The Unites States and the Euro Area are More Similar than You Think: Evidence from the Corporate Bond Market*

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^{*}The views expressed in this paper are those of the authors and do not necessarily reflect the views of the European Central Bank or the ESCB. These slides include a subset of results on the sample up to 2021.

Motivation

► Follow-up to the ECB Strategy Review → need to better understand the heterogeneity in (non-bank) transmission of monetary policy

What we know:

► Heterogeneity in firm fundamentals plays a role in the transmission of monetary policy (e.g. Ottonello & Winberry 2020; Anderson & Cesa-Bianchi 2021; Gürkaynak & al. (2022), Palazzo & Yamarthy (2022), Chiţu & al. (2023), Cloyne & al. (2023))

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What we understand less:

- ► Limited firm-level literature for monetary policy transmission in the euro area, particularly for corporate bonds → data challenges
- ▶ Role of country heterogeneity in monetary unions for (i) monetary policy transmission to corporate bond spreads & (ii) the level of corporate bond spreads

Our contribution:

▶ We study monetary policy transmission to corporate bond spreads in monetary unions

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Why does it matter?

- ▶ Understand the corporate bond lending channel of monetary policy (Darmouni & al. 2021)
 - ► EA corporate bond markets' increased importance (ECB, 2021; Darmouni & Papoutsi, 2022)

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Why does it matter?

- ▶ Understand the corporate bond lending channel of monetary policy (Darmouni & al. 2021)
 - ► EA corporate bond markets' increased importance (ECB, 2021; Darmouni & Papoutsi, 2022)
- ▶ Understand the degree of integration of corporate bond markets in the EA and the US
 - ► Current policy initiative on Capital Markets Union
 - ► Long-standing debate on Optimal Currency Areas (Mundell, 1961; Kenen, 1969; Friedman, 1997; Alessina&Barro, 2002; Krugman, 2013)
- ► Timely & policy relevant

Potential mechanisms

Mechanisms

- Monetary policy tightening surprise → tighter financing conditions → corporate debt service more challenging → firm's default probability higher → holding corporate bond riskier → wider corporate bond spread
- ► Heterogeneous effects of monetary policy transmission on corporate bond spreads depending on the residence of the bond issuer in the monetary union:
 - (1) United States: Expect the state of origin of the bond-issuing firm not to matter
 - (2) Euro area: Expect stronger corporate spread responses to monetary policy in lower-rated monetary union members:
 - Conventional perception that EA is not OCA as the US
 - ► EA bank loan spreads are strongly determined at the country level (Altavilla & al. 2024)

Key Findings

- ► Monetary policy transmits **homogeneously** to bond spreads independently of the country/state of residence of the bond-issuing firm
- ightharpoonup Corporate bond spreads determined primarily at the bond/firm level rather than at the country level ightharpoonup in contrast to bank loan spreads
- ▶ Euro area corporate bond market is as **integrated** as that of the United States
- Primarily due to properties of the corporate bond market rather than to bond-issuing firms' specific characteristics

Policy implications:

Deepen euro area capital markets to facilitate bond issuance ⇒ Implications for homogeneous monetary policy transmission to bond issuers & CMU analytical support

Data

- ▶ Unique and comprehensive dataset: Focus on non-financial corporates in the US and the EA (extension with financial corporates)
- ► Sample period: Jul-2006 to Dec-2021 (currently updating to 2023)
- Bond-level: ICE Bank of America Merrill Lynch, Bloomberg, ECB-CSDB, ECB-SHSS, Moody's KMV
 - USD-denominated bonds for US; EUR-denominated bonds for EA
 - Option-adjusted spreads (OAS), maturity-matched spreads vs. OIS, maturity-matched spreads vs. Bund
 - Additional bond characteristics: face value, age, coupon, seniority type, embedded options, ratings
 - ► Type and nationality of bond holders (EA only)

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 - ▶ Bank loans interest rate spread maturity matched vs. OIS (EA only)

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- Aggregate data: US muni bonds yields at State level, US 10Y yields, EA 10Y yields, etc
- Matched sample: 1,607 US firms and 15,383 US bonds; 287 EA firms and 2,471 EA bonds

Similar size distributions of bond-issuing firms across major EA countries

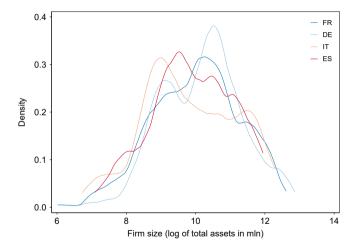


Figure 1: Distributions of euro area firms by size

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Convergence of EA bond-issuing firm size distributions towards US distribution

