

# Banking Globalization, Local Lending and Labor Market Outcomes: Micro-level Evidence from Brazil.

Felix Noth    Matias Ossandon Busch

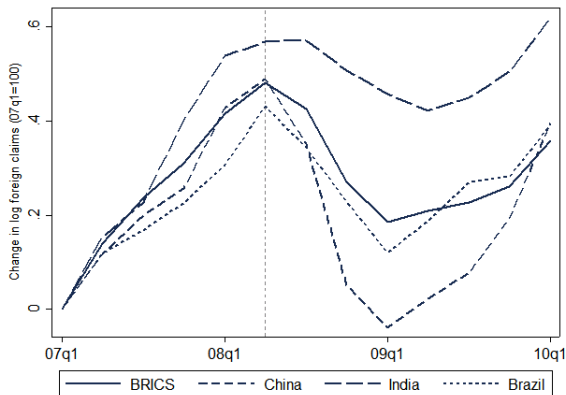
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# Motivation

Foreign funding shocks were a major driver of financial contagion in the crisis.



**Fig.1:** Change in log foreign claims vis-à-vis banks in BRICS countries (2007q1=0)  
The vertical dotted line is set at 2008q2. Source: BIS LBS.

- So far the **financial** and **real** effects of bank-level foreign funding shocks in EMEs during the crisis remain unexplored.

# Motivation

Hard to come by with a comprehensive research design.

- Foreign shocks affect banks in number of ways:
  - ▶ Bank lending channel.(Aiyar, 2012; Cetorelli and Goldberg, 2011)
  - ▶ Liquidity hoarding.(Cornett et al., 2011)
  - ▶ Local interbank market.(Correa et al., 2012; Iyer et al., 2014)
  - ▶ FX Market volatility.(Coudert et al., 2011)
- The nature of shocks might differ across banks:
  - ▶ Interaction with foreign ownership exposure.(Noth and Ossandon Busch, 2016)
  - ▶ Role for foreign BHCs abroad.(De Haas and van Horen, 2012)
- Several identification challenges:
  - ▶ Exogenous shocks hard to come by at the bank level.
  - ▶ Double causality concerns between lending and funding.
  - ▶ Supply vs. demand-driven adjustments in lending.

# Research Question

A data-intensive strategy to overcome identification challenges.

- Bank-lending channel:
  - ▶ Did bank-specific foreign-funding shocks Brazilian banks' credit supply?
- Real effects of foreign funding shocks:
  - ▶ Did shocks translate into disruptions in net job creation at the level of individual Brazilian municipalities?
- Identification based on three components:
  - ▶ Exogeneous bank-level shocks.
  - ▶ Parent-banks shocks affect lending by regional branches.
  - ▶ Exploit regional structure in the data isolate supply-effects.
  - ▶ First attempt to identify real effects of a foreign funding shocks' lending channel funneled via regional branches. Literature

# Foreign Funding Shock

Sudden stop!

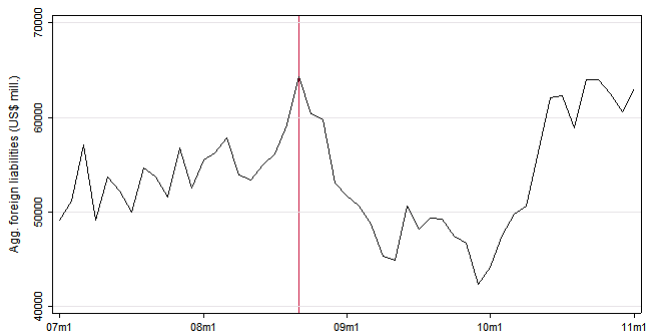
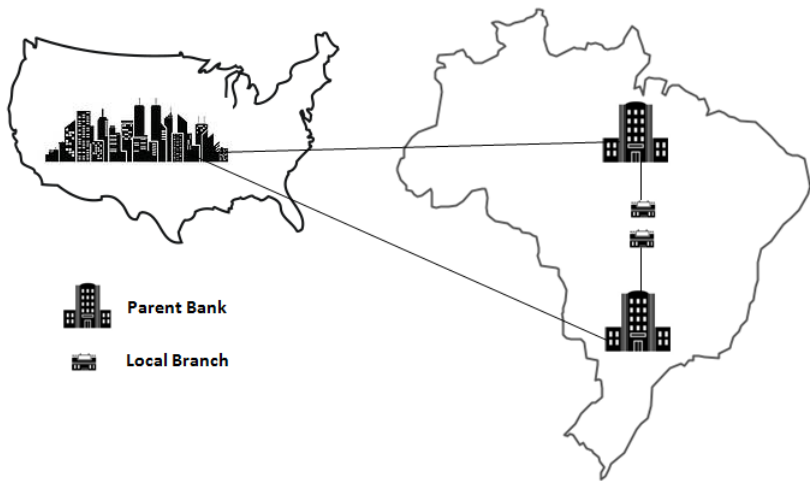


Fig.2: Stock of aggregated foreign liabilities reported by Brazilian banks. The vertical line is set at Sep. 2008. Source: Banks' call reports.

