Trade Credit and the Transmission of Unconventional Monetary Policy

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March 2021

Motivation

Conventional monetary policy is generally thought to have larger effects on small bank-dependent firms (Gertler and Gilchrist, 1994)

Unconventional monetary policy tools directly affect bond yields and issuance volumes of large firms

- Small firms can indirectly benefit through the bank lending channel as large firms' demand for credit decreases (Grosse-Rueschkamp, Steffen, and Streitz, 2019)

This Paper

Does trade credit help to redistribute the benefits of unconventional monetary policy across firms and regions?

Trade credit channel of transmission of unconventional monetary policy
- Laboratory: 2016 ECB Corporate Sector Purchase Program (CSPP)
- Firms with eligible bonds experience a reduction in their cost of capital.

- Do they act as financial intermediaries by providing trade credit to their customers?
- Do small and financially-constrained firms benefit indirectly through their large suppliers?

Interaction with concerns of asymmetric effects of monetary policy in the euro area
- Bond markets are more developed in the European core countries than in periphery countries

Distribution of GDP vs. CSPP amount issued
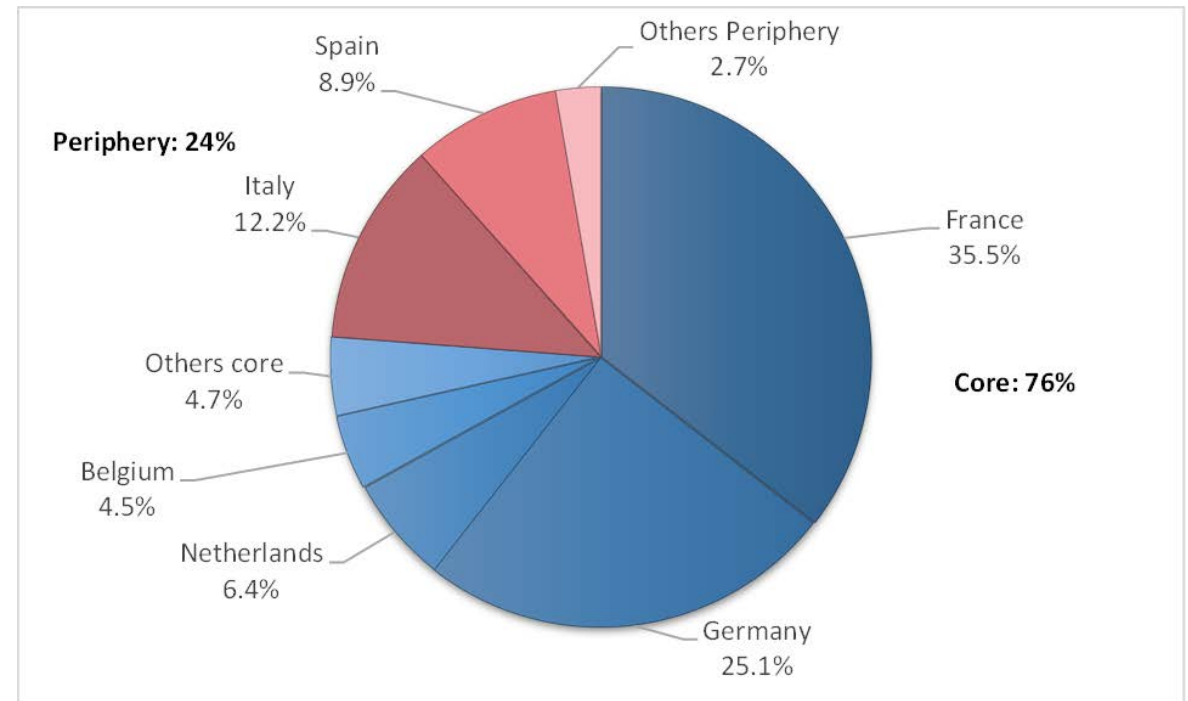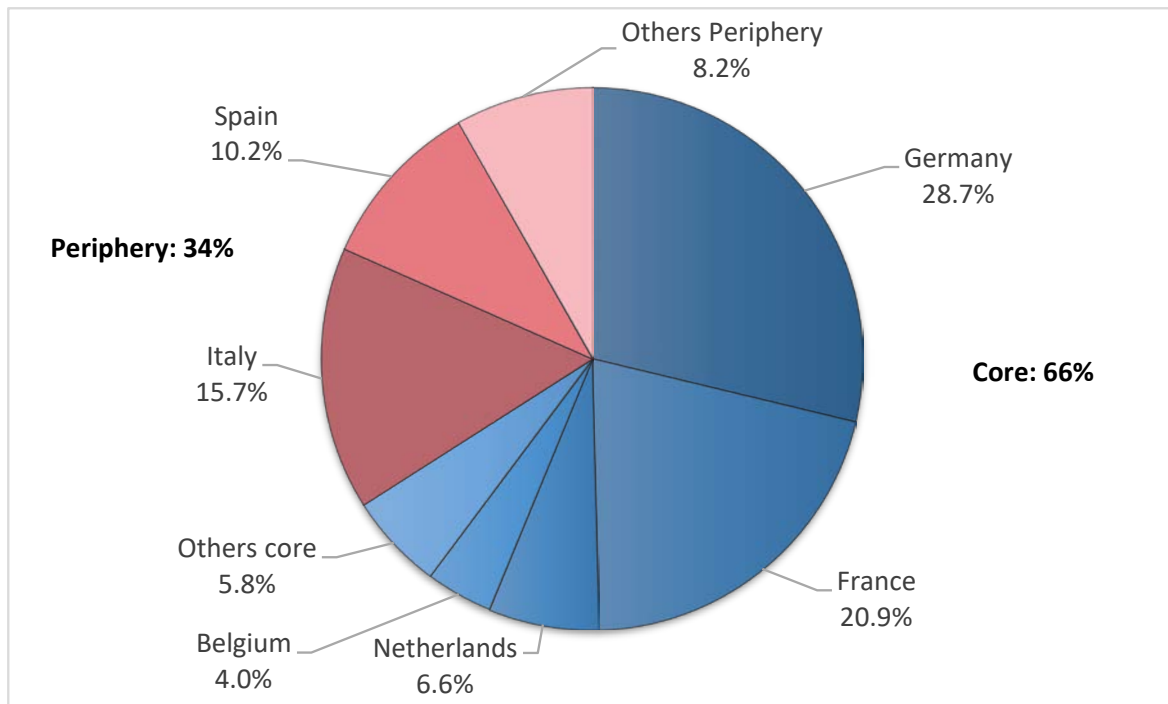
Preview of Results

