

Are capital controls effective at reestablishing monetary policy independence? Evidence from Colombia

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Motivation

- Large capital flows in international banking make the **conduction of local MP** more difficult (Borio and Zhu, 2008; Gertler and Karadi, 2015)
- International monetary policy (IMP) shocks from financial centers are transmitted to other countries **irrespective of their exchange rate regime** (Rey, 2018).
 - IMP shocks have been found to **affect bank lending in EMEs**: Forbes, (2008) (Chile); Barroso et al., (2013) (Brazil); Morais, Peydro and Ruiz, *forthcoming* (Mexico).
- **However, there is no evidence of the impact of IMP shocks on bank lending in Colombia**
- **Colombia** imposed capital controls during 2007:Q2 to 2008:Q4 to limit credit growth and capital inflows:
 - External reserve requirements: 40% of the foreign loan amount for 6 months.
 - Deposit on portfolio investment: 40% of the investment (increased to 50% in May 2008).
 - Leverage cap on banks' foreign currency derivative positions: The sum of assets and liabilities in foreign currency cannot exceed 5 times the bank' capital equity.
 - Capital controls were successful in **reducing external borrowing** (Clements and Kamil, 2009) and keeping higher interest rate differentials to the US (Baba and Kokenyne, 2011)
 - EMEs have imposed **capital controls** to tilt the composition of flows toward less risky liabilities (Magud, et al, 2011; Ostry et al., 2012; Bruno and Shin, 2014).
- **An open question is whether capital controls can mitigate the effects of IMP shocks on small open emerging economies.**

After a credit boom (2005q1-2006q3), the Colombian Authorities imposed capital controls (2007q2-2008q4), then the real effects from the GFC were observed (2009)...

