

The international bank lending channel at the zero lower bound

Johannes Gräßl Dawid Zochowski

European Central Bank

IBRN-BDF-CONFERENCE

30 June 2017

The views expressed in the paper are those of the authors and not those of the ECB or of the ESCB.

Outline

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data
- 4 Empirical framework
- 5 Results
- 6 Robustness
- 7 Conclusion

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data
- 4 Empirical framework
- 5 Results
- 6 Robustness
- 7 Conclusion

Motivation

- Sharp increase in international financial integration
 - ▶ Tremendous rise in cross-border financial positions has magnified geographical interconnection among financial markets
- Interlinkages between euro area banks and non-euro area financial markets increased
 - ▶ Growing foreign claims of EA banks on non-EA residents and increasing claims of non-EA residents on EA banks
- Rise in financial globalization may have resulted in increased spillovers of monetary policy shocks on international financial markets

Motivation

- Monetary policy transmission operates through number of channels that potentially propagate monetary conditions abroad
- Increased interconnectedness of global banks has turned attention to international bank linkages (Cetorelli and Goldberg, 2011; Kalemli-Ozcan et al., 2013),
 - ▶ including international bank lending channel of monetary policy (Temesvary et al., 2015; Morais et al., 2015).
- International bank lending channel similar to traditional bank lending channel (Bernanke and Blinder, 1988; Kashyap and Stein, 1994)
 - ▶ Operates through increase in foreign intra-group funding (Temesvary et al., 2015), or general rise in international banking flows (Baskaya et al., 2016)
- Bulk of literature has focussed on standard monetary policy

This paper

- Investigates international bank lending channel of unconventional monetary policy when interest rates are trapped at or below the zero lower bound
- Uses common methodology put forward in context of International Bank Research Network (IBRN)
- Uses confidential EA bank-level data set on 250 banks
- Assesses inward and outward spillovers of unconventional monetary policy changes, proxied by movements in central banks balance sheets

Main findings

- EA banks increase lending to domestic non-financial private sector in response to foreign central bank balance sheet expansions
- EA banks increase lending to rest of the world in response to ECB unconventional monetary policy accommodation
- Strong evidence for existence of international bank lending channel
 - ▶ Inward and outward spillovers stronger for EA banks which are liquidity constraint and rely more on internal capital markets
 - ▶ Bank-specific supply effects driver of monetary policy spillovers

1 Introduction

2 Identification of international bank lending channel

3 Data

4 Empirical framework

5 Results

6 Robustness

7 Conclusion

Traditional bank lending channel

- Existence of bank lending channel in transmission of monetary policy established by Bernanke and Blinder (1988); Kashyap and Stein (1994)
 - ① In response to monetary policy tightening interest rates increase and reservable bank deposits drop
 - ② When reserve requirements are binding, banks shrink size of reservable deposits
 - ③ Aggregate demand and thus lending demand falls leading to a drop in deposit supply
 - ④ Banks might have to cut lending if they cannot access alternative sources of funding (commercial papers, intragroup funding)

International bank lending channel of unconventional monetary policy

- Bank lending channel of UMP operates differently compared to traditional bank lending channel
 - ① Accommodative UMP shock: interest rates in that country decline across maturity spectrum and supply of money (M3) increases
 - ② Greater availability of broad money abroad enables domestic banks to increasingly lend abroad
 - ③ As a result foreign banks are subject to positive funding shock
- Spillovers particularly pronounced at times of increased international banking flows, and if monetary policy cycles are not perfectly synchronised

Related literature

- Looser monetary policy in US/UK leads to increase in lending by US/UK foreign banks operating in Mexico (Morais et al., 2015)
- Following US monetary policy tightening, US banks, in particular those with foreign offices, significantly reduce holdings of foreign claims on foreign residents (Correa and Murry, 2009)
- US monetary policy affects foreign lending of US resident banks both via cross-border claims and via lending activity of foreign affiliates (Temesvary et al., 2015)
- Globally active banks react weaker to changes in the domestic monetary policy; can resort to internal capital markets (Cetorelli and Goldberg, 2012)
- Larger and more capitalised banks increase credit supply when capital inflows are higher (Baskaya et al., 2016)