- The peak-to-through decline in foreign liabilities represented 1.8% of GDP (10.2% of financial sector GDP).

# Data

Routing the shock via lending by regional branches.



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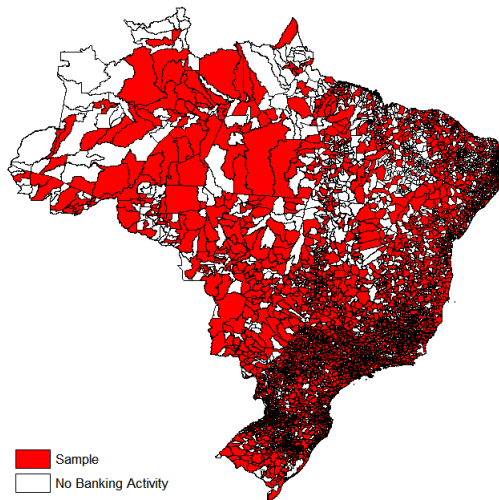


Fig.3: Geographical distribution of Brazilian municipalities.

# Data

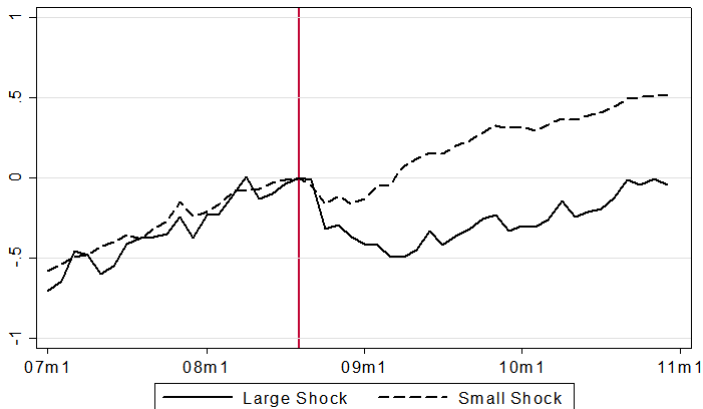
Manually collection of call reports for all banks and bank-branches in Brazil.

- Parent-banks sample:
  - ▶ 84 banks with a network of municipal branches.
  - ▶ Sample restricted to the 42 banks regularly relying on foreign funding and active over the whole sample period.
  - ▶ Foreign-ownership identifier from Claessens & van Horen (2014).
- Branches-sample:
  - ▶ Sample is restricted to municipalities hosting at least 2 banks active over the whole sample period.
  - ▶ 6640 branches located in 1770 regions (62.6% of bank assets)
  - ▶ Similar data as used by Coleman and Feler (JME, 2015)
- Sample period:
  - ▶ Monthly data for 2007m1-2010m12.
  - ▶ Crisis period defined between 2008m9-2010m12.



# Data: Graphical inspection

Median split at the change in foreign liabilities during the peak of the crisis.



**Fig.4:** Change in log outstanding credit with respect to 2008m8 by size of foreign-funding shocks. The vertical line is set at 2008m8. Source: Banks' call reports.

- Banks facing a larger (negative) foreign funding shock **reduce lending much more** after the crisis hit.

# Methodology

In the vein of Khwaja and Mian (2008) and Schnabl (2012).

- FE model collapsing the time-dimension before and after 2008m9:

$$\Delta \text{Log credit}_{ij} = \beta_0 + \beta_1 \Delta \text{Log foreign funding}_i + \lambda_j + \sum_{k=2}^K \beta_k x_{kij} + \epsilon_{ij}$$

- Variables:
  - ▶  $\Delta \text{Log credit}_{ij}$  -  $\Delta$  log credit between before and after 2008m9.
  - ▶  $\Delta \text{Log Foreign liabilities}_i$  -  $\Delta$  log foreign funding.
  - ▶ Parent Controls - Foreign dummy, size, capital, deposits, liquidity, credit risk.
  - ▶ Branch Controls - size, deposits, liquidity.
  - ▶ No evidence of ex-ante systemic sorting! [Results](#)

