

# The Corporate Debt Supply Effects of the Eurosystem's Collateral Framework

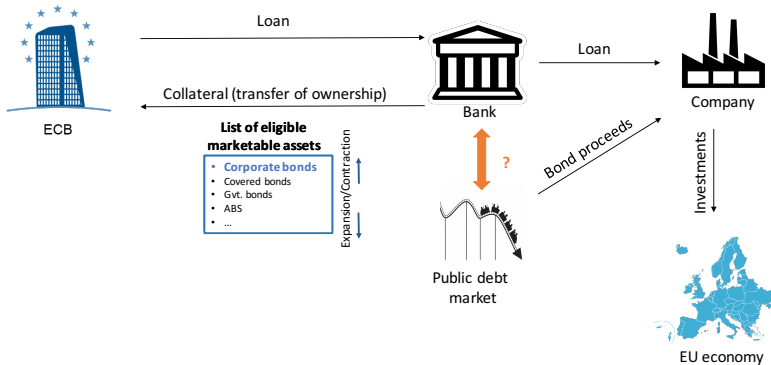
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CLOSING CONFERENCE OF THE PROJECT  
**Quantitative Easing and Financial (In)Stability**  
FUNDED BY THE VOLKSWAGEN FOUNDATION

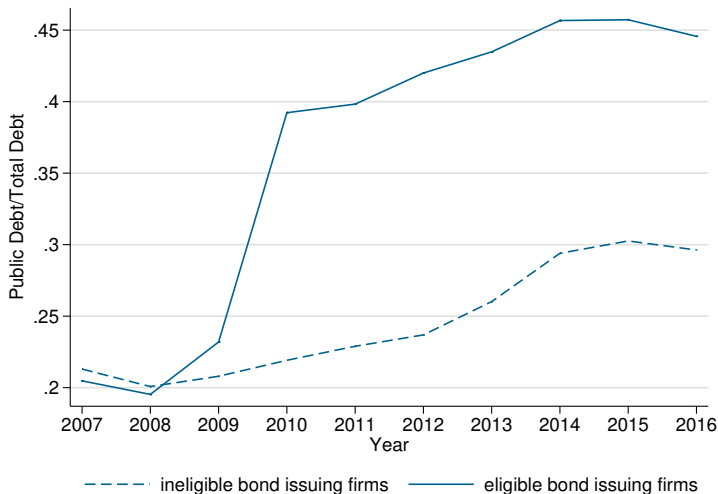
- Eurosystem's General Collateral Framework has existed since Jan 2001
- Corporate bonds have always been an eligible asset type under this framework
- Increased focus on corporate bonds since 2016, i.e., when CSPP was launched
- Our focus:
  - the period 2007 to 2016
  - the collateral channel and its effects on firms' debt structure
  - the collateral benefit to bond holders

# Eurosystem's Collateral Framework



- Does the Eurosystem's Collateral Framework have an effect on a firm's debt financing decision?
  - Public debt issuance?
  - Bank debt issuance?
  - Overall leverage?
  - Debt maturity?
  
- Are there any effects on
  - bond yields?
  - bond liquidity?

# Motivation: Debt Structure of Eligible vs Ineligible Firms



- Does the Eurosystem's Collateral Framework have an effect on the firms' debt structure decision?

ECB-eligible assets

CSPP candidates

Bonds bought  
under CSPP

Eligibility (i) affects loan supply to mortgage borrowers (Van Bakkum et al., 2018), (ii) reduces YTM of government agency bonds (Corradin and Rodriguez-Moreno, 2016), (iii) provides a "safety premium" for pledgeable CPs (Kacperczyk et al., 2017)

After CSPP announcement, (i) yields decrease (Zaghini, 2017; Abidi and Miquel-Flores, 2018), (ii) firms issue more bond debt (Grosse-Rueschkamp et al., 2017; Arce et al., 2017)

CSPP purchases affect firms' financing decisions (Galema and Lugo, 2017)

