

# Through Thick and Thin: Relationship Lending, Credit Supply, and Loan Performance During Crises

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## “Know thy customer”...

### Hard information

- Easier to quantify (financial statements, tax records,...).
- Especially used with de novo borrowers.
- Easily transferred to other lenders.

### Soft information

- Harder to quantify (borrower behavior, references from third parties,...).
- Requires time/learning.
- Not easily transferred to other lenders.
- Increases signal-to-noise ratio about borrower's type.

Given banks' knowledge of their customers...

- ... provide “continuation-lending” at more favorable terms?
- ... or exploit monopoly power (i.e., hold-up problem or lock-in effect)?

# Research Questions

- 1 Do relationship lenders offer more favorable loan terms to firms during bad times?
- 2 Can economic fundamentals/particular bank characteristics explain relationship lending effects?
- 3 What economic reasons may justify banks' credit supply decisions?

Use unique data set of universe of loans (and their individual characteristics) granted by commercial banks in Mexico to non-financial private firms between 2003 and 2015.

# Main Findings

- 1 During the 2008-2009 financial crisis, relationship lenders in Mexico offered more favorable loan contract terms relative to transactional lenders.
  - Amounts on new loans larger by about **24.1%** on average.
  - Prices on new loans lower by about **18 basis points** on average.
- 2 Bank characteristics seem to explain extent of relationship effects on business lending.
  - Better capitalized and less centralized banks more prone to be relationship lenders and “capture” customers with better loan terms during bad times.
- 3 Relationship lenders exploit their informational advantage at times of crisis.
  - Expect better returns on loans.
  - Their customers have better repayment rates in the short and long run.

Results robust to various specifications, relationship lenders definitions, definitions of “crisis”, etc.

- Monthly data of all loans provided to firms in Mexico by banks and affiliated non-bank financial intermediaries between December 2003 to May 2015.
  - Include characteristics of each loan, e.g., initial and outstanding loan amount, date granted, initial and residual maturity, interest rate charged, payment amount due, last payment date, etc.
  - Include bank characteristics, particularly detailed data from their financial statements.
  - Firms are uniquely identified by their tax identification number.
- Focus on new loans. Data aggregated quarterly.

# Data: Crisis and Pre-Crisis periods

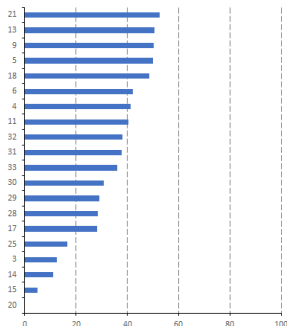
- Lehman shock in September 2008.
- Most severe effects of crisis recorded in 2009.
  - GDP fell by 6.8%.
  - Bank assets fell all throughout 2009 and reached their lowest level in the fourth quarter of 2009, then began recovering.
- Pre-crisis period: 2007.
  - Used to identify relationship lenders prior to the crisis.

# Data: Bank-Firm Relationship

A bank  $b$  is defined as a relationship lender for firm  $i$  if the share of firm  $i$ 's debt with bank  $b$  out of all its bank loans, is larger than its debt share with any other bank (as in Elyasiani and Goldberg 2004; Elsas 2005; Sette and Gobbi 2015).

- Focus on firms with multibank relationships (Khwaja and Mian 2008).
- Results are robust to alternative definitions.

Figure: Share of firms for which bank is relationship lender (%)



# Data: Summary Statistics

Table: Summary Statistics

	Full sample			Relationship lenders			Transaction lenders		
	N	Mean	sd	N	Mean	sd	N	Mean	sd
<i>Panel A. Pre-Crisis period</i>									
Loan size	32,125	74.99	1092.32	16,489	58.24	1019.35	15,636	90.61	1164.14
log(loan size)	32,125	15.46	2.18	16,489	15.33	2.10	15,636	15.59	2.25
Interest rate	32,125	16.02	5.55	16,489	16.57	5.56	15,636	15.44	5.49
Spread	32,125	8.35	5.55	16,489	8.90	5.55	15,636	7.77	5.48
Maturity	32,125	1.01	1.02	16,489	1.017	0.96	15,636	1.00	1.09
<i>Panel B. Crisis period</i>									
Loan size	25,387	78.24	900.39	10,157	60.28	695.71	15,230	90.22	1014.03
log(loan size)	25,387	15.31	2.28	10,157	15.23	2.22	15,230	15.37	2.33
Interest rate	25,387	15.1	6.32	10,157	15.88	6.82	15,230	14.59	5.9
Spread	25,387	9.05	6.15	10,157	9.80	6.69	15,230	8.55	5.71
Maturity	25,212	1.41	1.31	10,106	1.45	1.30	15,106	1.38	1.31

Note: Loan size is in millions of pesos.



