Monetary policy transmission with and without capital controls: Micro-Evidence from Colombia*

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Abstract: This paper evaluates the effect of capital controls on the transmission of domestic and international monetary policies to an emerging market. Using detailed regulatory data from Colombia, we test whether a mild form of capital controls that restricts short-term cross-border flows affects the transmission of Colombia's monetary policy and shields the Colombian economy from monetary policy shocks from the euro area and the United States. We find that, for the period in which Colombian authorities imposed capital controls (2007:Q2 to 2008:Q4), local monetary policy was more effective in controlling loan rates and loan growth, especially for domestic banks and less for banks dependent on foreign funds. After capital controls were lifted, the effect of local monetary policy on bank lending weakened while the effect of foreign monetary policies strengthened. Effects of foreign monetary policy shocks on loan conditions are greater for foreign banks and for banks that depend more on cross-border lending. Overall, our results suggest that capital controls reinforce local monetary policy independence.

Key Words: monetary policy; global financial cycle; capital controls; bank lending.
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1. Introduction

How does monetary policy transmission interact with capital controls? Large gross capital flows, in particular international banking flows, interact with the conduct of domestic monetary policy (Cetorelli and Goldberg (2012), Baskaya et al. (2017)). These flows depend on the monetary conditions from financial centers, which are drivers of the global financial cycle and are transmitted to other countries regardless of their exchange rate regimes (Rey, 2013, 2016). Recent studies show that changes in the United States and Euro area monetary policies have a significant impact on cross-border lending by global banks, consistent with the existence of an international bank lending channel (Bruno and Shin, 2015; Gräb and Zochowski, 2017; Temesvary et al., 2018; Miranda-Agrippino and Rey, 2018; Avdjiev et al., 2018; Buch et al., 2019). The lower interest rates and the large amounts of liquidity granted by central banks in advanced economies to deal with the financial crisis increased capital flows, eased financial conditions, and reduced term premia in emerging markets (Tillmann, 2016; Albagli et al, 2019). In response to global financial conditions, emerging markets have used macroprudential measures (BIS, 2019) and some have imposed capital controls to tilt the composition of flows toward less risky liabilities and to reduce financial vulnerabilities (Magud, et al., 2011; Ostry et al., 2012; Bruno and Shin, 2014; Forbes et al, 2015; Chamón and Garcia, 2016). The use of capital controls has been consistent with the view that counter-cyclical capital controls can lean against boom and busts cycles in international capital flows (Erten, Korinek and Ocampo, 2019). However, an open and important question is whether capital controls can affect the transmission of domestic and foreign monetary policies in emerging markets.

Colombia imposed prudential capital controls between 2007:Q2 and 2008:Q4 to limit credit growth and capital inflows. Namely, it implemented unremunerated reserve requirements and deposit on portfolio investment to reduce speculative foreign flows and mitigate foreign currency mismatches. Capital controls reduced external

borrowing (Clements and Kamil, 2009), mitigated the exchange rate appreciation (Rincon y Toro, 2010), and helped maintain higher interest rate differentials relative to the United States (Baba and Kokenyne, 2011). However, little is known on the effects that these capital controls had on the transmission of monetary policies.

In this paper, we examine the effect of local monetary policy and of international monetary policy (IMP) shocks from the euro area and the United States on corporate loan rates and volumes in Colombia during and outside the capital control period. We use quarterly bank-firm-loan level data for the period 2004-2014.

Our results suggest that IMP shocks from the euro are and from the United States affect lending conditions for Colombian firms. We estimate that there is a significant pass-through of IMP shocks to corporate loan rates and loan volumes when there are no major restrictions in cross-border flows (i.e., when there are no capital controls). Overall, more accommodative monetary conditions abroad increase domestic lending and reduce loan rates. The effects of IMP shocks on loan conditions are higher for loans granted by foreign banks compared to loans from domestic banks. Unlike previous studies, we use disbursements of corporate loans (instead of stock of loans) and anlayze the degree of bank dependence on cross-border lending. We find that IMP shocks affect more banks that depend more on cross-border lending. We observe that the introduction of capital controls during 2007:Q2-2008:Q4 significantly reduced the pass-through of IMP shocks to loan rates and loan volume while it strengthened the pass-through of local MP to loan rates and volumes. Hence, our results suggest that prudential capital controls are effective at reestablishing monetary policy independence, as far as the bank lending channel is concerned.

Our paper contributes to two strands of the literature. First, our paper is related to the literature on international banking and international monetary policy spillovers. We provide evidence consistent with the existing literature on the effects of IMP shocks on bank lending in emerging markets. Barroso et al. (2013) find that during the QE in the United States there was large capital inflows into the Brazilian economy, which contributed to exchange rate appreciation, stock market price increases, and a credit

boom. Baskaya et al. (2017) show that larger and more capitalized banks increase credit supply when capital inflows are higher. Morais et al. (2019) study the monetary spillovers of the U.K., U.S., and euro area monetary policies on Mexico. They find that foreign monetary policy conditions affect the supply of credit of foreign banks to Mexican firms. Each regional policy shock affects credit via their respective banks (for example, U.K. monetary policy affects credit supply in Mexico via U.K. banks). More generally, a growing array of paper studies the role of the international bank lending channel in the global financial cycle and the transmission of advanced economies monetary policy (Bruno and Shin, 2015; Gräb and Zochowski, 2017; Temesvary et al., 2018; Miranda-Agrippino and Rey, 2018; Avdjiev et al., 2018; Buch et al., 2019).
We complement these studies significantly in that we analyze the *interaction* of prudential capital controls with the transmission of local and foreign monetary policies at a granular level.

Second, our paper sheds light on the role of prudential capital controls in mitigating financial vulnerabilities in emerging markets. Episodes of high capital mobility have historically been associated with a greater incidence of financial crises (Reinhart and Rogoff, 2009) and have led to the use of capital controls (Magud, et al, 2011; Ostry et al., 2012; Korinek, 2017; Korinek and Sandri, 2016; Forbes et al, 2018). In Brazil, for instance, the tax on foreign investment in bonds contributed to the segmentation of the domestic financial market from global markets (Chamón and García, 2016) and to reduce bond (and equity) inflows to the country (Lambert et al., 2013; Forbes et al., 2016). In 2010, Korea, implemented a leverage cap on banks' foreign currency derivative positions (similar to what Colombia did) and a levy on banks' non-deposit foreign currency liabilities. These measures reduced banks' short-term foreign borrowing and improved their maturity structures (IMF, 2012; Kim, 2013) and lowered the volatility of cross-border bank flows to Korea (Bruno and Shin, 2014).[1] This suggests that prudential capital controls may increase macroeconomic stability

[1] Korea exhibited a rapid deleveraging that took place in the banking sector (both domestic and foreign) with the onset of the 2008 financial crisis. Korean banking sector saw rapid inflows in the form of short-term loan liabilities, which turned into substantial outflows once the crisis hit in September 2008

(Korinek, 2011; Farhi and Werning, 2016). We show that capital controls are effective in mitigating the transmission of IMP shocks over lending conditions in Colombia. Thus, by limiting the access of banks operating in an emerging market to cross-border borrowing, capital controls can help curb credit growth during large capital flow episodes and strengthen domestic monetary policy transmission (see Claessens, et al 2013; Korinek and Simsek. 2016; Cerutti, et al 2017; Gambacorta, et al, 2018). We however do not investigate in this paper any potential side-effects of capital controls (see Forbes (2007) for detrimental effects on small firms in Brazil and Blattner (2019) for risk transfer effects on Peru).

This paper is organized as follows. Section 2 describes the conduct of monetary policy and the use of capital controls in Colombia. Section 3 analyzes the data. Section 4 presents the analytical framework. Results are discussed in Section 5. Section 6 concludes.

2. Background on the Colombian monetary policy and the use of capital controls

Since 2000, monetary policy in Colombia has been conducted under an inflation-targeting regime with a relatively flexible exchange rate regime, and capital mobility. During the second half of the 2000s, there was a credit boom in Colombia: real annual growth rate of corporate loans rose from 11% in 2005:Q1 to 25% in 2006:Q3, with a real GDP growth of 6.7% at the end of 2006 (**Figure 1**). The excessive credit growth was associated to an increase in capital flows that caused the current account deficit to rise from 1.8% of GDP in 2006:Q2 to 3.6% in 2007:Q2 (Baskaya et al, 2017 document that Turkey had a similar experience). During this period, FDI and cross-border lending doubled, while terms of exchange improved grandy and in turn the exchange rate exhibited a rapid appreciation (**Figure 2**). This led to increased foreign exchange intervention (FXI) by the central bank of Colombia to deal with the excessive

appreciation of the exchange rate.[2] In response to the rapid credit expansion and to concerns on inflation dynamics the central bank increased the policy rate by 300 bps between 2006:Q2 and 2007:Q2.

