Capital Controls, Domestic Macroprudential Policy and the Bank Lending Channel of Monetary Policy

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- In Emerging Economies, large capital inflows are associated to credit booms, financial crises and other episodes of macroeconomic distress
  - Mendoza and Terrones (2008), Reinhart and Reinhart (2008), Jordá, Schularick and Taylor (2011), Gourinchas and Obstfeld (2012)

- The global financial cycle generates important spillovers to local credit cycles and raises monetary policy dilemmas and financial stability trilemmas in emerging markets
  - Schoenmaker (2011), Rey (2013; 2016), Obstfeld (2015)

- Prudential capital controls advocated by the IMF and by theoretical models
  - Davis and Presno (2017), Farhi and Werning (2012; 2014), IMF (2012; 2018; 2020)

This Paper

Exploit **capital controls** + **reserve requirements** + **credit registry** data to answer:

1. Do capital controls and/or domestic macroprudential policies strengthen the transmission of monetary policy to credit supply?

2. Do capital controls and domestic macroprudential measures complement each other in slowing down credit booms?

Colombia as Laboratory for Identification

Context

- Pronounced domestic and external credit boom ▸ Domestic Boom ▸ External Boom
- Monetary policy seems unable to reduce credit growth

Shocks

- Introduction of capital controls & reserve requirements during the boom
  - Capital controls target banks' *foreign* liquidity
  - Reserve requirements target banks' *domestic* deposits funding

Data

- Domestic credit register (loan-level data on all commercial loans)
- Bank supervisory data on banks' FX-exposure & domestic deposits

Preview of Results

1. Controls strengthen the bank-lending channel of MP and tame banks' risk-taking

   - Banks borrow in US$ and lend (more) in peso when local MP rate goes up
     - ▶ Results robust to using the local policy rate or the Colombia-US policy rate spread
     - ▶ Stronger when CIP deviations are larger and for riskier and/or opaque companies
   - Capital controls tax foreign liquidity and break the carry trade

2. Increased reserve requirement tame credit supply directly, rather than through MP

   - Stronger for riskier and/or opaque companies

3. Foreign debt and domestic deposits are substitute sources of bank financing
   → Tinbergen Prudential-Rule

   - A boom fueled by foreign & domestic liquidity requires two prudential measures
     - ▶ *Two (intermediate) objectives*: foreign & domestic liquidity
     - ▶ *Two policy instruments*: Capital Controls & Reserve Requirements

Related Literature

1. **Bank lending channel of monetary policy**
   - *Domestic and International bank lending channel*: Bernanke and Gertler (1995), Kashyap and Stein (2000), Cetorelli and Goldberg (2012), Jiménez et al. (2012; 2014), Ioannidou et al. (2014), Bruno and Shin (2015), Morais et al. (2019), Dias et al. (2021)

   - *Interest rate differentials and cross-border loans*: Cavallino and Sandri (2018), Fendoglu et al. (2019), Avdjiev et al. (2019)

2. **Capital Controls & Macro-prudential policies**
   - Bianchi (2011), Jeanne and Korinek (2010), Korinek (2011, 2018), Farhi and Werning (2012, 2014), Fernández et al. (2015), Rey (2013), Korinek and Sandri (2016), Davis and Presno (2017), Han and Wei (2018), Klein and Shambaugh (2015), Zeev (2017), Rebucci and Ma (2019), Erten et al. (2021)

   - Akinci and Olmstead-Rumsey (2018), Cerutti et al. (2017), Cordella et al. (2014), Federico et al. (2014), Jiménez et al. (2017), Camors et al. (2019)

Outline of the talk

1. Policy Description

2. Data

3. Empirical Analysis
   - CC, RR and MP Effectiveness
   - Reserve Requirements on Domestic Deposits
   - Domestic Deposits and Foreign Funding: Complements or Substitutes?

4. Conclusions

Policy Description: Capital Controls

CAPITAL CONTROLS introduced in May 2007 ▸ Institutional Context

1. 6-month 40% Unremunerated Reserve Requirement (URR) on FX borrowing
   - ▸ Applies to *foreign currency bank-debt* and portfolio investments inflows
   - ▸ Computed over total nominal amount of debt and paid by the borrower
   - ▸ Decreasing penalties (in time) for withdrawing funds
     - ★ Penalty ranging from 9.4% to 1.6% of the reserve, depending on length of time held
   - ▸ Heavy taxation of FX-debt inflows at a time when MP rate was 8%

2. New limit on *gross* FX-position ($\leq$ 500% of capital)

3. Capital Controls were eliminated in October 2008

- URR applies to both banks' and firms' borrowing

- If bank borrows 100 US$ to lend 100 US$, only the firm pays

- Therefore, URR affects banks' supply of peso-loans financed with FX debt
  - ▶ Banks typically fully hedge their FX-position
  - ▶ ● ▶ Institutional Context

- Summary
  - ▶ Before URR
    - ★ No tax
    - ★ Banks hedge FX exposure without gross limits
  - ▶ After URR
    - ★ Tax (40% URR)
    - ★ Banks hedge FX exposure with gross limits

Policy Description: Reserve Requirements on Domestic Deposits

- *Ordinary RR* before policy shock
  - Savings deposits: 6%
  - Checking deposits: 13%
  - Certificate of deposits ($\leq$ 18 months): 2.5%
    - ⋆ Remunerated at current inflation rate

- New regime after policy shock
  - Introduction of Marginal RR on deposits from May 7th (day after)
    - ⋆ Savings & Checking deposits: 27%
    - ⋆ Certificate of deposits ($\leq$ 18 months): 5%
    - ⋆ Not remunerated
  - Change in Ordinary RR
    - ⋆ Uniformed at 8.3% for Savings & Checking deposits

- Final change in August 2008
  - Elimination of Marginal RR
  - Ordinary RR for Savings & Checking deposits: 11.5%

- Ultimately, shocks raise costs of Savings & Checking deposits

Data

Quarterly Data

- Credit Register Data on domestic credit
  - Firm-bank outstanding debt
  - Firm-level yields
  - Short-term loan indicator ($\leq$ 1 year)
  - Supervised companies

- Banks balance sheet data
  - FX-funding
  - Domestic deposits (savings & checking deposits)

- Macroeconomic data, including CIP deviations from Du and Shregher (2016)

Final sample:
- 110,226 firms and 40 banks (12 banking groups)
- ▸ Details

Capital Controls, Reserve Requirements and the Effectiveness of Monetary Policy Rates

- Does the implementation of CC and RR strengthen the bank lending channel?

$$Y_{f,b,yq} = (\beta_1 + \beta_2 Post_{yq})^* i_{yq-1} + \gamma_1 MacroControls_{yq-1} + \gamma_2 BankControls_{b,yq-1} + \gamma_{f,b} + \epsilon_{f,b,yq}$$