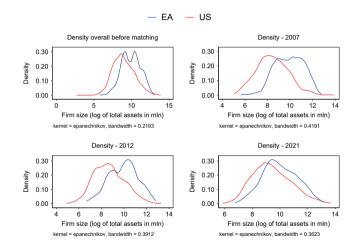


Figure 2: Distributions of US and EA firms by size

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Empirical framework - Step 1: Estimate bond-level responses to monetary policy surprises

- ▶ Research question 1: Do spreads of bond issuers in low-rated countries/states react more to monetary policy surprises?
- ► Event study methodology: bond-level panel regressions for bond *i* of firm *j* in sector *s* and country or state *c* over one-week window, *t*, around FOMC/ECB announcements (Jul-2006 to Dec-2021)

$$\Delta y_{ijsc,t} = \beta_1 \varepsilon_t + \beta_2 \varepsilon_t \times \mathbb{1}_{ij}^{\text{low-rated sov.}} + \beta_3 \mathbb{1}_{ij}^{\text{low-rated sov.}} +$$

$$\gamma \mathbf{Z}_{ij,t} + \alpha_i + \alpha_j + \alpha_s + e_{ijsc,t}$$
(1)

- \triangleright $y_{iisc,t}$: corporate bond spread (OAS; maturity-matched vs OIS; maturity-matched vs Bund)
- $ightharpoonup \epsilon_t$: monetary policy surprises from Jarocinski & Karadi (2020) and Altavilla & al. (2019)
- ightharpoonup 1 low-rated sov: dummy variable if bond-issuing firm domiciled in low-rated country/state
- \triangleright $Z_{ii.t}$: firm default risk; bond ratings
- $\triangleright \alpha_i, \alpha_i, \alpha_s$: bond-, firm-, sector-level fixed effects

Step 1.1: Estimate bond-level responses to monetary policy surprises: US results

Table 1: Corporate bond spreads responses to monetary policy in the US

	Overall	Lower rated US State	Overall, incl. FE and controls	Lower rated US State, incl. FE and controls
	(1)	(2)	(3)	(4)
Fed surprise	0.959*** (0.251)	0.911*** (0.252)	0.718*** (0.256)	0.706*** (0.240)
Fed surprise \times LR_dummy	` '	0.081 (0.081)	,	0.020 (0.075)
Observations	398,836	398,836	335,352	335,352
R-squared	0.01	0.01	0.05	0.05
Adjusted R2	0.01	0.01	0.02	0.02
Fixed effects	No	No	Yes	Yes
Additional controls	No	No	Yes	Yes
Double clustering	Yes	Yes	Yes	Yes
Number of clusters	110	110	110	110

Step 1.2: Estimate bond-level responses to monetary policy surprises: EA results

Table 2: Euro area corporate bond spreads responses to largest ECB monetary policy surprises

	Overall	Lower rated EA country	Overall, incl controls	Lower rated EA country, incl. controls
	(1)	(2)	(3)	(4)
ECB surprise	3.159* (1.528)	3.036* (1.510)	3.876** (1.271)	3.863** (1.196)
ECB surprise x LR_dummy	(1.320)	0.620 (1.106)	(1.2/1)	0.066 (0.872)
Observations	5,311	5,311	4,413	4,413
R-squared	0.422	0.422	0.545	0.545
Fixed effects	Yes	Yes	Yes	Yes
Additional controls	No	No	Yes	Yes
Double clustering	Yes	Yes	Yes	Yes
Adjusted R2	0.110	0.110	0.270	0.270
Number of clusters	10	10	10	10

Step 1.2: Estimate bond-level responses to monetary policy surprises: EA results

Table 3: Euro area corporate bond spreads responses to ECB and Fed monetary policy