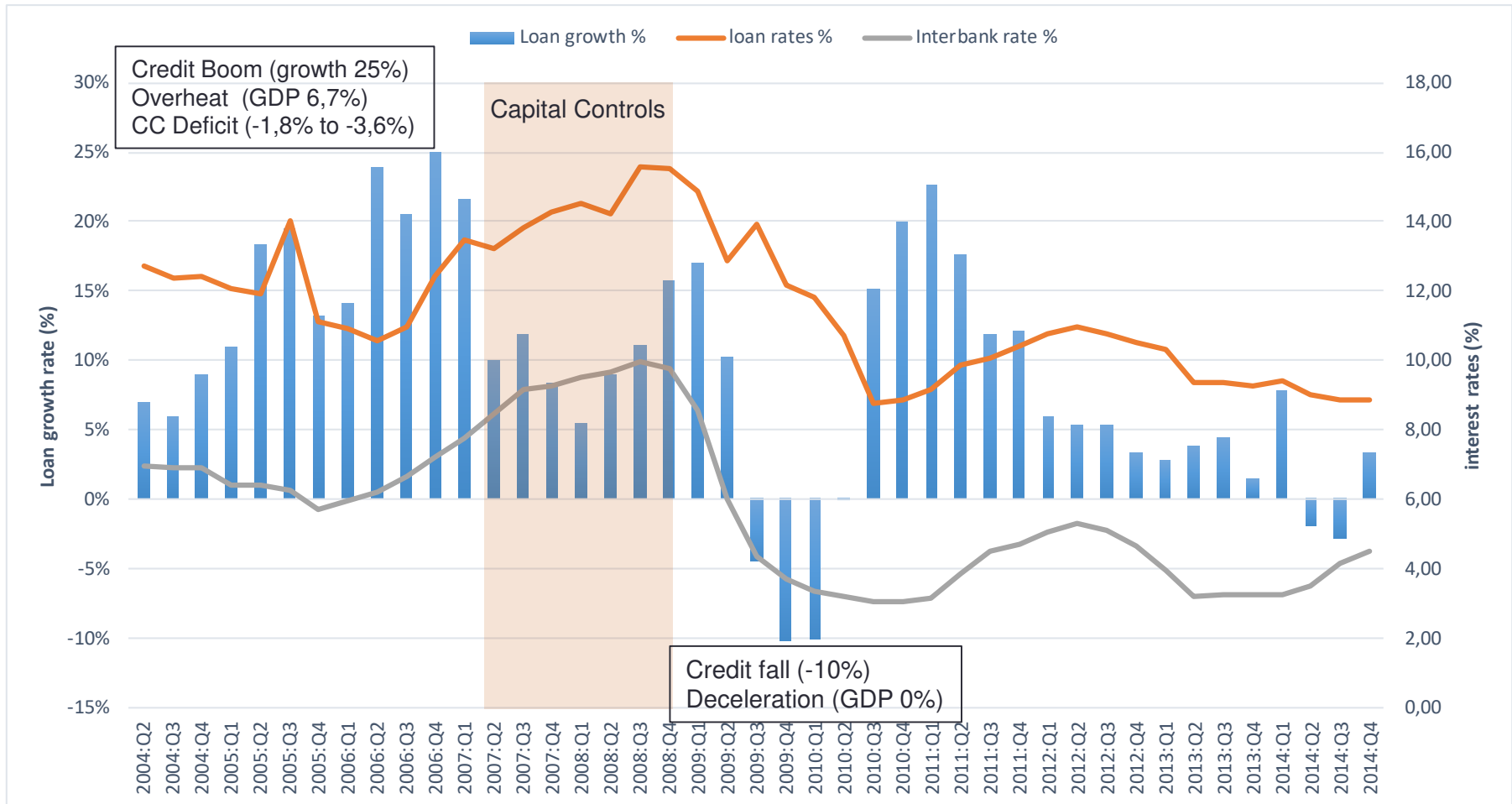


Figure 1. Corporate credit growth and interest rates in Colombia (2004-2014).

Notes: Real annual loan growth rate (in %); median corporate loan rates (in %) and overnight interbank rate (in %).

In this paper we focus on:

- How changes in international monetary policy (IMP) affect bank lending in emerging markets?
- Can capital controls mitigate the impact of IMP shocks on emerging markets?

What we do?

- This paper analyses the effects of foreign monetary policy actions on bank lending, using loan-bank-firm-level data from Colombia
 - We use loan-level data from *Superintendencia Financiera de Colombia (SFC)* (Colombia's credit registry database) covering the period 2004:Q2 to 2014:Q4
 - We use of corporate loans and distinguish between disbursements and stock of loans and among loans in local and foreign currency.
 - The data includes the universe of corporate loans granted by 27 banks (from which 7 are foreign owned from US and Eurozone) to 186.000 firms.
- We study the period 2004-2014, a period in which Colombia temporarily imposed capital controls between 2007:Q2 and 2008:Q4.
- We use this event to understand how capital controls may affect the transmission domestic and IMP shocks to small open emerging market economies.
- **First paper to assess the effect of capital controls on the transmission of monetary policy (domestic and foreign) using microeconomic data.**

Empirical specification

- Our empirical identification in **(1)** follows Morais, Peydro, and Ruiz *forthcoming*.
- In **(2)** we extend the model to test whether capital controls (CC) mitigate the impact of IMP shocks on credit conditions.
- The baseline specifications use **bank-firm** level data ($y_{i,b,t}$) and include bank-firm fixed effects to control for bank-firm relationship specific-characteristics:
- We test our results using **firm** level data ($y_{i,t}$) and include firm fixed effects to control for unobserved firm specific-characteristics:

$$y_{i,b,t} = \rho + \sum_{\text{country}} [\alpha_{\text{country}} MPshock - \text{country}_t] + X_{i,t} + \theta_{i,b} + \varepsilon_{i,b,t} \quad (1)$$

$$y_{i,b,t} = \sum_{\text{period}} \text{period}_j + \sum_{\text{period}} \sum_{\text{country}} [\alpha_{\text{country,period}} MPshock - \text{country}_t * \text{period}_t] + X_{i,t} + \theta_{i,b} + \varepsilon_{i,b,t} \quad (2)$$

Variables:

- Y_{ibt} : credit outcome y of firm i with bank b in quarter t . log(loan volume), loan rate, loan collateral and log(maturity).
- **MP Shock_country_t**: Monetary policy shocks in the US, EA or in Colombia. We use E.A. and U.S. shadow rates following Wu-Xia (2016), and residuals of the interbank rate over inflation and GDP for Colombia.
- **Period**: normal times (2004:Q2-2007:Q1 and 2009:Q1-2014:Q4) and **during capital controls (2007:Q2-2008:Q4)**
- X_{it} : control variables: inflation, GDP growth, credit to GDP gap, in US, EA and Colombia (Taylor-rule MP dynamics), US VIX, and EMBI-Latam (risk factors), some time-varying firm characteristics (size, importer, exporter, credit risk), and time dummies in 2008 and 2009, to control for the GFC and the economy deceleration in Colombia, respectively.

Table 1. Impact of local MP shocks on corporate *loan rates* and loan volume in Colombia (*bank-firm-level*)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.478 (0.166)***	0.598 (0.144)***	-0.501 (0.310)	-0.029 (0.018)	-0.033 (0.019)	-0.039 (0.032)
R^2	0.68	0.69	0.61	0.78	0.78	0.80
N	372,096	329,322	41,320	372,096	329,322	41,320
Bank-Firm FE	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	Local	Foreign

Notes: This table presents results of OLS estimates using *bank-firm* level specifications (1) and (2) over the the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume (log of million COP). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. Control variables include: inflation and GDP growth in EA and Colombia, EMBI-Latam and some time-varying firm characteristics (importer, exporter, size, credit risk). We include time dummies for the years 2008 and 2009 to control for the GFC and the economy deceleration in Colombia, respectively. Bank-firm fixed effects are include in all specifications. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2. Impact of Eurozone MP shocks on corporate *loan rates* and *loan volume* in Colombia (*bank-firm-level*)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.568 (0.114)***	0.672 (0.102)***	-0.305 (0.238)	-0.034 (0.018)*	-0.041 (0.019)**	-0.024 (0.034)
E.A. shadow rate	0.483 (0.123)***	0.417 (0.100)***	0.827 (0.310)**	-0.032 (0.013)**	-0.043 (0.015)**	0.061 (0.042)
R^2	0.68	0.69	0.61	0.78	0.78	0.80
N	372,096	329,322	41,320	372,096	329,322	41,320
Bank-Firm FE	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	Local	Foreign

Table 3. Impact of United States MP shocks on corporate *loan rates* and *loan volume* in Colombia (*bank-firm-level*)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.521 (0.134)***	0.636 (0.113)***	-0.433 (0.277)	-0.033 (0.017)*	-0.037 (0.019)*	-0.039 (0.031)
U.S. shadow rate	0.452 (0.200)**	0.424 (0.165)**	0.618 (0.460)	-0.043 (0.022)*	-0.049 (0.027)*	-0.006 (0.050)
R^2	0.68	0.69	0.61	0.78	0.78	0.80
N	372,096	329,322	41,320	372,096	329,322	41,320
Bank-Firm FE	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	Local	Foreign

Notes: Table 2 and Table 3 presents results of OLS estimates using *bank-firm* level specifications (1) and (2) over the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume (log of million COP). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA shadow rate and U.S. shadow rate are computed following Wu-Xia (2016). Control variables include: inflation and GDP growth in EA, US and Colombia, EMBI-Latam, US VIX and some time-varying firm characteristics (importer, exporter, size, credit risk). We include time dummies for the years 2008 and 2009 to control for the GFC and the economy deceleration in Colombia, respectively. Bank-firm fixed effects are included in all specifications. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Higher effect of local MP during capital controls and no effect of Eurozone MP is observed...

