Monetary Policy Spillovers Under COVID-19: Evidence from U.S. Foreign Bank Subsidiaries[1]

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Onset of COVID-19 crisis caused disrupted financial system

- Liquidity dried in treasury, commercial paper markets, and many nonbank institutions
- U.S. commercial banking system held up surprisingly well
- Banks well-capitalized going into the crisis due to tightened regulatory standards
- Banks were source of stability during the period of deepest disruption
- Tightened regulatory standards in part legacy of global financial crisis of 2007-2009

Studies of bank behavior during global financial crisis identified global policy spillovers

- Multinational banks as conduits of disruption or stability in the global financial system
    - Home country liquidity or regulatory changes influenced activity through foreign branches and subsidiaries
    - Management of "internal capital": after shocks left foreign lending more or less attractive banks adjust foreign subsidiary activity [e.g. Cetorelli and Goldberg (2012)].

- One important spillover is through transmission of monetary policy shocks
    - Foreign bank lending long-known to respond to cross-country interest differentials [e.g. Goldberg and Saunders (1981)].
    - during global financial crisis, advanced economies abruptly eased home country policy
    - Lowered potential returns on domestic lending
    - Banks responded by expanding credit supply through subsidiaries, branches and agencies

Revisit monetary policy spillovers for pandemic period

- Countries entered pandemic in different economic situations, with disparate monetary policy stances

    - Several traditional source country monetary regimes, particularly the euro area and Japan, entered pandemic with policy rates below the zero bound
    - Pandemic raises opportunity to examine global monetary policy spillovers under negative interest rates
    - Reluctance of banks to pay negative rates on retail deposits may result in extra sensitivity to the zero bound in bank responses to home country policy rates [e.g. Altavilla, et al (2018)]
    - Examine whether negative interest rates yield extra affect on activity of U.S. foreign bank subsidiaries over and above linear impact of negative rates as further reduction in policy rates.

- Importantly, do not consider unconventional policy, such asset purchases and forward guidance

To isolate the impact of home country monetary policy, concentrate on bank lending in the United States

- Use Call Report data on balance sheets and income
- Domestic U.S. banks and foreign bank subsidiaries
- Exclude foreign branches and agencies We do so to mitigate the degree of regulatory disparities across our sample.
    - Mitigates regulatory disparities across sample
    - Overlap of disparities in home and host country monetary and regulatory policies likely affects branches and subsidiaries differently [Bussiére, et al (2021)]
    - Can not completely remove foreign regulatory changes
    - But US domestic banks and foreign subs likely cleanest sample possible
- Condition for bank characteristics going into the pandemic based on end 2019 data
- Then examine impact of home country policy rates and any special sensitivity to negative rates over first half of 2020

Results

- Overall message is that bank lending channel fo global spillovers was alive and well during pandemic, as home country monetary policy rates had expected impact on foreign subsidiary lending

- Point estimates suggest 1 std dev ↓ in home country policy rates associated with 3.5 percentage point ↑ in total bank lending growth over first half of 2020

- Negative rates encouraged lending growth over and above this simple policy rate effect
  - Even after conditioning for policy rate levels, banks with negative home country interest rates had 3 percentage points additional growth in lending

- CPI growth also positively associated with lending

Other results

- Differences across our sample by bank size.
    - Large banks were more sensitive than small and medium-sized to policy rates, but small and medium-sized more sensitive to negative rates
    - Coefficient point estimates indicate that 1 sd decline in home country policy resulted in 1.8 percentage point increase in small and medium lending growth, but 6.2 percentage point increase among large banks
    - In contrast, point estimates indicate that small and medmium banks from countries with negative home policy rates on average had 12 percentage points greater lending growth while large bank coefficient negative and only significant at a 10% confidence level
- Combined results indicative that large banks are less encouraged to expand lending through home country movements into negative policy rates
- Also consider implications of home country policy for capital ratios and income

Relation to literature

- Global monetary policy spillovers to bank lending [Goldberg and Saunders (1981), Peek and Rosengren (1997), Cettorelli and Goldberg (2012), Acharya et al. (2017), Demirgüç-Kunt et al. (2017), Buch et al. (2019)]