However, the slower monetary policy transmission and the rapid credit growth accompanied by the increasing capital inflows in form of both cross-border lending and portfolio investments suggested the use of additional measures (Uribe, 2012). Monetary and fiscal authorities decided to impose a set of prudential measures including capital controls.[3] **Table 1** describes the set of capital controls implement. In May 7 of 2007, in an extraordinary session, the Board of Directors with the Minister of Finance informed the market on the imposition of a 40% external reserve requirement over foreign loans for a period of 6 months with a penalty to redeem it with anticipation.[4]. At the same time, the Ministry of Finance established a deposit of 40% on portfolio investments. In addition, the central bank limited banks exposition to currency mismatches by requiring banks to cover their funding position abroad with an asset denominated in the same currency and also imposed a limit to the bank's gross exposition in foreign currency to the bank's capital equity, namely, gross leverage position. That is the sum of debt and assets denominated in foreign currency should be less than 500% of the bank's capital equity. These measures were adopted to reduce speculative foreign flows and mitigate foreign currency mismatches (Banco de la República, 2007).[5] The rationality behind this policy response was to reduce the foreign currency mismatches of the firms and to curb capital inflows that are

[2] Financial credit to the private sector grows rapidly during a phase of large capital inflows (Uribe, 2011).
[3] The central bank also imposed a marginal reserve requirement to limit credit growth (see, Gomez et al, 2019). In July 2007, banks were required to implement a new model for loan losses provision based on expected losses rather than on incurred losses. This regulatory change was announced two years (see Morais et al, 2019).
[4] This unremunerated reserve requirement (URR) has been used in the past by the central bank during a strong surge in capital inflows (1993-2000). The URR was reduced to zero in April 2000, once the peso was let free to float (See, Villar and Rincón, 2003).
[5] Exemptions to the capital controls included any Foreign Direct Investments (FDI), initial public offerings, and loans to finance exports with a maturity of less than 12 months intermediated by Bancoldex (Banco de la República, 2007)

intermediated through the domestic banking system, which could expose the economy in a scenario of a sudden retrenchment of capital flows (Uribe, 2012).

In **Figure 2** we observe that during the capital controls period (2007q2-2008q4) cross-border lending to banks operating in Colombia remained relatively stable and that FX interventions by the central banks were less frequent and by lower amounts compared to the period before the introduction of capital controls. In **Figure 3** we observe that during the capital controls period the monetary policy rate in Colombia increased from 8.25% to 10%, while the Fed interest rates declined from 5.0% to 0.25%, a sharp decline associated with the 2008 financial crisis. The euro area policy rate remained at 4.0% until 2008q3 when the ECB initiated the expansionary monetary policy reaching in mid-2009 similar levels to those observed in the United States. The deposit on portfolio investments was increased to 50% in May of 2008 and was eliminated in October of 2008.[6] The requirement on banks' gross leverage position has been operating since May 7, 2007 onwards, in addition to other measures aimed at limiting banks' foreign currency position.[7] Because of capital flows are largely intermediated through the domestic banking system (Kaminsky and Reinhart, 1999), capital controls were a useful tool for containing excessive credit growth during periods of large capital inflows (Uribe, 2011). Prudential regulation that places limits on financial intermediaries' currency and external liquidity mismatches seems to improve the resilience of the financial system to external shocks avoiding the use of capital controls after 2010 (Uribe, 2012).

3. Data

[6] In May of 2008 FDI was required to have a minimum permanence of two years. The central bank also imposed a marginal reserve requirement that was eliminated in October 2008.

[7] Since 2001, the central bank requires to all banks operating in Colombia that the difference between all rights and obligations in foreign currency (including off-balance sheet claims) cannot exceeds 20% of the bank's capital equity. In addition to this, if the difference does not include off-balance sheet claim it cannot excess 50% of the bank's capital equity.

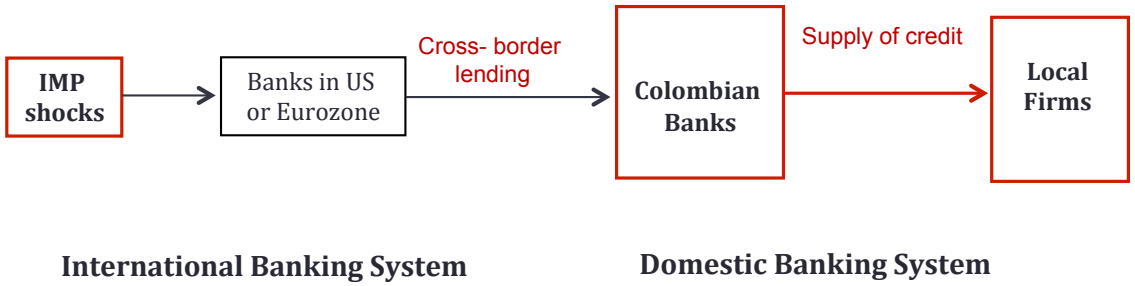
We use loan-level data from *Superintendencia Financiera de Colombia* (SFC) (Colombia's credit registry database) covering the period 2004:Q2 to 2014:Q4 (4.9 million obs.). We distinguish between disbursements and stock of loans to capture the effect of the IMP shock on loan issuances, and only use disbursements (around 0.8 million obs.) The data include the universe of corporate loans granted by 27 banks (from which 7 are from the euro area) to 123.000 firms. We drop loans issued by the main public bank, which has a different lending orientation (i.e. small farmers) and alternative sources of funding (i.e. government bonds). After cleaning the data, we have 796.955 bank-firm-quarter observations during the period 2004:Q2 to 2014:Q4.

Table 2 presents summary statistics of disbursements of corporate loans from all the banks in the sample. The average loan size in log real units 12,92, the average loan rate is 18.39%, the average maturity is 1.67 months, and the average log-collateral is 6.2. We are able to observe the lending behavior of banks that depend more on cross border lending. We use loan level data on all the cross-border loans from banks operating abroad to banks in Colombia, including loan amount, term of the loan and quota on a quarterly basis for the full period. In **Table 3** we observe that banks that rely more on cross-border lending exhibit a higher supply of credit, lower loan rate and higher maturity compared to banks with lower use of cross-border lending. We also use firm-level data from *Superintendencia de Sociedades* that includes detailed balance-sheet and PL (profit & loss) information. We compute bank-characteristics using monthly banks' balance sheet information from the SFC. We match the loan level data with bank and firm characteristics.

4. The empirical model

As shown in **Figure A1**, we want to check whether changes in the United Sataets and the Euro area MP affect more the supply of credit of banks that rely more on cross-border lending based on the international bank lending channel (Bruno and Shin, 2015; Temesvary et al., 2018; Miranda-Agrippino and Rey, 2018; Avdjiev et al., 2018; Buch et al., 2019).