- $Y_{f,b,yq}$ - Log of loan from b to f at yq
- $Post_{yq}$ - Dummy with value 1 from 2007q2 onward (and 0 before)
- i_{yq-1} - Lagged MP rate
- $MacroControls_{yq-1}$ - Lagged yearly inflation, GDP and exchange rate growth
- $BankControls_{b,yq-1}$ - Lagged ROA, log Total Assets, Common Equity, FX-Funds, NPL, Savings Deposits, Checking Deposits
- $\gamma_{f,b}$ - Firm*Bank Fixed Effects
- Sample   - 2005Q1-2008Q2

VARIABLES	(1)	(2)	(3)	(4)	(5)
			$Loan_{f,b,yq}$		
$Post_{yq} * i_{yq-1}$	-3.452***	-5.644***	-5.382***	-6.321***	-3.586***
	(0.552)	(0.757)	(0.751)	(0.663)	(0.813)
i_{yq-1}	2.881***	4.333***	4.519***	4.688***	3.502***
	(0.433)	(0.566)	(0.562)	(0.499)	(0.517)
Observations	1,475,369	1,475,369	1,475,369	1,475,369	1,475,369
R-squared	0.674	0.674	0.678	0.832	0.832
Firm FE	Yes	Yes	Yes	-	-
Macro Control*Post	No	Yes	Yes	Yes	Yes
Bank FE	No	No	Yes	-	-
Firm*Bank FE	No	No	No	Yes	Yes
Bank Controls	No	No	No	No	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Robustness

- Alternative proxies of monetary policy rates

  - ▶ ▶ Other Proxies

- Alternative models

  - ▶ ▶ Other Models
  - ▶ Firm*Seasonal FE
  - ▶ Controlling for loan loss provisions
  - ▶ WLS
  - ▶ Alternative clustering strategies

Capital Controls and Monetary Policy Rates - Carry Trade

- *Carry trade* strategy by local banks
  - ▸ Domestic MP-rate hikes widen Colombia-US rate differential
  - ▸ Before CC, Colombian banks borrow in cheap US$ and lend in expensive pesos
  - ▸ CC tax FX-borrowing and disincentivize the carry

- Carry-trade strategy requires additional US$ borrowing by local banks
  - ▸ Stronger carry for banks with easier access to FX-debt (higher ex-ante FX-funding)

$$Y_{f,b,yq} = (\beta_1 + \beta_2 * Post) * MP\ Spread_{yq-1} * FX\ Borrowing_{b,yq-1} +$$
$$+ (\chi_1 + \chi_2 * Post) * Macro_{yq-1} * FX\ Borrowing_{b,yq-1} +$$
$$+ (\phi_1 + \phi_2 * Post) * MP\ Spread * Controls_{b,yq-1} + \gamma_{f,b} + \gamma_{f,yq} + \epsilon_{f,b,yq}$$

- Under our hypothesis: $\beta_1 > 0$ and $\beta_2 < 0$
  - ▸ *Controls*$_{b,yq-1}$ include RR-taxed funding $\rightarrow$ horse-race
  - ▸ Firm*year-quarter FE $\gamma_{f,yq}$ absorb firm fundamentals (demand) shocks

Capital Controls and Monetary Policy Rates - Carry Trade

VARIABLES	(1)	(2)	(3)	(4)	(5)
			$Loan_{f,b,yq}$		
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1} * Post_{yq}$	-109.378***	-105.444***	-109.090***	-109.358***	-280.971***
	(36.838)	(36.668)	(33.361)	(37.228)	(59.067)
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1}$	55.557***	50.837**	53.148***	81.225***	144.609***
	(21.099)	(21.018)	(17.790)	(21.185)	(28.647)
$FXFunds_{b,yq-1} * Post_{yq}$	-28.769	-35.367	-41.893	-9.303	19.526
	(32.990)	(32.976)	(30.034)	(35.459)	(36.522)
$FXFunds_{b,yq-1}$	-43.477***	-36.322***	-35.900***	-51.056***	-58.943***
	(13.789)	(13.718)	(12.604)	(14.946)	(15.420)
$MP\ Spread_{yq-1} * Post_{yq}$	-21.826***				
	(2.748)				
$MP\ Spread_{yq-1}$	-0.212				
	(0.880)				
Observations	895,247	895,247	895,247	895,247	895,247
R-squared	0.808	0.808	0.810	0.886	0.886
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes
Macro Controls*Post	Yes	-	-	-	-
Bank Controls*Post	Yes	Yes	Yes	Yes	Yes
FXFunds*Macro Controls*Post	Yes	Yes	Yes	Yes	Yes
Year:Quarter FE	No	Yes	-	-	-
Industry*Year:Quarter FE	No	No	Yes	-	-
Firm*Year:Quarter FE	No	No	No	Yes	Yes
Bank Controls*MP Spread*Post	No	No	No	No	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

Capital Controls and Monetary Policy Rates - Horse Race

VARIABLES	(1) $Loan_{f,b,yq}$
MP Spread$_{yq-1}$ * *FXFunds*$_{b,yq-1}$ * *Post*$_{yq}$	-280.971***
	(59.067)
MP Spread$_{yq-1}$ * *FXFunds*$_{b,yq-1}$	144.609***
	(28.647)
MP Spread$_{yq-1}$ * *Saving*$_{b,yq-1}$ * *Post*$_{yq}$	-11.210
	(10.749)
MP Spread$_{yq-1}$ * *Saving*$_{b,yq-1}$	-7.413
	(7.117)
MP Spread$_{yq-1}$ * *Checking*$_{b,yq-1}$ * *Post*$_{yq}$	-13.325
	(9.307)
MP Spread$_{yq-1}$ * *Checking*$_{b,yq-1}$	8.429
	(14.103)
Observations	895,247
R-squared	0.886
Firm*Bank FE	Yes
FXFunds*Macro Controls*Post	Yes
Firm*Year:Quarter FE	Yes
Bank Controls*MP Spread*Post	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

▸ Full Interactions

More on Carry Trade

- **Economic Interpretation** (following a 1 p.p. increase in MP-Spread)
    - ▶ BEFORE CC: banks with 1 s.d. higher FX-Funds increase loans by 3.8 p.p.
    - ▶ AFTER CC: banks with 1 s.d. higher FX-Funds reduce loans by 3.5 p.p.