- Stabilizing or destabilizing roles of foreign banks [Rai et al. (2021), Kleimeier et al. (2013), Albertazzi and Bottero (2014)

- Subsidiaries as abitrage of foreign regulation or culture [Houston et al. (2012), Ashraf and Arshad (2017), di Giovanni et al. (2018), Avdjiev et al. (2021)]

- Impact of low or negative interest rates on lending [Borio and Gambacorta (2017), Demiralp et al. (2019), Lopez, Rose and Spiegel (2020). Ulate (2021)]

- Bank lending under COVID-19 virus [Hardy and Takáts (2020), Berger, et al (2021), Li and Strahan (2020), Lopez and Spiegel (2021), Anbil, et al (2021)]

Data

- Quarterly bank level regulatory filings obtained from the Federal Financial Institutions Examination Council's "Call Reports"

    - Provides detailed information on both balance sheet and income statement variables
    - Data measured as quarter-end
    - Use 2019Q4 data to characterize bank conditions going into the pandemic and 2020Q2 data to changes in bank characteristics over the course of the pandemic

- Call Report data compulsory for US banks, including foreign bank subsidiaries

    - No issues concerning potential endogeneity in reporting patterns
    - Reporting does soemtimes lag and can grow over time

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Sample

- Cross-section of U.S. commercial banks

- Our base specification contains 4,090 banks

- Separate banks into three groups based on asset size in 2019Q4
    - 3,376 small banks assets below $10 billion
    - 130 large banks with assets exceeding $100 billion
    - 584 middle between them

- Designate as foreign all banks listed in the Federal Reserve Board Structure and Data for the U.S. Offices of Foreign Banking Organizations

- Includes 6 banks classified as under US same monetary regime: U.S. territories, including Guam and Puerto Rico, as well as banks from the Cayman Islands, who run currency board pegged to dollar

Foreign Bank Sample 1 of 2

Bank Name	Parent Country	Policy Rate
City National Bank	Canada	.25
Delta Bank and Trust Company	Cayman Islands	.1
BMO Harris Bank	Canada	.25
Bank Leumi USA	Israel	.1
Banco do Brasil Americas	Brazil	2.25
Flagstar Bank	Cayman Islands	.1
MUFG Union Bank	Japan	-.068
Deutsche Bank USA	Germany	-.5
Mizuho Bank USA	Japan	-.068
Habib American Bank	Switzerland	-.75
Oriental Bank	Puerto Rico	.125
Deutsche Bank Trust Co. Delaware	Germany	-.5
Israel Discount Bank of New York	Israel	.1
BankPacific	Guam	.125
Woori America Bank	South Korea	.5
HSBC Bank USA	United Kingdom	.1
TD Bank	Canada	.25
FirstBank Puerto Rico	Puerto Rico	.125
KEB Hana Bank USA	South Korea	.5
BBVA USA	Spain	-.5
Bank of Guam	Guam	.125
Santander Bank	Spain	-.5
BAC Florida Bank	Brazil	2.25

Foreign Bank Sample 2 of 2

Bank Name	Parent Country	Policy Rate
State Bank of India - California	India	4
Bank of the West	France	-.5
City National Bank of Florida	Chile	.5
Safra National Bank of New York	Gibraltar	.1
Sumitomo Mitsui Trust Bank USA	Japan	-.068
Manufacturers Bank	Japan	-.068
Banco Popular de Puertro Rico	Puerto Rico	.125
CTBC Bank Corp. USA	Taiwan	1.125
Industrial and Commercial Bank of China	China	2.25
Shinhan Bank America	South Korea	.5
Canadian Imperical Bank of Commerce U.S.	Canada	.25
ANZ in Guam	Australia	.25
Desjardins Bank	Canada	.25
TD Bank USA	Canada	.25
Natbank	Canada	.25
EverTrust Bank	Taiwan	1.125
First Commercial Bank USA	Taiwan	1.125
Popular Bank	Puerto Rico	.125
BMW Bank of North America	Germany	-.5
Barclays Bank Delaware	United Kingdom	.1
UBS Bank USA	Switzerland	-.75
Toyota Financial Savings Bank	Japan	-.068
RBC Bank Georgia	Canada	.25

