

The Impact of the Deposit Channel on the International Transmission of Monetary Shocks

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Motivation and question

- The deposit channel plays an important role in the transmission of US monetary policy domestically
- Recent literature suggests that US monetary policy shocks have international impact
- Global banks (banks with foreign branches) play an important role in the transmission of shocks internationally

Question: Does the deposit channel impact the international transmission of US monetary shocks?

Deposit channel

- There are several proposed channels of monetary policy transmission: capital, reserve, lending, and **deposit**
- When central bank increases its policy rate, banks respond by increasing **deposit spreads**, i.e. policy rate minus deposit rate
- Banks can do it because they have **market power** – otherwise they would increase deposit rates as much as policy rate
- Consequently, households withdraw deposits because the cost of deposit liquidity increases
- Banks contract lending in response to deposit outflows

Overview of results

- Stylized model of a global bank that operates in two countries with following predictions:
 - Banks increase deposit spreads after an increase in FFR and deposits decrease
 - Global banks transfer funds from foreign branches to finance domestic and cut foreign loans
- Using panel of domestic and global banks (those that report fund flows across branches in different countries) we find that after 1 p.p. unexpected increase in the FFR, global banks
 - increase deposit spreads by 20 b.p. and face a 2.9% decline in deposit growth
 - **increase net transfers** from foreign branches by 40% to finance domestic lending
 - **contract foreign lending growth** by 1.3%
 - reduce domestic lending growth **half as much** as local banks per percent of deposit outflow

Related Literature

- US monetary policy shocks are transmitted internationally
 - Cetorelli and Goldberg (2012), Schnabl (2012), Acharya et al (2014), Hale et al (2020)
- Global banks amplify transmission and affect the real economy
 - Cetorelli and Goldberg (2012), Temesvary et al (2018), Bolton and Oehmke (2019), Brauning and Ivashina (2020)
- Monetary shocks are transmitted domestically through bank's deposit market power
 - Drechsler, Savov, and Schnabl (2017), Wang, Whited, Wu, and Xiao (2021)

Toy model

- Representative bank operates in two countries — US and UK
- Deposit supply functions D_{US} and D_{UK} decrease in deposit spreads, s_{US} and s_{UK}
- The bank chooses D_{US} , D_{UK} , and net inflows $T = L_{US} - D_{US}$ to solve

$$\begin{aligned} \Pi = & \max_{D_{US}, D_{UK}, T} \left[f_{UK} - \left(l_{UK_0} + \frac{l_{UK_1}}{2} L_{UK} \right) \right] L_{UK} - (f_{UK} - s_{UK}) D_{UK} \\ & + \left[f_{US} - \left(l_{US_0} + \frac{l_{US_1}}{2} L_{US} \right) \right] L_{US} - (f_{US} - s_{US}) D_{US} - \frac{\alpha}{2} T^2 \end{aligned}$$

- Lending is financed by deposits and foreign flows; foreign transactions are costly

Toy model

- Solving bank's problem gives

$$T = \frac{f_{US} - f_{UK} - (l_{US_0} - l_{UK_0})}{l_{US_1} + l_{UK_1} + \alpha} + \frac{l_{UK_1}}{l_{UK_1} + l_{US_1}} D_{UK} - \frac{l_{US_1}}{l_{UK_1} + l_{US_1}} D_{US}$$

If f_{US} increases,

- Direct effect (first term)
 - Deposit effect — s_{US} increases $\Rightarrow D_{US}$ decreases (third term)
 - Hence, T increases in f_{US}
- Inflows to the US increase and depend on deposit spreads and hence, market power

Data

- Bank-level quarterly balance sheet variables from U.S. Call Reports
- Foreign transfers and lending from U.S. Call Reports RCON and RCFN series
- Monetary policy surprises from CME Globex
- Branch-level annual deposit amounts from FDIC
- Branch-level weekly deposit rates from S&P Global RateWatch
- Small business lending data from the Community Reinvestment Act
- County and country variables from BIS, OECD, FRED, and World Bank
- Time range is from 1994Q1 to 2017Q4