- List of eligible marketable assets
  - monthly lists between Mar 2007 and Dec 2009 (Eberl and Weber, 2014)
  - daily lists between 8 Apr 2010 and 1 Jun 2016 (ECB's website)
- Bond data
  - eligible and ineligible bonds from firms in the List
  - bond characteristics, daily yield-to-maturity (Bloomberg)
- Firm data
  - balance sheet information (Compustat)
  - debt structure information (S&P's Capital IQ)
  - Types of debt
    - (i) commercial paper, (ii) (drawn) credit lines, (iii) term loans, (iv) senior bonds and notes, (v) subordinated bonds and notes, (vi) capital leases and (vii) other debt
    - ⇒ Bond/Public debt & Bank debt
  - In total: 79 treated and 812 control firms

# Identification Strategy

- General Documentation Guidelines do not allow for prediction of bond inclusion due to discretionary criteria
- ECB reduced the minimum credit rating threshold from A- to BBB- (15 Oct 2008)

Differentiate between:

- EA: eligible asset
- NEA: newly eligible asset, where inclusion date is observable
- EI: eligible issuer, whose bonds are eligible
- NEI: newly eligible issuer, who experiences a 1st-time eligibility event



- Two-way Fixed Effects Differences-in-Differences

$$Y_{f,t} = \alpha + \delta_1 NEI_f \times Post_t + \delta_2 NEI_f \times Post_t \times Crisis + X_{f,t} + \Phi_f + \Gamma_t + \epsilon_{f,t}$$

- $Y_{f,t}$ : public/bank debt share
- $NEI_f = 1$  if firm experiences a 1st-time eligibility event of one of its bonds
- $Post_t$ : four post-treatment quarters
- $Crisis$ : 2008Q3 - 2009Q2
- Control firms: ineligible bond-issuing firms, eligible firms that have not yet experienced the eligibility event

# Does eligibility affect public debt issuance?

Public Debt/Total Debt						
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Eligibility*Post</b>	<b>0.0958**</b> [0.0461]	<b>0.1298***</b> [0.0436]	<b>0.1130**</b> [0.0470]	<b>0.1247***</b> [0.0460]	<b>0.1620***</b> [0.0449]	<b>0.1563***</b> [0.0441]
Eligibility*Post*Crisis	0.0837 [0.0751]	0.0565 [0.0742]	-0.0801 [0.0497]	-0.0931* [0.0499]	-0.1241** [0.0481]	-0.1195** [0.0484]
Eligibility*Crisis	-0.0723 [0.0545]	-0.0715 [0.0551]	-0.0283 [0.0313]	-0.0257 [0.0321]	-0.0370 [0.0321]	-0.0360 [0.0325]
Post*Crisis	-0.0275** [0.0124]		-0.0488*** [0.0114]	-0.0234** [0.0117]		
Crisis	-0.0268*** [0.0094]		-0.0190** [0.0083]	-0.0245*** [0.0086]		
Eligibility	0.0567 [0.0569]	0.0551 [0.0565]				
Post	0.0321*** [0.0124]		0.0667*** [0.0120]	0.0379*** [0.0124]		
Firm Controls	Yes	Yes	No	Yes	No	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	No	No	Yes	Yes
SE	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.
Firm Clusters	849	849	834	833	834	833
Observations	22,164	22,164	22,224	22,148	22,224	22,148
R-squared	0.1712	0.1846	0.5958	0.6082	0.6096	0.6176

# Does eligibility affect public debt issuance?

## Public Debt/Total Debt

	(1)	(2)	(3)	(4)	(5)	(6)
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	[0.0461]	[0.0436]	[0.0470]	[0.0460]	[0.0449]	[0.0441]
<b>Eligibility*Post*Crisis</b>	<b>0.0837</b>	<b>0.0565</b>	<b>-0.0801</b>	<b>-0.0931*</b>	<b>-0.1241**</b>	<b>-0.1195**</b>
	[0.0751]	[0.0742]	[0.0497]	[0.0499]	[0.0481]	[0.0484]
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	[0.0545]	[0.0551]	[0.0313]	[0.0321]	[0.0321]	[0.0325]
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	[0.0124]		[0.0114]	[0.0117]		
Crisis	-0.0268***		-0.0190**	-0.0245***		
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Eligibility	0.0567	0.0551				
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	[0.0124]		[0.0120]	[0.0124]		
Firm Controls	Yes	Yes	No	Yes	No	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	No	No	Yes	Yes
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Post*Crisis	0.0275**		0.0489***	0.0224**		
Crisis						
Eligibility						
Post						
Firm Con						
Firm FE						
Quarter F						
SE						
Firm Clus.						
Observations	22,164	22,164	22,224	22,148	22,224	22,148
R-squared	0.1712	0.1846	0.5958	0.6082	0.6096	0.6176

Yes!