- **Robustness**
    - ▶ Time-varying coefficients → carry-trade dynamics aligned with timing of the boom
        - ★ ▶ Carry Trade over Time
        - ★ ▶ FX Issuance over Time
    - ▶ WLS, additional controls, shorter sample and alternative clustering
        - ★ ▶ Alternative Models
        - ★ ▶ Short Sample + Foreign
        - ★ ▶ Global Factors
    - ▶ Using the simple (lagged) policy rate rather than the spread
        - ★ ▶ Policy Rate
    - ▶ In a smaller sample, we show that the effect is driven by peso loans
        - ★ ▶ Peso Loan

Capital Controls and deviations from CIP `▸ CIP & Carry`

- CIP-deviations borrowed from Du and Schregher (2016) `▸ Time Series CIP`
  - ▸ Decompose 3-month sovereign spread into:
    1. CIP deviations
    2. FP (Forward Premium)

VARIABLES	(1)	(2)	(3)
		$Loan_{f,b,yq}$	
$FXFunds_{b,yq-1} * SOVspread_{yq-1} * Post_{yq}$	-184.667***		
	(50.870)		
$FXFunds_{b,yq-1} * CIP_{yq-1} * Post_{yq}$		-246.815***	-430.574***
		(66.541)	(81.650)
$FXFunds_{b,yq-1} * FP_{yq-1} * Post_{yq}$			-116.129***
			(44.903)
$FXFunds_{b,yq-1} * SOVspread_{yq-1}$	78.632***		
	(21.936)		
$FXFunds_{b,yq-1} * CIP_{yq-1}$		76.099***	132.700***
		(26.386)	(45.529)
$FXFunds_{b,yq-1} * FP_{yq-1}$			64.305**
			(25.905)
Observations	895,247	895,247	895,247
R-squared	0.886	0.886	0.886
Firm*Bank FE	Yes	Yes	Yes
Firm*Year-Quarter FE	Yes	Yes	Yes
FXFunds*MacroControls*Post	Yes	Yes	Yes
Bank Controls*(Sov. Spread Decomposition)*Post	Yes	Yes	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
							$Loan_{f,b,yq}$					
	$Risk_{f,pre}$				$ST\ Debt_{f,pre}$				$Default_{f,pre}$		$Supervised_{f,pre}$	
	Q=1	Q=2	Q=3	Q=4	Q=1	Q=2	Q=3	Q=4	No	Yes	Yes	No
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1} * Post_{yq}$	-94.897	-189.267*	-375.565***	-577.257***	-39.874	-430.129***	-257.162**	-342.661***	-233.226***	-374.137***	-175.004	-337.660***
	(126.913)	(98.445)	(108.555)	(122.708)	(117.157)	(111.560)	(103.053)	(119.001)	(70.705)	(97.968)	(108.069)	(67.337)
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1}$	-31.842	152.189***	322.070***	279.582***	-14.109	168.322***	154.613***	240.740***	111.753***	194.653***	194.357***	124.372***
	(56.991)	(48.387)	(53.652)	(67.529)	(56.007)	(52.554)	(50.298)	(60.923)	(35.249)	(46.441)	(52.406)	(32.643)
Observations	227,958	254,448	224,183	180,684	192,729	228,879	240,231	225,434	617,034	270,840	270,253	624,994
R-squared	0.884	0.863	0.859	0.886	0.914	0.877	0.872	0.876	0.881	0.894	0.862	0.887
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FX-Funds*Macro Controls*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Year:Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls*Int. Rate*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

- Carry trade lending allocates relatively more credit to firms with:
  - Higher ex-ante debt yields ($Risk_{f,pre}$) and/or reliance on short-term debt ($ST\ Debt_{f,pre}$)
- Under CC, larger credit cuts for firms with:
  - Higher ex-ante debt yields and/or reliance on short-term debt ($ST\ Debt_{f,pre}$)
  - Previous loan defaults ($Default_{f,pre}$) and unsupervised balance sheets ($Supervised_{f,pre}$)

Reserve Requirements (RR) on Domestic Deposits

- Asset expansion requires additional bank borrowing

- Hence, stronger RR effects within banks with larger reliance on domestic deposits

- Identification follows Khwaja and Mian (2008)

$$Y_{f,b,yq} = \beta * Post * RR\ Depo_{b,2007q1} + \gamma_{f,b} + \gamma_{f,yq} + Controls + \epsilon_{f,b,yq}$$

- Firm*Year-Quarter FE $\gamma_{f,yq}$ absorb firm fundamentals (demand) shocks

- Under our hypothesis: $\beta < 0$

- Sample - 2006Q1-2008Q2: 5-quarter windows around implementation of RR

Reserve Requirements and Credit Supply: Baseline Regressions

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
				$Loan_{f,b,yq}$		
$Post * RR\,Depo_{b,2007q1}$	-1.542***	-0.994***	-1.017***	-1.048***	-0.697***	
	(0.196)	(0.181)	(0.181)	(0.160)	(0.178)	
$Post * SavingD_{b,2007q1}$						-0.419**
						(0.179)
$Post * CheckingD_{b,2007q1}$						-1.845***
						(0.281)
Observations	742,950	742,950	742,950	742,950	742,950	742,950
R-squared	0.536	0.829	0.829	0.830	0.897	0.897
Bank Controls*Post	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	-	-	-	-	-
Firm*Bank FE	No	Yes	Yes	Yes	Yes	Yes
Year:Quarter	No	No	Yes	-	-	-
Industry*Year:Quarter	No	No	No	Yes	-	-
Firm*Year:Quarter	No	No	No	No	Yes	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

- **Economic Interpretation**
  - ▶ A 1 s.d. increase in (saving + checking) deposits funding leads to a 5.4 p.p. ex-post cut
  - ▶ Stronger impact of tax on checking deposits (more short-term funding)

- **Robustness**
  - ▶ Parallel trends assumption
    - ★ ▸ Time-varying Coefficients
  - ▶ Alternative models
    - ★ ▸ Alternative Models
  - ▶ Effect survives within shorter windows around the shock
    - ★ ▸ Shorter Window
  - ▶ Placebo test: "fake" 2006q1-exposure has no effect on credit supply
    - ★ ▸ Placebo
  - ▶ Robust to employing time-varying Core-Deposits
   - ★ ▸ Time-varying Heterogeneity

RR and Risk-taking

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
							Loan					
VARIABLES		$Risk_{f,pre}$					$ST\ Debt_{f,pre}$			$Default_{f,pre}$		$Supervised_{f,pre}$
	Q=1	Q=2	Q=3	Q=4	Q=1	Q=2	Q=3	Q=4	No	Yes	Yes	No
$Post_{yq} * RR\ Depo_{b,2007q1}$	0.290	-0.667**	-1.169***	-1.978***	-0.517	-0.375	-1.083***	-0.770**	-0.680***	-0.724**	-0.066	-0.994***
	(0.378)	(0.298)	(0.362)	(0.411)	(0.414)	(0.343)	(0.326)	(0.341)	(0.216)	(0.313)	(0.327)	(0.217)
Observations	190,069	211,012	184,976	148,919	160,095	190,709	198,522	185,650	521,480	214,097	218,269	524,681
R-squared	0.894	0.880	0.873	0.894	0.921	0.890	0.885	0.888	0.892	0.906	0.877	0.897
Bank Controls*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Year:Quarter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

- Larger cuts induced by RR on domestic deposits for firms with:
  - Higher ex-ante debt yields ($Risk_{f,pre}$) and/or reliance on short-term debt ($ST\ Debt_{f,pre}$)
  - Unsupervised balance sheets ($Supervised_{f,pre}$)

Domestic Deposits and Foreign Funding: Complements or Substitutes?


