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 policy shocks (IMP) 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 inflows is able to shield 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, with some heterogeneity across local and foreign banks. The effects of IMP shocks on loan conditions tend to be greater for loans granted by foreign banks. We also document some variations across banks depending on their dependence on cross-border lending and analyse potential costs of capital controls.

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? Monetary policies of large currency areas spill over to the rest of the world, making it more difficult for local Central Banks to set their own monetary and financial conditions (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, which is consistent with the existence of an international bank lending channel (Bruno and Shin, 2015; Avdjiev et al., 2017; Gräb and Zochowski, 2017; Temesvary et al., 2018, Morais et al., 2019; Buch et al., 2019; Avdjiev and Takáts, 2019; Bräuning and Ivashina, 2020; Acharya and Vij, 2021; Chari et al., 2021; Sarmiento, 2022). To regain some autonomy, countries can supplement their monetary policy tools by macroprudential policies or capital flow management tools. Emerging markets have been on the front line to deal with these issues as the lower interest rates and the large amounts of liquidity granted by central banks in advanced economies to deal with the financial crisis of 2008 increased capital flows, eased financial conditions, and reduced term premia (Tillmann, 2016; Albagli et al, 2019). In response to global financial conditions, emerging markets have used macroprudential measures and some have imposed capital controls to tilt the composition of flows toward less risky liabilities and to reduce financial vulnerabilities (Ostry et al., 2012; Bruno and Shin, 2014; Forbes et al, 2015; Chamón and Garcia, 2016; Magud, et al., 2018).

Several theories can motivate the imposition of capital controls on inflows. Theories based on pecuniary externalities have suggested that counter-cyclical capital controls can lean against boom and busts cycles in international capital flows (Jeanne and Korinek, Erten, et al, 2019). These pecuniary externalities, which can be redistributive or linked to the existence of a collateral induce private agents to borrow too much or take on excessive risk. Demand externalities may also be dampened by the existence of capital controls, as in Farhi and Werning (2012, 2014). Martin and Rey (2006) document that emerging economies with smaller effective market sizes (due for example to weak trade integration) and open capital accounts are more prone to destabilizing self-fulfilling demand collapses and capital flow reversals. The existence of moral hazard, via for example limited liability and government

guarantees in the banking system (as in Coimbra and Rey (2019)) or expectation of an international bail-out (Krugman 1999) also provide some theoretical rationale. Ex post controls on capital outflows in the midst of a financial crisis may also be imposed in order to limit adverse balance sheet effects. The literature makes also a useful distinction between temporary and permanent capital controls (see Klein (2012)). The IMF is developing a new integrated framework for policy advice in which financial spillovers is one of the market imperfections that a suitable set of policies may be able to address (Basu et al. (2020)). However, whether capital controls, when used, have effectively altered the transmission of domestic and foreign monetary policies in emerging economies has *not* been investigated using *granular credit data*.

This paper evaluates the effect of capital controls on the transmission of domestic and international monetary policy shocks (IMP) 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 inflows is able to shield the Colombian economy from monetary policy shocks from the euro area and the United States. Colombia imposed prudential capital controls between 2007:Q2 and 2008:Q4 to limit credit growth and capital inflows. Namely, it implemented unremunerated reserve requirements (URR) over foreign loans and portfolio investments to reduce speculative foreign flows and imposed a ceiling to banks' funding in foreign currency to mitigate foreign currency mismatches. Capital controls were successful in reducing external borrowing (Clements and Kamil, 2009), including corporate FX-debt inflows (Fabiani et al., 2021); contributed to mitigate the exchange rate appreciation (Rincon y Toro, 2010), helped maintain higher interest rate differentials relative to that of the United States (Baba and Kokenyne, 2011). Capital controls in conjunction with domestic macroprudential policy contributed to tame credit supply booms (Fabiani et al., 2022). However, little is known on the effects that these capital controls had on the transmission of the IMP shocks and on the effectiveness of local monetary policy via the credit channel.