Identification challenges—Exogeneity of monetary policy changes

- Exogeneity of monetary policy changes to both domestic and foreign economic and monetary conditions
- For inward spillovers, foreign monetary policy changes need to be exogenous to EA economic conditions and ECB monetary policy
 - ▶ Should hold for US, Japan; less so for UK
- For outward spillovers, domestic monetary policy needs to be exogenous to foreign monetary policy and to domestic and foreign economic conditions
 - ▶ Address endogeneity concerns using Taylor-rule proxy

Identification challenges—Identification of bank-specific shocks

- Isolate bank-specific shock from other macro effects of monetary policy
- Disentangle credit supply from credit demand shocks
 - ▶ Credit demand effects: general macro effects of monetary policy
 - ▶ Credit supply effects: change in banks' ability to lend following monetary policy shock
- Follow Stein and Kashyap (2000) and test to what extent bank balance sheet characteristics matter

Testable hypothesis

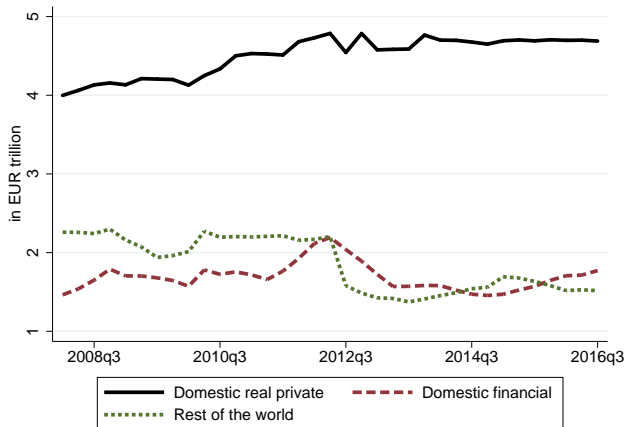
- 1 Domestic banks should increase lending in response to accommodative unconventional monetary policy measures abroad
- 2 Domestic banks should increase cross-border lending in response to domestic accommodative unconventional monetary policy
- 3 Effects should be stronger for banks that have lower liquid asset ratio or larger stronger internal capital market funding
 - ▶ Banks which rely more on intra-group funding forms more exposed to foreign monetary policy shocks to extent that foreign banks reduce cross-border claims and or foreign affiliates reduce lending activity
 - ▶ Banks that have a higher liquid asset ratio could sell those liquid assets without the need to curbing lending

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data**
- 4 Empirical framework
- 5 Results
- 6 Robustness
- 7 Conclusion

Dataset

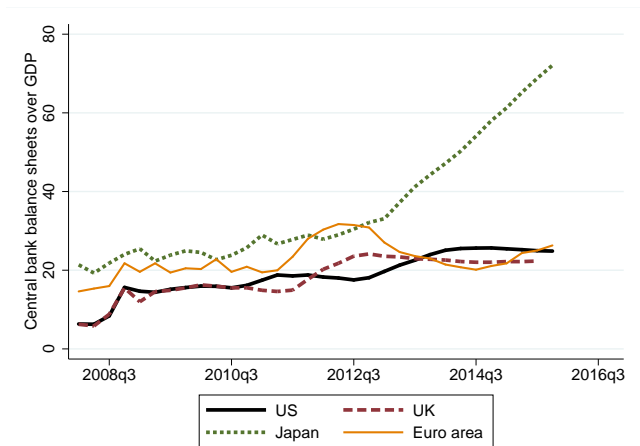
- Bank-level data of MFIs balance sheet items (BSI)
 - ▶ Confidential locational BSI (assets and liabilities) statistics for 250 MFIs from all EA countries, excluding France
 - ▶ Sample period: July 2007 to September 2016 at monthly frequency (collapsed to quarterly frequency) [▶ Loans](#)
- Country-level data
 - ▶ Country-specific estimates of output and credit gaps
- Unconventional monetary policy changes
 - ▶ Changes in central bank balance sheets (over GDP) to capture degree of unconventional monetary policy
 - ▶ Shadow policy rates to capture both conventional and unconventional monetary policies of the EA's core financial partners, US, UK, Japan (taken from Krippner (2013)) [▶ SSR](#)

