

Foreign Bank Behavior During Financial Crises

Jon Adams-Kane¹ Julián Caballero² Jamus Lim¹

¹*World Bank*

²*Inter-American Development Bank*

VIII Annual Seminar on Risk, Financial Stability and Banking
Banco Central do Brasil
São Paulo, August 8-9, 2013

This paper

- Paper aims to explore one question:

This paper

- Paper aims to explore one question:
 - 1 The extent by which multinational banks internationally transmit shocks from their *home* economies (2007/2008 crisis)
 - For multinational banks able to diversify both liabilities and assets, the international transmission of shocks is far from obvious

This paper

- Paper aims to explore one question:
 - 1 The extent by which multinational banks internationally transmit shocks from their *home* economies (2007/2008 crisis)
 - For multinational banks able to diversify both liabilities and assets, the international transmission of shocks is far from obvious
- Paper in a nutshell:

This paper

- Paper aims to explore one question:
 - ① The extent by which multinational banks internationally transmit shocks from their *home* economies (2007/2008 crisis)
→ For multinational banks able to diversify both liabilities and assets, the international transmission of shocks is far from obvious
- Paper in a nutshell:
 - ① Compare lending of majority foreign-owned financial institutions that experienced a crisis in their home countries against lending of foreign-owned institutions that did not face a crisis during 2007/2008

This paper

- Paper aims to explore one question:
 - ① The extent by which multinational banks internationally transmit shocks from their *home* economies (2007/2008 crisis)
→ For multinational banks able to diversify both liabilities and assets, the international transmission of shocks is far from obvious
- Paper in a nutshell:
 - ① Compare lending of majority foreign-owned financial institutions that experienced a crisis in their home countries against lending of foreign-owned institutions that did not face a crisis during 2007/2008
 - ② Two complementary approaches to identify *causal effects*: a difference-in-difference (DiD) design and a DiD matching estimator

This paper

- Paper aims to explore one question:
 - ① The extent by which multinational banks internationally transmit shocks from their *home* economies (2007/2008 crisis)
→ For multinational banks able to diversify both liabilities and assets, the international transmission of shocks is far from obvious
- Paper in a nutshell:
 - ① Compare lending of majority foreign-owned financial institutions that experienced a crisis in their home countries against lending of foreign-owned institutions that did not face a crisis during 2007/2008
 - ② Two complementary approaches to identify *causal effects*: a difference-in-difference (DiD) design and a DiD matching estimator
 - ③ Unique database on ownership of banks in developing economies (361 banks; 66 home and 51 host countries)

Preview of the results

- Foreign banks owned by countries experiencing crises in 2007/2008 did in fact exhibit relatively lower lending growth in host developing economies.
→ Foreign banks are a vehicle of international transmission of home shocks

Preview of the results

- Foreign banks owned by countries experiencing crises in 2007/2008 did in fact exhibit relatively lower lending growth in host developing economies.
→ Foreign banks are a vehicle of international transmission of home shocks
- The magnitude of this effect is large. Banks from crisis countries displayed growth in lending in the host economy between 13% to 42% lower than banks headquartered in non-crisis countries

Preview of the results

- Foreign banks owned by countries experiencing crises in 2007/2008 did in fact exhibit relatively lower lending growth in host developing economies.
→ Foreign banks are a vehicle of international transmission of home shocks
- The magnitude of this effect is large. Banks from crisis countries displayed growth in lending in the host economy between 13% to 42% lower than banks headquartered in non-crisis countries
- The space left by retreating crisis foreign banks was disproportionately filled by foreign non-crisis banks, as opposed to domestic banks

Preview of the results

- Foreign banks owned by countries experiencing crises in 2007/2008 did in fact exhibit relatively lower lending growth in host developing economies.
→ Foreign banks are a vehicle of international transmission of home shocks
- The magnitude of this effect is large. Banks from crisis countries displayed growth in lending in the host economy between 13% to 42% lower than banks headquartered in non-crisis countries
- The space left by retreating crisis foreign banks was disproportionately filled by foreign non-crisis banks, as opposed to domestic banks
- Foreign banks from crisis countries exhibited a *larger* relative decline in Eastern Europe

Related literature

A large, prolific literature of international spillovers of multinational banks... reignited by recent crisis

Related literature

A large, prolific literature of international spillovers of multinational banks... reignited by recent crisis

- Peek and Rosengren (1997) and Peek and Rosengren (2000)
→ Japanese banks in USA
- Martínez-Peria et al. (2005); Galindo et al. (2005; 2010); de Haas and van Lelyveld (2006); Chava and Purnanandam (2011); Rose and Wieladek (2011) ; Ongena et al. (2012); Popov and Udell (2012); Aiyar (2012); Schnabl (2012); Cetorelli and Goldberg (2012b)...
→ regional/country studies
- van Rijckeghem and Weder (2003); Martínez-Peria et al., 2005; Kamil and Rai (2010); Cetorelli and Goldberg (2011)...
→ use aggregate data from BIS banking statistics