Firms with bonds that are eligible under the CSPP issue more bonds and extend more trade credit to their customers

Simultaneous increase in accounts payable in customers firms
- More pronounced for financially constrained clients

Redistribution across regions mitigates asymmetric distribution of CSPP eligibility
- Eligible firms in core countries increase bond issuance and accounts receivable
- Increase in accounts payable more pronounced in periphery countries

Real effects: customers of eligible firms invest more, increase employment and provide more trade credit themselves

Eligible firms expand their customer base, possibly leading to more concentration in upstream industries

The ECB's Corporate Sector Purchase Program (CSPP)

Announced on March 10, 2016 and implemented starting in June 2016

Expansion of ECB's Asset Purchase programs to include investment grade corporate bonds (non-financials firms)

List of marketable bonds accepted as collateral published by the ECB the day before the CSPP announcement

Data

Bureau Van Dijk's Orbis Database

   Public and private firm financials for 2013-2017 period

   Restrict to 19 euro area countries

   Exclude firms with less than €1M in assets in 2015, financial firms (SIC codes 6000-6999) and public administration (SIC codes 9000-9999)

510,298 unique firms for a total of 2,248,514 firm-year observations

   151 unique non-financial eligible firms

Factset Revere Supply Chain Relationships Database

   Direct and reverse relationships of eligible suppliers

   Eligible firms report 7.6 customers domiciled in euro area, on average (as of 2015)

   318 unique non-financial customers of eligible firms

Empirical Methodology

$$Y_{i,t} = \beta_0 + \beta_1 Treated_i \times Post_t + \beta_2 \times X_{i,t-1} + \eta_i + \eta_{j,t} + \eta_{c,t} + \varepsilon_{i,t}$$

$Y_{i,t}$:   Suppliers: Accounts receivable/sales

Customers: Accounts payable/sales

- Additional outcomes: short-term and long-term investment, employment, sales and financing

Treated:

- *Eligible Supplier* = 1 if a firm has bonds eligible for purchase under the CSPP
- *Has Eligible Supplier* = 1 if a firm is a customer of a firm with eligible bonds

Post = 1: 2016 and onwards

Empirical Methodology

$$Y_{i,t} = \beta_0 + \beta_1 Treated_i \times Post_t + \beta_2 \times X_{i,t-1} + \eta_i + \eta_{j,t} + \eta_{c,t} + \varepsilon_{i,t}$$

$X_{i,t-1}$: firm-specific control variables including
   log(assets), cash/assets, PPE/assets, net income/sales, liabilities/assets

Firm fixed effects η_i, industry-year fixed effects $\eta_{j,t}$, and country-year fixed effects $\eta_{c,t}$

Standard errors clustered at the firm level

$\beta_1 > 0$: eligible suppliers extend more trade credit thanks to the decrease in cost of external finance due to the CSPP