We are particularly interested in three related questions: First, how changes in monetary policy in the euro area and the United States affect bank lending in emerging markets? Second, and more importantly, can capital controls mitigate the impact of IMP on emerging

markets and re-establish local monetary policy independence? Third, what are the side effects of capital controls in the credit market? To answer these questions, we use credit registry data on the universe of corporate loans in Colombia. We employ bank-firm-loan level data for the period 2004-2014. The detailed information at the loan level allows to control for demand effects to observe the effects of both domestic and foreign monetary policy over corporate loan conditions, and then to assess the role of capital controls in the monetary policy transmission. We can distinguish between disbursements and stock of loans to capture the effect of the IMP shock on loan issuances, and differentiate the effects of IMP shocks over loans granted by domestic and foreign banks from different currency areas. There are 27 banks in our sample, 6 are from the euro area and one is from the United States. Bank lending largely dominates market finance for firm borrowing in the Colombian economy [78%] and euro area banks have a large combined average market share of 17%, while the US bank has a market share of 2.9%. The Colombian economy is not very dollarized. Deposits are only denominated in pesos and foreign currency loans account for only about 10% of total loans.

Our results suggest that IMP shocks from the euro area and from the United States (to some extent) affect lending conditions for Colombian firms. We estimate that there is a significant pass-through of IMP shocks to corporate loan rates and some pass-through to 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. We observe that a domestic monetary policy shock of 100 bps is associated with an increase of 57 bps in corporate loan rates and a decline in corporate lending by 3.4 percentage points (pp). The effects are stronger on local banks compared to foreign banks, confirming monetary policy transmission via the traditional bank lending channel. In the case of the euro area monetary policy shock, we find that an increase of 100 bps in the euro area shadow rate is associated with an increase of 48 bps in loans rates and a decline of 3.2 pp in corporate lending. The transmission is higher on loan rates of foreign banks and for lending by local banks. For the United States monetary policy shocks, we find that an increase of 100 bps in the US shadow rate is associated with an increase of 46 bps in loans rates and a decline of 4.2 pp in corporate lending. The transmission is higher on loan rates and corporate loans of local banks, which depend more on cross border interbank

lending. Overall, we identify that the effects of IMP shocks on loan conditions are higher for loans granted by foreign banks compared to loans from domestic banks. We find that IMP shocks affect more banks that depend more on cross-border lending.

Then, 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. During the capital controls period, a typical domestic monetary policy shock of 100 bps was associated with an increase of 98 bps in loan rates and a decline of 6.8 pp in loan volume, compared to the period without capital controls. The transmission of IMP shocks over loan rates and loan volume from both euro area and the United States were also significantly reduced. The effects of capital controls over loan terms granted by banks that depend more on cross-border interbank lending were also greater compared with banks with low dependency on cross-border funding. Overall, our results suggest that prudential capital controls are effective at reestablishing monetary policy independence.

Related Literature. Our paper contributes to two strands of literature. First, we add to the evidence on the international bank lending channel in emerging markets. Barroso et al. (2013) find that during the Quantitative Easing period in the United States, large capital inflows into the Brazilian economy 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 in Turkey when capital inflows are higher. Morais et al. (2019) study the inward monetary spillovers of the U.K., U.S., and Euro area monetary policy on Mexico. They find that foreign monetary policy conditions affect the supply of credit of foreign banks to Mexican firms. Interestingly, each regional policy shock affects supply via their respective banks (for example, U.K. monetary policy affects credit supply in Mexico via U.K. banks). Global fluctuations in credit growth can be related to cross-border lending by global banks, which is consistent with the existence of an international bank lending channel with monetary policies of large currency areas -in particular the US- playing important roles (Bruno and Shin, 2015; Miranda-Agrippino and Rey, 2020; Morales et al., 2022). In line with these studies, we observe that more accommodative monetary conditions

abroad reduce loan rates and increase domestic lending, and that the effects of IMP shocks on loan conditions are higher for loans granted by foreign banks compared to loans from domestic banks. None of the existing literature however studies empirically the *interaction between international monetary policy transmission and capital controls*. This is the subject of our second and main contribution.

Our paper focuses on the role of prudential capital controls in affecting monetary transmission in emerging markets. Episodes of high capital mobility have historically been associated with a greater incidence of financial crises and have led to the adoption of temporary of capital controls (Martin and Rey, 2006; Magud, et al, 2011; Ostry et al., 2012; Korinek and Sandri, 2016; Forbes et al, 2016; Korinek, 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 and foreign investors' bond portfolio allocation to the country (Lambert et al., 2013). 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, 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 capital controls may induce private agents to internalize their externalities and thereby increase macroeconomic stability (Korinek, 2011; Farhi and Werning, 2016).