Variables

- Dependent variables
    - *LENDGRWTH* : growth in "total loans and leases" between 2019Q4 and 2020Q2
        - Also examine growth in subsets of small business and farm lending
    - *TCAPGRWTH* growth in total capital ratios
    - *T1RAGRWTH* growth in tier 1 risk-adjusted capital ratios
    - *NIGRWTH* net income growth
    - *NIIGRWTH* net interest income growth
    - *NNIGRWTH* net non-interest income growth
    - To minimize extreme outliers, we winsorize growth variables at the 5% level.

- Variables of interest
    - *POLRATE* foreign short-term policy rates
    - *NEGI*, dummy variable takes value 1 if home country policy rate is less than zero
    - *CPIGRWTH* growth in CPI so that we are considering real home country rates

Conditioning for bank characteristics

- Cornett, et al (2011): financial constraints inhibited credit extension during GFC

- Conditioning variables at bank level

    - *LOANCOM* outstanding loan commitments
    - *COREDEP* core deposits relative to total assets measure of reliance on deposit funding
    - *LIQASSET* bank cash and security holdings as a share of total assets (measure of liquidity)
    - *TCAP* total capital asset ratio
    - *CHGCOREDEP* changes in share of core deposit funding between 2019Q4 and 2020Q2: a number of banks experienced exceptionally large changes in their funding composition over this period

Summary statistics

	Foreign				US banks			
	mean	sd	min	max	mean	sd	min	max
LENDGRWTH	0.07	0.09	-0.04	0.36	0.10	0.10	-0.04	0.36
T1RCAP	-0.06	0.09	-0.34	0.10	-0.05	0.07	-0.75	1.03
POLRATE	0.33	0.88	-0.75	4.00	0.13	0.00	0.13	0.13
NEGI	0.28	0.46	0.00	1.00	0.00	0.00	0.00	0.00
LGBANK	0.41	0.50	0.00	1.00	0.03	0.16	0.00	1.00
LOANCOM	0.06	0.10	0.00	0.47	0.04	0.15	0.00	9.55
COREDEP	0.78	0.13	0.03	0.90	0.84	0.06	0.06	0.97
LIQASSET	0.16	0.22	0.01	0.98	0.09	0.09	0.00	0.94
TCAP	0.16	0.12	0.09	0.94	0.12	0.03	0.03	0.60
CHGCOREDEP	0.00	0.04	-0.11	0.07	-0.00	0.04	-0.62	0.45
CPIGRWTH	0.29	1.29	-1.22	5.20	0.36	0.00	0.36	0.36
Observations	46				4044			

Distribution of foreign bank home country policy rates

Figure 1: Foreign policy rates in 2020Q2
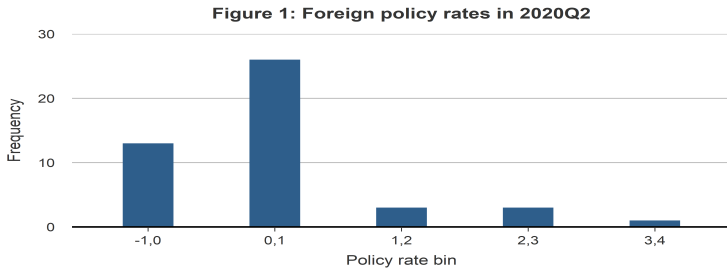
- Subsidiaries divided into 5 bins of 100 basis point spreads in policy rates
- U.S. policy target taken as 0.125

Sample includes foreign bank subsidiaries with home country policy rates above and below US rate