1. Public debt issuance *increases* after the eligibility event
2. Public debt issuance of eligible is similar during crisis or slightly lower

# Does eligibility affect bank debt?

## Bank Debt/Total Debt

	(1)	(2)	(3)	(4)	(5)	(6)
<b>Eligibility*Post</b>	<b>-0.1510***</b> [0.0479]	<b>-0.1724***</b> [0.0447]	<b>-0.1584***</b> [0.0478]	<b>-0.1686***</b> [0.0473]	<b>-0.2021***</b> [0.0455]	<b>-0.1974***</b> [0.0451]
Eligibility*Post*Crisis	-0.0974 [0.0748]	-0.0801 [0.0735]	0.0857* [0.0440]	0.0980** [0.0441]	0.1271*** [0.0415]	0.1237*** [0.0417]
Eligibility*Crisis	0.0761 [0.0558]	0.0788 [0.0562]	0.0295 [0.0278]	0.0253 [0.0289]	0.0350 [0.0280]	0.0327 [0.0290]
Post*Crisis	0.0122 [0.0138]		0.0440*** [0.0123]	0.0209* [0.0126]		
Crisis	0.0298*** [0.0102]		0.0184** [0.0085]	0.0250*** [0.0089]		
Eligibility	-0.0154 [0.0559]	-0.0193 [0.0552]				
Post	-0.0095 [0.0135]		-0.0575*** [0.0128]	-0.0324** [0.0133]		
Firm Controls	Yes	Yes	No	Yes	No	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	No	No	Yes	Yes
SE	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.
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<b>Eligibility*Post*Crisis</b>	<b>-0.0974</b> [0.0748]	<b>-0.0801</b> [0.0735]	<b>0.0857*</b> [0.0440]	<b>0.0980**</b> [0.0441]	<b>0.1271***</b> [0.0415]	<b>0.1237***</b> [0.0417]
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Quarter FE	No	Yes	No	No	Yes	Yes
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Post*Crisis	0.0122		0.0440***	0.0209*		
Crisis						
Eligibility						
Post						
Firm Controls						
Firm FE						
Quarter FE						
SE						
Firm Clusters	849	849	834	833	834	833
Observations	22,164	22,164	22,224	22,148	22,224	22,148
R-squared	0.1610	0.1689	0.5759	0.5858	0.5843	0.5916

Yes!

1. Bank debt issuance *decreases* after the eligibility event

2. Bank debt issuance of eligible firms is lower during crisis

# Does eligibility affect leverage?

	Total Debt/Total Assets					
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Eligibility*Post</b>	<b>0.0054</b>	<b>0.0226</b>	<b>0.0196</b>	<b>0.0229*</b>	<b>0.0246**</b>	<b>0.0303***</b>
	<b>[0.0158]</b>	<b>[0.0142]</b>	<b>[0.0121]</b>	<b>[0.0129]</b>	<b>[0.0105]</b>	<b>[0.0116]</b>
Eligibility*Post*Crisis	0.0183	0.0020	0.0060	0.0014	-0.0015	-0.0093
	[0.0338]	[0.0331]	[0.0164]	[0.0158]	[0.0147]	[0.0142]
Eligibility*Crisis	-0.0120	-0.0052	-0.0058	-0.0051	-0.0053	-0.0052
	[0.0249]	[0.0244]	[0.0153]	[0.0145]	[0.0146]	[0.0136]
Post*Crisis	-0.0312***		-0.0198**	-0.0229***		
	[0.0097]		[0.0079]	[0.0083]		
Crisis	0.0080		0.0150**	0.0183***		
	[0.0074]		[0.0063]	[0.0065]		
Eligibility	-0.0462**	-0.0529***				
	[0.0205]	[0.0204]				
Post	0.0334***		0.0134**	0.0176**		
	[0.0086]		[0.0067]	[0.0071]		
Firm Controls	Yes	Yes	No	Yes	No	Yes
Firm FE	No	No	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	No	No	Yes	Yes
SE	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.
Firm Clusters	849	849	834	833	834	833
Observations	22,164	22,164	22,224	22,148	22,224	22,148
R-squared	0.1445	0.1519	0.6695	0.6735	0.6729	0.6784