$\rho = -.37$ ***
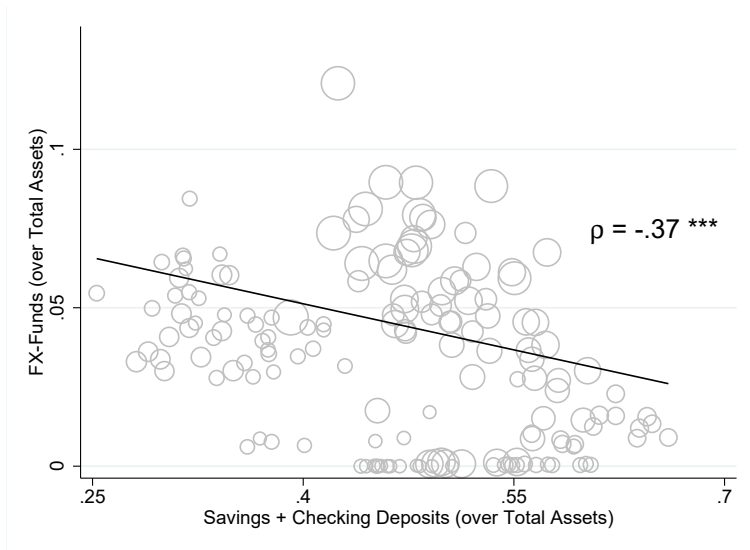
Formal Test

Conclusions

Exploit **capital controls** + **reserve requirements** + **credit registry** data

1. Capital controls enhance the bank lending channel of monetary policy

   ▶ Without capital controls, a local MP rate hike stimulates carry-trade lending

   ▶ Capital controls break the carry-trade by making FX-borrowing more costly

   ▶ Capital controls reduce banks' risk

      ★ Discourage flighty banks' FX-funding
      ★ Reduce risk-taking in lending through carry trade lending

2. Reserve Requirements affect credit supply directly, rather than through MP

   ▶ Increased reserve requirements also reduce risk-taking

3. Tinbergen Prudential-Rule → Both CC and RR needed to tame the credit boom

   ▶ Two targets (domestic & foreign liquidity) requires two macroprudential instruments

Credit Boom and Monetary Policy
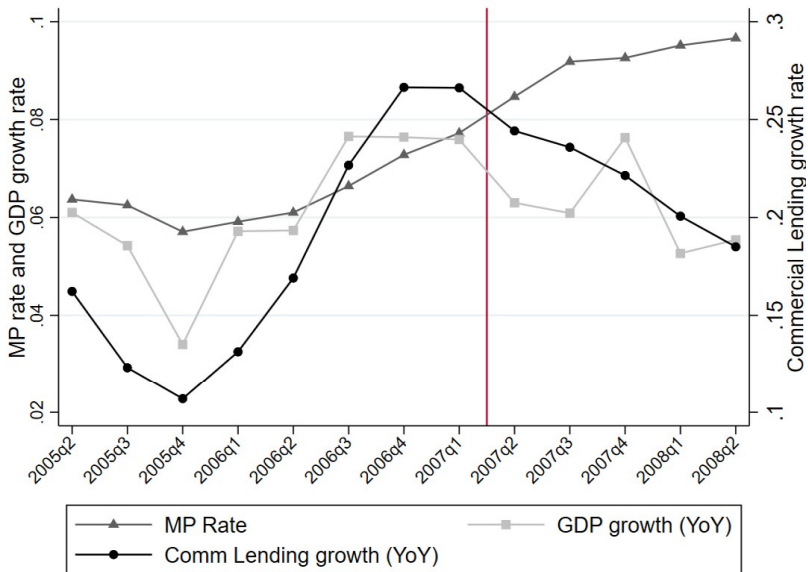
Foreign Debt Inflows
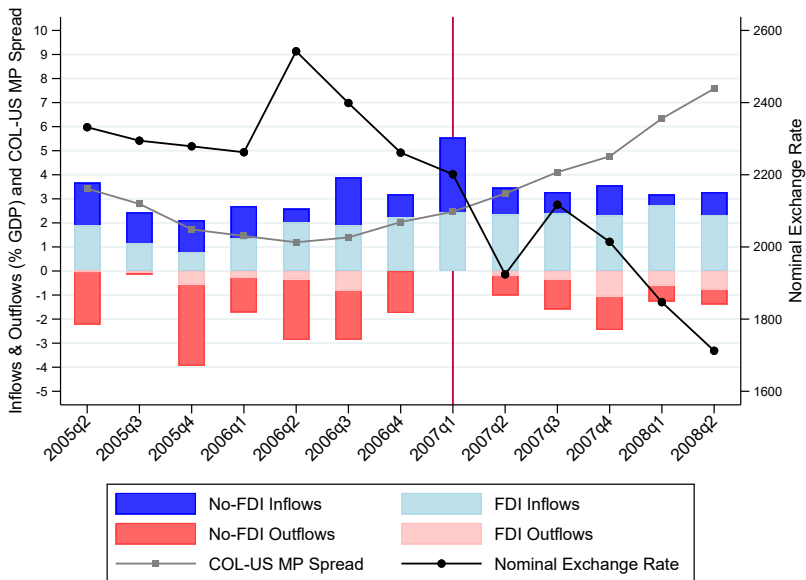
Institutional context: pre-existing FX-regulation for banks

- Banks registered in Colombia can borrow and lend in FX
- However, several limitations apply on such operations
  1. In balance sheet Net FX assets $\in [0\%, 50\%]$ of bank capital
  2. In- & Off-balance sheet Net FX assets $\in [-5\%, 20\%]$ of bank capital
  3. Positions computed over a 3-day horizon
- Colombia has a low-share of FX-assets ($\sim 10\%$) by Latin-American standards

	FX Balance of Colombian banks	
Balance Sheet	1. Assets	2. Liabilities
Off-Balance Sheet Derivatives	3. Rights	4. Obligations
Position Measures	PP = (1+3)-(2+4) $\in [-5\%, 20\%]$ of bank capital	
	PPC = 1-2 $\in [0\%, 50\%]$ of bank capital	
	$PBA \leq 500\%$ bank capital	