On the real effects of capital controls, Forbes (2007) showed that capital controls increased the cost of financing for smaller firms. Alfaro et al. (2017) documented that capital controls in Brazil had an adverse effect on investment, particularly for smaller firms. Fabiani et al. (2021) evaluated the real effects of the URR imposed in Colombia through a firm-debt mechanism. Using firm-level data on both FX and local debt during the period 2006-2009, they find that the URR substantially reduce FX-debt inflows, especially for more-exposed-

[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.

FX firms, and that firms with weaker local banking relationships cannot substitute FX-debt with domestic debt, thereby reducing imports. Their results, focused on a small set of firms, help us to understanding the potential effects of capital controls on FX-debt' dependent firms. More relate to our approach, Fabiani et al. (2022) exploit the simultaneous introduction of the URR and an increase of reserve requirements on domestic bank deposits in Colombia during the credit boom of 2006-2009. They show that an increase in the local monetary policy rate, raising the interest rate spread with the United States, allows more FX-indebted banks to carry trade cheap FX funds with more expensive peso lending, especially toward riskier, opaque firms, and that capital controls tax FX debt and break the carry trade. Second, the increase in reserve requirements on domestic deposits directly reduces credit supply, and more so for riskier, opaque firms, rather than enhances the transmission of monetary rates on credit supply. We show that the larger effects of capital controls were observed trough the supply of domestic credit as the capital controls increased the banks' external borrowing costs and reduced the banks' access to cross-border borrowing. This is because large capital flows are largely intermediated by the banking sector via the cross-border bank lending market. Moreover, we show that capital controls seem effective in mitigating the transmission of IMP shocks over lending conditions in an emerging market. By limiting the access of banks operating in an emerging market to cross-border borrowing, capital controls may help to reinforce the effectiveness of domestic monetary policy. Our findings on the use of capital controls to curb credit growth and strengthen monetary policy transmission also contribute to the literature on the interaction of macroprudential measures with monetary policy and financial stability (see, Claessens, et al 2013; Korinek and Simsek, 2016; Cerutti, et al 2017).

The 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. 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**). This large credit growth was associated to an increase in capital flows such that the current account deficit rose 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 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 large 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. 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 led the Central Bank to take 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 implemented. In May 7 of 2007, in an extraordinary session, the Board of Directors with the Minister of Finance informed the market of 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. This unremunerated reserve requirement (URR), which was used in the past during a strong surge in capital inflows (1993-2000), applied to both the private and public sectors.[4] The URR was extended on May

[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 before. In our analysis, when we control explicitly for the amount of reserve requirement and the loan loss provisions, results did not change. We note that these prudential regulatory changes did not change after the capital controls were lifted.
[4] The URR was reduced to zero in April 2000, once the peso was let free to float (see, Villar and Rincón, 2003). Exemptions to the capital controls included any Foreign Direct Investments (FDI), initial public

23 to portfolio inflows by foreign residents (i.e. a deposit of 40% on portfolio investments (DPI)). Investors were given the option of early withdrawals of funds from the URR, but with substantial penalties, ranging from 9.4 percent of the reserve requirement (for immediate withdrawals) to 1.6 percent (if held for 5 months). In addition, the central bank limited banks' exposition to currency mismatches by imposing a ceiling to the ratio of the banks' gross position in foreign currency to the banks' capital equity, namely, a ceiling on the gross leverage position (GLP): the sum of the bank's debt and assets denominated in foreign currency should be less than 500% of the bank's capital equity. Before this, banks were only required to cover their funding position abroad with an asset denominated in the same currency. The new measure addressed prudential concerns based on the high exposures of some banks and potential counterparty risks involved with these large positions. By restricting derivative positions, this measure also potentially affected capital flows, and helped prevent circumvention of the URR (Clements and Kamil, 2009).

The rationality behind this policy response was to reduce the foreign currency mismatches of the firms and to curb capital inflows that are intermediated through the domestic banking system, which could expose the economy in a scenario of a sudden retrenchment of capital flows (Banco de la República, 2007; Uribe, 2012). Classifying different measures between capital control measures and macro prudential measures is not easy. The URR is imposed on portfolio inflows by foreign residents so it qualifies unambiguously as a capital control measure. The ceiling on the gross leverage position fits in the category of a domestic regulation that restricts the use of a foreign currency by banks in Colombia. It is not imposed directly on a cross border transaction. But de facto it has an effect on the level of capital flows. It is in our view a hybrid between a capital control and a prudential regulation.