Related literature

Closest papers using bank-level data in a cross-country analysis

Related literature

Closest papers using bank-level data in a cross-country analysis

- de Haas and van Lelyveld, 2010, 2013; Galindo et al., 2010; Claessens and van Horen, 2013
→ compare foreign banks with *domestic* banks

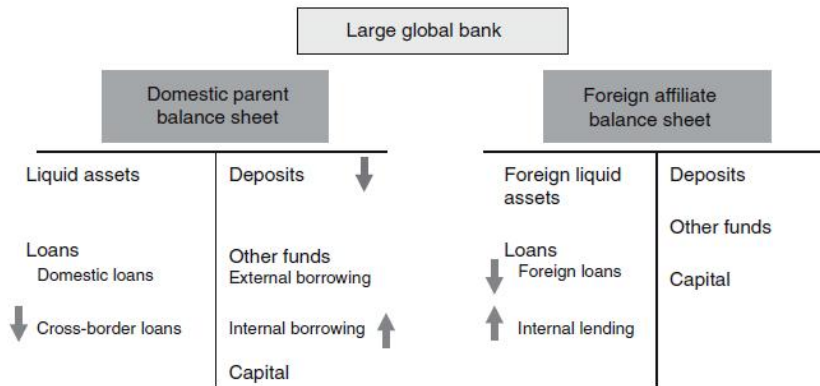
Related literature

Closest papers using bank-level data in a cross-country analysis

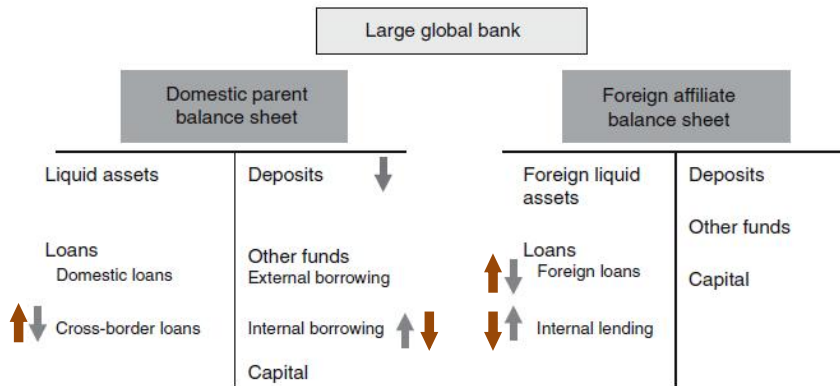
- de Haas and van Lelyveld, 2010, 2013; Galindo et al., 2010; Claessens and van Horen, 2013
→ compare foreign banks with *domestic* banks
- de Haas and van Horen, 2012a, 2012b; Giannetti and Laeven, 2012a, 2012b
→ use data from syndicated loans market

It is not obvious how a multinational bank may react when facing a shock in home country

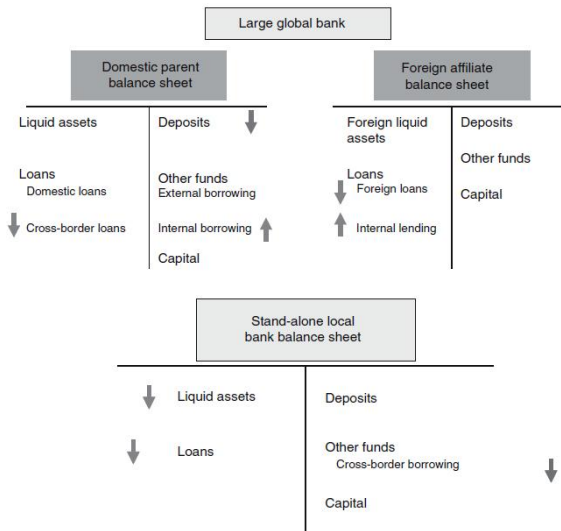
It is not obvious how a multinational bank may react when facing a shock in home country



It is not obvious how a multinational bank may react when facing a shock in home country



Our strategy is to compare foreign with foreign, rather than foreign with domestic



Empirical strategy 1

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

- $l_{ijk,t}$ is total lending of bank i in host country j at time t

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

- $l_{ijk,t}$ is total lending of bank i in host country j at time t
- $t = \{2006, 2009\}$ (pre and post treatment periods)

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

- $l_{ijk,t}$ is total lending of bank i in host country j at time t
- $t = \{2006, 2009\}$ (pre and post treatment periods)
- k is home country of ownership