Figure A1. IMP shocks, capital flows and the domestic banking system



More concretely, we are interested in identifying the impact of IMP shocks and the role of capital controls in the monetary policy transmission to corporate loans. Following Morais et al. (2019), our empirical identification in (1) relates loan outcomes to the impact of IMP shocks. In (2) we extend the model to test whether capital controls (CC) mitigate the impact of IMP shocks on credit conditions. Both specifications use firm-bank level data.

$$y_{i,b,t} = \rho + \sum_{country}\left[\alpha_{country} MPshock_country_t\right] + X_{i,t} + \theta_{i,b} + \varepsilon_{i,b,t} \quad (1)$$

$$y_{i,b,t} = \sum_{period} \rho_{period} + \sum_{period}\sum_{country}\left[\alpha_{country} MPshock_country_t * period_t\right] + X_{i,t} + \theta_{i,b} + \varepsilon_{i,b,t} \quad (2)$$

Where $y_{ibt,}$ corresponds to the credit outcome y of firm i with bank b in quarter t. We employ alternatively: loan rate (in %); loan volume in real terms (log of million COP deflated using CPII); loan collateral (share of collateral to loan amount in %) and maturity (log of loan maturity in months). The regressor $MPshock_country_t$ is the measure of monetary policy in the US, Euro area or in Colombia. We use the Wu-Xia (2016) euro area and U.S. shadow rates. These rates are able to capture the incidence

of QE programs on short-term interest rates when the policy rates are at the zero-lower bound. The QE is gauged as the share of the U.S and ECB balance-sheet to the country's GDP. X_{it} is a vector of control variables at the country level including: inflation and GDP growth in Colombia, US and United States, to capture Taylor-rule monetary policy dynamics; Colombia's GDP business cycle position, U.S. VIX and EMBI-Latam, to control for risk factors. We include some time-varying firm characteristics (size, importer, exporter, credit risk indicators) and a dummy time for the year 2009 to control for the impact of the global financial crisis on the Colombia's real growth. As noted in **Figure 1**, loan growth declined to -10% in 2009:Q3 and economic growth reached 0% in 2009. This poor performance of the Colombian economy was mainly associated to the real effects from the global financial crisis (Ahn and Sarmiento, 2019)

In (2) we employ dummy variables for the periods: capital controls (2007:Q2-2008:Q4) and normal times (2009:Q1-2014:Q4). Thus, the interaction term *MPshock-country$_t$*period* captures the effect of the capital controls on the transmission of IMP shock to loans outcomes. We use cross-border lending data to compute the credit usage variable, which is the share of cross-border debt to the quota of the bank *b* in quarter *t*. Foreign monetary policy shocks are assumed exogenous with respect to Colombia. In each specification we include bank-firm, and firm fixed effects to account for unobservable effects. We differentiate between domestic banks and foreign banks, as the latter seems to react more to IMP shocks (Morais, et al, 2019; Baskaya et at, 2017).

5. Results

Monetary policy shocks from the euro area

Our first exercise consists in estimating the impact of *local* MP shocks on corporate loan rates and loan volume using bank-firm-level data as stated in (1). The results are presented in **Table 3.** As expected, a significant pass-through of local MP shocks to corporate loan rates is observed. We identify that domestic banks react more to local

MP shocks. Then, we add to the specification MP shocks from the euro area along with the local MP shocks to test whether foreign MP has an influence on corporate lending in Colombia. The results, shown in **Table 4,** indicate that MP shocks from the euro area have a positive pass-through to corporate loan rates, suggesting that euro area monetary policy shocks influence loan conditions for Colombian firms. The impact of the IMP shocks is greater over loans granted by foreign banks compared to those granted by local banks. This can be related to the fact that from the seven foreign banks in Colombia five are from Europe. In **Table 5** we include the unconventional a measure of the unconventional monetary policy conducted by the ECB and find that it also affected corporate lending in Colombia. In particular, an expansion of the ECB's balance sheet is associated with lower loan rates and higher loan volume for Colombian firms.

Our second exercise consists in extending the model in (1) by including the interactions of the MP shocks in Colombia and the euro area with the capital controls period, as stated in Eq. (2). The results are reported in **Table 6**. We find a significant influence of Colombian MP shocks over loan rates during the capital controls period. This result indicates that capital controls reinforce the transmission mechanism of the monetary policy (Rey, 2018). We identify that the observed effects of the EA MP shocks over corporate loan rates disappear during the period of capital controls and that after capital controls are removed (normal times), they become significant. We also observe that only during the period of capital controls, local monetary policy was more able to effectively influence loan rates of corporate loans granted by foreign banks, and that after capital controls were removed, euro area monetary policy has greater influence over loans granted by foreign banks compared to those granted by local banks. Results in **Table 7** confirm that during capital controls, domestic MP is more effective in controlling loan rates and loan volumes, while the effect of foreign MP is reduced.

In **Table 8** we observe that banks that depend more on cross-border lending respond less to local MP conditions and react more to MP shocks from the euro area, consistent with the MP spillover effects to global banks operating in cross border lending markets (Bruno and Shin, 2015; Gräb and Zochowski, 2017; Temesvary et al., 2018; Avdjiev et

al., 2018; Buch et al., 2019) Interestingly, we identify that under capital controls the influence of cross border lending over banks' loan outcomes is significantly lower compared to the normal times period (**Table 9**). This is consistent with the view that macroprudential policies are more effective than interest rate policies in dealing with excessive leverage (Korinek and Simsek, 2016).

Monetary policy shocks from the United States

In this section we present the results using the Colombian and US MP shocks. We find a significant pass-through of both Colombia MP and US MP shocks to corporate loan rates and over loan volume (**Table 10**). Unlike the Euro area MP shocks, the transmission of the US MP shocks to loan condition granted by domestic banks are more important compared to those on foreign banks. This result can be related with the fact that domestic banks rely more on cross-border lending from US banks. In **Table 11** we confirm the higher transmission of US MP shocks to loan conditions for local banks, but we find also that during the QE program foreign banks are associated with higher loan volume. Our results are consistent with evidence showing that a Fed tightening is associated to a decrease in global credit creation and cross-border credit flows (Miranda-Agrippino and Rey, 2018).

In **Table 12** we observe that the influence of Colombian MP shocks over loan rates during the capital controls period is stronger compared to the normal times period, confirming our previous findings. We identify that the observed effects of the US MP shocks over corporate loan volume disappear during the period of capital controls and that after capital controls are removed (normal times), they become significant. We find a negative relation of the US monetary policy shocks with corporate loan rates during the capital controls period. This indicates that during 2007q2-2008q4 the lower the interest rate in the US the higher the interest rates for corporate loans in Colombia, reflecting that the higher interest rates differential between the US and Colombia (**Figure 3**) did not lead to higher capital inflows while increased funding costs for banks as a result of the capital controls. We find that during the period of capital controls, local

monetary policy was more able to effectively influence loan rates of corporate loans granted by both local and foreign banks, and that after capital controls were removed, US monetary policy has greater influence over loans granted by local banks compared to those granted by foreign banks. In **Table 13** we observe a positive influence of the QE in the US over loan volume granted by foreign banks.

In **Table 14** we observe that banks that depend more on cross-border are more sensitive to changes in monetary policy conditions and react more to MP shocks from the US, including the QE. This concurs with the US monetary policy spillover effects thought the cross-border lending market (Bruno and Shin, 2015; Avdjiev et al., 2018; Buch et al., 2019). In **Table 15**, We find that during the period of capital controls local monetary policy has a higher effect over loan rates compared to the normal times period, and that the access of banks to cross-border lending has no longer an impact over loan conditions, suggesting that capital controls effectively reduced banks' foreign borrowing. We also observe that the effects of the US monetary policy shocks are no longer significant during the capital controls period. Our results also indicate increased funding costs for banks that rely more on cross-border lending due to the capital controls.

Robustness

Our results are robust to the use of alternative monetary policy measures and without including U.S. banks (**Table A1**). Results of the impact of Eurozone MP shocks on corporate loans are robust to the use of firm-level data (**Table A2**) and also confirm the role of capital controls in mitigating IMP shocks (**Table A3**). We find similar results for the transmission of US MP shocks to corporate loans and the mitigating effect of capital controls (**Table A4** and **Table A5**).

6. Conclusions

In this paper we show that, similar to the existing literature, international monetary policy affects credit conditions of Colombian firms. We find that more accommodative monetary conditions in the euro area and in the United States increase lending and reduce loan rates for Colombian firms. But importantly we also find that capital controls *interact very significantly* with the transmission of domestic and foreign monetary policies in Colombia. The imposition of prudential capital controls between 2007:Q2 and 2008:Q4 seems to have mitigated the effects of euro area monetary policy shocks while strengthening the effect of local monetary policy. Those effects are heterogeneous across banks depending on their reliance in foreign funding. Capital controls were effective in limiting banks' borrowing in foreign currency, *reinforcing local monetary policy independence via the lending channel*. Whether they also created significant distortions in the real economy is a complex question that we leave for future research.

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Table 1. Capital controls imposed in Colombia (2007q2-2008q4)

Measure	Date	Goal
External reserve requirements (ERR)	May/2007 to October/2008	40% of the foreign loan amount was required to be held at the CB for 6 months otherwise to pay a penalty to redeem it with anticipation.
Deposit on portfolio investment (DPI)	May/2007 to October/2008	Deposit of 40% on portfolio investments. The DPI was increased to 50% in May 2008.
Limit to the gross derivative position in foreign currency (LDP)	Since May/2007	The sum of the bank's assets and liabilities in foreign currency cannot exceed 5 times the bank' capital equity.