We observe that while between 2004q2 and 2007q2 cross-border lending increased 1,5 times, during capital controls it remained relatively stable, and after capital controls it increased 3 times, suggesting that capital controls were effective in reducing the inflow of credit to the banking sector in Colombia (**Figure 4**). FX interventions by the central bank were also less

offerings, and loans to finance exports with a maturity of less than 12 months intermediated by Bancoldex (Banco de la República, 2007).

frequent and by lower amounts compared to the period before the introduction of capital controls (**Figure 2**). This happened while the the central bank of Colombia increased the policy rate from 8.25% to 10% in order to deal with the credit boom, while the interest rates in the United Stated declined sharply from 5.0% to 0.25% in response to 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 (**Figure 3**).

In response to the financial turbulence in global markets, Colombian authorities decided to adjust the capital controls. The DPI that increased to 50% in May of 2008 was eliminated in October 2008.[5] However, 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.[6] Because 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). By increasing the cost of external short-term debt with respect to other types of capital inflows with better risk characteristics (FDI, long term debt or movements of residents' assets abroad), capital controls may potentially improve the resilience of the financial system during the external shock 2007-2008 (Vargas, 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). We now use very granular data to assess whether those policies had a measurable effect or not lending conditions in Colombia. Did the capital controls deliver?

[5] 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.

[6] 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.

3. Data

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 observations). 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 6 are from the euro area and one from the US) to 123.000 firms. Euro area banks have an average combined market share of 17%; the US bank has an average market share of 2.9%. 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). We keep loans for firms with multiple banking relationships, that borrow from short and long term. 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 is 12.92, the average loan rate is 18.39%, the average maturity is 1.67 years, 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 by computing the "credit usage" variable, which is the share of cross-border debt to the quota of the bank *b* in quarter *t*. To do so 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. 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

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 CPI); loan collateral (share of collateral to loan amount in %) and maturity (log of loan maturity in months). The regressor $MPshock\_country_t$ is a measure of monetary policy stance 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, euro area 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 time dummy for the year 2009 to control for the impact of the global financial crisis on 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 of the global financial crisis (Ahn and Sarmiento, 2019).

In (2) we employ dummy variables for the different 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 also want to test for heterogeneity in the transmission channel through the banks of different countries. We check whether changes in the United States and the euro area MP affect more the supply of credit of banks for which cross-border lending plays a more important role, using our credit usage variable. 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

5.1. 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 the estimated 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. In particular, a domestic monetary policy shock of 100 bps is associated with an increase of 57 bps in corporate loan rates and a decline in corporate lending by 3.4 percentage points (pp). The effects are stronger on local banks compared to foreign banks. This result confirms the operation of the bank lending channel of monetary policy. Then, we find that an increase of 100 bps in the euro

area shadow rate is associated with an increase of 48 bps in loans rates and a decline of 3.2 % in corporate lending. The transmission is higher on loan rates of foreign banks and over lending 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 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 higher influence of Colombian MP shocks over loan rates during the capital controls period. This result indicates that capital controls reinforce the transmission mechanism of domestic monetary policy. We identify that the observed effects of the euro area 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 able to effectively influence loan rates of corporate loans granted by foreign banks, and that when capital controls were removed, euro area monetary policy had 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. **Table 8** shows that banks depending more on cross-border lending (measured by a higher credit usage) exhibit a lower pass-through of foreign monetary policy shocks to the domestic economy: as they have less space to borrow from abroad, the impact of domestic monetary policy strengthens. Interestingly, during capital controls, the influence of cross border lending over banks' loan outcomes is significantly lower compared to the normal times period **(Table 9)**.

5.2. Monetary policy shocks from the United States

As already mentioned, Euro area banks are more important than US banks in Colombia. In this section we present the results from Eq (1) and (2) using the Colombian and United States MP shocks. We find a pass-through of both Colombia and United States MP shocks to corporate loan rates and over loan volume (**Table 10**). Unlike the euro area MP shocks, the transmission of the United States MP shocks to loan conditions via 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 (Sarmiento, 2022). More concretely, we observe that a domestic monetary policy shock of 100 bps is associated with an increase of 52 bps in corporate loan rates and a decline in corporate lending by 3.2 percentage points (pp), confirming our baseline results. The effects are stronger on local banks compared to foreign banks, confirming monetary policy transmission via the traditional bank lending channel. We find that an increase of 100 bps in the United States shadow rate is associated with an increase of 46 bps in loans rates and a decline of 4.2 % in corporate lending. The transmission is higher on loan rates and corporate loans of local banks, which depend more on cross border interbank lending. In **Table 11** we confirm the higher transmission of United Sates 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.