▸ Back

VARIABLES	(1) N	(2) Mean	(3) P25	(4) P50	(5) P75	(6) SD
Loan-level Variables						
$Loan_{f,b,yq}$	1,475,369	16.843	15.317	17.051	18.507	2.573
Macro Variables						
i_{yq-1}	1,475,369	0.075	0.062	0.073	0.092	0.014
$\Delta_{1y}GDP_{yq-1}$	1,475,369	0.062	0.054	0.061	0.076	0.013
e_{yq-1}	1,475,369	7.692	7.608	7.724	7.754	0.090
CPI_{yq-1}	1,475,369	1.077	1.041	1.067	1.117	0.049
Bank-level Variables						
$FX-Funds_{b,yq-1}$	1,475,369	0.047	0.034	0.047	0.064	0.026
$SavingD_{b,yq-1}$	1,475,369	0.353	0.303	0.348	0.400	0.073
$CheckingD_{b,yq-1}$	1,475,369	0.137	0.108	0.126	0.173	0.045
$Size_{b,yq-1}$	1,475,369	30.301	30.02	30.383	30.704	0.523
$CET_{b,yq-1}$	1,475,369	0.042	0.032	0.039	0.050	0.013
$NPL_{b,yq-1}$	1,475,369	0.027	0.020	0.024	0.029	0.010
$ROA_{b,yq-1}$	1,475,369	0.014	0.008	0.012	0.019	0.007

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				$Loan_{l,b,yq}$				
$Post_{yq} * i_{yq-1}$	-10.775***	-3.430**	-2.414***	-8.806***	-3.081**	-3.586*	-3.586***	-3.586*
	(1.499)	(1.414)	(0.692)	(1.280)	(1.225)	(1.973)	(0.798)	(1.731)
i_{yq-1}	8.027***	0.242	3.301***	6.575***	0.505	3.502***	3.502***	3.502**
	(1.495)	(1.391)	(0.452)	(1.266)	(1.199)	(0.745)	(0.815)	(1.437)
Observations	1,362,608	1,203,805	1,475,369	1,362,608	1,203,805	1,475,369	1,475,369	1,475,369
R-squared	0.842	0.853	0.844	0.851	0.861	0.832	0.832	0.832
Loan-Size Weighted	No	No	Yes	Yes	Yes	No	No	No
Macro Control*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provision	No	Yes	No	No	Yes	No	No	No
Firm*Quarter FE	Yes	Yes	No	Yes	Yes	No	No	No
Cluster						F+B	F+B+YQ	F + B*Ind + YQ

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	Dependent Variable: $Loan_{f,b,yq}$				
$MP_{yq-1} =$	$MP\ Spread_{yq-1}$	$\Delta_{2q} i_{yq-1}$	$\Delta_{1y} i_{yq-1}$	$Taylor1_{yq-1}$	$Taylor2_{yq-1}$
$Post_{yq} * MP_{yq-1}$	-3.226***	-3.442*	-3.518**	-2.874***	-3.961***
MP_{yq-1}	2.656***	3.696***	3.140***	2.050***	2.931***
	(0.402)	(0.524)	(0.430)	(0.730)	(0.639)
Observations	1,475,369	1,475,369	1,475,369	1,475,369	1,475,369
R-squared	0.832	0.832	0.832	0.832	0.832
Loan-Size Weighted	No	No	No	No	No
Macro Control*Post	Yes	Yes	Yes	Yes	Yes
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes	Yes	Yes

Standard errors are double-clustered at the Bank*Industry and at the Firm level. *** p<0.01, ** p<0.05, * p<0.1

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	(1)	(2)	(3)	(4)
VARIABLES		$Loan_{f,b,yq}$		
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1} * Post_{yq}$	-109.378***	-105.444***	-109.090***	-109.358***
	(36.838)	(36.668)	(33.361)	(37.228)
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1}$	55.557***	50.837**	53.148***	81.225***
	(21.099)	(21.018)	(17.790)	(21.185)
$FXFunds_{b,yq-1} * Post_{yq}$	-28.769	-35.367	-41.893	-9.303
	(32.990)	(32.976)	(30.034)	(35.459)
$FXFunds_{b,yq-1}$	-43.477***	-36.322***	-35.900***	-51.056***
	(13.789)	(13.718)	(12.604)	(14.946)
$Checking_{b,yq-1} * Post_{yq}$	-0.417**	-0.411**	-0.425***	-0.367**
	(0.171)	(0.173)	(0.140)	(0.162)
$Checking_{b,yq-1}$	0.003	-0.136	-0.133	-0.055
	(0.107)	(0.120)	(0.103)	(0.123)
$Saving_{b,yq-1} * Post_{yq}$	-0.705***	-0.696***	-0.715***	-0.679***
	(0.110)	(0.113)	(0.098)	(0.108)
$Saving_{b,yq-1}$	-0.066	-0.069	-0.075	-0.064
	(0.111)	(0.119)	(0.107)	(0.121)
Observations	895,247	895,247	895,247	895,247
R-squared	0.808	0.808	0.810	0.886
Firm*Bank FE	Yes	Yes	Yes	Yes
Macro Controls*Post	Yes	-	-	-
Bank Controls*Post	Yes	Yes	Yes	Yes
FXFunds*Macro Controls*Post	Yes	Yes	Yes	Yes
Year:Quarter FE	No	Yes	-	-
Industry*Year:Quarter FE	No	No	Yes	-
Firm*Year:Quarter FE	No	No	No	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

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VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					$Loan_{l,b,yq}$				
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1} * Post_{yq}$	-288.329***	-231.786***	-244.143***	-414.111***	-328.787***	-297.866***	-280.971**	-280.971**	-280.971**
	(56.723)	(51.920)	(50.517)	(45.070)	(37.933)	(36.776)	(112.997)	(126.842)	(112.734)
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1}$	156.579***	136.535***	148.287***	157.006***	146.446***	159.482***	144.609**	144.609**	144.609***
	(27.880)	(25.537)	(25.089)	(21.804)	(18.954)	(18.602)	(50.188)	(49.075)	(46.711)
$FXFunds_{b,yq-1} * Post_{yq}$	62.843*	38.665	73.801**	-86.157***	-43.921**	10.150	19.526	19.526	19.526
	(35.608)	(31.420)	(30.929)	(28.092)	(22.269)	(22.102)	(48.747)	(24.538)	(37.841)
$FXFunds_{b,yq-1}$	-69.324***	-58.978***	-68.475***	-40.601***	-40.857***	-45.649***	-58.943**	-58.943	-58.943
	(15.308)	(13.223)	(13.205)	(9.791)	(8.217)	(8.344)	(26.579)	(34.548)	(37.108)
Observations	791,322	895,247	791,322	1,475,262	1,475,262	1,302,847	895,247	895,247	895,247
R-squared	0.894	0.889	0.898	0.834	0.846	0.857	0.886	0.886	0.886
Loan-Size Weighted	No	Yes	Yes	No	Yes	Yes	No	No	No
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FX-Funds*Macro Controls*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year:Quarter FE	-	-	-	Yes	Yes	Yes	-	-	-
Firm*Year:Quarter FE	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes
Bank Controls*MP-Spread*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provision*MP-spread*Post	Yes	No	Yes	No	No	Yes	No	No	No
Sample	Multi-Bank	Multi-Bank	Multi-Bank	All	All	All	Multi-Bank	Multi-Bank	Multi-Bank
Clustering							F + B	F + B + YQ	F + B*Ind + YQ