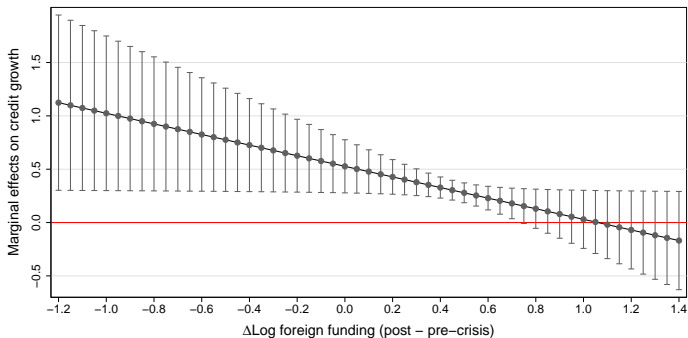
# RESULTS

	Baseline (1)	Commercial (2)	Consumer (3)	Mortgage (4)	Leasing (5)	Interbank (6)
$\Delta$ Log foreign funding	0.267*** (0.095)	0.382*** (0.128)	0.377*** (0.090)	-0.106 (0.084)	-0.005 (0.019)	0.142** (0.055)
<b>Parent-level</b>						
Foreign	-0.108 (0.112)	-0.104 (0.080)	-0.021 (0.085)	-0.200** (0.099)	-0.016 (0.011)	0.165* (0.082)
Size (log Assets)	0.053* (0.031)	0.021 (0.021)	0.058** (0.028)	0.047** (0.017)	0.001 (0.004)	0.055** (0.021)
Capital Ratio	3.329 (2.753)	1.663 (2.066)	2.318 (2.613)	-1.661 (2.768)	-0.791 (0.535)	1.284 (2.142)
Liquidity Ratio	-4.721** (2.330)	-4.082 (2.589)	-3.384* (1.928)	-4.310** (1.857)	0.103 (0.334)	2.738* (1.516)
Deposit Base	2.851*** (0.964)	2.404* (1.206)	1.747** (0.770)	2.902** (1.109)	-0.094 (0.131)	-0.620 (0.666)
Credit Risk	0.008 (0.021)	0.015 (0.046)	0.001 (0.022)	0.031 (0.036)	-0.014 (0.009)	0.084*** (0.014)
<b>Branch-level</b>						
Size (log Assets)	0.044* (0.022)	0.048** (0.020)	0.073*** (0.019)	0.043 (0.028)	0.003 (0.004)	0.014 (0.016)
Liquidity Ratio	-1.280 (1.066)	-2.041* (1.068)	-2.347** (0.907)	-0.699 (1.560)	0.316 (0.259)	0.518 (1.367)
Deposit Base	0.040 (0.174)	0.158 (0.182)	-0.053 (0.166)	-0.158 (0.104)	-0.023 (0.028)	0.100 (0.124)
Obs.	6644	6644	6644	6644	6644	6644
R-squared	0.334	0.296	0.390	0.511	0.114	0.333

**Tab.1:** Variables are winsorized at the 1st and 99th percentiles. S.E. are clustered at the bank-level. \*\*\* indicates significance at the 1% level; \*\* at the 5%; \* at the 10%. [→ Extension](#)

# Results: Graphical inspection

$$\Delta \text{Credit}_{ij} = \Delta \text{foreign funding}_i + \Delta \text{foreign funding}_i^2 + \dots$$



**Fig.5:** Marginal effect at the 95% CI of  $\Delta \text{Foreign liabilities}_i$  on  $\Delta \text{Credit}_{ij}$  along the distribution of  $\Delta \text{Foreign liabilities}_i$ .

- Results are driven by negative foreign funding shocks!

# Results: Extensions and Robustness.

- Sensibility to definitions of the funding shock and the crisis period:
  - ▶ Results hold for shocks defined with “peak-to-through” or average funding growth rates. Results
  - ▶ Effect is only identified if the crisis is defined around Sep' 08. Results
  - ▶ IV model with pre-crisis exposure as instrument.
- Do foreign and local banks adjust similarly to the funding shock?
  - ▶ No, the effect concentrates in foreign banks. Results
  - ▶ State-owned banks compensate for the funding shock. Results
- Is the effect homogeneous across the subsample of foreign banks?
  - ▶ No, the effect increases when foreign banking conglomerates lose capital and increase liquid assets in the crisis. Results
  - ▶ Baseline effect decreases with access to the TAF program. Results

# Real Effects of the Lending Channel.

Do borrowers compensate for the shortfall in lending?