Parallel trends test to evaluate whether eligible suppliers and customers of eligible firms experience different demand shocks

Eligible Firms Extend More Trade Credit

Dependent variable: Accounts receivable/sales

	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.103***		0.102***		0.089***	
	(0.032)		(0.032)		(0.032)	
Eligible × 2014		-0.007		-0.007		-0.013
		(0.022)		(0.022)		(0.022)
Eligible × 2015		0.046		0.046		0.042
		(0.043)		(0.043)		(0.043)
Eligible × 2016		0.077**		0.077**		0.062*
		(0.038)		(0.038)		(0.038)
Eligible × 2017		0.156**		0.156**		0.139**
		(0.062)		(0.062)		(0.062)
Controls	No	No	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	No	No	Yes	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.74	0.74	0.74	0.74	0.74	0.74

Customers of Eligible Firms Receive More Trade Credit

Dependent variable: <u>Accounts payable/sales</u>

	(1)	(2)	(3)	(4)	(5)	(6)
Has Eligible Supplier × Post	0.048***		0.045***		0.032*	
	(0.017)		(0.017)		(0.017)	
Has Eligible Supplier × 2014		0.030		0.028		0.025
		(0.023)		(0.023)		(0.023)
Has Eligible Supplier × 2015		0.039		0.038		0.039
		(0.027)		(0.027)		(0.027)
Has Eligible Supplier × 2016		0.034**		0.031*		0.018
		(0.016)		(0.017)		(0.017)
Has Eligible Supplier × 2017		0.110***		0.107***		0.092***
		(0.034)		(0.034)		(0.034)
Controls	No	No	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	No	No	Yes	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.71	0.71	0.71	0.71	0.71	0.71

Robustness tests:

- Using propensity score matching with replacement (the nearest neighbor) on log(Assets), Cash, PPE, Net Margin, Liabilities, industry fixed effects and region (exact match on core or periphery countries)

- Regressions including size decile x year fixed effects

- Dropping firms with less than 10 million in assets or German firms

- Regressions including country-industry-year fixed effects

- Mechanisms: Eligible suppliers issue more bonds; no evidence that the customers of eligible firms have better access to financial debt

Heterogeneity:
Financially Constrained Firms Receive More Trade Credit

Dependent variable: Accounts payable/sales

	Investment Grade	Non-Investment Grade	Rated	Unrated	Low Liabilities	High Liabilities	High PPE	Low PPE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Has Eligible Supplier × *Post*	-0.049	0.041**	-0.055	0.047**	0.023	0.082***	0.022**	0.039*
	(0.048)	(0.021)	(0.038)	(0.022)	(0.020)	(0.031)	(0.010)	(0.023)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	697	2,247,817	1,169	2,247,345	1,124,258	1,124,256	1,124,256	1,124,258
R-squared	0.77	0.71	0.68	0.71	0.71	0.72	0.72	0.72
Difference (p-value)	0.07		0.02		0.11		0.51	

Heterogeneity:
Financially Constrained Firms Receive More Trade Credit

Dependent variable: <u>Accounts payable/sales</u>

	High Sales	Low Sales	Low Sales Growth	High Sales Growth	Low Asset Growth	High Asset Growth	High EBITDA	Low EBITDA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Has Eligible Supplier × Post	0.019	0.191	0.027	0.044**	0.014	0.052**	0.014**	0.066***
	(0.015)	(0.371)	(0.032)	(0.019)	(0.029)	(0.026)	(0.006)	(0.023)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,124,256	1,124,258	1,081,305	1,081,303	1,090,815	1,090,812	1,082,737	1,082,737
R-squared	0.68	0.72	0.76	0.75	0.75	0.73	0.71	0.72
Difference (p-value)	0.75		0.63		0.47		0.06	

Regional Propagation of CSPP through Trade Credit

	Core Countries			Periphery Countries		
	Accounts Receivable	Accounts Payable	Accounts Payable	Accounts Receivable	Accounts Payable	Accounts Payable
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.126***			0.018		
	(0.045)			(0.025)		
Has Eligible Supplier × Post		0.017			0.072**	
		(0.019)			(0.032)	
Eligible Suppliers Share × Post			0.003			0.109**
			(0.031)			(0.048)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	650,691	650,691	650,691	1,597,823	1,597,823	1,597,823
R-squared	0.77	0.71	0.71	0.73	0.71	0.71

Regional Propagation of CSPP through Trade Credit

	Euro Area Countries	Core Countries	Periphery Countries
		Accounts Payable	
	(1)	(2)	(3)
Has Core Eligible Supplier × Post	0.044**	0.018	0.077
	(0.020)	(0.020)	(0.051)
Has Periphery Eligible Supplier × Post	0.024*	0.003	0.034*
	(0.013)	(0.023)	(0.018)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Number of observations	2,248,514	650,691	1,597,823
R-squared	0.71	0.71	0.71