Figure 2: Average policy rates in 2020Q2
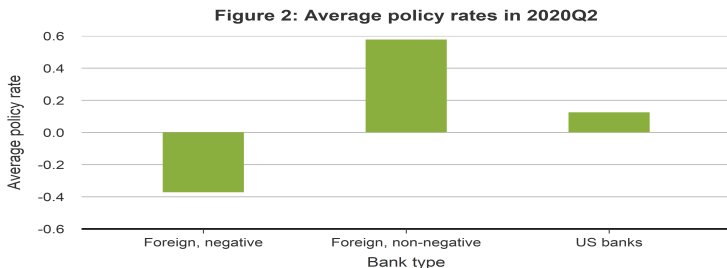
- 13 foreign subsidiaries with negative home country rates averaged -0.37 bp
- 33 banks with 0 or positive policy rates averaged 0.58
- sample include foreign bank subsidiaries with home country policy rates both substantially above and below the policy rate prevailing in the United States.

Base specification estimates cross-section of banks using ordinary least squares

$$LENDGRWTH_i = c + \beta_1 POLRATE_i + \beta_2 NEGI_i + \beta X_i + USBANK_i + \epsilon_i \tag{1}$$

where $POLRATE_i$ and $NEGI_i$ are our variables of interest, X_i denotes the set of conditioning variables, $USBANK_i$ is a 0-1 dummy identifying US banks, and ϵ_i represents the regression residual

- Cluster standard errors into domestic bank and foreign subsidiary sub-groups

Base specification results

Table 2: Policy rates and lending growth

	(1)	(2)	(3)	(4)	(5)	(6)
POLRATE	-0.04**	-0.05**		-0.03***	-0.04***	
	(0.01)	(0.02)		(0.01)	(0.01)	
NEGI	0.03*		0.06**	0.02***		0.04***
	(0.05)		(0.04)	(0.00)		(0.00)
Observations	4,090	4,090	4,090	4,090	4,090	4,090
R-squared	0.09	0.09	0.09	0.00	0.00	0.00

P value in parenthesis

Summary of base specification results

- Base specification with both variables of interest

    - Both variables significant at 1% confidence level, negative for *POLRATE*, positive for *NEGI*
    - Point estimates indicate 1 sd ↓ in home country policy rates associated with 3.5 pp ↑ in lending growth, banks with negative home country policy rates experienced 3.0 pp additional ↑ on average
    - Also obtain a positive and significant coefficient on *CPIGRWTH*, at a 5% confidence level, indicating banks responded to real interest rate differentials

- Results robust to introducing variables of interest one at a time or dropping conditioning variables

Conditioning variables included

Table 2: Policy rates and lending growth

	(1)	(2)	(3)	(4)	(5)	(6)
POLRATE	-0.04**	-0.05**		-0.03***	-0.04***	
	(0.01)	(0.02)		(0.01)	(0.01)	
NEGI	0.03*		0.06**	0.02***		0.04***
	(0.05)		(0.04)	(0.00)		(0.00)
LGBANK	-0.00	-0.00	0.00	-0.02**	-0.02*	-0.02**
	(0.64)	(0.63)	(0.69)	(0.05)	(0.05)	(0.03)
LOANCOM	0.03***	0.03***	0.03***			
	(0.00)	(0.00)	(0.00)			
COREDEP	-0.08**	-0.08*	-0.08*			
	(0.05)	(0.05)	(0.06)			
LIQASSET	0.05	0.05	0.05			
	(0.20)	(0.21)	(0.22)			
TCAP	-0.33***	-0.33***	-0.33***			
	(0.00)	(0.01)	(0.00)			
CHGCOREDEP	-0.67**	-0.67**	-0.67**			
	(0.01)	(0.01)	(0.01)			
CPIGRWTH	0.02**	0.02**	0.01**	0.02***	0.02***	0.01***
	(0.02)	(0.03)	(0.03)	(0.01)	(0.00)	(0.00)
USBANK	0.03***	0.01*	0.04**	0.02**	0.02**	0.04***
	(0.02)	(0.08)	(0.02)	(0.02)	(0.03)	(0.00)
Constant	0.17**	0.18***	0.16**	0.08***	0.08***	0.06***
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.00)
Observations	4,090	4,090	4,090	4,090	4,090	4,090
R-squared	0.09	0.09	0.09	0.00	0.00	0.00