Standard errors are double-clustered at the Bank*Industry and at the Firm level. *** p<0.01, ** p<0.05, * p<0.1

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Capital Controls and Monetary Policy: Simple Policy Rate

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
				$Loan_{f,b,yq}$		
$Post_t * i_{yq-1} * FXFunds_{b,yq-1}$		-81.450**	-73.523**	-77.064**	-83.296**	-126.016***
		(35.405)	(35.386)	(31.494)	(35.624)	(48.314)
$i_{yq-1} * FXFunds_{b,yq-1}$		39.253	31.008	33.505	61.832**	68.681**
		(25.366)	(25.343)	(21.475)	(25.547)	(33.358)
$Post_t * FXFunds_{b,yq-1}$		-7.997	-12.628	-18.946	-20.728	-5.914
		(24.695)	(24.460)	(21.806)	(24.511)	(25.108)
$FXFunds_{b,yq-1}$	-0.952***	-19.159*	-13.521	-12.200	-16.207	-19.789*
	(0.165)	(11.208)	(11.092)	(10.251)	(11.876)	(12.000)
Observations	895,247	895,247	895,247	895,247	895,247	895,247
R-squared	0.808	0.808	0.808	0.810	0.886	0.886
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	
Macro Controls*Post	Yes	Yes	-	-	-	
Bank Controls	Yes	-	-	-	-	-
Bank Controls*Post	Yes	Yes	Yes	Yes	Yes	
FX-Funds*Macro Controls*Post	Yes	Yes	Yes	Yes	Yes	
Year:Quarter FE	No	No	Yes	-	-	
Industry*Year:Quarter FE	No	No	No	Yes	-	
Firm*Year:Quarter FE	No	No	No	No	Yes	
Bank Controls*Int Rate*Post	No	No	No	No	No	

Standard errors are double-clustered at the Bank*Industry and at the Firm level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

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Capital Controls and Monetary Policy: Peso- *vs* FX-Loans

VARIABLES	(1) Peso Loan$_{f,b,yq}$	(2) FX Loan$_{f,b,yq}$	(3) $\frac{Peso\ Loan_{f,b,yq}}{Loan_{f,b,yq}}$	(4) Loan$_{f,b,yq}$
*MP Spread$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$*	-417.566***	230.785	-19.692**	-202.724**
	(113.575)	(427.576)	(8.780)	(96.183)
*MP Spread$_{yq-1}$ * FXFunds$_{b,yq-1}$*	222.817***	87.433	6.084	169.646***
	(54.926)	(157.764)	(4.440)	(46.026)
*FXFunds$_{b,yq-1}$ * Post$_{yq}$*	15.964	-430.059	-2.812	96.400
	(75.847)	(325.617)	(7.105)	(63.617)
FXFunds$_{b,yq-1}$	-149.157***	14.977	-14.486***	-97.449***
	(30.872)	(119.729)	(2.915)	(26.425)
Observations	315,692	22,686	322,775	322,775
R-squared	0.835	0.891	0.785	0.857
Firm*Bank FE	Yes	Yes	Yes	Yes
FX-Funds*Macro Controls*Post	Yes	Yes	Yes	Yes
Firm*Year:Quarter FE	Yes	Yes	Yes	Yes
Bank Controls*Int Rate*Post	Yes	Yes	Yes	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

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Capital Controls and Monetary Policy: Shorter Sample + Foreign-Owned Banks

VARIABLES	(1) (2) Shorter Sample ($\leq$ 2007q3)		(3) Carry *vs* Foreign Owned
$MP\ Spread_{y1q-1} * FXFunds_{b,yq-1} * Post_{yq}$	-1,285.925*** (151.594)		-241.104*** (60.710)
$i_{y1q-1} * FXFunds_{b,yq-1} * Post_{yq}$		-692.303*** (101.484)	
$MP\ Spread_{y1q-1} * FXFunds_{b,yq-1}$	163.892*** (28.375)		110.573*** (30.676)
$i_{y1q-1} * FXFunds_{b,yq-1}$		132.199*** (37.546)	
$MP\ Spread_{y1q-1} * Foreign_b * Post_{yq}$			-3.676** (1.528)
$MP\ Spread_{y1q-1} * Foreign_b$			3.823*** (1.421)
Observations	634,912	634,912	895,247
R-squared	0.897	0.897	0.886
Macro Control*Post	Yes	Yes	Yes
Bank FE	-	-	-
Firm*Bank FE	Yes	Yes	Yes
Bank Controls	Yes	Yes	Yes

Standard errors are double-clustered at the Bank*Industry and at the Firm level. *** p<0.01, ** p<0.05, * p<0.1

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Capital Controls and Monetary Policy: Alternative Global Facotrs

VARIABLES	(1)	(2)	(3)
		Loan$_{f,b,yq}$	
MP Spread$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$	-280.971***	-347.229***	-339.030**
	(59.067)	(92.252)	(145.969)
MP Spread$_{yq-1}$ * FXFunds$_{b,yq-1}$	144.609***	166.740***	294.263***
	(28.647)	(30.001)	(37.001)
e$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$	3.025		
	(2.651)		
e$_{yq-1}$ * FXFunds$_{b,yq-1}$	-4.190**		
	(1.658)		
vix$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$		5.868	
		(4.661)	
vix$_{yq-1}$ * FXFunds$_{b,yq-1}$		-3.476**	
		(1.456)	
oil$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$			-12.577
			(7.905)
oil$_{yq-1}$ * FXFunds$_{b,yq-1}$			8.048***
			(1.185)
Observations	895,247	895,247	895,247
R-squared	0.886	0.886	0.886
Firm*Bank FE	Yes	Yes	Yes
Bank Controls*Post	Yes	Yes	Yes
FX-Funds*Macro Controls*Post	Yes	Yes	Yes
Firm*Year:Quarter FE	Yes	Yes	Yes
Bank Controls*MP Spread$_{yq-1}$*Post	Yes	Yes	Yes
H0: e$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$ + e$_{yq-1}$ * FXFunds$_{b,yq-1}$ = 0	.59	-	-
H0: vix$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$ + vix$_{yq-1}$ * FXFunds$_{b,yq-1}$ = 0	-	.58	-
H0: oil$_{yq-1}$ * FXFunds$_{b,yq-1}$ * Post$_{yq}$ + oil$_{yq-1}$ * FXFunds$_{b,yq-1}$ = 0	-	-	.56