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

- $l_{ijk,t}$ is total lending of bank i in host country j at time t
- $t = \{2006, 2009\}$ (pre and post treatment periods)
- k is home country of ownership
- $crisis_k$ is the treatment (a systemic banking crisis in country k)

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

- $l_{ijk,t}$ is total lending of bank i in host country j at time t
- $t = \{2006, 2009\}$ (pre and post treatment periods)
- k is home country of ownership
- $crisis_k$ is the treatment (a systemic banking crisis in country k)
- $post_t$ takes value 1 for $t = 2009$

Empirical strategy 1

- Difference-in-Differences regression

$$l_{ijk,t} = \alpha + \gamma_0 crisis_k + \gamma_1 post_t + \delta (crisis_k \cdot post_t) + \varepsilon_{ijk,t}$$

- $l_{ijk,t}$ is total lending of bank i in host country j at time t
 - $t = \{2006, 2009\}$ (pre and post treatment periods)
 - k is home country of ownership
 - $crisis_k$ is the treatment (a systemic banking crisis in country k)
 - $post_t$ takes value 1 for $t = 2009$
- Identification comes from assumption of parallel trends of treated and controls during the pre-treatment period

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

$$l_{ijk,t} = \alpha' + \gamma_0' crisis_k + \gamma_1' post_t + \delta' (crisis_k \cdot post_t) + \alpha_i + \alpha_j + \alpha_k \\ + \gamma_2 (\alpha_j \cdot post_t) + \gamma_3 (\alpha_k \cdot post_t) + \varepsilon'_{ijk,t}$$

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

$$l_{ijk,t} = \alpha' + \gamma_0' crisis_k + \gamma_1' post_t + \delta' (crisis_k \cdot post_t) + \alpha_i + \alpha_j + \alpha_k \\ + \gamma_2 (\alpha_j \cdot post_t) + \gamma_3 (\alpha_k \cdot post_t) + \varepsilon'_{ijk,t}$$

- Introduce bank-level fixed effects α_i

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

$$l_{ijk,t} = \alpha' + \gamma'_0 \text{crisis}_k + \gamma'_1 \text{post}_t + \delta' (\text{crisis}_k \cdot \text{post}_t) + \alpha_i + \alpha_j + \alpha_k \\ + \gamma_2 (\alpha_j \cdot \text{post}_t) + \gamma_3 (\alpha_k \cdot \text{post}_t) + \varepsilon'_{ijk,t}$$

- Introduce bank-level fixed effects α_i
- Home and host-country FE α_j, α_k (takes into account local demand and other country-level factors)

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

$$l_{ijk,t} = \alpha' + \gamma'_0 \text{crisis}_k + \gamma'_1 \text{post}_t + \delta' (\text{crisis}_k \cdot \text{post}_t) + \alpha_i + \alpha_j + \alpha_k \\ + \gamma_2 (\alpha_j \cdot \text{post}_t) + \gamma_3 (\alpha_k \cdot \text{post}_t) + \varepsilon'_{ijk,t}$$

- Introduce bank-level fixed effects α_i
- Home and host-country FE α_j, α_k (takes into account local demand and other country-level factors)
- Allow for home and host-country FE to be time-varying

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

$$l_{ijk,t} = \alpha' + \gamma'_0 \text{crisis}_k + \gamma'_1 \text{post}_t + \delta' (\text{crisis}_k \cdot \text{post}_t) + \alpha_i + \alpha_j + \alpha_k \\ + \gamma_2 (\alpha_j \cdot \text{post}_t) + \gamma_3 (\alpha_k \cdot \text{post}_t) + \varepsilon'_{ijk,t}$$

- Introduce bank-level fixed effects α_i
- Home and host-country FE α_j, α_k (takes into account local demand and other country-level factors)
- Allow for home and host-country FE to be time-varying
- Clustering by home, host, and two-way clustering

Empirical strategy 1

- Difference-in-Differences regression; some nuances:

$$l_{ijk,t} = \alpha' + \gamma'_0 \text{crisis}_k + \gamma'_1 \text{post}_t + \delta' (\text{crisis}_k \cdot \text{post}_t) + \alpha_i + \alpha_j + \alpha_k \\ + \gamma_2 (\alpha_j \cdot \text{post}_t) + \gamma_3 (\alpha_k \cdot \text{post}_t) + \varepsilon'_{ijk,t}$$

- Introduce bank-level fixed effects α_i
 - Home and host-country FE α_j, α_k (takes into account local demand and other country-level factors)
 - Allow for home and host-country FE to be time-varying
 - Clustering by home, host, and two-way clustering
- Since $T = 2$, we implement this by estimating the equivalent model in the cross-section as in Card and Krueger (1994):

$$\Delta l_{ijk} = \beta' + \tilde{\delta}' \text{crisis}_k + \alpha'_j + \alpha'_k + \varepsilon'_{ijk}$$