Measure of monetary shock

- Monetary surprises – fluctuations of 1-month FF futures around FOMC meetings (1 hour window)
- Instrument FFR with monetary surprises to interpret shocks as unexpected changes to FFR
- Our measure – FFR predicted by monetary surprises and classic controls (GDP, inflation, and lagged FFR)
- We try reduced form (surprises as a regressor) and FFR itself in robustness tests

Important definitions

- **Netdue** – net due to foreign branches less net due from foreign branches
- Netdue represents net transfers from foreign branches
- **Global bank** – bank that reports non-zero netdue at time t
- Global banks have foreign branches that they make operations with
- We keep only relatively large banks (top 20% in assets) to make domestic and global banks more comparable

First step – deposit spreads and deposit amounts

- Deposit channel predicts an increase in deposit spreads and decline in deposit growth
- For each bank i , we run a time-series:

$$y_{it} = \beta_i MS_t + \gamma_i X_{it} + u_{it}$$

where y is either a change in deposit spreads or a log deposit growth, MS is a monetary shock, and X is a vector of controls

- For each bank, we have the following:
 - ① Spread beta (sensitivity of spreads to monetary shock)
 - ② Flow beta (sensitivity of deposits to monetary shock) \Rightarrow predicted deposit growth

Deposit channel spread betas

- How do bank deposit spreads respond to monetary shocks?

$$\Delta s_{it} = \beta_i MS_t + \gamma_i X_{it} + u_{it}$$

Subset	Mean spread beta
Domestic	0.209***
Global	0.198***
All	0.208***

- After 1 p.p. contractionary monetary shock, average global bank increases spreads by 20 b.p.

Global banks increase spreads following unexpected increase to FFR

Deposit channel flow betas

- How do bank deposits respond to monetary shocks?

$$\Delta \log D_{it} = \beta_i MS_t + \gamma_i X_{it} + u_{it}$$

Subset	Mean flow beta
Domestic	-0.005***
Global	-0.030***
All	-0.006***

- After 1 p.p. contractionary monetary shock, average global bank reduces deposit growth by 3%
- Define $\widehat{\text{DepGrowth}}_{it} = \hat{\beta}_i MS_t + \hat{\gamma}_i X_{it}$

Second step – lending contraction and foreign lending

- In response to contractionary monetary shock, we expect **global banks** to reduce lending less than **local banks** per percent of deposit outflow

$$\Delta \log L_{it} = \theta \widehat{DepGrowth}_{it} + \nu Global_{it} \cdot \widehat{DepGrowth}_{it} + \xi X_{it-1} + \alpha_i + \theta_t + \varepsilon_{it}$$

- increase net transfers

$$NetDueGr_{it} = \eta \widehat{DepGrowth}_{it} + \mu Y_{it-1} + \alpha_i + \theta_t + v_{it}$$

- and contract foreign lending

$$\Delta \log ForL_{it} = \iota \widehat{DepGrowth}_{it-1} + \mu Z_{it-1} + \alpha_i + \theta_t + m_{it}$$

Global banks contract lending less than domestic banks, increase net transfers, and contract foreign lending

	<i>Dependent variable:</i>					
	Loans		Netdue		Foreign loans	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{DepGrowth}$	0.225*** (0.010)	0.239*** (0.010)	-13.640*** (5.202)	-12.128** (5.033)	0.462** (0.177)	0.381** (0.186)
$Global \cdot \widehat{DepGrowth}$	-0.117*** (0.031)	-0.105*** (0.032)				
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	203,926	203,926	1,319	1,319	1,107	1,107
R ²	0.218	0.161	0.222	0.210	0.196	0.196

Main results

- Global banks transfer funds from foreign branches when they lose deposits
- Global banks contract domestic lending half as much as local banks per percent of deposit outflow
- Global banks contract foreign lending growth by 1.3%

Potential concerns

- Can results be driven by lending demand or self-selection on global banks?

We confirm our results using county-bank level CRA data and controlling for county fixed effects

- What if it is a lending channel rather than deposit channel?

We conduct branch-level analysis where deposits move more for banks with higher market power as measured by HHI

- Can funds move because of international correlation of monetary shocks?

We control for ECB shocks and show that this is not the case

- Can results be biased because of movements in exchange rates?