Development of loans by euro area MFIs by counterparty



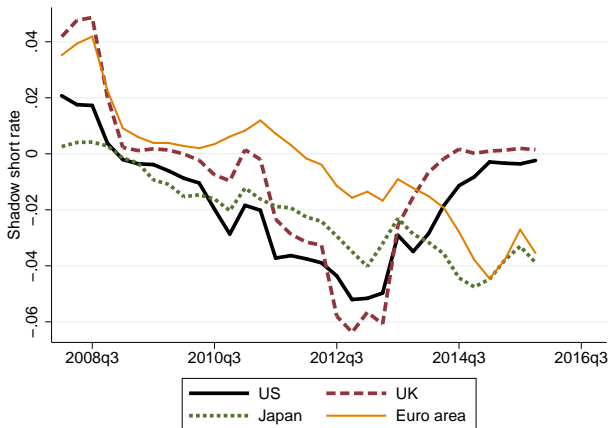
Source: Euro area MFI BSI statistics.

Development of central bank balance sheets



Notes: Central bank balance sheets as a ratio over GDP.

Development of short term shadow rates across major jurisdictions



Notes: Shadow short-term rates based on Krippner (2013).

Bank controls

- Control for bank characteristics which are important for monetary policy transmission, reflecting both bank credit and bank capital channels
 - ▶ Banks' total assets ($\text{Log total assets}_{b,t-1}$)
 - ▶ Banking organization's regulatory Tier 1 risk-based capital to asset ratio ($\text{Tier1 ratio}_{b,t-1}$)
 - ▶ Liquid asset ratio or percentage of a bank's portfolio of assets that is liquid ($\text{Liquid asset ratio}_{b,t-1}$)
 - ▶ Ratio of retail deposits to total liabilities ($\text{Core deposits ratio}_{b,t-1}$)
 - ▶ Percentage of banking organization's net intragroup funding scaled by total assets ($\text{Net intragroup funding ratio}_{b,t-1}$).

Transmission channels

- ECB BSI MFI statistics do not contain any bilateral country-specific information on the source (destination) country of cross-border liabilities (assets)
- Bank-specific transmission channels to establish an international bank lending channel
 - ▶ Liquid asset ratio
 - ▶ Dependence on short-term funding of the domestic bank
 - ▶ Dependence on intragroup funding forms
 - ▶ Total assets

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data
- 4 Empirical framework**
- 5 Results
- 6 Robustness
- 7 Conclusion

Inward transmission of monetary policy

- Inward perspective: impact of foreign UMP on lending behaviour of EA MFIs to the private non-financial sector

$$\Delta Y_{b,t} = \alpha_0 + \sum_{ctry} \left(\sum_{k=0}^K \alpha_{1,k}^{ctry} \Delta QE_{t-k}^{ctry} \right) + \alpha_2 X_{b,t-1} + \alpha_3 Z_{t-1} + \alpha_4 \Delta MP^{EA} + \alpha_4 VIX_{t-1} + f_b + \epsilon_{b,t}, \quad (1)$$

with ΔQE_{t-k}^{ctry} capturing central bank balance sheet changes of US, UK and Japan

- Inward specification testing for international bank lending channel

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{ctry} \left(\sum_{k=0}^K (\alpha_{1,k}^{ctry} * \Delta QE_{t-k}^{ctry} * Channel_{b,t-k-1}) \right) \\ & + \sum_{ctry} \alpha_2^{ctry} Channel_{b,t-k-1} + \alpha_3 X_{b,t-1} + f_b + f_t + Z_{i,t} + \epsilon_{b,t}, \end{aligned} \quad (2)$$

with $Channel_{b,t-k-1}$ capturing the liquid asset ratio, dependence on short-term funding, and dependence on intragroup funding

Outward transmission of monetary policy

- Outward perspective: impact of ECB UMP measures on lending behaviour of EA MFIs to non-EA residents

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{k=0}^K (\alpha_{1,k} \Delta MP_{t-k}^{EA} + \alpha_{2,k} \Delta QE_{t-k}^{EA}) + \alpha_3 X_{b,t-1} \\ & + \alpha_4 Z_{t-1}^{domestic} + \alpha_5 Z_{t-1}^{foreign} + \alpha_6 \Delta MP_{t-1}^{US} + \alpha_7 VIX_{t-1} + f_b + \epsilon_{b,t}, \end{aligned} \quad (3)$$

with ΔMP_{t-k}^{EA} and ΔQE_{t-k}^{EA} capturing changes in the ECB's main policy rate and balance sheet, respectively