- So far we have identified a bank-lending channel of bank-specific foreign funding shocks, but...
  - ▶ if borrowers **compensate for the restriction in lending** no real effect of the shock would exist.
  - ▶ We aggregate bank-level data at the municipality level and look at the effect of the shock on **several real outcomes**.
- Sampling:
  - ▶ Same baseline data on **1768** municipalities but now **all active branches** are included.
  - ▶ Municipality-level variables are computed as **market-share weighted averages** of bank traits.

# Real Effects of the Lending Channel

Sample of regional-aggregated variables.

- Municipality-level variables are computed as market-share weighted averages of banks:

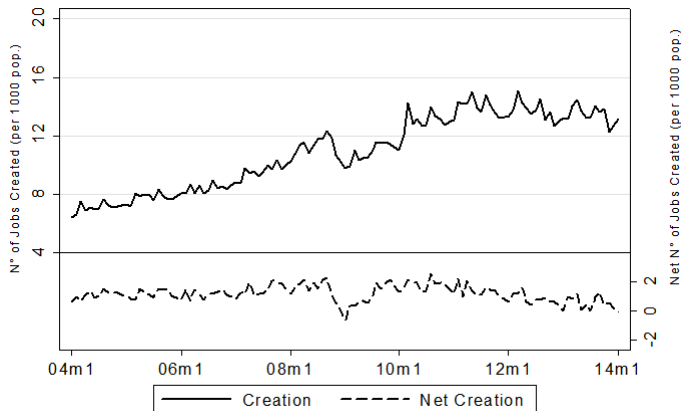
$$\Delta \text{Log outcome}_j = \alpha_0 + \alpha_1 \Delta \text{Log foreign funding}_j + \sum_{k=2}^K \alpha_k x_{kj} + \epsilon_j$$

- Variables:
  - ▶  $\Delta \text{Log outcome}_j$  -  $\Delta$  before/after 2008m9 of agg. credit, job creation, net job creation and GDP growth.
  - ▶  $\Delta \text{Log foreign funding}_j$  - market-share weighted  $\Delta$  log foreign funding of all banks in  $j$ .
  - ▶ Bank controls - Mirroring the baseline model.



# Real Effects of the Lending Channel

Regional labor markets disrupted by the crisis!



**Fig.6:** Aggregated job creation (upper panel) and net job creation (bottom panel) per 1000 inhabitants in Brazilian municipalities. Source: Brazilian Ministry of Labor, authors' calculations.

- The crisis triggers a large disruption in local labor markets.

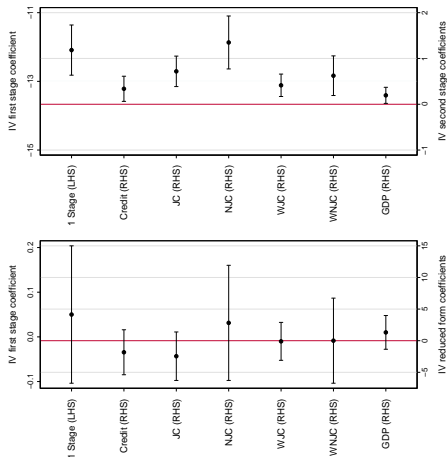
	Aggregated $\Delta$ Credit	$\Delta$ Job Creation	$\Delta$ Net Creation	$\Delta$ Job Creation p.p.	$\Delta$ Net Job Creation p.p.	$\Delta$ GDP 08-09
$\Delta$ Log foreign funding	0.580*** (0.168)	0.461** (0.197)	0.917*** (0.287)	0.364*** (0.133)	0.567*** (0.198)	0.157* (0.081)
<b>Headquarter-level</b>						
Size (log Assets)	-0.004 (0.029)	-0.102*** (0.032)	-0.087* (0.052)	-0.060** (0.024)	-0.049 (0.039)	-0.003 (0.015)
Capital Ratio	0.028 (0.979)	3.920*** (1.211)	2.907* (1.765)	2.044** (0.827)	2.464* (1.266)	0.838* (0.500)
<b>Branch-level</b>						
Size (log Assets)	-0.005 (0.018)	0.005 (0.019)	-0.003 (0.030)	-0.003 (0.015)	-0.018 (0.024)	-0.027*** (0.009)
Liquidity Ratio	9.653*** (2.470)	17.683*** (3.488)	18.416*** (5.382)	6.011*** (2.023)	6.686** (3.266)	0.617 (1.471)
<b>Mun-level</b>						
Size (GDP)	0.049*** (0.014)	0.031** (0.014)	0.034 (0.020)	0.030*** (0.012)	0.024 (0.018)	0.029*** (0.006)
Credit/GDP Ratio	-0.012*** (0.004)	0.008 (0.006)	-0.008 (0.007)	0.010* (0.005)	0.012* (0.007)	-0.006** (0.003)
Obs.	1768	1768	1768	1768	1768	1768
R-squared	0.185	0.077	0.042	0.048	0.027	0.053