We control for the dollar trade index and show that this is not the case

Branch-level analysis

- Market power on deposit market should only affect deposits but not lending:

$$y_{it} = \beta MS_t \cdot BranchHHI_c + \gamma Global_{it} \cdot MS_t \cdot BranchHHI_c + \delta_i + \lambda_c + \theta_{st} + \varepsilon_{icst}$$

- y_{it} is either a log deposit growth or change in deposit spreads for each **branch**
- $BranchHHI$ is the HHI of the deposit market for the county the branch operates in
- In the second stage, we use aggregated fitted deposit outflows (weighted by the deposit share of each branch) to explain net foreign transfers and lending

CRA data

- Community Reinvestment Act incentivizes banks to lend in low and medium income communities
- Lenders also originate loans to small businesses, i.e. firms with annual revenues smaller than \$1 million
- **Identification assumption:** Global and domestic banks in CRA have the same set of borrowers
- The assumption is likely to be satisfied since all loans need to be approved by FDIC, OCC, or Fed

Loan origination results

	<i>Dependent variable:</i>			
	Loans to all firms		Loans to small firms	
	(1)	(2)	(3)	(4)
$\widehat{DepGrowth}$	0.605*** (0.054)	0.515*** (0.052)	1.323*** (0.078)	1.339*** (0.075)
$Global \cdot \widehat{DepGrowth}$	-1.363*** (0.152)	-1.343*** (0.150)	-1.655*** (0.181)	-1.673*** (0.179)
Bank FE	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	No
County FE	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	1,330,453	1,330,453	961,110	961,110

Branch-level results on deposits

	<i>Dependent variable:</i>		
	Deposits (1)	CD Spreads (2)	MM spreads (3)
<i>MS · BranchHHI</i>	-0.018*** (0.005)	0.199** (0.092)	0.177 (0.139)
<i>Global · MS · BranchHHI</i>	-0.019*** (0.008)	0.204 (0.220)	-0.390 (0.279)
Fixed effects	Yes	Yes	Yes
Observations	1,307,583	89,711	72,682
R ²	0.315	0.834	0.880

Results on lending, netdue, and foreign loans

	<i>Dependent variable:</i>					
	Loans		Netdue		Foreign loans	
	(1)	(2)	(3)	(4)	(5)	(6)
$\widehat{DepGrowthBr}$	0.010*** (0.001)	0.010*** (0.001)	-0.736** (0.321)	-0.288 (0.256)	0.084 (0.100)	0.006 (0.021)
$Global \cdot \widehat{DepGrowthBr}$	-0.020*** (0.004)	-0.021*** (0.004)				
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	No	Yes	No	Yes	No
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	141,112	141,112	332	157	206	96
R ²	0.349	0.349	0.394	0.674	0.372	0.859

Branch-level results summary

- Branches in high HHI counties (high market power) increase spreads more and lose more deposits
- Branches of global banks increase spreads by the same amount but lose twice as much deposits as domestic banks
- The gap in lending contraction between domestic and global banks is wider for banks with higher market power
- Banks with higher market power transfer more funds
- Foreign lending results here are subject to finite sample bias – too few observations, but the sign is as expected

Are monetary shocks correlated?

- Monetary policy changes in the US can lead to analogous changes in other countries
- If this is true for shocks, foreign lending can contract because of the positive shocks abroad
- We show that:
 - 1 Monetary surprises in the US and EU are not highly correlated
 - 2 Controlling for ECB shocks does not change our results and even makes them more significant
 - 3 Inclusion of lags doesn't matter

Effect of exchange rates

- Exchange rate movements impact foreign flows
- We use FX dollar trade index as a proxy
- We find that:
 - 1 Exchange rates do not impact monetary surprises
 - 2 Controlling for FX index does not change our results

Additional robustness tests

- Use changes to FFR as a measure of monetary policy shock

We find that global banks increase net transfers and cut foreign lending after increase to FFR

- Results are robust to full sample, top 30%, 10% and 5% of banks by assets
- Results are robust to fixed effects, controls, and standard errors

Conclusion

- We find that after contractionary monetary shock
 - Global banks increase deposit spreads and thus, suffer a deposit outflow
 - Global banks which experience more declines in deposit growth transfer more foreign funds, mitigating reductions in lending
 - Global banks contract foreign lending
- 1 p.p. shock leads to 1.3% decline in foreign lending growth