# Empirical Strategy

The baseline specification is the following:

$$y_{ibq} = \lambda_i + \theta_b + \beta RL_{ib,07} + \rho_q + \varepsilon_{ibq} \quad (1)$$

- $y \in \{\ln(\text{loan size}), \text{loan price}\}$ .
  - Loan size is total amount of new loans granted in quarter  $q$ .
  - Loan price is the average interest rate of all loans granted in  $q$ , weighted by individual loan amount, net of bank cost of funds.
- $RL_{ib,07} = 1$  if bank  $b$  is relationship lender to firm  $i$ , 0 otherwise.
- $\lambda_i$ ,  $\theta_b$  and  $\rho_q$  are firm, bank and quarter fixed effects.
- Standard errors are clustered at the bank  $\times$  sector level.

# Contract terms

Table: Relationship lending and loan contract terms

	log(loan size)			Loan price		
	(1)	(2)	(3)	(4)	(5)	(6)
Relationship Lender	-0.144 (0.106)	0.236*** (0.0267)	0.241*** (0.0266)	1.252** (0.556)	-0.185** (0.0764)	-0.181** (0.0767)
Observations	25387	25387	25387	25387	25387	25387
R <sup>2</sup>	0.001	0.722	0.739	0.010	0.860	0.861
Firm fixed effects	No	Yes	Yes	No	Yes	Yes
Bank fixed effects	No	Yes	Yes	No	Yes	Yes
Quarter fixed effects	No	No	Yes	No	No	Yes

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors shown in parentheses are clustered at the bank $\times$ sector level (clusters = 328).

2007

More

Table: Heterogeneity by bank characteristics - Panel A. log(Loan size)

	(1)	(2)	(3)
Relationship lender	0.474*** (0.0434)	0.296*** (0.0691)	0.415*** (0.0513)
Relationship lender x ICAP	-0.393*** (0.0703)		
Relationship lender x Size		-0.0447 (0.0782)	
Relationship lender x Centralized			-0.230*** (0.0660)
Sum of effects	0.0817** (0.0409)	0.2511*** (0.0366)	0.1846*** (0.0409)
Observations	25372	25372	25372
R <sup>2</sup>	0.733	0.733	0.734
Firm fixed effects	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors shown in parentheses are clustered at the bank×sector level (clusters = 328). Note: ICAP index is retrieved from the CNBV, takes the value of 1 if the index of the bank is in the lower quartile of the distribution during the pre-crisis period. Size = log(bank assets), takes the value of 1 if the value of the bank is in the top quartile of the distribution during the pre-crisis period. Centralized takes the value of one if the degree of autonomy granted to branch managers is low, and zero otherwise, as described in Canales and Nanda (2012). All regressions include bank characteristics main effects.

Table: Heterogeneity by bank characteristics - Panel B. Loan price

	(1)	(2)	(3)
Relationship lender	-1.679*** (0.319)	-0.973*** (0.225)	-1.151*** (0.205)
Relationship lender x ICAP	3.200*** (0.631)		
Relationship lender x Size		1.468*** (0.382)	
Relationship lender x Centralized			2.057*** (0.440)
Sum of effects	1.521*** (0.392)	0.495* (0.258)	0.9058*** (0.306)
Observations	25372	25372	25372
$R^2$	0.706	0.651	0.671
Firm fixed effects	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors shown in parentheses are clustered at the bank $\times$ sector level (clusters = 328). Note: ICAP index is retrieved from the CNBV, takes the value of 1 if the index of the bank is in the lower quartile of the distribution during the pre-crisis period. Size =  $\log(\text{bank assets})$ , takes the value of 1 if the value of the bank is in the top quartile of the distribution during the pre-crisis period. Centralized takes the value of one if the degree of autonomy granted to branch managers is low, and zero otherwise, as described in Canales and Nanda (2012). All regressions include bank characteristics main effects.

# Loan profitability

What economic reasons may justify bank's credit supply decisions? We conjecture that relationship lending loans are more profitable in the long run. To test this hypothesis, we estimate:

$$R_{ib} = \lambda_i + \theta_b + \beta RL_{ib,07} + \varepsilon_{ib} \quad (2)$$

- $R_{ib}$  measures profitability of loans granted during crisis for each  $ib$  pair.
- $RL_{ib,07} = 1$  if bank  $b$  is relationship lender to firm  $i$ , 0 otherwise.
- $\lambda_i$  and  $\theta_b$  are firm and bank fixed effects.
- Standard errors are clustered at the bank  $\times$  sector level.