- Outward specification establishing international bank lending channel

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{k=0}^K (\alpha_{1,k} \Delta MP_{t-k}^{EA} * Channel_{b,t-K-1} + \alpha_{2,k} \Delta QE_{t-k}^{EA} * Channel_{b,t-K-1}) \\ & + \alpha_3 * Channel_{b,t-K-1} + \alpha_4 X_{b,t-1} + f_b + \epsilon_{b,t}, \end{aligned} \quad (4)$$

where $Channel_{b,t-K-1}$ is bank-time specific, and includes the liquid asset ratio, the dependence on short-term funding, and the dependence on intragroup funding

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data
- 4 Empirical framework
- 5 Results**
- 6 Robustness
- 7 Conclusion

Loans to the *domestic non-financial* private sector

	(1)	(2)	(3)	(4)
	No channel	Liquid assets	Short-term funding	Intragroup funding
Log total assets_t-1	-0.016 (0.20)	-0.021 ⁺ (0.13)	-0.021 ⁺ (0.12)	-0.021 ⁺ (0.11)
Tier1 ratio_t-1	-0.038 ^{**} (0.04)	-0.046 [*] (0.06)	-0.046 ^{**} (0.05)	-0.045 [*] (0.05)
Liquid assets ratio_t-1	0.241 [*] (0.06)	0.210 ⁺ (0.14)	0.173 ⁺ (0.11)	0.172 ⁺ (0.11)
Net IG funding ratio_t-1	0.004 (0.78)	-0.002 (0.84)	-0.003 (0.77)	0.073 (0.23)
Core deposits ratio_t-1	0.071 ^{***} (0.00)	0.083 ^{***} (0.00)	0.083 ^{***} (0.00)	0.082 ^{***} (0.00)
US Credit Gap_t-1	0.001 ⁺ (0.10)			
UK Credit Gap_t-1	0.001 (0.36)			
JP Credit Gap_t-1	-0.000 (0.93)			
EA Credit Gap_t-1	0.002 [*] (0.09)			
US Output Gap_t-1	-0.007 (0.21)			
UK Output Gap_t-1	0.010 ⁺ (0.18)			
JP Output Gap_t-1	-0.001 (0.49)			
EA Output Gap_t-1	0.005 (0.50)			
D.MP Domestic_t-1	-0.034 ⁺ (0.12)			
VIX_t-1	-0.003 ^{**} (0.03)			
Short-term funding ratio_t-1			0.004 (0.89)	
Sum D.QE US t to t-3(* Channel)	0.030 (0.12)	-0.060 ^{**} (0.02)	0.007 (0.69)	-0.002 (0.94)
Sum D.QE UK t to t-3(* Channel)	0.026 ^{**} (0.03)	0.021 (0.46)	0.003 (0.86)	-0.048 (0.22)
Sum D.QE JP t to t-3(* Channel)	-0.009 [*] (0.09)	0.015 (0.42)	-0.005 (0.67)	-0.018 ^{**} (0.04)
Sum Impact D.QE	0.011 [*] (0.10)	-0.031 (0.26)	-0.002 (0.85)	0.042 [*] (0.09)
Sum all D.QE	0.046 (0.08)	-0.024 (0.66)	0.005 (0.86)	-0.067 (0.32)
Bank controls	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Observations	5520	5847	5847	5847
R-squared	0.02	0.02	0.02	0.02
Adj-R-squared	0.01	0.02	0.01	0.01
N. of banks	236	233	233	233

Robust standard errors; p-values in parentheses

⁺ $p < 0.2$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Loans to the *domestic financial* sector

