibility, ECB can, but does not have to, sell bonds

Literature on financing effects of CSPP

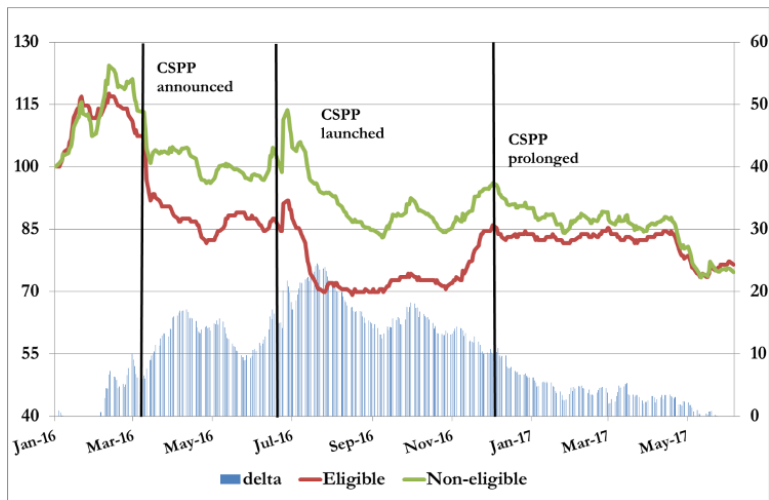
- ▶ Direct effects:

- ▶ **Bond yields of eligible bonds dropped** by 15-30% (see next slide); eligible firms issue more bonds. Announcement effect in march sizeable (Abidi and Flores, 2017; Arce et al., 2017; Zaghini, 2019; De Santis and Holm-Hadulla, 2020; Li et al., 2021).
- ▶ **Eligible firms increase their bond leverage** ratio by 10%, low risk firms to a lesser extent (Grosse-Rueschkamp et al., 2019).

- ▶ Indirect effects:

- ▶ **Drop in demand for bank loans** by firms whose bonds were eligible by the ECB, more credit supply for other firms, (see Arce et al., 2021)
- ▶ With some lag, **non-eligible firms issued more loans**.

Spread performance of euro area bonds (basis points)



Source: Zaghini 2019. Bank of America-Merrill Lynch Indices of Option Adjusted Spread. The index Eligible is the BofA-Merrill Lynch Index EUR non-financial corporations; the index Non-eligible is the simple average of the BofA-Merrill Lynch Index EUR High yield and the BofA-Merrill Lynch Index EUR financial corporations (banking).
Source: Thomson Reuters.

Corporate QE and firm finance: A simple framework

Consider a firm that whose initial capital stock is not sufficient for financing input bills and therefore needs to raise external finance. The firm then faces the costs c of renting the factors of production:

$$c = wH + r_{bank}K_{bank} + r_{bondrisky}K_{bondrisky} + r_{bondinv}K_{bondinv}$$

where wH is the wage bill. Capital costs can take three forms: r_{bank} is the cost of raising bank finance K_{bank} , $r_{bondrisky}$ is the cost of raising bond finance $K_{bondrisky}$ via corporate bonds rated high yield (BB+ or worse), and $r_{bondinv}$ is the cost of raising bond finance $K_{bondinv}$ via corporate bonds rated investment grade (BBB- or better).

Corporate QE and firm finance: A simple framework

An increase in the demand for corporate bonds can have the following effects:

1. $\downarrow r_{bondinv}$ (decrease in investment grade bond financing costs)
2. $\downarrow r_{bondrisky}$ (decrease high yield bond financing costs)
3. $\downarrow r_{bank}$ (higher demand for bonds \rightarrow \downarrow bank finance demand for firms in the bond market, \rightarrow \uparrow bank finance supply for firms outside the bond market, at lower costs)

Corporate QE and firm finance: A simple framework

How do these three effects compare?