P value in parenthesis

Summary of conditioning variables results

- *LOANCOM* positive and significant results at 1% confidence level: Firms drew on lending commitments at start of crisis
- *TCAP* negative and significant results at the 1% level: Banks better placed, but less aggressive
- *COREDEP* and *CHGCOREDEP* negative and significant coefficient at 5% confidence level: Indicator of more conservative behavior
- *LIQASSET* is insignificant, as is large bank dummy
- U.S. bank dummy positive and significant at 10% confidence level (3.0 percentage points higher lending growth)

Banks separated by size

Table 3: Banks separated by size

	(SM)	(SM)	(SM)	(L)	(L)	(L)
POLRATE	-0.02**	-0.05*		-0.07***	0.01	
	(0.05)	(0.05)		(0.00)	(0.34)	
NEGI	0.12**		0.13**	-0.07*		-0.02
	(0.02)		(0.02)	(0.05)		(0.18)
CPIGRWTH	0.01*	0.02*	0.00	0.04**	0.04**	0.04**
	(0.05)	(0.07)	(0.15)	(0.02)	(0.02)	(0.03)
Observations	3,960	3,960	3,960	130	130	130
R-squared	0.09	0.09	0.09	0.19	0.19	0.19

Results with split samples

- Small and medium very similar to overall sample
  - Both *POLRATE* and *NEGI* continue to enter with expected negative and positive coefficient estimates at 5% level
  - *NEGI* point estimate: small and medium with negative home country rates 12 pp higher lending growth
- Large bank sub-sample qualitatively different
  - Continue to obtain significant negative estimate on *POLRATE*
  - *NEGI* variable enters with incorrect negative sign at 10% level
  - US bank dummy insignificant (large foreign subs more like US)
- Conclude incidence of home country policy effect distinct between small and medium-sized banks and large banks
  - Larger foreign subsidiaries better-placed respond to prevailing interest differentials
  - *NEGI* variable discrepancy likely reflects smaller banks more dependent on wholesale deposit funding, where ZLB on deposit interest rates most biting
  - Consistent with Lopez, et al (2020), i.e. greater ↓ in net int income under negative rates

Small business and farm lending

Table 4: Policy rates and small business and farm lending growth

	(1)	(2)	(3)	(4)	(5)	(6)
	Business	Business	Business	Farm	Farm	Farm
POLRATE	-0.09*	-0.07*		-0.11**	-0.04**	
	(0.07)	(0.10)		(0.01)	(0.02)	
NEGI	-0.08**		-0.01	-0.21***		-0.17**
	(0.01)		(0.45)	(0.01)		(0.02)
CPIGRWTH	-0.04**	-0.05**	-0.08***	0.06***	0.04***	-0.00
	(0.05)	(0.04)	(0.00)	(0.01)	(0.01)	(0.14)
PPPR	0.01	0.01	0.01	-0.00	-0.00	-0.00
	(0.13)	(0.13)	(0.13)	(0.12)	(0.16)	(0.13)
Observations	3,840	3,840	3,840	3,368	3,368	3,368
R-squared	0.05	0.05	0.05	0.00	0.00	0.00

P value in parenthesis

Results for small business and farm lending

- Small business results
  - *POLRATE* comes in with its expected negative coefficient estimate, albeit only at 10% level
  - *NEGI* variable incorrect negative sign, again at only a 10% level
  - Proxy for PPP participation very insignificant
- Small farm lending results
  - Similar to small business results
- Disappointing, but small business and farm lending only small component of overall bank lending for foreign subs

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Results for Capital ratio growth

Table 5: Policy rates and capital growth

	(1)	(2)	(3)	(4)	(5)	(6)
	TCAP	TCAP	TCAP	T1RACAP	T1RACAP	T1RACAP
POLRATE	0.01**	0.02***		0.07**	0.07**	
	(0.01)	(0.01)		(0.04)	(0.05)	
NEGI	-0.03***		-0.04***	0.00		-0.05*
	(0.00)		(0.00)	(0.36)		(0.08)
CPIGRWTH	0.00	0.00	0.01**	-0.01**	-0.01*	0.02**
	(0.12)	(0.34)	(0.03)	(0.05)	(0.05)	(0.04)
Observations	4,109	4,109	4,109	4,109	4,109	4,109
R-squared	0.03	0.03	0.03	0.03	0.03	0.03