	(1)	(2)	(3)	(4)
	No channel	Liquid assets	Short-term funding	Intragroup funding
Log total assets_t-1	-0.048** (0.03)	-0.041*** (0.04)	-0.041* (0.06)	-0.041*** (0.04)
Tier1 ratio_t-1	-0.003 (0.96)	-0.015 (0.78)	-0.020 (0.73)	-0.010 (0.85)
Liquid assets ratio_t-1	-0.090 (0.61)	-0.361* (0.08)	-0.105 (0.59)	-0.112 (0.55)
Net IG funding ratio_t-1	-0.093* (0.08)	-0.060 (0.26)	-0.055 (0.29)	0.084 (0.63)
Core deposits ratio_t-1	-0.048 (0.61)	0.007 (0.94)	0.004 (0.96)	-0.000 (1.00)
US Credit Gap_t-1	0.003 (0.59)			
UK Credit Gap_t-1	0.001 (0.78)			
JP Credit Gap_t-1	0.004 (0.78)			
EA Credit Gap_t-1	-0.003 (0.85)			
US Output Gap_t-1	0.004 (0.90)			
UK Output Gap_t-1	-0.002 (0.97)			
JP Output Gap_t-1	-0.024*** (0.00)			
EA Output Gap_t-1	0.023 (0.74)			
D.MP Domestic_t-1	-0.016 (0.80)			
VIX_t-1	-0.003 (0.45)			
Short-term funding ratio_t-1			-0.026 (0.86)	
Sum D.QE US t to t-3(* Channel)	0.051 (0.46)	0.212*** (0.00)	-0.059 (0.25)	0.168*** (0.00)
Sum D.QE UK t to t-3(* Channel)	0.076 (0.29)	0.066 (0.60)	-0.015 (0.75)	-0.061 (0.34)
Sum D.QE JP t to t-3(* Channel)	0.034 (0.34)	0.019 (0.74)	-0.041 (0.30)	-0.076 (0.10)
Sum Impact D.QE	0.045 (0.16)	0.190* (0.07)	-0.065 (0.13)	0.057 (0.52)
Sum all D.QE	0.160 (0.17)	0.297 (0.16)	-0.115* (0.08)	0.031 (0.75)
Bank controls	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Observations	5493	5807	5807	5807
R-squared	0.01	0.02	0.02	0.02
Adj-R-squared	0.01	0.02	0.02	0.01
N. of banks	241	238	238	238

Robust standard errors; p-values in parentheses

+ $p < 0.2$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Loans to the Rest of the World

	(1) No channel	(2) Liquid assets	(3) Short-term funding	(4) Intragroup funding	(5) Total Assets
Log total assets_t-1	-0.017 ⁺ (0.14)	-0.016 ⁺ (0.20)	-0.015 (0.25)	-0.015 (0.25)	-0.015 (0.24)
Tier1 ratio_t-1	0.067 ⁺ (0.16)	0.112 ^{**} (0.02)	0.114 ^{**} (0.02)	0.114 ^{**} (0.02)	0.118 ^{**} (0.02)
Liquid assets ratio_t-1	0.236 ^{**} (0.05)	0.420 ^{***} (0.01)	0.386 ^{**} (0.01)	0.394 ^{**} (0.01)	0.388 ^{**} (0.01)
Net IG funding ratio_t-1	-0.048 (0.29)	-0.038 (0.42)	-0.036 (0.42)	-0.090 ^{**} (0.03)	-0.040 (0.40)
Core deposits ratio_t-1	0.212 ^{***} (0.00)	0.191 ^{**} (0.01)	0.201 ^{***} (0.01)	0.199 ^{**} (0.01)	0.198 ^{**} (0.01)
L.Credit-to-GDP Gap Estimates	-0.008 ^{**} (0.01)				
Global Credit Gap_t-1	0.010 ^{***} (0.00)				
L.Output Gap Estimates	0.013 ^{**} (0.02)				
Global Output Gap_t-1	-0.011 ^{**} (0.05)				
D.US MP_t-1	0.271 (0.58)				
VIX_t-1	-0.004 ^{***} (0.00)				
Short-term funding ratio_t-1			0.041 (0.72)		
Sum MP t to t-3(* Channel)	0.812 (0.50)	-0.037 (0.92)	0.329 (0.11)	0.318 (0.36)	0.006 (0.52)
Sum QE t to t-3(* Channel)	0.013 ^{***} (0.00)	-0.133 ^{***} (0.01)	-0.052 ^{**} (0.05)	0.022 (0.31)	0.002 (0.20)
MP Impact (* Channel)	0.255 (0.70)	-0.250 (0.17)	0.112 (0.44)	-0.042 (0.49)	0.000 (0.94)
QE Impact * Channel)	0.002 (0.22)	-0.022 (0.41)	-0.015 (0.43)	0.042 ^{***} (0.01)	0.002 ^{**} (0.02)
Time fixed effects	No	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6722	6068	6068	6068	6071
R-squared	0.02	0.03	0.02	0.02	0.02
Adj-R-squared	0.01	0.02	0.02	0.02	0.02
N. of banks	239	235	235	235	235