- ▶ Investment grade bonds saw a higher reduction in their yield spread as compared to high yield bonds, so

$$\left| \frac{\partial r_{bondinv}}{\partial CSPP} \right| > \left| \frac{\partial r_{bondrisky}}{\partial CSPP} \right|.$$

- ▶ The indirect effect (via bank finance) is muted and less uniform, so:

$$\left| \frac{\partial r_{bondinv}}{\partial CSPP} \right| > \left| \frac{\partial r_{bondrisky}}{\partial CSPP} \right| > \left| \frac{\partial r_{bank}}{\partial CSPP} \right|$$

Our estimation framework yields estimates for a **lower bound**:

$$\left| \frac{\partial r_{bondinv}}{\partial CSPP} \right| - \left| \frac{\partial r_{bondrisky}}{\partial CSPP} \right|$$

Methodology & Data

Compare firms that issue **eligible and non-eligible bonds** in the bond market in a difference-in-differences setting.

Combine microdata sources via firm name to gain granular information about CSPP effects:

1. Universe of corporate bonds, especially historical **bond rating** (Thomson Reuters / Eikon)
2. **Balance sheet** information on firms in the Eurozone (BvD ORBIS) - ultimate owners
3. Data on **actual purchases** under the CSPP from national central banks

The corporate bond market

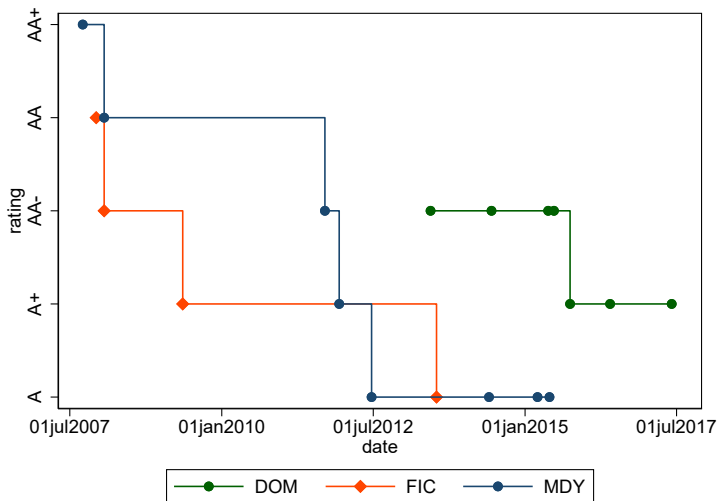
Bonds denominated in €:

	(1) Bond issuers	(2) Eligible	(3) CSPP bond issuers
# firms	3,750	497	195
# bonds	240,306	9,435	1,516

Source: Thomson Reuters Eikon / National Central Bank Websites

The corporate bond market

Bond rating history example

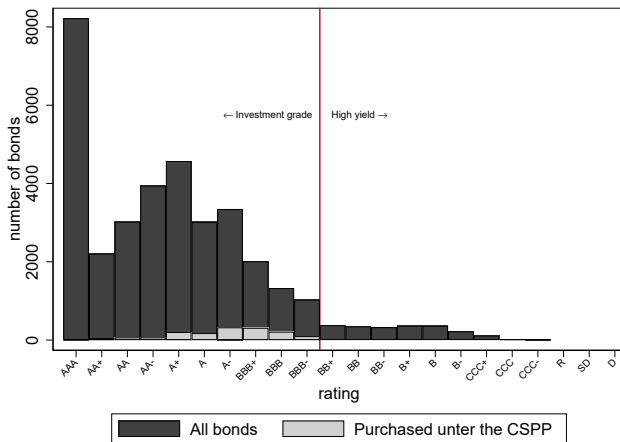


Notes: The figure shows an example of bond ratings emitted by a French firm.

Source: Thomson Reuters EIKON.

The corporate bond market

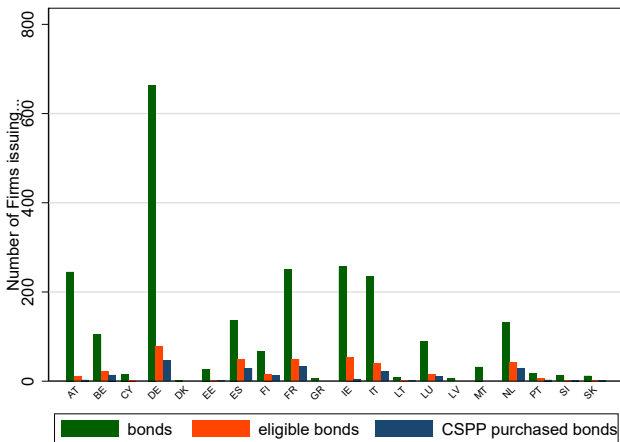
Distribution of ratings, bonds denominated in Euro



Notes: The figure shows the number of bonds active 03/2016 or after. The black bars show the number of bonds by their maximum rating by Standard & Poor, Moody's, Fitch Ratings or DBRS. The grey bars show the number of bonds purchased under the CSPP. Source: Thomson Reuters EIKON, National Central Banks, authors' calculations.