**Tab.4:** Variables are winsorized at the 1st and 99th percentiles. \*\*\* indicates significance at the 1% level; \*\* at the 5%; \* at the 10%. S.E. clustered at the municipality level.

- Economic effect: Reducing the shock's size from the 75pt to the 25pt of the distribution implies a 32% higher growth rate of net job creation.

# Results: IV Model

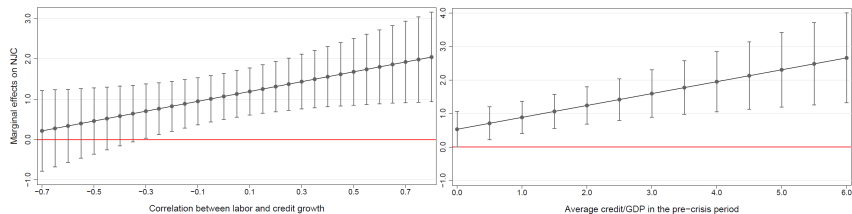
Alternatively we use the regional pre-crisis exposure to foreign funding as an instrument of the shock.



**Fig.7:** Estimated coefficients at the 95% CI for the variable  $\Delta \log \text{foreign funding}$  for different dependent variables. The upper panel shows the results for the full sample, whereas the bottom panel is restricted to the subsample of banks with a foreign funding exposure below the 25 percentile.

# Are all regions equally vulnerable?

Looking at the historical correlation between credit & job markets.



**Fig.8:** Marginal effects on net (weighted) job creation.

- **Left Panel:** Larger effect in regions reporting a higher correlation between credit and net job creation growth.
- **Right Panel:** Larger effect in regions with a higher ex-ante Credit/GDP ratio.

# Conclusions

- We identify robustly a **causal effect of foreign funding shocks** on lending and net job creation in Brazil:
  - ▶ Main channel operates via internal capital markets of **foreign banks**.
  - ▶ Evidence of cross-border effects of large **Fed interventions**.
  - ▶ Foreign funding shocks explain a sizable share of **job losses** during the crisis.
- Policy implications:
  - ▶ The heterogeneity of banks should be considered for **macroprudential regulation** (e.g. liquidity requirements in Basel III).
  - ▶ The timing, size and target of **liquidity interventions** (e.g. TAF, OMT) could be internationally coordinated.
  - ▶ Enhancing the quality of local **financial intermediation** can compensate for aggregated liquidity shocks.

# APPENDIX

# Literature I

- Aiyar, S., 2012. From financial crisis to great recession: the role of globalized banks. *American Economic Review* 102, 225–230.
- Allen, F., Krzysztof, J., Kowalewski, O., 2013. The effects of foreign and government ownership on bank lending behavior during a crisis in central and eastern europe. Working Paper 13-25, Wharton Financial Institutions Center.
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# Literature II

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## Literature III

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- Popov, A., Rocholl, J., 2015. Financing constraints, employment, and labor compensation: evidence from the subprime mortgage crisis. Working Paper 1821, ECB.
- Popov, A., Van Horen, N., 2014. Exporting sovereign stress: Evidence from syndicated bank lending during the euro area sovereign debt crisis. *Review of Finance* 19, 1825–1866.

# Literature IV

Schnabl, P., 2012. The international transmission of bank liquidity shocks: Evidence from an emerging market. *The Journal of Finance* 67, 897–932.

# Contribution to the literature

We contribute to two main strands in the literature. [Back](#)

- The cross-border transmission of the crisis was shaped by banking globalization.

*Cetorelli and Goldberg (2011); Aiyar (2012); Buch and Goldberg (2014); Allen et al. (2013); Popov and Van Horen (2014) ...*

⇒ We **explicitly analyze** the interaction between several dimensions of banking globalization.

- The lending channel of financial contagion can translate into real economic effects.

*Peek and Rosengren (1997); Schnabl (2012); Chodorow-Reich (2014); Ongena et al. (2015); Popov and Rocholl (2015)...*

⇒ We trace the transmission of the crisis from global interbank markets to **regional job-market performance** in a large emerging country.