Robust standard errors; p-values in parentheses

⁺ $p < 0.2$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data
- 4 Empirical framework
- 5 Results
- 6 Robustness**
- 7 Conclusion

Loans to the *domestic non-financial* private sector—Short-term shadow rate (SSR)

	(1)	(2)	(3)	(4)
	No channel	Liquid assets	Short-term funding	Intragroup funding
Log total assets_t-1	-0.032** (0.04)	-0.021* (0.09)	-0.021* (0.09)	-0.021* (0.08)
Tier1 ratio_t-1	-0.055*** (0.00)	-0.052** (0.02)	-0.052** (0.01)	-0.050** (0.02)
Liquid assets ratio_t-1	0.206 ⁺ (0.11)	0.148* (0.07)	0.168* (0.10)	0.161 ⁺ (0.12)
Net IG funding ratio_t-1	-0.001 (0.92)	-0.003 (0.76)	-0.006 (0.61)	0.003 (0.76)
Core deposits ratio_t-1	0.078*** (0.00)	0.087*** (0.00)	0.086*** (0.00)	0.086*** (0.00)
Credit Gap_t-1	-0.000 (0.91)			
Output Gap_t-1	0.000 (0.77)			
D.MP Domestic_t-1	0.001 (0.80)			
VIX_t-1	-0.000 (0.84)			
Short-term funding ratio_t-1			-0.008 (0.73)	
Sum D.SSR US t to t-3(* Channel)	-1.349* (0.09)	11.780 (0.17)	-6.941 (0.40)	-10.080*** (0.02)
Sum D.SSR UK t to t-3(* Channel)	0.405 (0.51)	-5.103 (0.36)	6.619 (0.30)	5.755* (0.05)
Sum D.SSR JP t to t-3(* Channel)	0.241 (0.74)	-21.153 (0.50)	-15.612* (0.08)	-9.879 (0.29)
Sum of Impact D.SSR	0.208 (0.39)	-1.860 (0.82)	-5.697* (0.09)	-4.193 (0.20)
Sum of all D.SSR	-0.703 (0.36)	-14.476 (0.67)	-15.933 (0.15)	-14.204 (0.17)
Bank controls	Yes	Yes	Yes	Yes
Time fixed effects	No	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Observations	5605	6059	6059	6059
R-squared	0.02	0.02	0.02	0.02
Adj-R-squared	0.01	0.01	0.02	0.01
N. of banks	231	233	233	233

Robust standard errors; p-values in parentheses

⁺ $p < 0.2$, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Loans to the Rest of the World—Taylor-shocks

	(1) No channel	(2) Liquid assets	(3) Short-term funding	(4) Intragroup funding	(5) Total Assets
Log total assets_t-1	-0.015 ⁺ (0.18)	-0.016 (0.21)	-0.015 (0.22)	-0.015 (0.23)	0.007 (0.84)
Tier1 ratio_t-1	0.079 ⁺ (0.10)	0.111 ^{**} (0.02)	0.116 ^{**} (0.02)	0.117 ^{**} (0.02)	0.114 ^{**} (0.02)
Liquid assets ratio_t-1	0.231 ^{**} (0.05)	0.035 (0.92)	0.381 ^{**} (0.01)	0.384 ^{**} (0.02)	0.389 ^{**} (0.01)
Net IG funding ratio_t-1	-0.045 (0.33)	-0.042 (0.38)	-0.034 (0.45)	0.164 (0.38)	-0.043 (0.37)
Core deposits ratio_t-1	0.212 ^{***} (0.00)	0.200 ^{**} (0.01)	0.207 ^{***} (0.01)	0.196 ^{**} (0.01)	0.196 ^{**} (0.01)
L.Credit-to-GDP Gap Estimates	-0.004 (0.22)				
Global Credit Gap_t-1	0.005 ^{**} (0.02)				
L.Output Gap Estimates	0.016 ^{***} (0.00)				
Global Output Gap_t-1	-0.009 ⁺ (0.11)				
VIX_t-1	-0.002 ^{***} (0.00)				
Sum D.MP EA t to t-3(* Channel)	-0.105 ^{***} (0.00)	1.507 [*] (0.07)	0.328 (0.25)	0.002 (1.00)	-0.014 (0.48)
Sum D.MP EA*ZLB t to t-3	0.032 (0.50)	-1.073 (0.36)	-0.723 [*] (0.07)	0.008 (0.98)	0.014 (0.62)
Sum all MP (*ZLB)	-0.072 ^{**} (0.01)	0.435 (0.42)	-0.395 (0.20)	0.010 (0.96)	-0.000 (0.99)
Sum Impact MP	-0.019 ^{**} (0.03)	0.171 (0.48)	0.081 (0.43)	-0.086 (0.43)	-0.007 (0.18)
Sum Impact MP*ZLB	0.002 (0.89)	-0.164 (0.68)	-0.152 (0.34)	0.022 (0.86)	0.005 (0.58)
Sum all Impact	-0.017 (0.12)	0.007 (0.98)	-0.071 (0.58)	-0.064 (0.45)	-0.002 (0.75)