Table 1. Summary statistics of corporate loans (2004-2014)

	All banks		
Variable	Obs	Mean	Std. Dev.
log (loan volume)	796955	12,93	2,13
Loan rate (%)	796955	18,39	6,28
Maturity (in months)	796955	1,76	1,88
log 1+Collateral	796955	6,20	8,22

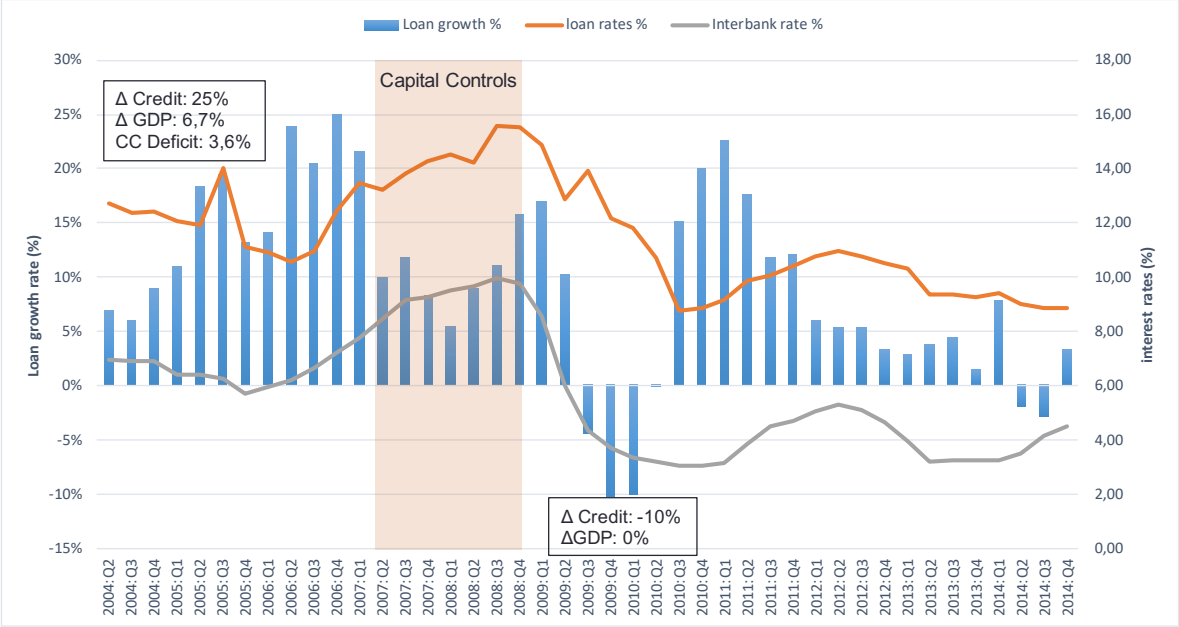
Note: The variables are computed based on loan disbursement in each bank-firm relationship for the period 2004:Q2-2014:Q4.

Table 2. Summary statistics of corporate loans by banks' use of cross border lending (2004-2014)

	Banks with *low* use of cross border lending		
Variable	Obs	Mean	St. dev.
log (loan volume)	347219	12,92	2,08
Loan rate (%)	347219	18,75	6,19
Maturity (in months)	347219	1,67	1,84
log 1+Collateral	347219	6,17	8,13
	Banks with *high* use of cross border lending		
Variable	Obs	Mean	St. dev.
log (loan volume)	371315	13,06	2,02
Loan rate (%)	371315	18,03	6,16
Maturity (in months)	371315	1,91	1,99
log 1+Collateral	371315	6,52	8,37

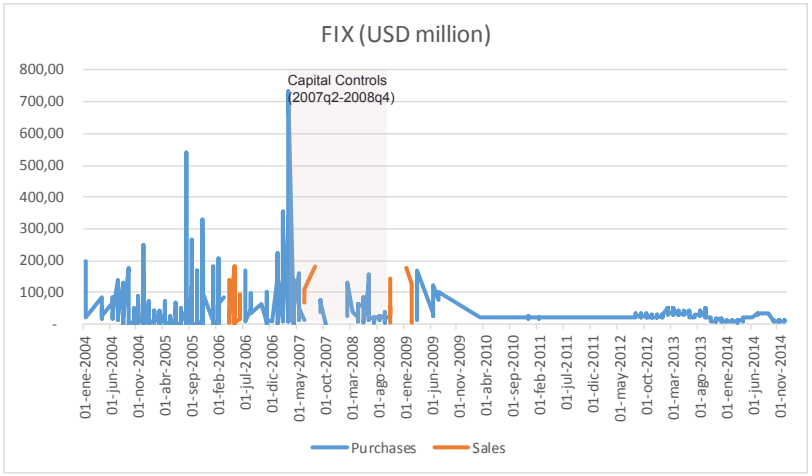
Note: The variables are computed based on loan disbursement in each bank-firm relationship for the period 2004:Q2-2014:Q4. We use credit usage as the share of cross-border debt to the quota of the bank b in quarter t. Banks below (above) the median are defined as low(high) use of cross border lending.

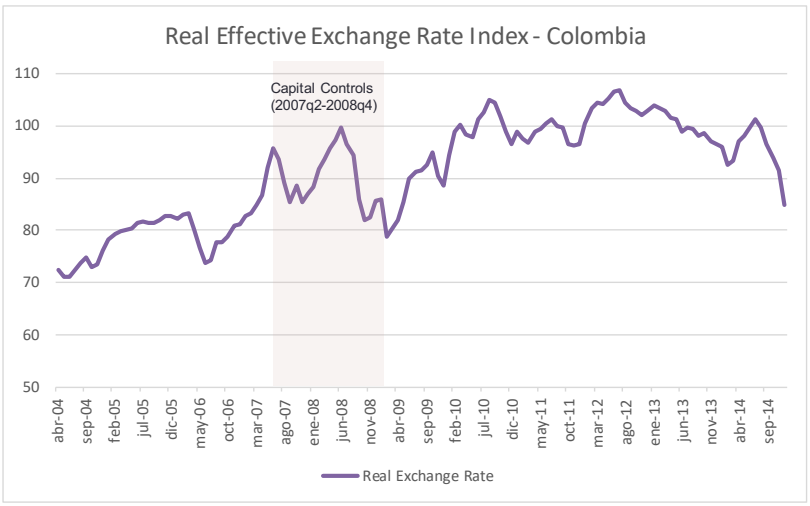
Figure 1. Corporate credit growth and loan rates in Colombia (2004-2014)

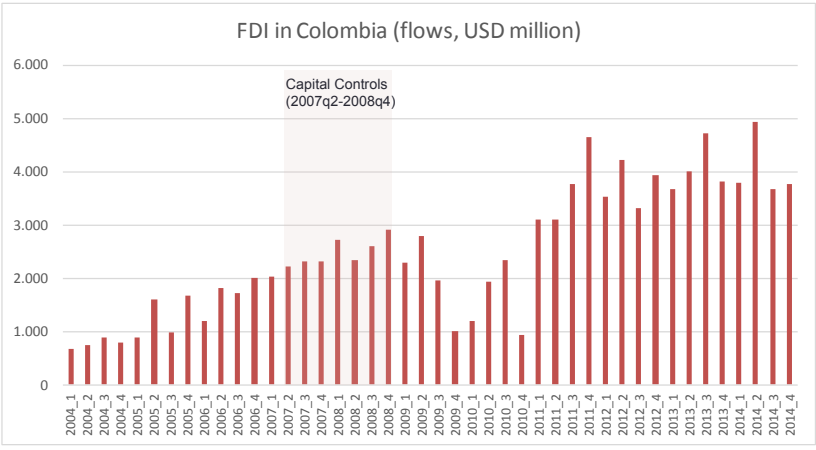


Notes: Real annual loan growth rate (in %); median corporate loan rates (in %) and overnight interbank rate (in %).

Figure 2. FXI, Exchange rate, and FDI in Colombia (2004-2014)







Notes: Data is from Banco de la República.