Empirical strategy 2

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} crisis_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} crisis_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

- DiD Matching Estimator (Abadie and Imbens, 2006):

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} crisis_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

- DiD Matching Estimator (Abadie and Imbens, 2006):

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} \text{crisis}_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

- DiD Matching Estimator (Abadie and Imbens, 2006):

$$\tilde{\delta} = \frac{1}{I} \sum_{i=1}^I \left\{ \Delta \hat{l}_{ijt}^{\text{crisis}} - \Delta \hat{l}_{ijt}^{\text{noncrisis}} \right\}$$

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} \text{crisis}_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

- DiD Matching Estimator (Abadie and Imbens, 2006):

$$\tilde{\delta} = \frac{1}{I} \sum_{i=1}^I \left\{ \Delta \hat{l}_{ijt}^{\text{crisis}} - \Delta \hat{l}_{ijt}^{\text{noncrisis}} \right\}$$

$$\Delta \hat{l}_{ijt}^{\text{crisis}} = \begin{cases} \frac{1}{M} \sum_{-i \in \mathcal{J}_M(i)} \Delta l_{-ijt} & \text{if } \text{crisis}_k = 0, \\ \Delta l_{ijt} & \text{if } \text{crisis}_k = 1; \end{cases}$$

$$\Delta \hat{l}_{ijt}^{\text{noncrisis}} = \begin{cases} \Delta l_{ijt} & \text{if } \text{crisis}_k = 0, \\ \frac{1}{M} \sum_{-i \in \mathcal{J}_M(i)} \Delta l_{-ijt} & \text{if } \text{crisis}_k = 1, \end{cases}$$

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} crisis_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

- DiD Matching Estimator (Abadie and Imbens, 2006):

$$\tilde{\delta} = \frac{1}{I} \sum_{i=1}^I \left\{ \Delta \hat{l}_{ijt}^{crisis} - \Delta \hat{l}_{ijt}^{noncrisis} \right\}$$

$$\Delta \hat{l}_{ijt}^{crisis} = \begin{cases} \frac{1}{M} \sum_{-i \in \mathcal{J}_M(i)} \Delta l_{-ijt} & \text{if } crisis_k = 0, \\ \Delta l_{ijt} & \text{if } crisis_k = 1; \end{cases}$$

$$\Delta \hat{l}_{ijt}^{noncrisis} = \begin{cases} \Delta l_{ijt} & \text{if } crisis_k = 0, \\ \frac{1}{M} \sum_{-i \in \mathcal{J}_M(i)} \Delta l_{-ijt} & \text{if } crisis_k = 1, \end{cases}$$

- Identification comes from assumption of *unconfoundedness*: conditional on covariates, there are no unobservables that are associated both with the treatment and with the potential outcomes

Empirical strategy 2

- Since $T = 2$, estimating a DiD regression is identical to estimating a cross-section of the difference in the dependent variable

$$\Delta l_{ijk} = \beta' + \tilde{\delta} crisis_k + \varepsilon'_{ijk}$$

$\tilde{\delta}$ is captured by the difference in the average change in lending for treated vis-à-vis untreated banks

- DiD Matching Estimator (Abadie and Imbens, 2006):

$$\tilde{\delta} = \frac{1}{I} \sum_{i=1}^I \left\{ \Delta \hat{l}_{ijt}^{crisis} - \Delta \hat{l}_{ijt}^{noncrisis} \right\}$$

$$\Delta \hat{l}_{ijt}^{crisis} = \begin{cases} \frac{1}{M} \sum_{-i \in \mathcal{J}_M(i)} \Delta l_{-ijt} & \text{if } crisis_k = 0, \\ \Delta l_{ijt} & \text{if } crisis_k = 1; \end{cases}$$

$$\Delta \hat{l}_{ijt}^{noncrisis} = \begin{cases} \Delta l_{ijt} & \text{if } crisis_k = 0, \\ \frac{1}{M} \sum_{-i \in \mathcal{J}_M(i)} \Delta l_{-ijt} & \text{if } crisis_k = 1, \end{cases}$$

- Identification comes from assumption of *unconfoundedness*: conditional on covariates, there are no unobservables that are associated both with the treatment and with the potential outcomes

Data: Banks' ownership data

- Independent data collection by authors (at the World Bank)
- Builds on a previous effort by Claessens-van Horen at the WB (recently these authors have also updated these data independently)
- Coverage of 4,496 banks in 131 developing countries, years 1995-2010
- Information comes mostly from Bankscope, but supplemented with other sources
- Data covers all legal entities within a jurisdiction, and is composed of mostly subsidiaries (but also branches when the local regulation forces foreign banks to set up shop as independent legal entities, as in Argentina)