The corporate bond market

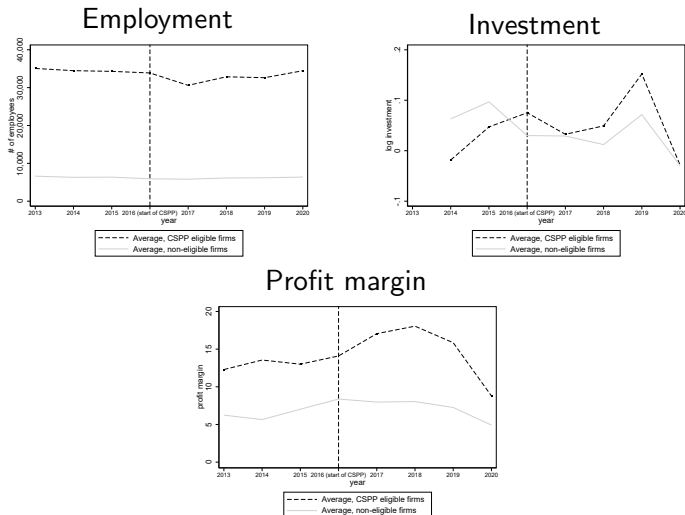
Bond issuing firms



Notes: The figure shows the number of firms issuing bonds, eligible bonds, and bonds purchased under the CSPP. Source: Thomson Reuters EIKON, National Central Banks, Bureau van Dijk ORBIS, authors' calculations.

Descriptives

Figure: Firm dynamics by bond ratings



Notes: Average employment, investment and profit margins of firms issuing CSPP-eligible and non-eligible bonds. Source: ORBIS, Thomson Reuters EIKON.

Estimation strategy

- ▶ Difference-in-Difference strategy:

$$LHS_{i,t} = \beta_1 Post + \beta_2 eligible_i + \beta_3 Post_t X eligible_{i,t} + \Phi'_{i,t} + a_i + y_t + \epsilon_{i,t}$$

with

- ▶ $LHS_{i,t}$: log number of employees/investment/profit margin of firm i at time t
- ▶ $Post$: Dummy for years 2016-2020
- ▶ $eligible$: Dummy=1 if the firms' bonds are eligible under the CSPP
- ▶ $\phi'_{i,t}$: Logs of control variables:
 - ▶ Size controls: Operating revenue, total assets, added value, sales
 - ▶ Debt controls: loans, total liabilities, long term debt, net debt
- ▶ a_i, y_t fixed effects at firm and year level

Estimation strategy

- ▶ Difference-in-Difference strategy:

$$LHS_{i,t} = \beta_1 Post + \beta_2 eligible_i + \beta_3 Post_t X eligible_{i,t} + \Phi'_{i,t} + a_i + y_t + \epsilon_{i,t}$$

Identification strategy:

- ▶ Focus on firms that **only issue bonds close to the eligibility threshold - BB+/BB/BB- and BBB+/BBB/BBB-**.
- ▶ This ensures to compare only firms that are **very similar** w.r.t. the characteristics that influence their bonds' ratings (**mean comparison**).
- ▶ Call these firms "close to the eligibility threshold"