Figure 3. Evolution of policy rates in Eurozone, US and Colombia 2004-2014 (%)

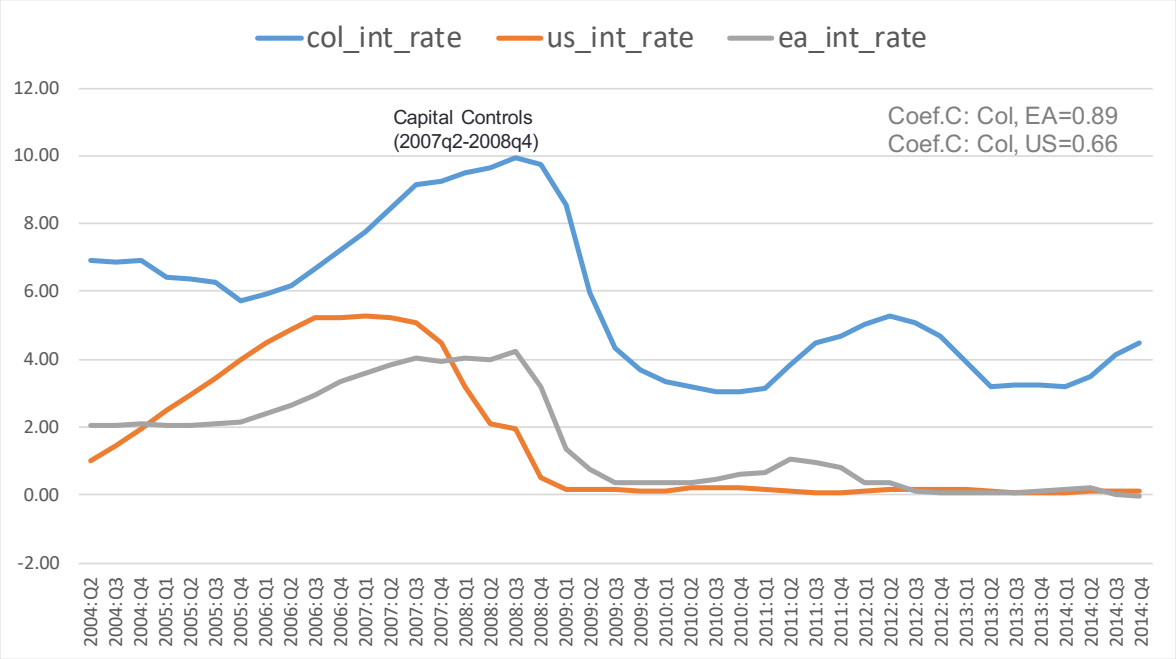


Figure 4. Cross-border lending to banks operating in Colombia 2004-2014 (USD Million)

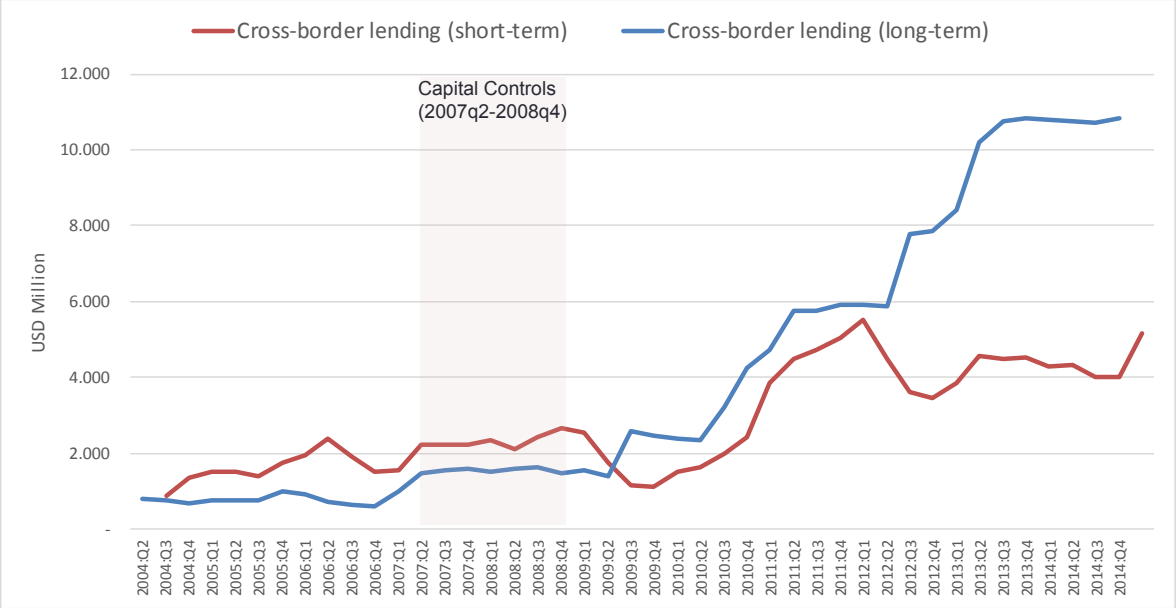


Table 3. The impact of local MP shocks on corporate loan rates and loan volume in Colombia (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.484	0.598	-0.554		-0.028	-0.033	-0.016	
	(0.167)***	(0.144)***	(0.337)		(0.018)	(0.019)	(0.036)	
Colombia monetary shock - local bank				0.638				-0.034
				(0.146)***				(0.017)*
Colombia monetary shock - foreign bank				-0.541				0.010
				(0.400)				(0.037)
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