Data: Banks' ownership data

- Definition of ownership:
 - Data identifies nationality of ownership based on the direct ownership of shares
 - A bank is foreign-owned if 50% or more of its shares are directly owned by foreigners
 - Majority ownership based on information at the end of the year
 - Ultimate ownership used when holding companies in tax heavens; or shell company owns majority of shares
 - Nationality of largest shareholder(s) when multiple nationalities of foreign owners with less than 50%

Data: Database of systemic banking crises in 2007/2008

- Data from Laeven and Valencia (2012)

Data: Database of systemic banking crises in 2007/2008

- Data from Laeven and Valencia (2012)
- A *systemic banking crisis* takes place when:
 - ① significant signs of financial distress in the banking system
 - ② significant banking policy interventions
- The year the crisis starts is identified when at least 3 out of 6 policy interventions:
 - ① extensive liquidity support (ratio of CB claims on the financial sector to deposits and foreign liabilities exceeds 5% and more than doubles)
 - ② large bank restructuring costs (at least 3% of GDP)
 - ③ significant asset purchases
 - ④ significant bank nationalizations ($> 5\%$ of GDP)
 - ⑤ significant guarantees put in place
 - ⑥ deposit freezes and/or bank holidays

Sample: Host countries

Country	Foreign	Domestic	Country	Foreign	Domestic
<i>Host Countries; (51 countries; 361 foreign banks; 738 domestic banks)</i>					
Algeria	5	3	Kenya	5	15
Angola	4	4	Lebanon	3	20
Argentina	15	41	Lithuania	5	3
Armenia	6	2	Macedonia	2	3
Belarus	4	4	Malaysia	11	22
Bolivia	4	6	Mauritius	6	3
Bosnia & Herz.	8	5	Mexico	14	19
Botswana	3	5	Moldova	2	7
Brazil	26	52	Nepal	2	10
Bulgaria	7	7	Pakistan	7	11
Cameroon	5	1	Panama	17	9
China	5	58	Paraguay	7	3
Colombia	5	6	Peru	6	5
Congo, Dem. Rep.	4	1	Romania	15	3
Costa Rica	5	34	Russia	23	168
Côte d'Ivoire	4	1	Senegal	5	1
Dominican Rep.	2	27	Sierra Leone	2	3
Ecuador	2	13	South Africa	7	19
Egypt	9	10	Tanzania	11	4
El Salvador	4	2	Tunisia	5	8
Georgia	4	2	Turkey	10	11
Guatemala	3	10	Uganda	9	1
Honduras	3	7	Uruguay	13	3
India	6	48	Venezuela	3	11
Indonesia	16	18	Zambia	6	1
Kazakhstan	6	8			

Sample: Home countries

Country	Banks	Country	Banks	Country	Banks
<i>Crisis countries* (17 countries; 208 banks)</i>					
Austria	10	Ireland	1	Portugal†	7
Belgium	3	Italy	6	Slovenia†	1
Denmark	1	Latvia	1	Spain	16
France†	28	Luxembourg	3	United Kingdom	46
Germany	13	Netherlands	18	United States	38
Greece	14	Nigeria	2		
<i>Non-crisis countries; (49 countries; 153 banks)</i>					
Argentina	4	Honduras	1	Panama	6
Australia	2	Hong Kong	2	Peru	2
Azerbaijan	1	Hungary	3	Russia	9
Bahrain	6	India	9	Saudi Arabia	1
Botswana	2	Indonesia	1	Singapore	6
Brazil	9	Israel	4	South Africa	9
Canada	8	Japan	10	Sweden	1
China	1	Jordan	1	Switzerland	4
Colombia	4	Kazakhstan	1	Thailand	1
Costa Rica	2	Kenya	4	Togo	5
Croatia	1	Korea, Rep.	2	Turkey	5
Dominican Rep.	2	Lebanon	2	UAE	4
Ecuador	1	Libya	4	Uruguay	3
Egypt	1	Liechtenstein	1	Uzbekistan	1
Estonia	1	Malaysia	1	Venezuela	1
Finland	1	Mauritius	1		
Guatemala	1	Mexico	1		

* As defined by Laeven and Valencia (2012); †]Borderline banking crisis

Data: Relevant covariates ($t = 2006$)

Data: Relevant covariates ($t = 2006$)

Core bank-level covariates

Size	Stock of total earning assets
Solvency	Ratio of equity to total assets
Income to loan ratio	Net current income/total loans
Interest margin	Interest income on assets less expense paid on liabilities/total assets