Results: Employment

VARIABLES	(1) firm FE	(2) firm FE sector-year FE	(3) firm FE country-year FE	(4) firm FE sector- and country-year FE	(5) firm FE all controls and FEs
eligible#2010	0.379 (0.392)	0.690 (0.514)	0.602 (0.647)	1.136 (0.749)	-0.677* (0.370)
eligible#2011	0.367 (0.409)	0.627 (0.556)	0.603 (0.687)	1.143 (0.897)	0.114 (0.241)
eligible#2012	0.0827 (0.434)	0.517 (0.452)	0.558 (0.627)	0.909 (0.724)	0.0308 (0.233)
eligible#2013	0.1000 (0.368)	0.126 (0.463)	0.538 (0.335)	0.829** (0.367)	0.553 (0.391)
eligible#2014	0.164 (0.221)	0.215 (0.248)	0.244 (0.221)	0.348 (0.298)	0.389 (0.254)
eligible#2016	-0.109 (0.164)	-0.0888 (0.139)	-0.0350 (0.281)	0.0486 (0.229)	0.135 (0.180)
eligible#2017	-0.0554 (0.170)	-0.272* (0.157)	0.197 (0.268)	0.131 (0.281)	-0.185 (0.176)
eligible#2018	0.00474 (0.162)	-0.0862 (0.138)	0.0862 (0.285)	0.0962 (0.306)	-0.216 (0.223)
eligible#2019	0.0415 (0.194)	-0.114 (0.201)	0.248 (0.293)	0.214 (0.349)	0.372 (0.390)
eligible#2020	0.859 (0.541)	0.900 (0.601)	0.231 (0.302)	0.261 (0.343)	0.471 (0.291)
Constant	7.669*** (0.368)	7.571*** (0.402)	7.706*** (0.510)	7.248*** (0.514)	-12.56*** (1.021)
Observations	640	640	502	502	288
R-squared	0.076	0.324	0.325	0.560	0.937
Number of firms	79	79	62	62	40
sector-year FE		yes	no	yes	yes
country-year FE			yes	yes	yes
debt and size controls					yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Event study plot

Wild cluster bootstrap

No effects on profit margins as well.

Results: Investment

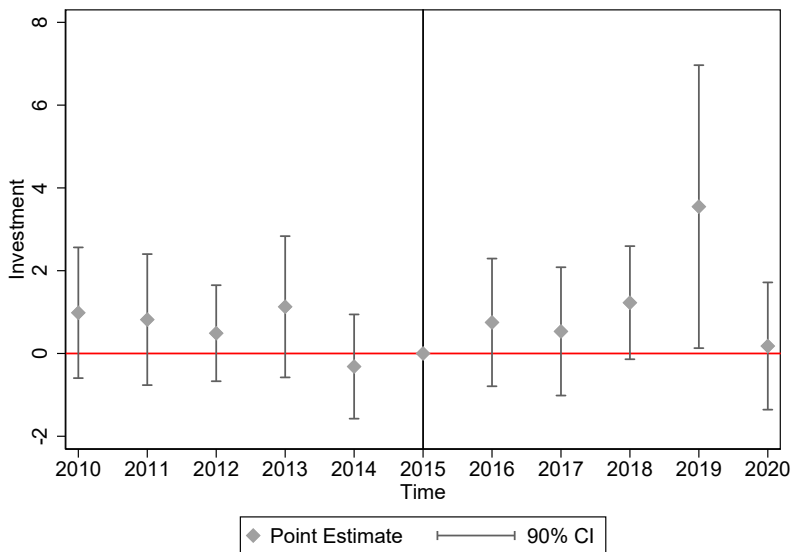
	(1)	(2)	(3)	(4)	(5)
VARIABLES	firm FE	firm FE sector-year FE	firm FE country-year FE	firm FE sector and sector-year FE	firm FE all controls and FEs
eligible#2016	0.0362 (0.0981)	0.317 (0.284)	0.423 (0.390)	0.789 (0.607)	0.751 (0.916)
eligible#2017	-0.0707 (0.110)	0.177 (0.251)	0.812** (0.367)	1.096** (0.498)	0.534 (0.920)
eligible#2018	-0.127 (0.108)	0.184 (0.233)	0.500 (0.320)	0.878 (0.558)	1.227 (0.811)
eligible#2019	0.390* (0.231)	0.223 (0.324)	1.091 (0.679)	1.658 (1.290)	3.547* (2.029)
eligible#2020	-0.112 (0.0993)	-0.0309 (0.259)	0.0192 (0.425)	0.298 (0.691)	0.180 (0.912)
Constant	0.0821 (0.0764)	-0.252 (0.248)	-0.555** (0.240)	-3.648*** (0.344)	-0.406 (3.146)
Observations	642	642	463	463	289
R-squared	0.047	0.194	0.558	0.669	0.742
Number of firms	78	78	56	56	40
sector X year FE		yes	no	yes	yes
country X year FE			yes	yes	yes
debt and size controls					yes