Standard errors are double-clustered at the Bank*Industry and at the Firm level. *** p<0.01, ** p<0.05, * p<0.1
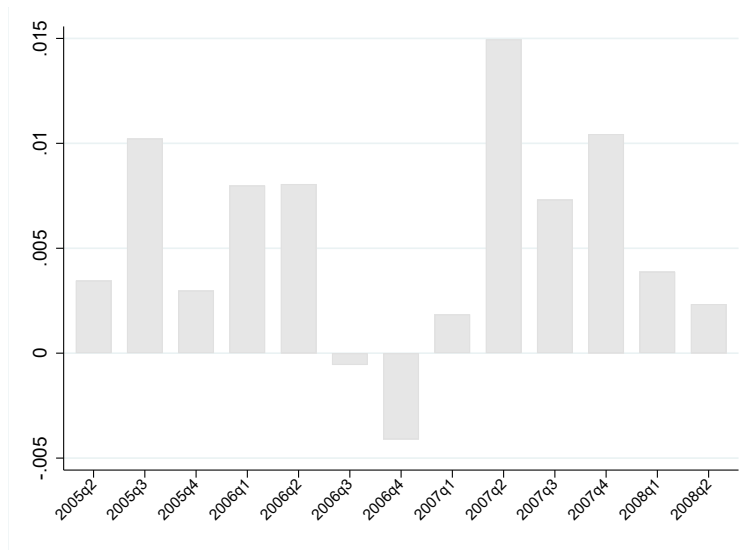
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- In a frictionless (risk-neutral) FX-market, carry-trade brings no gains:

$$(UIP): \quad 1 + i_{t+1}^{COL} = (1 + i_{t+1}^{US}) * \mathbb{E}(\frac{E_{t+1}}{E_t})$$

- Risk-aversion implies deviations from UIP. The following relation holds:

$$(CIP): \quad 1 + i_{t+1}^{COL} = (1 + i_{t+1}^{US}) * (\frac{F_t}{E_t})$$

- Frictions in the FX-market can lead to deviations from CIP
  ▸ Systematic deviations from CIP (e.g. Du et al., 2016, 2017; Borio et al, 2016)
- If UIP fails (but CIP does not), only unhedged carry-trade is profitable
  ▸ Profiting from carries requires bearing FX-risk + counterparty risk
  ▸ Banks fully hedge FX-risk under Basel rule
- When CIP fails, hedged carry-trade is profitable as well
  ▸ Profiting from carries requires bearing counterparty risk (no FX-risk!)
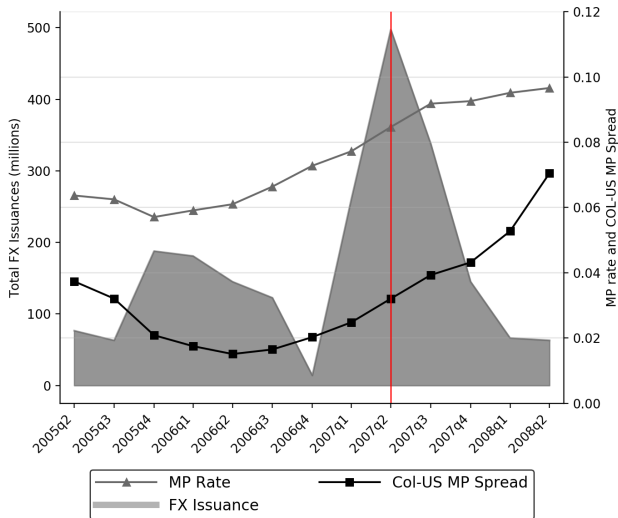
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Monetary Policy Rate and Credit: Carry Trade over Time
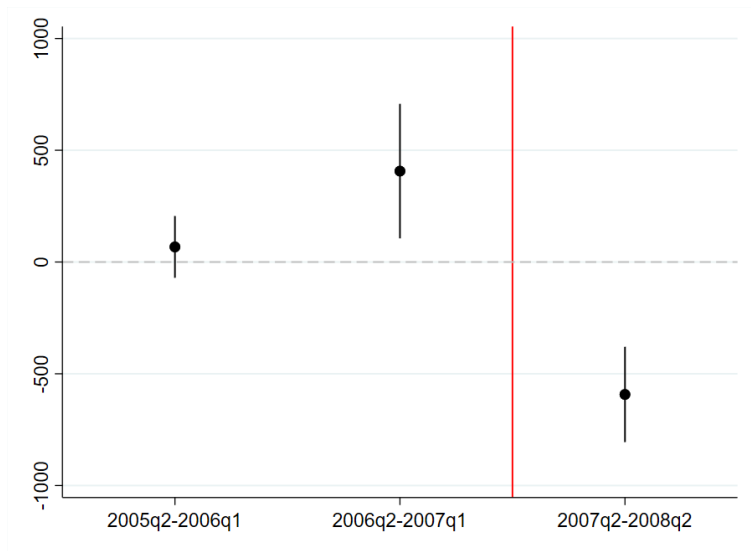
Monetary Policy Rate and Credit: FX Liabilities over Time

VARIABLES	(1)	(2)	(3)	(4)
	$Loan_{f,b,yq}$			
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1} * Post_{yq}$	-109.378***	-105.444***	-109.090***	-109.358***
	(36.838)	(36.668)	(33.361)	(37.228)
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1}$	55.557***	50.837**	53.148***	81.225***
	(21.099)	(21.018)	(17.790)	(21.185)
$FXFunds_{b,yq-1} * Post_{yq}$	-28.769	-35.367	-41.893	-9.303
	(32.990)	(32.976)	(30.034)	(35.459)
$FXFunds_{b,yq-1}$	-43.477***	-36.322***	-35.900***	-51.056***
	(13.789)	(13.718)	(12.604)	(14.946)
$Checking_{b,yq-1} * Post_{yq}$	-0.417**	-0.411**	-0.425***	-0.367**
	(0.171)	(0.173)	(0.140)	(0.162)
$Checking_{b,yq-1}$	0.003	-0.136	-0.133	-0.055
	(0.107)	(0.120)	(0.103)	(0.123)
$Saving_{b,yq-1} * Post_{yq}$	-0.705***	-0.696***	-0.715***	-0.679***
	(0.110)	(0.113)	(0.098)	(0.108)
$Saving_{b,yq-1}$	-0.066	-0.069	-0.075	-0.064
	(0.111)	(0.119)	(0.107)	(0.121)
Observations	895,247	895,247	895,247	895,247
R-squared	0.808	0.808	0.810	0.886
Firm*Bank FE	Yes	Yes	Yes	Yes
Macro Controls*Post	Yes	-	-	-
Bank Controls*Post	Yes	Yes	Yes	Yes
FXFunds*Macro Controls*Post	Yes	Yes	Yes	Yes
Year:Quarter FE	No	Yes	-	-
Industry*Year:Quarter FE	No	No	Yes	-
Firm*Year:Quarter FE	No	No	No	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