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

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.575	0.672	-0.333		-0.034	-0.041	-0.000	
	(0.115)***	(0.102)***	(0.256)		(0.018)*	(0.019)**	(0.036)	
E.A. shadow rate	0.489	0.417	0.918		-0.032	-0.043	0.066	
	(0.123)***	(0.100)***	(0.312)***		(0.014)**	(0.015)**	(0.041)	
Colombia monetary shock - local bank				0.718				-0.042
				(0.104)***				(0.017)**
Colombia monetary shock - foreign bank				-0.346				0.032
				(0.405)				(0.038)
E.A. shadow rate - local bank				0.463				-0.037
				(0.129)***				(0.014)**
E.A. shadow rate - foreign bank				0.688				0.029
				(0.301)**				(0.032)
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. The impact of MP shocks from the euro area on corporate loan rates and loan volume in Colombia (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.656	0.741	-0.190		-0.037	-0.040	-0.031	
	(0.106)***	(0.095)***	(0.252)		(0.017)**	(0.019)*	(0.032)	
E.A. shadow rate	0.354	0.304	0.611		-0.028	-0.045	0.133	
	(0.112)***	(0.095)***	(0.310)*		(0.017)	(0.018)**	(0.046)***	
E.A. quant. easing	-6.037	-5.109	-11.870		0.185	-0.058	2.574	
	(3.101)*	(2.546)*	(8.101)		(0.498)	(0.498)	(0.894)***	
Colombia monetary shock - local bank				0.750				-0.046
				(0.092)***				(0.016)***
Colombia monetary shock - foreign bank				0.103				0.040
				(0.375)				(0.036)
E.A. shadow rate - local bank				0.301				-0.033
				(0.113)**				(0.018)*
E.A. shadow rate - foreign bank				0.512				0.033
				(0.245)**				(0.033)
E.A. quant. easing - local bank				-4.586				0.240
				(2.932)				(0.498)
E.A. quant. easing - foreign bank				-21.227				-0.201
				(4.634)***				(0.602)
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 6. The impact of MP shocks from the euro area and from Colombia with and without capital controls (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Normal times period	-0.523	-0.886	-1.882	-0.800	-0.113	-0.170	0.461	-0.113
	(1.220)	(1.064)	(3.233)	(1.210)	(0.133)	(0.127)	(0.378)	(0.133)
Colombia monetary shock - cap cont	0.978	0.949	1.671		-0.068	-0.068	-0.053	
	(0.179)***	(0.166)***	(0.501)***		(0.027)**	(0.027)**	(0.066)	
Colombia monetary shock - normal times	0.502	0.660	-0.870		-0.009	-0.013	0.019	
	(0.106)***	(0.091)***	(0.288)***		(0.016)	(0.016)	(0.033)	
E.A. shadow rate - cap cont	0.193	0.033	0.302		-0.007	-0.029	0.199	
	(0.450)	(0.395)	(1.083)		(0.046)	(0.047)	(0.120)	
E.A. shadow rate - normal times	0.524	0.428	1.143		-0.028	-0.037	0.056	
	(0.136)***	(0.113)***	(0.364)***		(0.015)*	(0.016)**	(0.039)	
Colombia monetary shock - cap cont - local bank				0.984				-0.074
				(0.179)***				(0.025)***
Colombia monetary shock - cap cont - foreign bank				1.042				0.007
				(0.302)***				(0.073)
Colombia monetary shock - normal times - local bank				0.629				-0.017
				(0.102)***				(0.016)
Colombia monetary shock - normal times - foreign bank				-0.421				0.053
				(0.392)				(0.037)
E.A. shadow rate - cap cont - local bank				0.173				-0.010
				(0.440)				(0.046)
E.A. shadow rate - cap cont - foreign bank				-0.519				0.013
				(0.476)				(0.052)
E.A. shadow rate - normal times - local bank				0.485				-0.032
				(0.142)***				(0.016)**
E.A. shadow rate - normal times - foreign bank				0.724				0.034
				(0.292)**				(0.029)
R^2	0.67	0.67	0.63	0.67	0.76	0.76	0.69	0.76
N	470,513	425,812	44,701	470,513	470,513	425,812	44,701	470,513
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. The impact of MP shocks (and QE policies) from the euro area and from Colombia with and without capital controls (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Normal times period	-0.926	-1.226	-2.584	-0.120	-0.189	0.544
	(1.169)	(1.040)	(2.959)	(0.134)	(0.130)	(0.349)
Colombia monetary shock - cap cont	1.249	1.174	2.239	-0.064	-0.056	-0.119
	(0.225)***	(0.197)***	(0.654)***	(0.028)**	(0.028)*	(0.071)
Colombia monetary shock - normal times	0.579	0.725	-0.728	-0.008	-0.010	0.002
	(0.097)***	(0.087)***	(0.264)***	(0.016)	(0.017)	(0.028)
E.A. shadow rate - cap cont	-0.534	-0.572	-1.169	-0.019	-0.062	0.371
	(0.641)	(0.543)	(1.507)	(0.058)	(0.062)	(0.125)***
E.A. shadow rate - normal times	0.348	0.285	0.696	-0.031	-0.045	0.108
	(0.140)**	(0.118)**	(0.433)	(0.018)*	(0.018)**	(0.044)**
E.A. quant. easing - normal times	-7.922	-6.552	-17.008	-0.132	-0.363	1.992
	(3.943)*	(3.182)**	(10.713)	(0.453)	(0.460)	(0.720)***
R^2	0.67	0.67	0.63	0.76	0.76	0.70
N	470,513	425,812	44,701	470,513	425,812	44,701
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 disbursements of corporate loans in local currency. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. The role of access to cross-border lending in the transmission of MP shocks from the euro area (and QE policies) and from Colombia (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Credit usage - lagged	-1.592	-1.101	-7.022	0.066	0.278	-0.069
	(0.840)*	(0.692)	(1.350)***	(0.126)	(0.156)*	(0.277)
Colombia monetary shock	0.173	0.815	-0.307	0.023	-0.019	-0.183
	(0.343)	(0.372)**	(0.531)	(0.049)	(0.047)	(0.112)
Colombia monetary shock * credit usage	0.905	0.089	1.068	-0.092	-0.047	0.312
	(0.386)**	(0.451)	(1.016)	(0.057)	(0.049)	(0.213)
E.A. shadow rate	0.535	1.071	2.119	0.039	0.025	0.201
	(0.294)*	(0.389)**	(0.514)***	(0.042)	(0.040)	(0.137)
E.A. shadow rate * credit usage	-0.402	-1.200	-2.101	-0.091	-0.088	-0.187
	(0.408)	(0.524)**	(0.983)**	(0.067)	(0.062)	(0.257)
E.A. quant. easing	-18.189	-6.973	-13.051	0.734	1.175	3.133
	(5.392)***	(4.644)	(10.945)	(0.795)	(0.787)	(2.622)
E.A. quant. easing * credit usage	17.592	4.260	6.862	-0.672	-1.638	-1.385
	(5.153)***	(4.793)	(16.853)	(0.657)	(0.735)**	(4.150)
R^2	0.67	0.69	0.58	0.75	0.76	0.69
N	325,304	291,564	33,740	325,304	291,564	33,740
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 disbursements of corporate loans in local currency. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Credit usage as the share of cross-border debt to the quota of the bank b in quarter t. Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the GFC and the economy deceleration in Colombia. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9. The role of capital controls and access to cross-border lending in the transmission of MP shocks from the euro area (and QE policies) and from Colombia (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Normal times period	1.622	1.095	25.661	0.193	0.020	-3.904
	(1.588)	(1.297)	(14.104)*	(0.272)	(0.271)	(2.126)*
Credit usage, lagged - cap control	2.006	2.244	63.946	0.478	0.452	-8.320
	(1.615)	(1.173)*	(27.680)**	(0.330)	(0.310)	(4.133)*
Credit usage, lagged - normal times	-3.052	-2.467	-5.565	0.081	0.127	-0.109
	(0.653)***	(0.646)***	(1.909)***	(0.073)	(0.091)	(0.256)
Colombia monetary shock - cap cont	1.539	1.303	2.500	-0.081	-0.081	-0.025
	(0.315)***	(0.256)***	(1.036)**	(0.056)	(0.060)	(0.179)
Colombia monetary shock * credit usage - cap cont	-0.522	-0.344	0.788	0.011	0.040	-0.272
	(0.407)	(0.342)	(2.314)	(0.098)	(0.102)	(0.555)
Colombia monetary shock - normal times	-0.066	0.505	-1.002	0.064	0.061	-0.194
	(0.310)	(0.348)	(0.658)	(0.042)	(0.040)	(0.094)**
Colombia monetary shock * credit usage - normal times	1.040	0.374	1.087	-0.110	-0.103	0.350
	(0.360)***	(0.424)	(1.231)	(0.053)**	(0.051)*	(0.195)*
E.A. shadow rate - cap cont	-0.494	-0.282	4.746	0.104	0.021	-0.622
	(0.764)	(0.605)	(3.617)	(0.091)	(0.099)	(0.497)
E.A. shadow rate * credit usage - cap cont	-0.555	-0.750	-17.658	-0.152	-0.132	1.872
	(0.456)	(0.315)**	(6.976)**	(0.094)	(0.096)	(0.947)*
E.A. shadow rate - normal times	0.370	0.751	1.280	0.050	0.036	0.259
	(0.314)	(0.394)*	(0.962)	(0.037)	(0.038)	(0.141)*
E.A. shadow rate * credit usage - normal times	-0.216	-0.850	0.388	-0.114	-0.109	-0.377
	(0.416)	(0.511)	(1.777)	(0.065)*	(0.065)	(0.269)
E.A. quant. easing - normal times	-18.142	-7.685	-13.586	0.374	0.687	4.149
	(5.642)***	(5.006)	(14.739)	(0.727)	(0.743)	(2.339)*
E.A. quant. easing * credit usage - normal times	14.526	2.902	2.929	-0.607	-1.427	-2.749
	(4.846)***	(4.672)	(22.051)	(0.617)	(0.682)**	(3.476)
R^2	0.67	0.68	0.61	0.74	0.74	0.69
N	422,327	379,469	42,858	422,327	379,469	42,858
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 disbursements of corporate loans in local currency. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Credit usage is the share of cross-border debt to the quota of the bank at each quarter. Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the GFC and the economy deceleration in Colombia. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10. The 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 rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.528	0.636	-0.470		-0.032	-0.037	-0.016	
	(0.134)***	(0.113)***	(0.291)		(0.017)*	(0.019)*	(0.034)	
U.S. shadow rate	0.463	0.424	0.756		-0.042	-0.049	-0.000	
	(0.199)**	(0.165)**	(0.462)		(0.023)*	(0.027)*	(0.052)	
Colombia monetary shock - local bank				0.675				-0.037
				(0.111)***				(0.016)**
Colombia monetary shock - foreign bank				-0.442				-0.005
				(0.381)				(0.039)
U.S. shadow rate - local bank				0.486				-0.046
				(0.194)**				(0.023)*
U.S. shadow rate - foreign bank				0.210				0.005
				(0.279)				(0.032)
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United states shadow rate from Wu-Xia (2016). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11. The impact of United States MP shocks (and QE) on corporate loan rates and loan volume in Colombia (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.537	0.643	-0.464		-0.032	-0.038	-0.004	
	(0.135)***	(0.115)***	(0.299)		(0.018)*	(0.019)*	(0.030)	
U.S. shadow rate	0.467	0.427	0.764		-0.041	-0.049	0.017	
	(0.204)**	(0.168)**	(0.483)		(0.023)*	(0.027)*	(0.044)	
U.S. quant. easing	3.172	2.371	1.935		0.103	-0.354	4.066	
	(5.797)	(4.963)	(12.873)		(0.551)	(0.583)	(1.091)***	
Colombia monetary shock - local bank				0.683				-0.039
				(0.116)***				(0.017)**
Colombia monetary shock - foreign bank				-0.434				0.020
				(0.404)				(0.034)
U.S. shadow rate - local bank				0.489				-0.046
				(0.199)**				(0.023)*
U.S. shadow rate - foreign bank				0.218				0.011
				(0.283)				(0.034)
U.S. quant. easing - local bank				2.640				-0.078
				(5.793)				(0.560)
U.S. quant. easing - foreign bank				2.691				2.250
				(8.826)				(0.895)**
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United states shadow rate from Wu-Xia (2016). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 12. The impact of United States MP shocks (and QE) on corporate loan rates and loan volume in Colombia (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock	0.537	0.643	-0.464		-0.032	-0.038	-0.004	
	(0.135)***	(0.115)***	(0.299)		(0.018)*	(0.019)*	(0.030)	
U.S. shadow rate	0.467	0.427	0.764		-0.041	-0.049	0.017	
	(0.204)**	(0.168)**	(0.483)		(0.023)*	(0.027)*	(0.044)	
U.S. quant. easing	3.172	2.371	1.935		0.103	-0.354	4.066	
	(5.797)	(4.963)	(12.873)		(0.551)	(0.583)	(1.091)***	
Colombia monetary shock - local bank				0.683				-0.039
				(0.116)***				(0.017)**
Colombia monetary shock - foreign bank				-0.434				0.020
				(0.404)				(0.034)
U.S. shadow rate - local bank				0.489				-0.046
				(0.199)**				(0.023)*
U.S. shadow rate - foreign bank				0.218				0.011
				(0.283)				(0.034)
U.S. quant. easing - local bank				2.640				-0.078
				(5.793)				(0.560)
U.S. quant. easing - foreign bank				2.691				2.250
				(8.826)				(0.895)**
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 13. The impact of United States MP shocks in Colombia with and without capital controls (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Normal times period	-1.812	-1.545	-4.408	-1.818	-0.059	-0.039	-0.209	-0.058
	(0.398)***	(0.372)***	(0.882)***	(0.389)***	(0.051)	(0.054)	(0.118)*	(0.050)
Colombia monetary shock - cap cont	0.985	0.908	1.981		-0.059	-0.063	-0.002	
	(0.218)***	(0.209)***	(0.469)***		(0.025)**	(0.026)**	(0.065)	
Colombia monetary shock - normal times	0.671	0.775	-0.293		-0.013	-0.019	0.030	
	(0.120)***	(0.108)***	(0.272)		(0.017)	(0.017)	(0.043)	
U.S. shadow rate - cap cont	-0.536	-0.394	-1.603		0.022	0.030	-0.037	
	(0.127)***	(0.127)***	(0.246)***		(0.019)	(0.019)	(0.041)	
U.S. shadow rate - normal times	0.528	0.426	1.094		-0.037	-0.046	0.031	
	(0.153)***	(0.133)***	(0.384)***		(0.021)*	(0.024)*	(0.044)	
Colombia monetary shock - cap cont - local bank				0.992				-0.060
				(0.214)***				(0.024)**
Colombia monetary shock - cap cont - foreign bank				1.050				-0.040
				(0.357)***				(0.056)
Colombia monetary shock - normal times - local bank				0.803				-0.017
				(0.110)***				(0.016)
Colombia monetary shock - normal times - foreign bank				-0.297				0.012
				(0.352)				(0.040)
U.S. shadow rate - cap cont - local bank				-0.486				0.018
				(0.122)***				(0.019)
U.S. shadow rate - cap cont - foreign bank				-1.081				0.060
				(0.145)***				(0.027)**
U.S. shadow rate - normal times - local bank				0.542				-0.040
				(0.147)***				(0.021)*
U.S. shadow rate - normal times - foreign bank				0.261				0.004
				(0.235)				(0.031)
R^2	0.67	0.67	0.63	0.67	0.76	0.76	0.69	0.76
N	470,513	425,812	44,701	470,513	470,513	425,812	44,701	470,513
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 14. The impact of United States MP shocks (and QE) in Colombia with and without capital controls (bank-firm-level)