# Does eligibility affect leverage?

Leverage	Total Debt/Total Assets					
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Eligibility*Post</b>	<b>0.0054</b>	<b>0.0226</b>	<b>0.0196</b>	<b>0.0229*</b>	<b>0.0246**</b>	<b>0.0303***</b>
	<b>[0.0158]</b>	<b>[0.0142]</b>	<b>[0.0121]</b>	<b>[0.0129]</b>	<b>[0.0105]</b>	<b>[0.0116]</b>
Eligibility*Post*Crisis	0.0183	0.0020	0.0060	0.0014	-0.0015	-0.0093
	[0.0338]	[0.0331]	[0.0164]	[0.0158]	[0.0147]	[0.0142]
Eligibility*Crisis	-0.0120	-0.0052	-0.0058	-0.0051	-0.0053	-0.0052
Post*Crisis						
Crisis						
Eligibility						
Post						
Firm Con.						
Firm FE	No	No	Yes	Yes	Yes	Yes
Quarter FE	No	Yes	No	No	Yes	Yes
SE	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.	Firm Cl.
Firm Clusters	849	849	834	833	834	833
Observations	22,164	22,164	22,224	22,148	22,224	22,148
R-squared	0.1445	0.1519	0.6695	0.6735	0.6729	0.6784

Yes!

1. Firm leverage *increases* after the eligibility event

2. Firm leverage increase is not affected by the crisis

# Does eligibility affect debt maturity?

	Bank Debt Maturity			Public Debt Maturity		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Eligibility*Post</b>	<b>0.4979</b>	<b>2.1111</b>	<b>1.3911</b>	<b>17.8692***</b>	<b>22.3393***</b>	<b>14.2896***</b>
	[4.0197]	[3.2455]	[2.7479]	[2.7246]	[2.3844]	[1.9148]
Eligibility*Post*Crisis	0.1970	1.8230	4.5857	-8.1041	-16.1222***	-6.1365
	[11.6265]	[8.5787]	[7.9135]	[8.3895]	[6.2020]	[5.7163]
Eligibility*Crisis	-9.5883	-13.8107**	-10.6382**	-12.7876**	-6.3448	-7.2785*
	[7.3759]	[5.9432]	[5.4215]	[5.5875]	[4.5384]	[4.1833]
Post*Crisis	6.0164	4.0152		5.0644	11.7909***	
	[4.3018]	[3.4434]		[4.7036]	[3.3519]	
Crisis	13.5323***	14.8828***		4.2810	-0.6075	
	[3.3089]	[2.7739]		[3.6022]	[2.6473]	
Eligibility	-1.4902			-11.8317***		
	[2.8188]			[2.1602]		
Post	-1.6575	-3.5802**		-5.0422***	-12.3094***	
	[1.6438]	[1.7598]		[1.4280]	[1.4949]	
Firm Controls	Yes	No	Yes	Yes	No	Yes
Firm FE	No	Yes	Yes	No	Yes	Yes
Quarter FE	No	No	Yes	No	No	Yes
SE	Rob.	Rob.	Rob.	Rob.	Rob.	Rob.
Observations	9,084	9,080	9,046	9,084	9,080	9,046
R-squared	0.0725	0.4979	0.5587	0.1258	0.5601	0.5990

Findings in line with Saretto and Tookes (2013), who document that relaxation of credit supply is accompanied with lengthening maturity

# Does eligibility affect debt maturity?

	Bank Debt Maturity			Public Debt Maturity		
	(1)	(2)	(3)	(4)	(5)	(6)
<b>Eligibility*Post</b>	<b>0.4979</b>	<b>2.1111</b>	<b>1.3911</b>	<b>17.8692***</b>	<b>22.3393***</b>	<b>14.2896***</b>
	[4.0197]	[3.2455]	[2.7479]	[2.7246]	[2.3844]	[1.9148]
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	[11.6265]	[8.5787]	[7.9135]	[8.3895]	[6.2020]	[5.7163]
Eligibility*Post*Crisis						
Post*Crisis						
Crisis						
Eligibility						
Post						
Firm Cont						
Firm FE						
Quarter F						
SE						
Observations	3,007	3,000	3,070	3,007	3,000	3,070
R-squared	0.0725	0.4979	0.5587	0.1258	0.5601	0.5990

Yes!