P value in parenthesis

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Results for capital ratio growth

- Growth in *TCAP*

    - As expected, obtain significant positive coefficient on *POLRATE* and negative coefficient estimate on *NEGI*
    - However, estimated movements are not large: Point estimates indicate 1 sd ↓ in *POLRATE* only 88 bp ↓ in total bank capital ratio growth
    - Negative rates are stronger, adds 3 pp to decline in total capital asset ratio growth

- Risk-adjusted tier 1 capital ratio

    - Point estimates indicate that 1 sd ↓ in home country policy rates associated with 6.1 pp decline in tier 1 risk-adjusted capital ratio growth
    - *NEGI* insignificant and close to zero in base specification

- Overall, consistent with lending growth results

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Income growth results

Table 6: Policy rates and income growth

	(1)	(2)	(3)	(4)	(5)
	INC	INC	INC	NIINC	NNIINC
POLRATE	-0.06**	-0.06**		-0.05*	0.04**
	(0.03)	(0.02)		(0.07)	(0.04)
NEGI	0.00*		0.05**	-0.01**	0.08***
	(0.06)		(0.04)	(0.04)	(0.00)
CPIGRWTH	0.02**	0.02**	-0.00	0.01	0.01***
	(0.03)	(0.03)	(0.31)	(0.20)	(0.00)
Observations	4,109	4,109	4,109	4,109	4,108
R-squared	0.04	0.04	0.04	0.06	0.01

P value in parenthesis

Results for income growth

- Overall results consistent with hypothesis that easier home country policy associated with increased foreign bank subsidiary lending, and hence income
- *POLRATE* significantly negative at 5% level
- Point estimate indicates that 1 sd ↓ in home country rates associated with 5.3 pp ↑ increase in net income
- Results for *NEGI* mixed
  - Very small point estimate with both *POLRATE* and *NEGI* included together
  - But on its own indicates negative home country policy rate associated with 5 pp higher income growth

Net interest income and net non-interest income behave differently

- Net interest income
    - *POLRATE* negative at 10% level, point estimate indicates 1 sd ↓ in rates associated with 4.4 pp ↑ in net interest income growth
    - However, *NEGI* also negative at 5% level
- Net non-interest income coefficient estimates of opposite sign
    - *POLRATE* positive at 5% level
    - *NEGI* also positive at 1% level
- Mixed results appear to reflect complicated funding and revenue options available to US foreign bank subsidiaries
    - *NEGI* conflicting results may indicate response to interest income losses by increasing non-interest fees on deposits and services
    - However, foreign subs rely on domestic deposits at rates comparable to their domestic competitors (e.g. Goulding and Nolle (2012))

Global monetary policy spillovers during pandemic

- Restrict attention to foreign subsidiaries to harmonize regulatory conditions as much as possible
- Results confirm that lending channel a feature
    - Foreign subs responded to both home country policy rate levels and rates below the zero bound by increasing US lending activity
    - Results strongest for small and medium-sized banks
    - As easier home policy encouraged U.S. activity, also lowered capital ratios
- Income results a little mixed
    - Easier policy rates expanded net income
    - Impact of negative rates on net income close to zero
    - Impact on interest income positive and non-interest income negative
    - Mirrors literature for domestic banks under negative policy rates: banks exit traditional activity and rely more heavily on fees and other revenues

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Some caveats

- Can never fully harmonize regulatory incentives
  - Even subsidiaries face differences in home country regulations
  - However, seems to be an unambiguous improvement over pooling with branches and agencies
- Also, other policy responses to pandemic
  - Government guarantees on home country lending
- Endogeneity of home country policy
  - Easy monetary policy may reflect poor lending prospects at home