# Loan profitability

Table: *Ex-ante* loan profitability

	log(payments)		log(interest)		Return per peso	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Crisis period (2009)</i>						
Relationship lender	0.333*** (0.0410)	0.357*** (0.0296)	0.224*** (0.0311)	0.160*** (0.0301)	0.000241 (0.000387)	-0.000875*** (0.000163)
Dep. Var. mean	15.54	15.54	10.92	10.92	1.02	1.02
Observations	25178	25178	25178	25178	25178	25178
R <sup>2</sup>	0.786	0.804	0.592	0.634	0.571	0.784
<i>Panel B. Post-Crisis period (2012)</i>						
Relationship lender	0.144*** (0.0428)	0.146*** (0.0391)	0.207*** (0.0469)	0.133*** (0.0406)	0.00120** (0.000485)	0.000423* (0.000253)
Dep. Var. mean	16.37	16.37	11.66	11.66	1.02	1.02
Observations	14822	14822	14822	14822	14822	14822
R <sup>2</sup>	0.830	0.845	0.613	0.630	0.857	0.899
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	No	Yes	No	Yes	No	Yes

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Standard errors shown in parentheses are clustered at the bank×sector level.

# Loan repayment

Table: Relationship lending and loan repayment

	Delinquency rate			Default rate		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Crisis period (2009)</i>						
Relationship lender	-0.00874 (0.00899)	-0.0105 (0.0106)	-0.0115* (0.00596)	0.000854 (0.00281)	-0.00379 (0.00266)	-0.00485** (0.00198)
Dep. Var. mean	0.09	0.09	0.09	0.04	0.04	0.04
Observations	35377	35377	35377	35377	35377	35377
R <sup>2</sup>	0.000	0.309	0.344	0.000	0.391	0.422
<i>Panel B. Post-Crisis period (2012)</i>						
Relationship lender	-0.00253 (0.00594)	-0.000485 (0.00526)	0.000828 (0.00395)	0.00812* (0.00478)	-0.00273 (0.00417)	-0.00697* (0.00421)
Dep. Var. mean	0.04	0.04	0.04	0.06	0.06	0.06
Observations	18037	18037	18037	18037	18037	18037
R <sup>2</sup>	0.000	0.631	0.651	0.000	0.744	0.750
Firm fixed effects	No	Yes	Yes	No	Yes	Yes
Bank fixed effects	No	No	Yes	No	No	Yes

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Standard errors shown in parentheses are clustered at the bank×sector level.

# Conclusion

- Using a unique dataset of universe of bank loans in Mexico, we find evidence that relationship lending has an significant impact on the supply of credit and loan prices to firms in Mexico, particularly during periods of financial distress.
- Relationship lending appears to be beneficial to both borrowers and lenders because it helps customers stay in business and in the long run these relationships seem to be more profitable.
- Further work:
  - Role of loan maturity.
  - Role of bank exposure to the crisis on credit outcomes.
  - Potential real effects.



# Appendix

# Literature Review

- There is an extensive literature that studies how the borrower's quality information is used by lenders to determine the loan contract terms:
  - Early papers like Boot and Thakor (1994) and Berger and Udell (1995) find that relationship lending improves loan contract terms and reduces loan prices, as “soft” information reduces monitoring costs.
  - Recently, more studies have studied empirically how the relationship between borrowers and lenders affected the credit market during the financial crisis of 2008-2009:
    - Sette and Gobbi (2015) found that relationship lenders increased loan sizes by 4.6 percentage points more and charged 50 basis points less relative to transaction lenders.
    - Bolton et al. (2016) found that the growth of loans granted by transaction lenders grew by 3 percentage points less and charged 12 basis points more than relationship lenders.
  - In fact, La Porta et al. (2003) studied related lending in Mexico during the crisis in the mid-nineties. They argue that the channel through which related lending occurs is the mutual ownership of banks and firms. This relation between lenders and borrowers increases the risk of “looting” the banks, as the borrowing terms in relationship lending were significantly better than in transactional lending and also have much higher default rates.

# Literature Review

- Finally, Gambacorta and Mistrulli (2011) investigated the role of lending relationships and bank-specific characteristics in the functioning of the credit market in an economy-wide crisis:
  - They found that close lending relationships kept firms more insulated from the financial crisis.
  - Although the spreads between loans rates and the interbank rate increased significantly during the financial crisis of 2008-2009, the firms with a stronger relationship with their lenders suffered a lesser increase in this spread.
  - In overall, it is utterly important the lending relationship in shielding credits from the effects of a crisis. However, banks which are less liquid or less well capitalized are less likely to shield their corporate clients from an increase in the interest spread.