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 United States MP shocks over corporate loan volume disappear during the period of capital controls and that after capital controls (normal times), they become significant. A negative relation of the United Sates MP shocks with corporate loan rates during the capital controls period is observed. This indicates that during 2007q2-2008q4 the lower interest rates in the United States were associated with higher loan rates in Colombia. One conjecture is that this could reflect higher financing costs during the capital controls period. Our results confirm that, during the period of capital controls, local monetary policy had a major influence over loan rates granted by both local and foreign banks, and that after capital controls, the United States monetary policy had

greater influence over loans granted by local banks compared to those granted by foreign banks. Moreover, we also observe a positive influence of QE in the United Sates over loan volume granted by foreign banks (**Table 13**).

Table 14, like **Table 8** shows that the effect of local MP strengthens as availability of foreign credit diminishes. But the effect of US MP appears to be stronger for foreign banks as the usage of credit increases. One explanation could be that those banks have access to other sources of external financing. **Table 15** shows that during the period of capital controls local monetary policy has a higher effect over loan rates compared to normal periods and that the credit usage variable has no longer an impact over loan conditions. This could suggest that capital controls reduced banks' foreign borrowing as intended. We also observe that US MP shocks are no longer significant when there are capital controls.

5.3. 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 euro area 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

This paper shows that, like for other emerging economies, Colombia's credit conditions are affected by the monetary policies of the euro area and the United States. These international spillovers play out in a highly heterogeneous fashion across banks of different nationalities and relying differentially on international lending. 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 our main contribution is to identify the effects of capital

controls on the transmission of the monetary policies of Banco de la Republica, the US Federal Reserve and the European Central Bank on the Colombian economy. We find that the transmission channel of the policy of these three Central Banks to the Colombian economy is altered significantly when capital flows are managed. The domestic interest rate is more powerful while the effect of foreign interest rates are dampened.

References

Ahn, J. M. Sarmiento (2019). Estimating the Direct Impact of Bank Liquidity Shocks on the Real Economy: Evidence from Letter-of-Credit Import Transactions in Colombia, *Review of International Economics*, 27 (5), 1510-1536.

Aiyar, S., (2012). From financial crisis to great recession: the role of globalized banks. *American Economic Review*, 102 (3), 225–230

Albagli, E., Ceballos, L. Sebastian, C., Romero, D. (2019). Channels of US Monetary Policy Spillovers to International Bond Markets, *Journal of Financial Economics* 134 (2), 447-473.

Alfaro, L., A. Chari, and F. Kanczuk. (2017). The real effects of capital controls: Firm-level evidence from a policy experiment. *Journal of International Economics* 108: 191-210.

Avdjiev, S., Koch, C., McGuire, P., von Peter, G. (2017). International Prudential Policy Spillovers: A Global Perspective, *International Journal of Central Banking*, 13, 5-33.

Baba, C., Kokenyne, A. (2011). Effectiveness of Capital Controls in Selected Emerging Markets in the 2000s, IMF WP/11/281, Washington D.C.

Banco de la República (2007). Resolución Externa 02 de 2007 de la Junta Directiva del Banco de la República, Banco de la República, Bogotá DC.

Barroso, J, L Pereira da Silva, Sales, A. (2016): Quantitative easing and related capital flows into Brazil: measuring its effects and transmission channels through a rigorous counterfactual evaluation, *Journal of International Money and Finance* 67, 102-122.

Baskaya, Y., Giovanni, J. Özcan, S., JL. Peydró., M.F Ulu. (2017) Capital Flows and the International Credit Channel, *Journal of International Economics*, 108 (1), 15-22.

Basu, Boz, Gopinath, Roch, Unsal (2020): Integrated Monetary and Financial Policies for Small Open Economies, *IMF Working Paper*.

Bianchi, J. (2011). Overborrowing and Systemic Externalities in the Business Cycle. American Economic Review 101 (7): 3400-3426.

Benigno, G., H. Chen, C. Otrok, A. Rebucci, and E.R. Young. (2016). Capital Controls or Exchange Rate Policies? A Pecuniary Externality Perspective. Journal of Monetary Economics 84: 147-165.