# Descriptive Statistics

	mean	sd	min	max	Shock Affected		dif.
					Yes	No	
Δ log Credit	0.14	0.26	-0.76	0.70	0.05	0.18	-0.13*
Δ log foreign funding	0.25	0.60	-1.22	1.46	-0.35	0.55	-0.90*
<b>Headquarter-level</b>							
Size (log Assets)	9.15	1.40	8.13	12.72	9.10	9.04	0.06
Capital Ratio	0.13	0.07	0.04	0.32	0.14	0.13	0.01
Liquidity Ratio	0.22	0.10	0.06	0.43	0.19	0.23	-0.05
Deposit Base	0.41	0.13	0.24	0.74	0.35	0.42	-0.08*
Credit Risk	0.13	0.08	0.04	0.27	0.12	0.14	-0.02
Foreign	0.39	0.49	0.00	1.00	0.57	0.30	0.28*
State-owned	0.20	0.40	0.00	1.00	0.21	0.19	0.03
<b>Branch-level</b>							
Size (log Assets)	5.18	2.07	1.33	8.76	5.19	5.13	0.06
Liquidity Ratio	0.06	0.06	0.00	0.22	0.06	0.07	-0.01
Deposit Base	0.15	0.18	0.01	0.73	0.12	0.16	-0.04
RoA	0.08	0.04	0.02	0.18	0.08	0.07	0.00
<b>Pre-crisis trends</b>							
Credit growth	0.05	0.36	-0.77	1.51	0.06	0.05	0.00
Assets growth	0.08	0.29	-0.49	0.96	0.03	0.11	-0.08
Deposits growth	0.09	0.28	-0.49	0.85	0.08	0.09	0.00

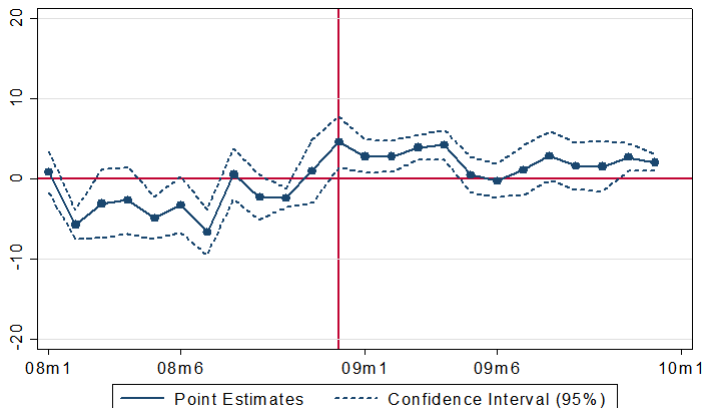
**Tab.A1:** Descriptive statistics for bank traits. The last column show the difference in means between not affected/affected banks. \* indicates whether the difference is significant by normalized differences (Imbens and Wooldridge, 2009). [Back](#)

	Shock Def: $\Delta$ 9m6-8m9 (1)	Shock Def: $\Delta$ 10m12-9m12 (2)	Shock Def: Av.% $\Delta$ 8m9-9m6 (3)	Shock Def: Crisis 07m6-08m8 (4)
$\Delta$ Log foreign funding	4.899*** (1.509)	-0.257 (0.870)	37.797*** (12.132)	0.707 (0.538)
<b>Parent-level</b>				
Foreign	-0.048 (0.092)	-0.109 (0.150)	-0.028 (0.100)	0.003 (0.017)
Size (log Assets)	0.025 (0.035)	0.092* (0.049)	0.024 (0.036)	-0.010 (0.009)
Capital Ratio	1.552 (2.636)	5.872 (4.400)	0.971 (2.805)	-1.324 (1.187)
Liquidity Ratio	-1.681 (2.192)	-1.453 (2.307)	-1.781 (2.244)	-0.518 (0.516)
Deposit Base	2.272** (0.889)	2.806** (1.269)	2.442** (0.944)	-0.158 (0.247)
Credit Risk	-0.008 (0.019)	-0.003 (0.024)	0.003 (0.020)	0.000* (0.000)
<b>Branch-level</b>				
Size (log Assets)	0.036 (0.026)	0.041 (0.025)	0.033 (0.026)	-0.012 (0.010)
Liquidity Ratio	-1.741 (1.278)	-2.074 (1.372)	-1.729 (1.311)	-0.758*** (0.251)
Deposit Base	-0.127 (0.226)	-0.115 (0.243)	-0.123 (0.228)	0.088 (0.058)
Obs.	6640	6640	6640	6640
R-squared	0.366	0.332	0.362	0.245

**Tab.A3:** Variables are winsorized at the 1st and 99th percentiles. Regressions include regional FE, S.E. clustered at the bank-level. \*\*\* indicates significant at the 1% level; \*\* at the 5%; \* at the 10%. [Back](#)

# Testing multiple crisis definitions

Which shock-windows are explaining the results?