# Measuring the strength of bank-firm relationships

We have to construct measures of strength of the banks-firms relationships, in order to classify the banks as relationship or transactional lenders with each firm:

- Share of the debt the firms hold with each bank.
- Number of years of relationship a bank-firm pair has in the pre-crisis period.
- Proxy the strength of the relationship using the fact that the allocation of credit is a function of the quality of the borrower:

$$y_{ib07} = \lambda_{i07} + \pi_1 H_{ib07} + \zeta_{ib07} \quad (3)$$

- $y_{ib07} \in \{\ln(\text{loan size}), \text{interest rate}\}$ . Loan size corresponds to the total new debt of firm  $i$  during the crisis period, whereas loan price corresponds to the weighted average interest rate discounted by the risk free rate.
- $\lambda_{i07}$  is a firm fixed effect.
- $H_{ib07}$  is a proxy for hard information.<sup>1</sup>
- $\zeta_{ib07} = \pi_2 S_{ib07} + \vartheta_{ib07}$ .
  - $S_{ib07}$  is a proxy for soft information, and is uncorrelated to the idiosyncratic error  $\vartheta_{ib07}$ .

<sup>1</sup>We use as a proxy of hard information the credit score that each lender assigns to a borrower.

# Contract terms

**Table:** Relationship lending and loan contract terms in the pre-crisis period

	log(loan size)				Loan price			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relationship Lender	-0.263*** (0.0390)	0.792*** (0.0269)	0.717*** (0.0247)	0.715*** (0.0248)	1.125*** (0.0989)	-1.754*** (0.0747)	-1.015*** (0.0603)	-1.021*** (0.0603)
Observations	32125	32125	32125	32125	32125	32125	32125	32125
R <sup>2</sup>	0.004	0.764	0.791	0.792	0.010	0.845	0.896	0.897
Firm fixed effects	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Bank fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Quarter fixed effects	No	No	No	Yes	No	No	No	Yes

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Standard errors shown in parentheses are clustered at the firm level.

Back

# Robustness tests

Table: Relationship lending and contract terms

	OLS	OLS	OLS	IV
	(1)	(2)	(3)	(4)
<i>Panel A. log(loan size)</i>				
1{max Years}	0.0267 (0.0295)			
1{max Sizeresidual}		0.225*** (0.0244)		
1{min Priceresidual}			0.107*** (0.0285)	
1{max Share}				0.284*** (0.0265)
Observations	25387	25387	25387	25387
R <sup>2</sup>	0.736	0.738	0.737	0.0457
Firm fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes	No

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Standard errors shown in parentheses are clustered at the bank×sector level.

**Table:** Relationship lending and contract terms

	OLS	OLS	OLS	IV
	(1)	(2)	(3)	(4)
<i>Panel B. Loan price</i>				
1{max Years}	0.215*			
	(0.117)			
1{max Sizeresidual}		-0.183***		
		(0.0702)		
1{min Priceresidual}			-1.138***	
			(0.127)	
1{max Share}				-0.245***
				(0.0506)
Observations	25387	25387	25387	25387
R <sup>2</sup>	0.861	0.861	0.868	0.5329
Firm fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes	No

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Standard errors shown in parentheses are clustered at the bank  $\times$  sector level.

# Loan profitability

Table: Loan profitability

	log(payments)		log(interest)		Return per peso	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A. Post-Crisis period (2011)</i>						
Relationship lender	0.152*** (0.0520)	0.154*** (0.0447)	0.270*** (0.0579)	0.186*** (0.0507)	0.000819*** (0.000309)	0.000122 (0.000183)
Dep. Var. mean	16.40	16.40	11.60	11.60	1.01	1.01
Observations	16273	16273	16273	16273	16273	16273
R <sup>2</sup>	0.828	0.839	0.602	0.620	0.866	0.900
<i>Panel B. Post-Crisis period (2013)</i>						
Relationship lender	0.0827 (0.0595)	0.111*** (0.0421)	0.131*** (0.0479)	0.0806* (0.0467)	0.00121** (0.000581)	0.000533 (0.000342)
Dep. Var. mean	16.34	16.34	11.63	11.63	1.02	1.02
Observations	12990	12990	12990	12990	12990	12990
R <sup>2</sup>	0.831	0.857	0.622	0.634	0.895	0.933
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	No	Yes	No	Yes	No	Yes

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Standard errors shown in parentheses are clustered at the bank×sector level.