1. Public debt maturity increases by up to 1.5 years.
2. No crisis effect
3. No effect on bank debt maturity

Findings in line with Saretto and Tookes (2013), who document that relaxation of credit supply is accompanied with lengthening maturity

# Any effects on bond yields?

$$\text{Yield spread}_{bft} = \alpha + \beta EA_{bft} + \text{Controls} + \epsilon_{bft}$$

	Yield spread (1)	Yield spread (2)	Yield spread (3)
EA	-0.3777*** [0.1202]	-0.3777*** [0.1068]	-0.3777*** [0.0643]
Observations	1,382,743	1,382,743	1,382,743
Adjusted R-squared	0.5145	0.5146	0.5145
Bond Controls	Yes	Yes	Yes
Market Controls	Yes	Yes	Yes
Year-Month FE	Yes	Yes	Yes
SEs	Bond & Year-Month Cl.	Bond Cl.	Year-Month Cl.
Bond Clusters	1610	1610	-
Year-Month Clusters	74	-	74

# Any effects on bond yields?

$$\text{Yield spread}_{bft} = \alpha + \beta EA_{bft} + \text{Controls} + \epsilon_{bft}$$

	Yield spread	Yield spread	Yield spread
EA			
Observations			
Adjusted R-squared			
Bond Clusters	1610	1610	-
Market Year-Month Clusters	74	-	74

Yes!

1. Bond eligibility is associated with a 38bp yield reduction (equiv. to 10% reduction in avg. yields)
2. Magnitude is comparable to CSPP announcement effect - Zaghini (2017): 60bp reduction

# Any effects on bond liquidity?

$$ABIL_{\tau} = \text{Roll}_{\tau}^T - \sum_{c=1}^C \text{Roll}_{\tau}^c \omega^c$$

Eligibility event	Control Portfolio	$ABIL_{post} - ABIL_{pre}$ ( $\times 10^{-3}$ )	T-test	N	Liquidity response
Inclusion	EW	1.863**	0.0206	460	decrease
	VW	2.493***	0.0021	460	decrease
Exclusion	EW	-0.8654**	0.0101	320	increase
	VW	-0.8561**	0.0130	320	increase

# Any effects on bond liquidity?

$$ABIL_{\tau} = \text{Roll}_{\tau}^T - \sum^C \text{Roll}_{\tau}^c \omega^c$$

Yes! But a surprising effect.

Eligibility event: Our expectation: eligibility increases liquidity due to spotlight effect

Inclusion: Finding: banks seem to hoard eligible assets, which leads to scarcity

Exclusion	EVV	-0.8054	0.0101	320	increase
	VW	-0.8561**	0.0130	320	increase

- Does the Eurosystem's Collateral Framework have an effect on a firm's debt structure decision? - **Yes!**
  - Public debt issuance? - **Yes, increase**
  - Bank debt issuance? - **Yes, decrease**
  - Overall leverage? - **Yes, increase**
  - Debt maturity? - **Yes, increase for public debt**
  
- Are there any affects on
  - bond yields? - **Yes, reduction**
  - bond liquidity? - **Yes, reduction**

Eurosystem's Collateral Framework is a counter-cyclical unconventional monetary policy tool to stimulate corporate borrowing and capital market growth



Thank You

Thank You

1. Timing of treatment events
  - Placebo analysis with randomly assigned treatment dates
  - Results: no effect on firm's debt structure
2. DiD model specifications
  - Inclusion of time-trend dummy variables for treated firms does not affect results
  - Stacked DiD to account for dispersed treatment dates leads to similar results
3. CEM with different degrees of coarseness
  - Employ 3-bin to 8-bin CEM specification
  - Results: less firm matches with higher coarseness (8 bins) but significant results