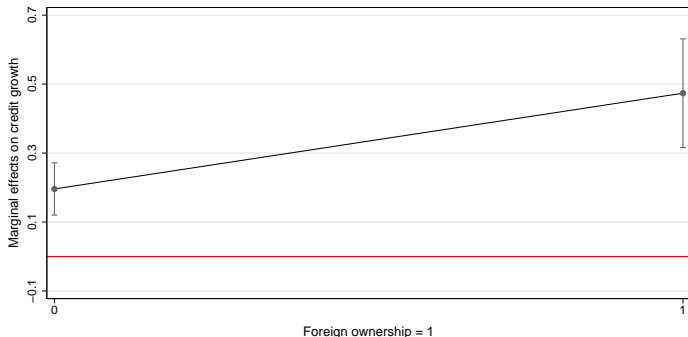
**Fig.A1:** Baseline effect on lending by computing the shock as the change in foreign funding between 3 months before and 3 months after a given date. Vertical line is set at 2008m12. <sup>B</sup>

	Baseline (1)	Controls (2)	Controls (3)	Cluster SE (4)	Region FE (5)
$\Delta$ Log foreign funding	0.079*** (0.012)	0.244*** (0.016)	0.263*** (0.016)	0.263*** (0.080)	0.267*** (0.095)
<b>Parent-level</b>					
Foreign		-0.061*** (0.014)	-0.074*** (0.014)	-0.074 (0.095)	-0.108 (0.112)
Size (log Assets)		0.032*** (0.004)	0.035*** (0.005)	0.035 (0.030)	0.053* (0.031)
Capital Ratio		1.334** (0.564)	2.201*** (0.548)	2.201 (2.226)	3.329 (2.753)
Liquidity Ratio		-5.018*** (0.292)	-4.207*** (0.313)	-4.207* (2.259)	-4.721** (2.330)
Deposit Base		2.786*** (0.169)	2.652*** (0.169)	2.652*** (0.854)	2.851*** (0.964)
Credit Risk		0.023** (0.009)	0.001 (0.009)	0.001 (0.020)	0.008 (0.021)
<b>Branch-level</b>					
Size (log Assets)			0.076*** (0.003)	0.076*** (0.024)	0.044* (0.022)
Liquidity Ratio			-0.536* (0.306)	-0.536 (0.819)	-1.280 (1.066)
Deposit Base			0.152*** (0.028)	0.152 (0.201)	0.040 (0.174)
Constant	0.280*** (0.005)	-0.280*** (0.065)	-0.675*** (0.072)	-0.675 (0.449)	
Obs.	6644	6644	6644	6644	6644
R-squared	0.041	0.074	0.156	0.155	0.334

**Tab.A4:** Variables are winsorized at the 1st and 99th percentiles. \*\*\* indicates significant at the 1% level; \*\* at the 5%; \* at the 10%. [Back](#)

# Foreign vs. Local Banks

$$\Delta \text{Credit}_{ij} = \Delta \text{foreign funding}_i + \Delta \text{foreign funding}_i \times \text{Foreign}_i + \dots$$

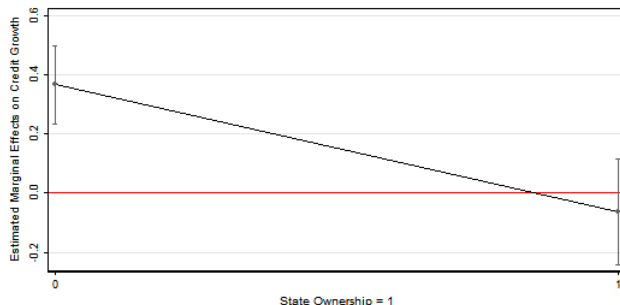


**Fig.A2:** Marginal effects foreign funding shocks along a variable defining banks' foreign or local ownership. [Back](#)



# Foreign vs. Local Banks

$$\Delta Credit_{ij} = \Delta Foreign\ liabilities_i + \Delta Foreign\ liabilities_i \times State_i + \dots$$