	Overall	Lower rated EA country	Overall, incl controls	Lower rated EA country, incl. controls	Overall, Fed surprise	Overall, Fed and ECB horse race	Lower rated EA, Fed sur- prise
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ECB surprise	3.159* (1.528)	3.036* (1.510)	3.876** (1.271)	3.863** (1.196)		0.580 (0.718)	
ECB surprise x LR_dummy	,	0.620 (1.106)	` ,	0.066 (0.872)		,	
Fed surprise		, ,		, ,	0.425** (0.176)	0.823*** (0.224)	0.403** (0.159)
Fed surprise × LR_dummy					(0.170)	(0.224)	0.106 (0.180)
Observations	5,311	5,311	4,413	4,413	62,534	563,201	62,534
R-squared	0.422	0.422	0.545	0.545	0.051	0.041	0.051
Adjusted R2	0.110	0.110	0.270	0.270	0.0192	0.0130	0.0192
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional controls	No	No	Yes	Yes	No	No	No
Double clustering	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of clusters	10	10	10	10	110	280	110

Key Finding 1

- Key Finding 1: Monetary policy transmits homogenously to bond issuers across US states and EA countries:
 - ► There are no differential responses to monetary policy surprises of bond spreads of firms located in lower rated US states/EA countries

Empirical framework - Step 2: Role of country fixed effects for corporate bond spreads levels

▶ Research question 2: Are corporate bond spreads levels determined at the issuer's country level or at the firm level?

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Empirical framework - Step 2: Role of country fixed effects for corporate bond spreads levels

- ► Research question 2: Are corporate bond spreads levels determined at the issuer's country level or at the firm level?
- Our findings: Corporate bond spreads levels are determined at the firm level both for the US and the EA, not at the country level

Table 4: Role of country fixed effects for corporate bond spreads levels and firm default risk

	US			EA				
	(1) (2) (3) (4)			(4)	(5)	(6)	(7)	(8)
	OAS	OAS	OAS	Default risk	OAS	OAS	OAS	Default risk
Fixed effects Controls (Bond EDF, Firm EDF)	Country No	Country-Time No	Bond, firm Yes	Country-Time No	Country No	Country-Time No	Bond, firm Yes	Country-Time No
R2 Adjusted R2	0.04 0.04	0.07 0.07	0.70 0.70	0.00 0.00	0.03	0.06 0.06	0.65 0.65	0.02 0.02

Key Finding 2

- ▶ **Key Finding 2**: Corporate bonds spreads levels do not depend on country/state of the bond-issuing firm at all:
 - Country/country-time fixed effects explain only single digits of the variance of US and EA corporate bond spreads levels
 - ▶ This is polar opposite of bank loan spreads, which are very strongly determined at the country level (Altavilla & al. 2024)

Empirical framework - Step 3: Corporate bond markets vs bond-issuing firms specific features?

Research question 3: Are these findings explained by salient features of the bond-issuing firms or of the corporate bond market?

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- ▶ If **bank loan spreads** of the bond-issuing firms are determined at:
 - ▶ firm level (expect low R2 for country-time FE) \Rightarrow Bond-issuing firms are special
 - ▶ country level (expect high R2 for country-time FE) ⇒ Corporate bond market is special

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 - ► country level (expect high R2 for country-time FE) ⇒ Corporate bond market is special

Table 5: Role of country fixed effects for bank loan spreads

	Bank loan spreads	Bank loan spreads	Bank loan spreads
	(1)	(2)	(3)
Fixed effects	Country	Country-Time	Country-Time
Controls	No	No	Yes
R2	0.29	0.71	0.74
Adjusted R2	0.29	0.71	0.74

Key Finding 3

- **Key Finding 3**: The corporate bond market is special not the bond-issuing firms:
 - ► The bank loan spreads of the bond issuing firms are similarly determined as those of other firms, at the country level

Robustness tests and ongoing extensions

Robustness checks:

- ► Alternative definitions of corporate bond spread, country/state classification, sample periods (e.g. pre-CSPP sample)
- ► Sub-sample of EA and US firms matched by size
- ► EA: Alternative monetary policy surprises (Altavilla & al. 2019)
- ► EA: Fixed or changing composition of EA
- ► EA: Country-by-country estimates

Ongoing extensions:

- Further robustness checks (e.g. including lower tranches of high-yield bonds; restricting to sovereign stress periods; using WLS; perform similar analysis for financials)
- Enlarge database to entire universe of firms (not only bond-issuing)
- ► Match bond-issuing firms with their peer non-bond issuing firms ⇒ Compute a bond-issuance welfare indicator

This paper:

- ▶ Investigates monetary policy transmission to corporate bond spreads in the EA and US
- Explores the role of country/state heterogeneity in monetary unions for corporate bond spreads