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VARIABLES	(1)	(2)	(3)	(4)
			$Loan_{f,b,yq}$	
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1} * Post_{yq}$	-109.378***	-105.444***	-109.090***	-109.358***
	(36.838)	(36.668)	(33.361)	(37.228)
$MP\ Spread_{yq-1} * FXFunds_{b,yq-1}$	55.557***	50.837**	53.148***	81.225***
	(21.099)	(21.018)	(17.790)	(21.185)
$FXFunds_{b,yq-1} * Post_{yq}$	-28.769	-35.367	-41.893	-9.303
	(32.990)	(32.976)	(30.034)	(35.459)
$FXFunds_{b,yq-1}$	-43.477***	-36.322***	-35.900***	-51.056***
	(13.789)	(13.718)	(12.604)	(14.946)
$Checking_{b,yq-1} * Post_{yq}$	-0.417**	-0.411**	-0.425***	-0.367**
	(0.171)	(0.173)	(0.140)	(0.162)
$Checking_{b,yq-1}$	0.003	-0.136	-0.133	-0.055
	(0.107)	(0.120)	(0.103)	(0.123)
$Saving_{b,yq-1} * Post_{yq}$	-0.705***	-0.696***	-0.715***	-0.679***
	(0.110)	(0.113)	(0.098)	(0.108)
$Saving_{b,yq-1}$	-0.066	-0.069	-0.075	-0.064
	(0.111)	(0.119)	(0.107)	(0.121)
Observations	895,247	895,247	895,247	895,247
R-squared	0.808	0.808	0.810	0.886
Firm*Bank FE	Yes	Yes	Yes	Yes
Macro Controls*Post	Yes	-	-	-
Bank Controls*Post	Yes	Yes	Yes	Yes
FXFunds*Macro Controls*Post	Yes	Yes	Yes	Yes
Year:Quarter FE	No	Yes	-	-
Industry*Year:Quarter FE	No	No	Yes	-
Firm*Year:Quarter FE	No	No	No	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

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VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	$\Delta Loan_{2007q2}$		$\Delta Loan_{2007q3}$		$\Delta Loan_{2007q4}$		$\Delta Loan_{2008q1}$		$\Delta Loan_{2008q2}$	
$RR\ Depo_{b,2007q1}$	-0.285**		-0.673***		-1.042***		-0.778***		-0.842***	
	(0.134)		(0.169)		(0.207)		(0.219)		(0.242)	
$Saving_{b,2007q1}$		-0.181		-0.548***		-0.870***		-0.458**		-0.498**
		(0.133)		(0.169)		(0.209)		(0.222)		(0.246)
$Checking_{b,2007q1}$		-0.738***		-1.222***		-1.794***		-2.158***		-2.302***
		(0.214)		(0.274)		(0.326)		(0.347)		(0.367)
Observations	66,758	66,758	63,993	63,993	60,865	60,865	58,921	58,921	57,199	57,199
R-squared	0.378	0.378	0.393	0.394	0.405	0.405	0.414	0.414	0.425	0.426
Bank Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1

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Reserve Requirements and Credit Supply: Placebo Test

- Sample: 2005q1-2006q4
- Fake exposure as of 2005q4, $\tilde{Post}_t$=1 if year=2006

	(1)	(2)
VARIABLES		$Loan_{f,b,yq}$
$\tilde{Post}_t * RR\ Depo_{b,2005q4}$	0.368	
	(0.256)	
$\tilde{Post}_t * Saving_{b,2005q4}$		0.800***
		(0.299)
$\tilde{Post}_t * Checking_{b,2005q4}$		0.313
		(0.255)
Observations	486,201	486,201
R-squared	0.903	0.903
Bank Controls*Post	Yes	Yes
Firm*Bank	Yes	Yes
Firm*Year:Quarter	Yes	Yes

S.e. are clustered at the Firm and Bank*Industry level. *** p<0.01, ** p<0.05, * p<0.1
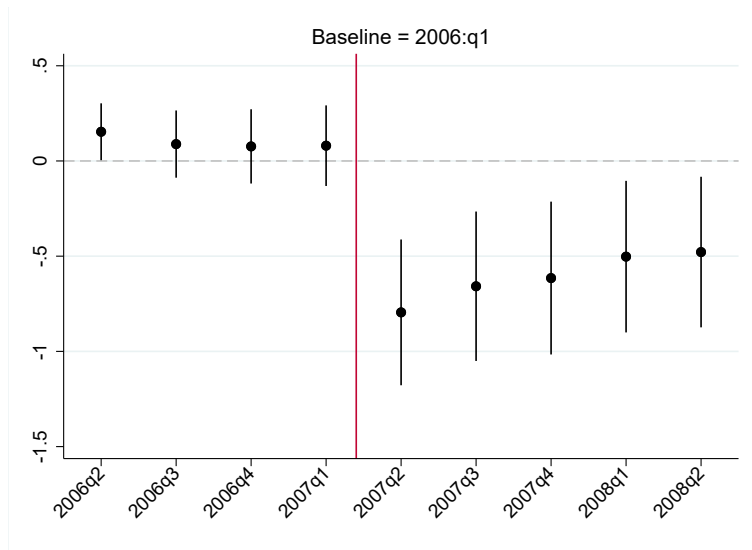
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Reserve Requirements and Credit Supply: Alternative Models

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
					$Loan_{f,b,yq}$				
$Post_{yq} * RR\ Depo_{b,2007q1}$	-0.675***	-0.647***	-0.612***	-0.844***	-0.871***	-0.994***	-0.697˙	-0.697*	-0.697**
Observations	640,136	742,950	640,136	1,219,366	1,219,366	1,049,099	742,950	742,950	742,950
R-squared	0.908	0.900	0.911	0.851	0.862	0.877	0.897	0.897	0.897
Loan-Size Weighted	No	Yes	Yes	No	Yes	Yes	No	No	No
Firm*Bank FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FX-Funds*Macro Controls*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year:Quarter	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-
Firm*Year:Quarter	No	No	No	No	No	No	Yes	Yes	Yes
Bank Controls*Int Rate*Post	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provision*MP-spread*Post	Yes	No	Yes	No	No	Yes	No	No	No
Provision*Post	Yes	No	Yes	No	No	Yes	No	No	No

Standard errors are double-clustered at the Bank*Industry and at the Firm level. *** p<0.01, ** p<0.05, * p<0.1

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Reserve Requirements and Credit Supply: Parallel Trends

Baseline = 2006:q1

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