- 1 Introduction
- 2 Identification of international bank lending channel
- 3 Data
- 4 Empirical framework
- 5 Results
- 6 Robustness
- 7 Conclusion**

Conclusion

- Paper examines spillovers of monetary policy via international bank lending channel using confidential EA bank level dataset
- Strong evidence for existence of international bank lending channel
 - ▶ EA banks significantly increase their balance sheets in response to US monetary policy accommodation
 - ▶ EA banks significantly increase their cross-border lending in response to ECB monetary policy accommodation
 - ▶ Spillovers substantially stronger for EA banks which are liquidity constraint and rely more on internal capital markets
- Important implications for conduct and coordination of monetary policy
 - ▶ In times of increasing financial interconnectedness, international bank lending channel is an additional and economically important channel through which monetary conditions are propagated abroad

- Baskaya, Y. S., di Giovanni, J., Kalemli-Özcan, S., Peydro, J.-L., Ulu, M. F., 2016. Capital Flows and the International Credit Channel. In: NBER International Seminar on Macroeconomics 2016. NBER Chapters. National Bureau of Economic Research, Inc.
- Bernanke, B., Blinder, A., 1988. Credit, Money, and Aggregate Demand. *American Economic Review* 78 (2), 435–439.
- Cetorelli, N., Goldberg, L. S., 2011. Global Banks and International Shock Transmission: Evidence from the Crisis. *IMF Economic Review* 59 (1), 41–76.
- Cetorelli, N., Goldberg, L. S., 2012. Banking Globalization and Monetary Transmission. *Journal of Finance* 67 (5), 1811–1843.
- Correa, Murry, 2009. Is there a cross-border bank lending channel? evidence from u.s. banks' international exposure. Manuscript, Federal Reserve Board of Governors.
- Kalemli-Ozcan, S., Papaioannou, E., Perri, F., 2013. Global banks and crisis transmission. *Journal of International Economics* 89 (2), 495–510.
- Kashyap, A. K., Stein, J. C., February 1994. Monetary Policy and Bank

Lending. In: Monetary Policy. NBER Chapters. National Bureau of Economic Research, Inc, pp. 221–261.

Krippner, L., 2013. Measuring the stance of monetary policy in zero lower bound environments. *Economics Letters* 118 (1), 135–138.

Morais, B., Peydro, J. L., Ruiz, C., Jul. 2015. The International Bank Lending Channel of Monetary Policy Rates and QE: Credit Supply, Reach-for-Yield, and Real Effects. *International Finance Discussion Papers* 1137, Board of Governors of the Federal Reserve System (U.S.).

Stein, J. C., Kashyap, A. K., 2000. What Do a Million Observations on Banks Say about the Transmission of Monetary Policy? *American Economic Review* 90 (3), 407–428.

Temesvary, J., Ongena, S., Owen, A. L., 2015. A Global Lending Channel Unplugged? Does U.S. Monetary Policy Affect Cross-border and Affiliate Lending by Global U.S. Banks? MPRA Paper 65913, University Library of Munich, Germany.