Additional bank-level covariates

Liquidity	Liquid assets/Total Assets
Wholesale	Net loans as a percentage of customer funding
Profitability	Return on average equity (%)
Weakness	Ratio of loan loss provisions to net interest revenue

Data: Relevant covariates ($t = 2006$)

Data: Relevant covariates ($t = 2006$)

Core country-level covariates

GDP growth	Real GDP growth, lagged one year
GDP per capita	GDP per capita (US\$ constant, 2000)
Inflation	Inflation (CPI)
Current account balance	Current account balance (% of GDP)

Additional country-level covariates

Bank capital	Bank capital to assets ratio
Nonperforming loans	Ratio of banks' NPLs to total gross loans
Trade openness	Imports plus exports as % of GDP
Financial exports	Exports of insurance and financial services as % of service exports

Some stylized facts from the data

- ① Fact 1: Domestic and foreign banks in developing countries exhibit systematically different sizes
→ in 2006, lending by an average domestic bank was \$5 bill. vs. \$1.7 bill. for average foreign bank

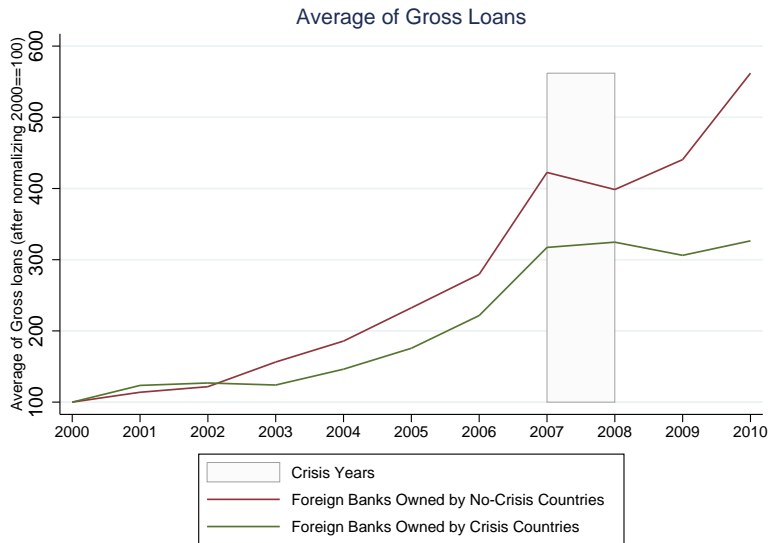
Some stylized facts from the data

- ① Fact 1: Domestic and foreign banks in developing countries exhibit systematically different sizes
→ in 2006, lending by an average domestic bank was \$5 bill. vs. \$1.7 bill. for average foreign bank
- ② Fact 2: Foreign banks owned by countries experiencing a crisis in 2007/2008 do differ from banks owned by non-crisis countries
→ in 2006, the mean for loans of crisis banks was \$2.4 bill. vs. \$0.7 bill of non-crisis banks

Some stylized facts from the data

- ① Fact 1: Domestic and foreign banks in developing countries exhibit systematically different sizes
→ in 2006, lending by an average domestic bank was \$5 bill. vs. \$1.7 bill. for average foreign bank
- ② Fact 2: Foreign banks owned by countries experiencing a crisis in 2007/2008 do differ from banks owned by non-crisis countries
→ in 2006, the mean for loans of crisis banks was \$2.4 bill. vs. \$0.7 bill of non-crisis banks
- ③ Fact 3: Lending by both groups of foreign banks essentially followed the same trend up through the eve of the crisis
→ change in average lending between 2004-2006 is statistically indistinguishable between foreign crisis and foreign non-crisis banks

Trends in total gross loans, disaggregated by crisis treatment and nontreatment foreign banks, 2000–2010



Baseline results: DiD Regression Model

Baseline results: DiD Regression Model

	B1	B2	B3	B4
Crisis effect	-0.316 (0.13)** (0.14)** (0.14)**	-0.364 (0.12)*** (0.16)** (0.16)**	-0.127 (0.00)*** (0.39) (0.10)	-0.420 (0.16)*** (0.21)** (0.17)**
Fixed effects				
Home	No	No	Yes	Yes
Host	No	Yes	No	Yes
Adj. R^2	0.021	0.307	0.245	0.490
Clusters (countries)	66, 51	66, 51	66, 51	66, 51
Estimation	OLS	OLS	OLS	OLS
N (banks)	361	361	361	361

† The dependent variable is in log differenced form. Heteroskedasticity and intragroup correlation-robust standard errors are reported in parentheses; the rows correspond to standard errors: (1) clustered by home country; (2) clustered by host country; (3) with two-way clustering. A constant term was included in the regressions, but not reported. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Fixed effects for home and host are time varying. Cluster sizes are reported for home and host, respectively.