Borio, C., Zhu, H. (2012). Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?, *Journal of Financial Stability*, 8(4), 236–251.

Bruno, V., and H. Shin. (2014). "Assessing Macroprudential Policies: Case of South Korea, *The Scandinavian Journal of Economics*, 116(1), 128–157.

Bruno, V., and H. Shin. (2015). "Cross-Border Banking and Global Liquidity," *Review of Economic Studies*, 82, 535-64.

Buch, C. M., Bussière, M., Goldberg, L., R. Hills. (2019). The International Transmission of Monetary Policy, *Journal of International Money and Finance*, 91, 29-48

Chamón, M., Garcia, M. (2016), Capital controls in Brazil: Effective?, *Journal of International Money and Finance*, 61, 163-187.

Clements, B., Kamil, H. (2009). Are Capital Controls Effective in the 21st Century? The Recent Experience of Colombia, IMF Working Paper No. 09/30.

Cerutti, E., Claessens, S., Laeven, L., (2017). The use and effectiveness of macroprudential policies: new evidence, *Journal of Financial Stability* 28, 203–224.

Claessens, S., Ghosh, S.R., Mihet, R., (2013). Macro-prudential policies to mitigate financial system vulnerabilities. *Journal of International Money and Finance* 39, 153–185.

Eichengreen, B. and A. Rose. (2014). Capital Controls in the 21st Century, *Journal of International Money and Finance* 48, 1-16.

Erten, B., Korinek, A., Ocampo, J.A. (2019). Capital controls: Theory and Evidence, NBER Working Paper 26447.

Fabiani, A. López, M., Peydró, J.L. Soto, P.E. (2021) Capital Controls, Corporate Debt and Real Effects, mimeo. Economics Working Papers 1833, Department of Economics and Business, Universitat Pompeu Fabra.

Fabiani, A. López, M., Peydró, J.L. Soto, P.E. (2022). Capital controls, domestic macroprudential policy and the bank lending channel of monetary policy. Journal of International Economics, Elsevier, vol. 139

Farhi, E. and I. Werning. (2014). Dilemma not Trilemma? Capital Controls and Exchange Rates with Volatile Capital Flows. IMF Economic Review 62: 569-605.

Farhi, E. and I. Werning. (2016). A Theory of Macroprudential Policies in the Presence of Nominal Rigidities, *Econometrica* 84 (5): 1645-1704.

Forbes, K., (2007). One Cost of the Chilean Capital Controls: Increased Financial Constraints for Smaller Traded Firms, *Journal of International Economics* 71 (2), 294-323.

Forbes, K., Fratzscher, M., Straub, R. (2015). Capital flow management measures: what are they good for?, *Journal of International Economics* 96(1), 76-97.

Forbes, K., M. Fratzscher, T. Kostka, and R. Straub. (2016). Bubble Thy Neighbor: Portfolio Effects and Externalities from Capital Controls, *Journal of International Economics*, 99, 85–104.

Gertler, M., P. Karadi (2015). Monetary policy surprises, credit costs, and economic activity, *American Economic Journal: Macroeconomics*, 7(1), 44–76.

Gräb, J., Zochowski, D. (2017). The International Bank Lending Channel of Unconventional Monetary Policy, Working Paper No. 2109, European Central Bank.

International Monetary Fund. (2012). The Liberalization and Management of Capital Flows—An Institutional View, Washington, DC: International Monetary Fund.

Jeanne, O. and A. Korinek. (2010). Excessive Volatility in Capital Flows: A Pigouvian Taxation Approach. American Economic Review 100 (2): 403- 407

Jeanne, O. and A. Korinek. (2019). Macroprudential Regulation Versus Mopping Up After the Crash. Review of Economic Studies , forthcoming.

Kaminsky, G.L., Reinhart. C.M. (1999). The Twin Crises: The Causes of Banking and Balance-of-Payments Problems, *American Economic Review,* 89 (3): 473-500.

Kim, C., (2013). Macroprudential Policies: Korea's Experiences, Remarks made at the Rethinking Macro Policy II Conference: First Steps and Early Lessons, April 16–17, Washington, DC.

Korinek, A. (2011). The new economics of prudential capital controls: A research agenda, *IMF Economic Review* 59 (3), 523-561.