Real Effects of CSPP: Investment and Operations

Investment in Fixed Assets, Working Capital and Human Capital

	Asset Growth	CAPEX	ΔInventories	ΔReceivable	Labor Growth
	(1)	(2)	(3)	(4)	(5)
Has Eligible Supplier × Post	0.025*	0.005*	0.004**	0.011**	0.034*
	(0.015)	(0.003)	(0.002)	(0.005)	-0.02
Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,116,731	2,246,443	2,247,599	1,779,908
R-squared	0.55	0.48	0.32	0.29	0.28

Trade Credit and Suppliers' Competitive Position

Core Countries

	Number of Clients Kept			Number of New Clients		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	11.700***	9.968***	9.729***	4.247***	3.429**	3.612**
	(2.334)	(2.510)	(2.481)	(1.482)	(1.501)	(1.471)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Ys	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	6,558	3,883	3,883	6,558	3,883	3,883
R-squared	0.84	0.84	0.84	0.59	0.58	0.58

Periphery Countries

	Number of Clients Kept			Number of New Clients		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.624	-0.359	-0.580	-0.419	0.275	-0.648
	(1.318)	(1.445)	(1.548)	(1.152)	(1.058)	(1.248)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,876	2,162	2,154	2,876	2,162	2,154
R-squared	0.85	0.85	0.85	0.51	0.5	0.52

Effect on supplier (SIC-4) market share

	Euro Area Countries		Core Countries		Periphery Countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.373*	0.374*	0.499*	0.499*	0.108	0.109
	(0.226)	(0.226)	(0.302)	(0.302)	(0.297)	(0.297)
Controls	No	Yes	No	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,514	2,248,514	650,691	650,691	1,597,823	1,597,823
R-squared	0.98	0.98	0.98	0.98	0.97	0.97

Conclusion

1. Central bank's direct corporate bond purchases favor large firms with public debt
2. Production networks mitigate asymmetric effects through the provision of trade credit to customers
3. Expansion in trade credit benefits more financially constrained customers and customers located in periphery countries
4. Customers increase investment and employment in response to trade credit
5. Ability to offer trade credit can strengthen the market position of larger firms in upstream industries

Trade credit is an important mechanism of monetary policy transmission and redistributes the effects of unconventional monetary policy across regions and firms.

Effect of CSPP on Accounts Payable of Eligible Firms

	(1)	(2)	(3)
Has Eligible Supplier × Post	0.040**	0.039**	0.028
	(0.019)	(0.019)	(0.019)
Eligible × Post	0.027	0.025	0.015
	(0.021)	(0.021)	(0.021)
Controls	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes
Number of observations	2,248,514	2,248,514	2,2485,14
R-squared	0.71	0.71	0.71

Effect of CSPP on Debt of Eligible Firms

Dependent variable: <u>Change in financial debt (scaled by lagged assets)</u>

Panel A: Sample of All Firms

	Eurozone	Core Countries	Periphery Countries
	(1)	(2)	(3)
Eligible × Post	0.016	0.022*	-0.007
	(0.011)	(0.014)	(0.017)
Controls	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Number of observations	2,081,233	633,211	1,448,022
R-squared	0.26	0.25	0.26

Effect of CSPP on Debt of Eligible Firms

Panel B: Sample of Publicly Listed Firms (Compustat Global/Capital IQ)

	Eurozone			Core Countries			Periphery Countries		
	$\Delta Total\ Debt$	$\Delta Bond\ Debt$	$\Delta Bank$ $Debt$	$\Delta Total\ Debt$	$\Delta Bond\ Debt$	$\Delta Bank$ $Debt$	$\Delta Total\ Debt$	$\Delta Bond\ Debt$	$\Delta Bank$ $Debt$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Eligible × Post	0.007	0.016**	-0.008	0.005	0.013*	-0.003	0.006	0.016	-0.029
	(0.010)	(0.006)	(0.007)	(0.012)	(0.007)	(0.007)	(0.023)	(0.018)	(0.022)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3,908	3,908	3,908	2,463	2,463	2,463	1,445	1,445	1,445
R-squared	0.39	0.29	0.26	0.39	0.31	0.29	0.4	0.29	0.23

Trade credit Provision Driven by Less Competitive Industries

	Low Herfindahl Index		High Herfindahl Index	
	Accounts Receivable	Accounts Payable	Accounts Receivable	Accounts Payable
	(1)	(2)	(3)	(4)
Eligible × Post	0.109		0.086**	
	(0.073)		(0.037)	
Has Eligible Supplier × Post		-0.022		0.045**
		(0.043)		(0.018)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,186,108	1,186,108	1,062,406	1,062,406
R-squared	0.74	0.71	0.77	0.73