Baseline results: DiD Matching

Baseline results: DiD Matching

	M1	M2	M3	M4	M5	M6
Crisis effect	-0.497 (0.13)***	-0.367 (0.13)***	-0.496 (0.11)***	-0.071 (0.12)	-0.277 (0.11)***	-0.381 (0.11)***
Core bank covariates	Yes	Yes	Yes	Yes	Yes	Yes
Core host covariates	Yes	Yes	Yes	Yes	Yes	Yes
Core home covariates	Yes	Yes	Yes	Yes	Yes	Yes
Non-core bank covariates	No	No	No	Yes	Yes	Yes
Estimation	Matching	Matching	Matching	Matching	Matching	Matching
Matches	1	2	4	1	2	4
N (banks)	340	340	340	322	322	322

[†] The dependent variable is in log differenced form. Point estimates computed from matching with replacement based on the Mahalanobis metric and are Abadie and Imbens (2011) bias-corrected. Heteroskedasticity-robust standard errors reported in parentheses. * indicates significance at 10 percent level, ** indicates significance at 5 percent level, and *** indicates significance at 1 percent level. Covariates used for matching are the core country and bank controls listed in the appendix. Additional bank covariates are wholesale and liquidity. All bank-level covariates enter with their values set in the pre-crisis period ($t = 2006$).

Baseline results: DiD regression model allowing for time-varying bank-level covariates (set at $t = 2006$)

	C1	C2	C3	C4	C5	C6
Crisis effect	-0.256 (0.14)*	-0.571 (0.26)**	-0.548 (0.24)**	-0.508 (0.27)*	-0.397 (0.22)*	-0.296 (0.25)
<i>Core bank-specific characteristics</i>						
Solvency		0.000 (0.00)*	0.000 (0.00)*	0.000 (0.00)	0.000 (0.00)	0.000 (0.00)
Income-to-loan				-0.007 (0.01)	0.247 (0.04)***	0.256 (0.04)***
<i>Additional bank-specific characteristics</i>						
Fixed effects						
Home	Yes	Yes	Yes	Yes	Yes	Yes
Host	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.502	0.548	0.550	0.558	0.660	0.668
Clusters (countries)	66, 51	66, 51	66, 51	66, 51	66, 51	66, 51
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
N (banks)	361	361	361	361	344	343

Robustness checks

- For both DiD Regression and DiD Matching:

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$
- Checks on the identifying assumptions:

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$
- Checks on the identifying assumptions:
 - ① Placebo: assignment of treatment for $pre = 2002$ and $post = 2005$

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$
- Checks on the identifying assumptions:
 - ① Placebo: assignment of treatment for $pre = 2002$ and $post = 2005$
 - ② Falsification: assignment of treatment for trade collapse in home

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$
- Checks on the identifying assumptions:
 - ① Placebo: assignment of treatment for $pre = 2002$ and $post = 2005$
 - ② Falsification: assignment of treatment for trade collapse in home
 - ③ Falsification: assignment of treatment for fiscal stimulus in home

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$
- Checks on the identifying assumptions:
 - ① Placebo: assignment of treatment for $pre = 2002$ and $post = 2005$
 - ② Falsification: assignment of treatment for trade collapse in home
 - ③ Falsification: assignment of treatment for fiscal stimulus in home
 - ④ Estimating a DiD matching model allowing for domestic banks in pool of controls, but forcing exact matching by host country

Robustness checks

- For both DiD Regression and DiD Matching:
 - ① Adding other bank-level covariates: profitability and weakness
 - ② Adding other home country covariates: banks' capital and bank's NPLs; trade openness and financial exports
 - ③ Estimating the models with averages $pre = 2005 - 2006$ and $post = 2009 - 2010$
- Checks on the identifying assumptions:
 - ① Placebo: assignment of treatment for $pre = 2002$ and $post = 2005$
 - ② Falsification: assignment of treatment for trade collapse in home
 - ③ Falsification: assignment of treatment for fiscal stimulus in home
 - ④ Estimating a DiD matching model allowing for domestic banks in pool of controls, but forcing exact matching by host country
- DiD regression: fully saturated model on the covariates

Falsification tests

Falsification tests

	F1	F2	F3	F4	F5	F6
	<i>t=2002, t+1=2005</i>		<i>treatment=trade</i>		<i>treatment=fiscal</i>	
Treatment effect	0.077 (0.32)	-0.389 (0.29)	0.889 (0.33) ^{***}	0.435 (0.74)	0.517 (0.23) ^{**}	0.675 (0.27) ^{**}
Core bank covariates	Yes	No	Yes	No	Yes	No
Home FE	Yes	Yes	Yes	Yes	Yes	Yes
Host FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.442	0.516	0.490	0.558	0.490	0.558
Clusters (countries)	49, 42	49, 42	66, 51	66, 51	66, 51	66, 51
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
N (banks)	265	264	361	361	316	316