Korinek, A. and D. Sandri. (2016). Capital Controls or Macroprudential Regulation? *Journal of International Economics* 99(S1): S27-S42.

Korinek, A. (2018). Regulating capital flows to emerging markets: An externality view. *Journal of International Economics* 111, 61-80

Korinek, A. and A. Simsek. (2016). Liquidity Trap and Excessive Leverage. *American Economic Review* 106(3): 699-738.

Lambert, F., J. Ramos-Tallada, and C. Rebillard, (2013). Capital Controls and Spillover Effects: Evidence from Latin-American Countries, Working Paper No. 357, Banque de France.

Magud, N. E., Reinhart, C. M., Rogoff, K. S. (2018). Capital Controls: Myth and Reality—A Portfolio Balance Approach, *Annals of Economics and Finance*, Society for AEF, 19(1), 1-47.

Martin, P. and H. Rey (2006). "Globalization and Emerging Markets: With or Without Crash?." *The American Economic Review* 96: 1631-1651.

Miranda-Agrippino, S. and Rey, H. (2020) US Monetary Policy and The Global Financial Cycle, *Review of Economic Studies* (2020).

Morais, B. J.L Peydró, C. Ruiz. (2019). The International Bank Lending Channel of Monetary Policy Rates and QE: Credit Supply, Reach-for-Yield, and Real Effects, *Journal of Finance* 74 (1), 55-90.

Morales, P. Lémus, J.S., Osorio, D., Sarmiento, M. (2022). The Internationalization of Domestic Banks and the Credit Channel of Monetary Policy, Journal of Banking and Finance 135.

Ostry, J. D., Ghosh, A. R., Chamon, M., Qureshi, M. S. (2012). Tools for Managing Financial-Stability Risks from Capital Inflows, *Journal of International Economics,* 88(2), 407-421.

Pasricha, G. K., (2012). Recent Trends in Measures to Manage Capital Flows in Emerging Market Economies. *The North American Journal of Economics and Finance* 23(3), 286-309.

Rey, H. (2013). Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence, Kansas City Fed Jackson Hole Symposium.

Rey, H. (2016). International Channels of Transmission of Monetary Policy and the Mundellian Trilemma, Mundell Fleming Lecture 2014, *IMF Economic Review*.

Rincón, H., J. Toro (2010). Are capital controls and central cank intervention effective?, Borradores de Economía No. 625, Banco de la República Colombia.

Sarmiento, M., (2022). Sudden Yield Reversals and Financial Intermediation in Emerging Markets. Journal of Financial Stability

Temesvary, J., Ongena, S., A.L. Owen (2018). A Global Lending Channel Un-plugged? Does U.S. Monetary Policy Affect Cross-Border and Affiliate Lending by Global U.S. Banks?, *Journal of International Economics*, 112, 50-69.

Tillmann, P. (2016). Unconventional monetary policy and the spillovers to emerging markets, Journal of International Money and Finance 66, 136-156.

Uribe, J.D. (2011). Capital Flows, Policy Challenges and Policy Options, SEACEN – CEMLA Conference "The Implementation of Monetary Policy: Lessons from the Crisis and Challenges for Coming Years", Kuala Lumpur. Malaysia

Uribe, J.D. (2012). How can macro-prudential policies or frameworks for financial stability be designed to preserve the credibility of monetary policy to keep inflation low? reflections from a commodity exporting, small open economy. Paper prepared for the High Level Conference on Macroprudential Policies to Achieve Financial Stability. Organized by the Banco Central del Uruguay and the IMF (2012).

Vargas, H. (2011). Monetary policy and the exchange rate in Colombia, BIS WP No. 57, Basel.

Villar, L., Rincón, H., (2003). Capital Flows and Foreign Exchange Regimes in the Colombian Economy. In: Berry, A., G. Indart, G. (Eds.), Critical Issues in International Financial Reform. Transaction Publishers.

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 central bank 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 (or 500%) the bank' capital equity.

Source: Authors' compilation based on Banco de la República (2007).