Robust standard errors in parentheses, leads and controls omitted

*** p<0.01, ** p<0.05, * p<0.1

Wild cluster bootstrap

Investment event study (column 5: all controls and FEs)



Investment: Firm heterogeneity

Split at the median of total assets in 2015:

	(1) small firms debt controls and FEs	(2) big firms debt controls and FEs
eligible#2016	0.905* (0.455)	-0.167 (0.118)
eligible#2017	0.567 (0.376)	0.175 (0.361)
eligible#2018	0.844* (0.426)	-0.358** (0.156)
eligible#2019	1.184 (0.773)	-0.0982 (0.208)
eligible#2020	0.672* (0.386)	-0.451 (0.346)
Constant	-1.511 (0.954)	-1.105** (0.481)
Observations	207	316
R-squared	0.247	0.125
Number of firms	29	34
sector X year FE	no	no
country X year FE	no	no
debt controls	yes	yes
size controls	no	no

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Driven by firm size?

Investment: Firm heterogeneity

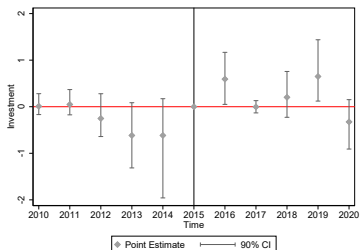
Is size a proxy for financial constraint?

- ▶ Smaller firms are more likely to be financially constrained (Gertler and Gilchrist, 1994; Ferreira et al., 2023).
- ▶ Measure financial constraints directly using a book-based indicator of Ferrando and Mulier (2015)
- ▶ The indicator considers the financing gap, changes in debt and equity and total investment to classify firms as constrained or unconstrained

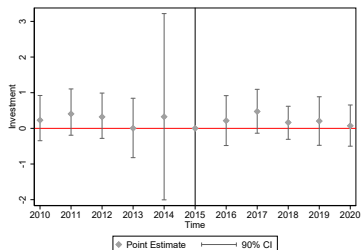
Investment: Firm heterogeneity

Figure: Investment effect by financial constraints

Financially constrained firms



Financially unconstrained firms



Taking stock

- ▶ Comparing firms only issuing marginally eligible / non-eligible bonds
- ▶ Evidence for **positive effect on investment**
- ▶ Driven by **financially constrained firms**

Other possible channels

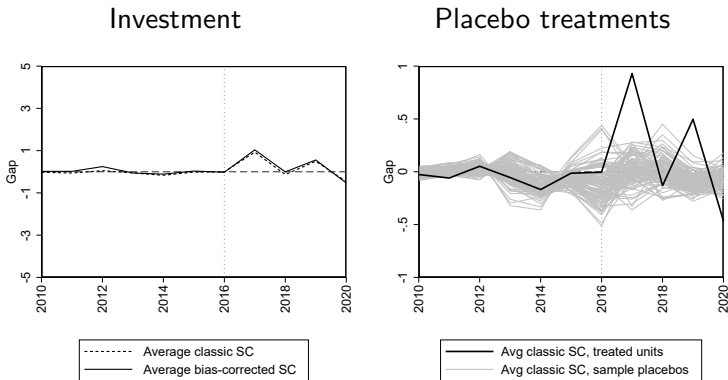
- ▶ Difference between firms issuing **CSPP purchases** from those issuing **eligible bonds** that are not purchases? No difference.
- ▶ Do firms issuing **newly eligible bonds** benefit particularly? No evidence.
- ▶ no effects on intangible investment, sales or operating revenue.
- ▶ Some negative effects on long term debt.
- ▶ Grimm et al. (2022) find positive effects on R&D expenditure: can't corroborate.