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Normal times period	-1.945	-1.627	-4.421	-0.062	-0.022	-0.382
	(0.500)***	(0.474)***	(1.011)***	(0.055)	(0.064)	(0.131)***
Colombia monetary shock - cap cont	0.972	0.900	1.979	-0.059	-0.061	-0.028
	(0.220)***	(0.211)***	(0.484)***	(0.025)**	(0.026)**	(0.063)
Colombia monetary shock - normal times	0.671	0.775	-0.293	-0.013	-0.019	0.027
	(0.122)***	(0.110)***	(0.273)	(0.017)	(0.017)	(0.036)
U.S. shadow rate - cap cont	-0.508	-0.377	-1.601	0.023	0.027	-0.000
	(0.123)***	(0.121)***	(0.244)***	(0.019)	(0.020)	(0.035)
U.S. shadow rate - normal times	0.501	0.408	1.092	-0.037	-0.042	0.008
	(0.156)***	(0.133)***	(0.392)***	(0.022)*	(0.024)*	(0.038)
U.S. quant. easing - normal times	2.849	1.737	0.306	0.065	-0.361	4.046
	(4.850)	(4.347)	(10.568)	(0.414)	(0.464)	(0.957)***
R^2	0.67	0.67	0.63	0.76	0.76	0.70
N	470,513	425,812	44,701	470,513	425,812	44,701
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 disbursements of corporate loans in local currency. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 15. *United States* MP shocks, QE, and the role of cross-border lending

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Credit usage - lagged	-1.298	-1.899	-4.052	-0.024	0.092	0.847
	(0.873)	(0.684)**	(2.467)	(0.131)	(0.154)	(0.429)*
Colombia monetary shock	-0.377	-0.002	-0.464	-0.003	-0.043	-0.194
	(0.337)	(0.274)	(0.601)	(0.046)	(0.048)	(0.103)*
Colombia monetary shock * credit usage	1.438	1.033	0.792	-0.049	-0.010	0.328
	(0.355)***	(0.332)***	(1.088)	(0.046)	(0.047)	(0.190)*
U.S. shadow rate	-0.289	0.177	-0.262	0.092	0.095	-0.012
	(0.320)	(0.336)	(0.699)	(0.036)**	(0.046)*	(0.138)
U.S. shadow rate * credit usage	0.839	0.103	3.554	-0.174	-0.175	0.186
	(0.333)**	(0.345)	(1.239)***	(0.040)***	(0.048)***	(0.288)
U.S. quant. easing	-7.516	-22.699	-3.180	2.471	0.117	8.960
	(7.191)	(6.792)***	(13.181)	(1.064)**	(1.319)	(1.756)***
U.S. quant. easing * credit usage	21.092	38.556	81.745	-4.065	-1.415	-15.162
	(10.671)*	(9.122)***	(31.497)**	(1.360)***	(1.599)	(4.405)***
R^2	0.67	0.69	0.58	0.75	0.76	0.69
N	325,304	291,564	33,740	325,304	291,564	33,740
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 disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Credit usage is the share of cross-border debt to the quota of the bank at each quarter. Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 16. *United States* MP shocks, QE, and the role of cross-border lending under capital controls