Table 4. Impact of *Eurozone* MP shocks on corporate *loan rates* and loan volume in Colombia (*bank-firm-level*)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Colombia monetary shock - capital controls	0.931 (0.183)***	0.949 (0.166)***	1.345 (0.439)***	-0.064 (0.026)**	-0.068 (0.027)**	-0.029 (0.064)
Colombia monetary shock - normal times	0.482 (0.107)***	0.660 (0.091)***	-0.744 (0.269)***	-0.007 (0.016)	-0.013 (0.016)	0.021 (0.030)
E.A. shadow rate - capital controls	0.181 (0.471)	0.033 (0.395)	0.259 (0.998)	-0.009 (0.045)	-0.029 (0.047)	0.193 (0.117)
E.A. shadow rate - normal times	0.523 (0.137)***	0.428 (0.113)***	1.043 (0.351)***	-0.028 (0.014)*	-0.037 (0.016)**	0.054 (0.040)
R^2	0.67	0.67	0.63	0.77	0.76	0.78
N	479,267	425,812	51,020	479,267	425,812	51,020
Bank-Firm FE	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	Local	Foreign

Notes: This table presents results of OLS estimates using *bank-firm* level specifications (1) and (2) over the the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume (log of million COP). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA shadow rate is computed following Wu-Xia (2016). Control variables include: inflation and GDP growth in EA, and Colombia, EMBI-Latam, and some time-varying firm characteristics (importer, exporter, size, credit risk). We include time dummies for the years 2008 and 2009 to control for the GFC and the economy deceleration in Colombia, respectively. Bank-firm fixed effects are include in all specifications. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

A significant pass-through of *United States* MP shocks to corporate loan rates...and also over loan volume

Table 5. Impact of *United States* MP shocks on corporate loan rates and loan volume in Colombia (*bank-firm-level*)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Colombia monetary shock - capital controls	0.939 (0.216)***	0.908 (0.209)***	1.638 (0.424)***	-0.056 (0.025)**	-0.063 (0.026)**	-0.002 (0.065)
Colombia monetary shock - normal times	0.662 (0.121)***	0.775 (0.108)***	-0.244 (0.260)	-0.013 (0.017)	-0.019 (0.017)	0.009 (0.035)
U.S. shadow rate - capital controls	-0.555 (0.130)***	-0.394 (0.127)***	-1.422 (0.235)***	0.026 (0.019)	0.030 (0.019)	0.003 (0.042)
U.S. shadow rate - normal times	0.539 (0.153)***	0.426 (0.133)***	0.933 (0.384)**	-0.038 (0.020)*	-0.046 (0.024)*	0.028 (0.043)
R^2	0.67	0.67	0.63	0.77	0.76	0.78
N	479,267	425,812	51,020	479,267	425,812	51,020
Bank-Firm FE	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	Local	Foreign

Notes: This table presents results of OLS estimates using *bank-firm* level specifications (1) and (2) over the the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume (log of million COP). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is computed following Wu-Xia (2016). Control variables include: inflation and GDP growth in U.S. and Colombia, EMBI-Latam, US_VIX and some time-varying firm characteristics (importer, exporter, size, credit risk). We include time dummies for the years 2008 and 2009 to control for the GFC and the economy deceleration in Colombia, respectively. Bank-firm fixed effects are include in all specifications. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Main findings:

- We identify that IMP shocks from United States and Eurozone affect lending conditions to Colombian firms.
 - We find a significant **pass-through of IMP shocks** to corporate loan rates and loan volume, and some effects on loan maturity and collateral.
 - Foreign banks react more to Eurozone MP shocks compared to local banks, while the opposite is found for US MP shocks.
- During capital controls, local monetary policy was **more effective** in increasing loan rates and reducing loan growth, especially for domestic banks.
- After capital controls were lifted, the effect of local monetary policy on bank lending weakened while the effect of foreign monetary policy strengthened.
- Thus, our results suggest that capital controls are effective at **reestablishing monetary policy independence** and contribute to mitigate the impact of the global financial cycle.

Extensions:

- Bank heterogeneity matters? (i.e. capitalization, liquidity, credit risk exposure)
- What is the transmission channel? cross-border lending (at the bank-level) is used to gauge banks' reliance on foreign funding from US and Eurozone.
- There are real effects associated to the imposition of capital controls?