Robustness check: Synthetic control

Small number of observations \rightarrow use Synthetic Control methods (Abadie and Gardeazabal, 2003; Abadie, 2021) in the context of many treated units (Abadie and L'hour, 2021)

- Find for every "treated" firm a donor pool of non-treated firms

Figure: Investment treatment effect using synthetic controls



Conclusion

- ▶ Analysis of ECBs large-scale **corporate asset purchase programme**
- ▶ Compare **targeted and non-targeted firms** active in the corporate bond sector
- ▶ No substantial and robust effects on employment or profits discernible
- ▶ Some positive evidence on **investment**
- ▶ Driven by **financially constrained** firms
- ▶ Some (bigger) firms face less financial constraints, MP pass-through limited

Thank you!

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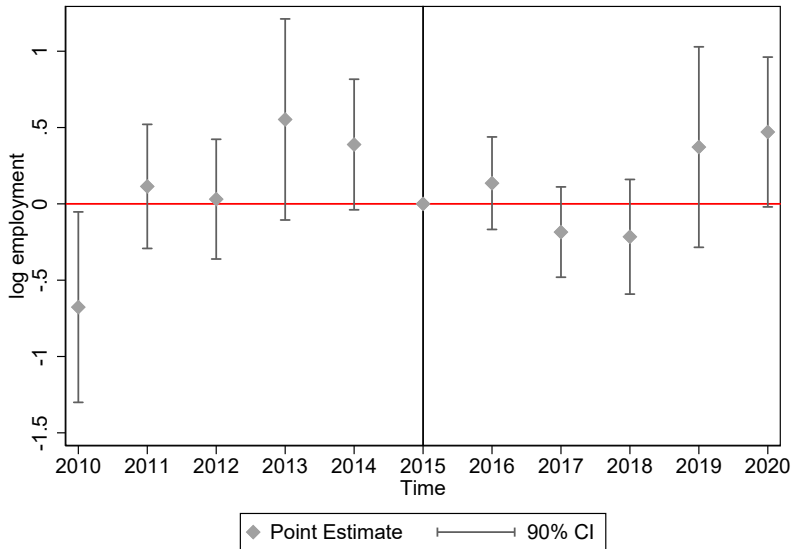
Mean comparison 2015

Table: Mean comparison, firms close, 2015

	not eligible		eligible		difference	
	mean	sd	mean	sd	b	t
log employees	7.97	3.41	8.28	3.03	-0.31	(-0.32)
investment	0.17	0.44	0.09	0.78	0.08	(0.44)
profit margin	12.51	16.99	11.85	22.76	0.66	(0.12)
Observations	18		55		73	

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Employment event study



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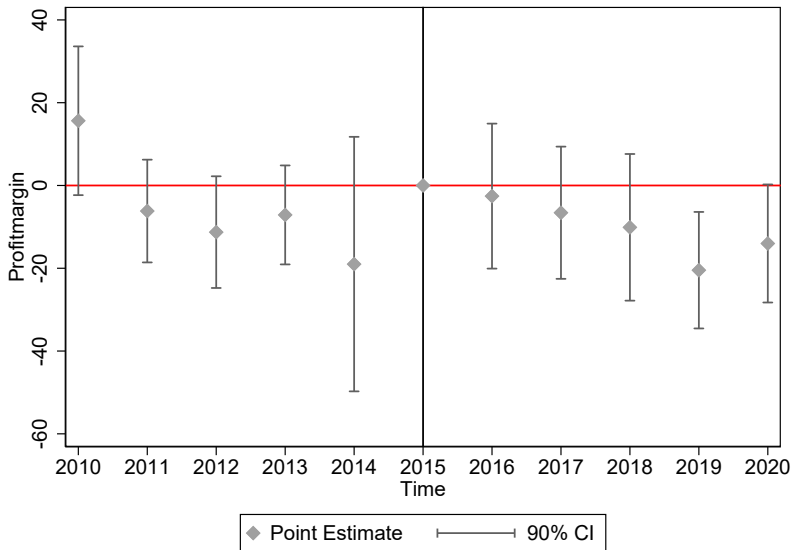
Baseline estimation