	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume
Normal times period	0.886	1.288	-2.158	-0.288	-0.148	-1.322
	(0.837)	(0.769)	(3.325)	(0.111)**	(0.131)	(0.498)**
Credit usage, lagged - cap control	1.033	0.414	2.802	-0.345	-0.274	-1.716
	(0.991)	(0.857)	(6.323)	(0.160)**	(0.173)	(0.832)**
Credit usage, lagged - normal times	-2.709	-3.202	0.171	-0.016	-0.053	0.449
	(0.704)***	(0.644)***	(3.138)	(0.085)	(0.101)	(0.456)
Colombia monetary shock - cap cont	1.132	1.131	1.002	-0.010	-0.029	0.064
	(0.231)***	(0.206)***	(1.462)	(0.048)	(0.049)	(0.112)
Colombia monetary shock * credit usage - cap cont	0.034	-0.021	2.508	-0.146	-0.105	-0.552
	(0.445)	(0.429)	(3.390)	(0.075)*	(0.078)	(0.371)
Colombia monetary shock - normal times	-0.205	0.142	0.257	0.025	0.014	-0.261
	(0.329)	(0.287)	(0.654)	(0.044)	(0.042)	(0.090)***
Colombia monetary shock * credit usage - normal times	1.322	0.950	-1.343	-0.046	-0.042	0.469
	(0.346)***	(0.343)***	(1.296)	(0.047)	(0.043)	(0.196)**
U.S. shadow rate - cap cont	-0.137	-0.091	-0.684	-0.041	-0.035	-0.026
	(0.137)	(0.145)	(0.617)	(0.032)	(0.035)	(0.074)
U.S. shadow rate * credit usage - cap cont	-0.628	-0.482	-2.987	0.122	0.114	0.394
	(0.240)**	(0.221)**	(1.520)*	(0.030)***	(0.032)***	(0.221)*
U.S. shadow rate - normal times	-0.401	-0.135	-0.862	0.098	0.111	0.055
	(0.246)	(0.288)	(0.897)	(0.035)***	(0.040)***	(0.136)
U.S. shadow rate * credit usage - normal times	0.838	0.299	4.184	-0.174	-0.191	-0.111
	(0.257)***	(0.303)	(1.763)**	(0.037)***	(0.045)***	(0.275)
U.S. quant. easing - normal times	-9.567	-22.328	-16.440	2.065	0.151	6.459
	(7.194)	(6.448)***	(12.537)	(0.925)**	(1.085)	(1.326)***
U.S. quant. easing * credit usage - normal times	21.038	36.319	57.071	-3.235	-1.214	-10.879
	(8.438)**	(7.335)***	(35.527)	(1.340)**	(1.401)	(4.398)**
R^2	0.67	0.68	0.61	0.74	0.74	0.69
N	422,327	379,469	42,858	422,327	379,469	42,858
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 disbursements of corporate loans in local currency. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). Credit usage is the share of cross-border debt to the quota of the bank at each quarter Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Appendix

Table A1. Robustness- The transmission of Local MP with and without U.S banks

	Loan rate	Loan rate	Loan rate	Loan rate	Loan volume	Loan volume	Loan volume	Loan volume
Colombia monetary shock - no U.S. bc	0.484	0.598	-0.554		-0.028	-0.033	-0.016	
	(0.167)***	(0.144)***	(0.337)		(0.018)	(0.019)	(0.036)	
Col. mon. shock - no U.S. bc - local bank				0.614				-0.034
				(0.142)***				(0.017)*
Col. mon. shock - no U.S. bc - for. bank				-0.314				0.006
				(0.440)				(0.034)
R^2	0.68	0.69	0.61	0.68	0.77	0.78	0.69	0.77
N	364,867	329,322	35,545	364,867	364,867	329,322	35,545	364,867
Bank-Firm FE	Y	Y	Y	Y	Y	Y	Y	Y
Banks	All	Local	Foreign	All	All	Local	Foreign	All

Notes: This table 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 in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A2. Alternative specifications-The impact of *Eurozone* MP shocks on corporate l*oan rates* and loan volume in Colombia (*firm-level*)

	Loan rate	Loan rate	Loan volume	Loan volume
Colombia monetary shock	0.617	0.656	-0.050	-0.047
	(0.102)***	(0.109)***	(0.021)**	(0.024)*
E.A. shadow rate	0.459	0.392	-0.025	-0.031
	(0.120)***	(0.114)***	(0.019)	(0.024)
E.A. quant. easing		-2.974		-0.253
		(3.065)		(0.552)
R^2	0.54	0.54	0.68	0.68
N	314,070	314,070	314,070	314,070
Firm FE	Y	Y	Y	Y

Notes: This table presents results of OLS estimates using *firm-level* following eq. (1) and (2) over the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A3. Alternative specifications-. *Eurozone* MP shocks impact on Colombian corporate loans under capital controls (firm-level)

	Loan rate	Loan rate	Loan volume	Loan volume
Normal times period	-0.938	-1.208	-0.434	-0.468
	(1.345)	(1.365)	(0.159)**	(0.164)***
Colombia monetary shock - cap cont	1.144	1.329	-0.108	-0.085
	(0.195)***	(0.240)***	(0.034)***	(0.034)**
Colombia monetary shock - normal times	0.481	0.534	0.019	0.026
	(0.096)***	(0.102)***	(0.022)	(0.025)
E.A. shadow rate - cap cont	-0.014	-0.508	-0.100	-0.162
	(0.519)	(0.711)	(0.055)*	(0.081)*
E.A. shadow rate - normal times	0.506	0.385	-0.022	-0.037
	(0.137)***	(0.141)**	(0.027)	(0.029)
E.A. quant. easing - normal times		-5.412		-0.678
		(3.922)		(0.622)
R^2	0.55	0.55	0.66	0.66
N	405,773	405,773	405,773	405,773
Firm FE	Y	Y	Y	Y

Notes: These tables present results of OLS estimates using *firm-level* following eq. (1) and (2) over the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. EA_shadow rate is the Eurozone shadow rate from Wu-Xia (2016). The QE is gauged as the share of the ECB's balance-sheet to Eurozone's GDP. Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A4. The impact of *United States* MP shocks on corporate l*oan rates* and loan volume in Colombia (*firm-level*)

	Loan rate	Loan rate	Loan volume	Loan volume
Colombia monetary shock	0.568	0.587	-0.048	-0.050
	(0.131)***	(0.128)***	(0.021)**	(0.021)**
U.S. shadow rate	0.399	0.406	-0.033	-0.033
	(0.209)*	(0.213)*	(0.031)	(0.030)
U.S. quant. easing		6.204		-0.671
		(5.406)		(0.541)
R^2	0.54	0.54	0.68	0.68
N	314,070	314,070	314,070	314,070
Firm FE	Y	Y	Y	Y

Notes: These tables present results of OLS estimates using *firm-level* following eq. (1) and (2) over the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). The QE is gauged as the share of the Fed's balance-sheet to U.S GDP. Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A5. United States MP shocks impact on Colombian corporate loans under capital controls (firm-level)

	Loan rate	Loan rate	Loan volume	Loan volume
Normal times period	-1.606	-1.730	-0.079	-0.039
	(0.397)***	(0.535)***	(0.074)	(0.082)
Colombia monetary shock - cap cont	1.148	1.137	-0.134	-0.131
	(0.219)***	(0.219)***	(0.044)***	(0.042)***
Colombia monetary shock - normal times	0.659	0.660	-0.008	-0.008
	(0.117)***	(0.118)***	(0.024)	(0.025)
U.S. shadow rate - cap cont	-0.527	-0.500	0.062	0.053
	(0.123)***	(0.126)***	(0.033)*	(0.033)
U.S. shadow rate - normal times	0.458	0.432	-0.044	-0.036
	(0.159)***	(0.162)**	(0.035)	(0.033)
U.S. quant. easing - normal times		2.682		-0.875
		(5.186)		(0.560)
R^2	0.55	0.55	0.66	0.66
N	405,773	405,773	405,773	405,773
Firm FE	Y	Y	Y	Y

Notes: These tables present results of OLS estimates using *firm-level* following eq. (1) and (2) over the disbursements of corporate loans in *local currency*. Dependent variable is loan rate (in %) and loan volume in real terms (log of million COP; deflated using CPI). Colombia monetary shock is the residual of the interbank rate over inflation and GDP growth. U.S. shadow rate is the United States shadow rate from Wu-Xia (2016). The QE is gauged as the share of the Fed's balance-sheet to U.S GDP. Normal times (2009:Q1-2014:Q4) and capital controls (2007:Q2-2008:Q4). Control variables include: inflation and GDP growth in Colombia, Eurozone, and the United States; Colombia's GDP business cycle position; S&P VIX; EMBI-Latam and some time-varying firm characteristics (importer-exporter, size, credit risk indicators). We include a time dummy for the year 2009 to control for the impact of the GFC on the Colombia's real growth. Bank-firm fixed effects are included in all specifications. Double clustered standard errors at the firm and time levels in parentheses. *** p<0.01, ** p<0.05, * p<0.1.