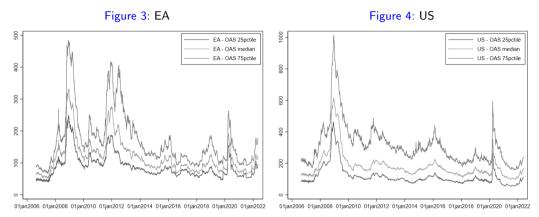
Key Takeaways:

- Monetary policy transmits homogeneously to bond spreads independently of the country/state of residence of the bond-issuing firm
- ► Euro area corporate bond market is as **integrated** as that of the United States
- ► Primarily due to **properties of the corporate bond market** rather than to bond-issuing firms' specific features

Policy implications:

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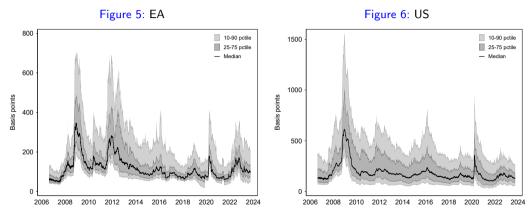
Options adjusted spreads - Baseline dataset



Sources: ICE BofA Merrill Lynch, Moody's CreditEdge, Bloomberg, LSEG and authors' calculations.

Notes: The figures plots the panel of daily corporate bonds spreads in basis points for the US (panel a) and the EA (panel b) over 2006 to 2022, excluding lower tranches of high-yield bonds.

Option adjusted spreads - Extended dataset



Sources: ICE BofA Merrill Lynch, Moody's CreditEdge, Bloomberg, LSEG and authors' calculations.

Notes: The figures plots the panel of daily corporate bonds spreads in basis points for the US (panel a) and the EA (panel b) over 2006 to 2023 and includes lower tranches of high-yield bonds.

Investor base composition of the euro area corporate bond market

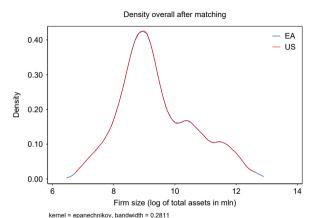
Table 6: The investor base composition of euro area corporate bonds by country

Bond holdings by	of Banks	MMFs	IFs	IC	PF	Othe
domestic investors	which:					
(in % of total						
EA holdings as						
reported in SHSS)						

Country							
AT	24.0	9.6	0.0	4.4	3.9	0.0	6.0
BE	9.6	0.8	0.0	0.8	5.3	0.1	2.7
DE	48.9	11.4	0.0	16.4	3.3	0.5	17.1
ES	16.5	2.9	0.0	3.9	5.4	2.5	1.8
FI	32.8	5.4	0.0	7.6	4.9	0.3	14.3
FR	49.4	5.7	0.2	7.2	33.8	0.0	2.5
GR	41.1	19.6	0.0	6.0	3.1	0.9	11.5
ΙE	7.7	1.0	0.0	5.8	0.7	0.0	0.1
ΙΤ	33.0	4.0	0.0	4.6	14.0	0.5	9.8
LU	16.7	1.1	0.0	11.0	0.4	0.0	4.4
NL	7.6	0.2	0.0	1.7	2.9	2.1	8.0
PT	32.8	8.6	0.0	2.1	13.6	3.4	4.8

Sources: ECB Securities Holdings Securities Statistics (SHSS) and authors calculations

Distributions of US and EA firms by size after matching



Sources: ICE BofA Merrill Lynch, Orbis and authors calculations.

Notes: The chart shows the kernel density of firm size, measured as the log of total assets in mln EUR, in the EA and the US after applying a nearest neighbour matching algorithm on total assets with a caliper of 5 mln EUR in order to find the closest US match for an EA firm.

Figure 7: Distributions of US and EA firms by size after applying a matching algorithm

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Correlations

Figure 8: Corporate bond spreads



Figure 9: Bank bond spreads







Sources: ICE BofA Merrill Lynch, Moody's CreditEdge, Bloomberg, LSEG and authors' calculations.

Notes: The chart displays the correlation coefficients country by country of corporate bond spreads with sovereign bond spreads, matched by bond time to maturity (panel (a)), and bank bond spreads with sovereign bond spreads, matched by bond time to maturity (panel (b)). To correct for the Forbes and Rigobon (2002) bias, the calculations exclude periods of sovereign stress, i.e. periods where the dispersion of changes in individual 10-year sovereign yields relative to the EA GDP-weighted 10-year yield is one standard deviation above the mean.