DiD matching: Including domestic banks

DiD matching: Including domestic banks

	D1	D2	D3	D4	D5	D6
Crisis effect	-0.229 (0.08)***	-0.364 (0.07)***	-0.334 (0.07)***	-0.161 (0.08)**	-0.160 (0.07)**	-0.210 (0.07)***
Core bank covariates	Yes	Yes	Yes	Yes	Yes	Yes
Non-core bank covariates	No	No	No	Yes	Yes	Yes
Exact host matching	Yes	Yes	Yes	Yes	Yes	Yes
Exact matches (%)	95.7	94.5	87.0	92.8	91.8	81.8
Estimation	Matching	Matching	Matching	Matching	Matching	Matching
Matches	1	2	4	1	2	4
N (banks)	1,099	1,099	1,099	1,021	1,021	1,021

DiD OLS & DiD matching: Comparing foreign noncrisis banks with domestic banks

DiD OLS & DiD matching: Comparing foreign noncrisis banks with domestic banks

	N1	N2	N3	N4	N5	N6	N7	N8
	<i>OLS DID</i>				<i>Matching DID</i>			
Treatment effect	0.251 (0.12)**	0.166 (0.22)	0.140 (0.20)	0.184 (0.27)	2.158 (0.09)***	1.299 (0.08)***	3.383 (0.14)***	2.997 (0.08)***
Core bank covariates	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Core host covariates	-	-	-	-	Yes	Yes	Yes	Yes
Core home covariates	-	-	-	-	Yes	Yes	Yes	Yes
Non-core bank covariates	No	No	No	Yes	No	No	No	Yes
Home FE	No	Yes	Yes	Yes	-	-	-	-
Host FE	No	Yes	Yes	Yes	-	-	-	-
Exact host matching	-	-	-	-	Yes	Yes	Yes	Yes
Exact matches (%)	-	-	-	-	95.4	87.6	73.7	69.5
Adj. R^2	0.012	0.395	0.405	0.452	-	-	-	-
Clusters (countries)	74, 51	74, 51	74, 51	74, 51	-	-	-	-
Estimation	OLS	OLS	OLS	OLS	Matching	Matching	Matching	Matching
Matches	-	-	-	-	1	2	4	4
N (banks)	891	891	891	827	891	891	891	827

Compare foreign noncrisis banks with domestic banks

Compare foreign noncrisis banks with domestic banks

- Compare relative crisis effect of non-crisis foreign banks with that of domestic banks
 - Results suggest non-crisis foreign banks relatively increased their lending beyond of what domestic banks did (relative to crisis-hit foreign banks)

DiD OLS: Heterogeneity of crisis effect by region

DiD OLS: Heterogeneity of crisis effect by region

	S1	S2	S3	S4	S5	S6
Crisis effect	-0.425 (0.08)***	0.010 (0.37)	-0.447 (0.07)***	-0.621 (0.08)**	-0.467 (0.07)**	-0.515 (0.07)***
Crisis × EAP	-0.304 (0.50)					
Crisis × ECA		-1.560 (0.61)**				
Crisis × LAC			0.551 (0.63)			
Crisis × MNA				0.549 (0.43)		
Crisis × SAS					0.301 (0.42)	
Crisis × SSA						0.562 (0.43)
Fixed effects						
Home	Yes	Yes	Yes	Yes	Yes	Yes
Host	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.491	0.505	0.493	0.492	0.491	0.492
Clusters (countries)	66, 51	66, 51	66, 51	66, 51	66, 51	66, 51
Estimation	OLS	OLS	OLS	OLS	OLS	OLS
N (banks)	361	361	361	361	361	361

Recap of the results

- Foreign banks owned by countries experiencing crises in 2007/2008 did in fact exhibit relatively lower lending growth in host developing economies.
→ Foreign banks are a vehicle of international transmission of home shocks
- The magnitude of this effect is large. Banks from crisis countries displayed growth in lending in the host economy between 13% to 42% lower than banks headquartered in non-crisis countries
- The space left by retreating crisis foreign banks was disproportionately filled by foreign non-crisis banks, not by domestic banks
- Foreign banks from crisis countries exhibited a *larger* relative decline in Eastern Europe

Foreign Bank Behavior During Financial Crises

Jon Adams-Kane¹ Julián Caballero² Jamus Lim¹

¹*World Bank*

²*Inter-American Development Bank*

VIII Annual Seminar on Risk, Financial Stability and Banking
Banco Central do Brasil
São Paulo, August 8-9, 2013