VARIABLES	(1) firm FE all controls and FEs
eligible#2010	-0.677* (0.370)
eligible#2011	0.114 (0.241)
eligible#2012	0.0308 (0.233)
eligible#2013	0.553 (0.391)
eligible#2014	0.389 (0.254)
eligible#2016	0.135 (0.180)
eligible#2017	-0.185 (0.176)
eligible#2018	-0.216 (0.223)
eligible#2019	0.372 (0.390)
eligible#2020	0.471 (0.291)
Constant	-11.99*** (1.011)
Observations	288
Number of firms	40
R-squared	0.937
sector X year FE	yes
country X year FE	yes
debt and size controls	yes

Wild cluster bootstrap standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Profit margin event study



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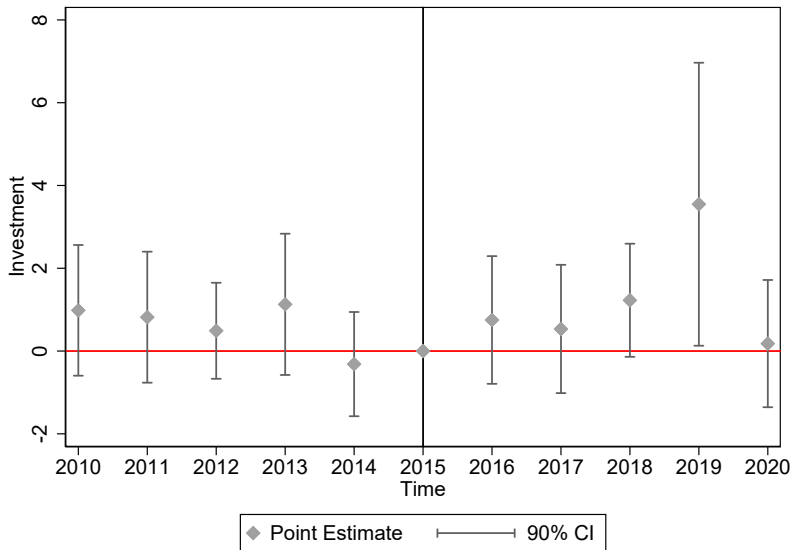
VARIABLES	(1) firm FE all controls and FEs
eligible#2010	15.63 (10.63)
eligible#2011	-6.175 (7.339)
eligible#2012	-11.27 (7.978)
eligible#2013	-7.113 (7.069)
eligible#2014	-19.00 (18.18)
eligible#2016	-2.567 (10.36)
eligible#2017	-6.582 (9.446)
eligible#2018	-10.11 (10.48)
eligible#2019	-20.46** (8.324)
eligible#2020	-14.01 (8.433)
Constant	-82.51 (54.22)
Observations	258
Number of firms	35
R-squared	0.913
sector-year FE	yes
country-year FE	yes
debt and size controls	yes

Wild cluster bootstrap

*** p<0.01, ** p<0.05, * p<0.1

Back to [Baseline estimation](#).

Investment event study



Back to [Baseline estimation](#).

VARIABLES	(1) firm FE all controls and FEs
eligible#2010	0.984 (0.937)
eligible#2011	0.819 (0.939)
eligible#2012	0.490 (0.688)
eligible#2013	1.129 (1.013)
eligible#2014	-0.316 (0.747)
eligible#2016	0.751 (0.916)
eligible#2017	0.534 (0.920)
eligible#2018	1.227 (0.811)
eligible#2019	3.547* (2.029)
eligible#2020	0.180 (0.912)
Constant	-0.336 (3.138)
Observations	289
Number of firms	40
R-squared	0.742
sector X year FE	yes
country X year FE	yes
debt and size controls	yes

Wild cluster bootstrap

*** p<0.01, ** p<0.05, * p<0.1

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Literature

Theoretical arguments:

- ▶ QE modifies the supply or demand of an asset
- ▶ Portfolio balance channel: Assets trade in narrow market → demand shocks have effect in the specific market, but also indirect effect on other markets because investors' capital constraints are affected (Vayanos and Vila, 2021; Gagnon et al., 2011)
- ▶ Signalling channel: CSPP might be viewed as signal regarding the CBs intentions regarding interest rates
- ▶ Main mechanism for QE to affect the real economy is through its impact on long term interest rates, which determine many important economic decisions