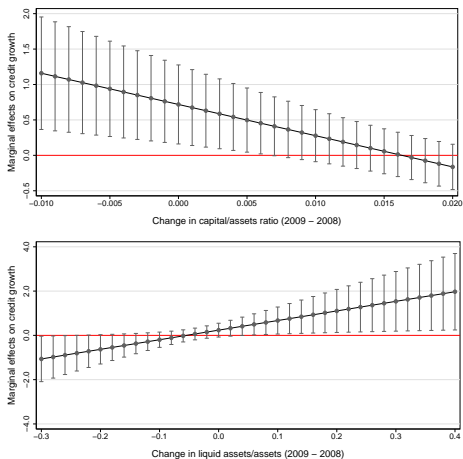
**Fig.A5:** Marginal effects foreign funding shocks along a variable defining banks' private or state ownership. [Back](#)

	$\Delta$ Capital Ratio	$\Delta$ log Interbank Assets	Average TAF	Weighted TAF
$\Delta$ Log foreign funding	0.472* (0.246)	-0.103 (0.137)	0.057 (0.087)	0.041 (0.082)
$\Delta$ Parent Trait	-0.303 (1.732)	-2.189 (1.277)	-0.070 (0.049)	0.003 (0.003)
$\Delta$ funding $\times$ $\Delta$ Parent	-31.393** (14.225)	4.414** (2.096)	-0.534*** (0.139)	-0.022** (0.009)
<b>Parent-level</b>				
Size (log Assets)	-0.002 (0.032)	0.051** (0.023)	0.048** (0.021)	0.045** (0.020)
Capital Ratio	-0.333 (1.360)	0.543 (2.166)	0.358 (1.947)	-0.688 (1.790)
Liquidity Ratio	-3.833 (2.736)	-3.345 (3.376)	-3.257 (3.153)	-2.253 (3.004)
Deposit Base	-0.970 (1.339)	-2.601 (1.617)	-3.164** (1.186)	-3.483*** (0.965)
Credit Risk	-0.314 (0.203)	-0.334* (0.190)	-0.272 (0.167)	-0.430* (0.216)
<b>Branch-level</b>				
Size (log Assets)	0.094* (0.052)	0.097* (0.052)	0.097* (0.053)	0.095* (0.052)
Liquidity Ratio	4.585 (4.989)	5.263 (4.958)	4.867 (4.868)	5.211 (4.837)
Deposit Base	0.465* (0.249)	0.491* (0.250)	0.479* (0.246)	0.481* (0.247)
Constant	-0.076 (0.449)	-0.573 (0.517)	-0.496 (0.431)	-0.385 (0.391)
Obs.	545	545	545	545
R-squared	0.375	0.374	0.376	0.374

**Tab.A5:** \*\*\* indicates significance at the 1% level; \*\* at the 5%; \* at the 10%. 16 banks operating in 250 regions are included in the sample. [Back](#)

# The role of parent bank performance

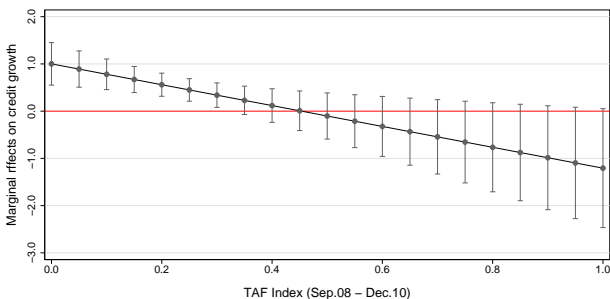
$$\Delta \text{Credit}_{ij} = \Delta \text{foreign funding}_i + \Delta \text{foreign funding}_i \times \text{Parent Trait}_i + \dots$$



**Fig.A3:** Marginal effects of foreign funding shocks along the distribution of parent banks' changes in the capital and liquidity ratios between 2009 and 2007. Parent banks' characteristics are computed from BankScope. Confidence intervals at 95%. [Back](#)

# Evidence of cross-border effects of TAF

$$\Delta \text{Credit}_{ij} = \Delta \text{foreign funding}_i + \Delta \text{foreign funding}_i \times \text{TAF}_i + \dots$$



**Fig.A4:** Marginal effects of foreign funding shocks along the distribution of parent banks' access to the TAF program in the U.S. Parent banks' TAF data is computed from Bloomberg. TAF access is computed as the average ratio of TAF balances to banks equity between September 2008 and December 2009. We compute a normalize index weighting TAF with the size of shocks. Confidence intervals at 95%. [Back](#)