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

		All banks	
Variable	Obs	Mean	Std. Dev.
log (loan volume)	796,955	12.93	2.13
Loan rate (%)	796,955	18.39	6.28
Maturity (in years)	796,955	1.76	1.88
log 1+Collateral	796,955	6.20	8.22

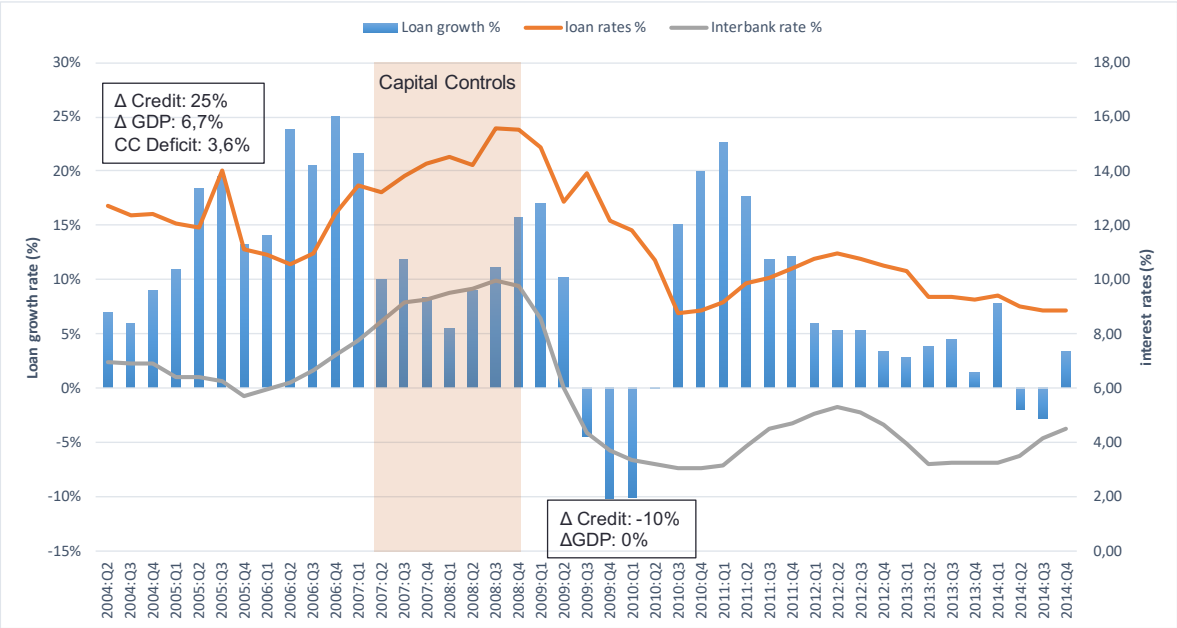
Note: The variables are computed based on loan disbursement in each bank-firm relationship for the period 2004:Q2-2014:Q4.

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)	347,219	12.92	2,08
Loan rate (%)	347,219	18.75	6,19
Maturity (in years)	347,219	1.67	1,84
log 1+Collateral	347,219	6.17	8,13
	Banks with *high* use of cross border lending		
Variable	Obs	Mean	St. dev.
log (loan volume)	371,315	13.06	2.02
Loan rate (%)	371,315	18.03	6.16
Maturity (in years)	371,315	1.91	1.99
log 1+Collateral	371,315	6.52	8.37

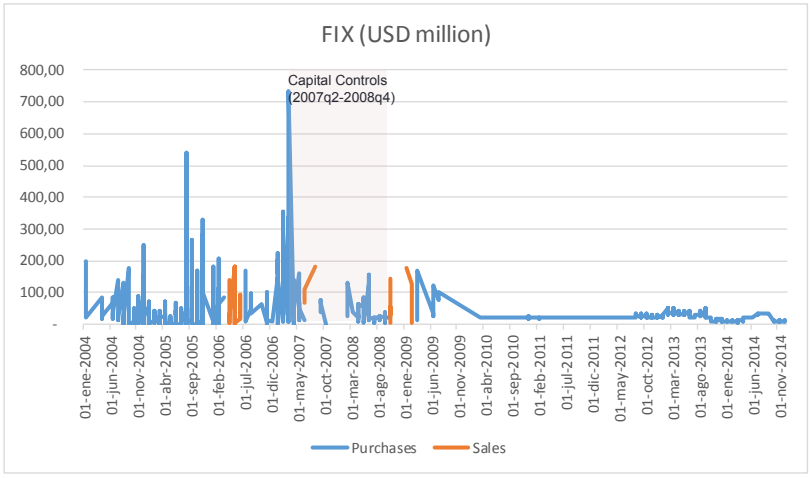
Note: The variables are computed based on loan disbursement in each bank-firm relationship for the period 2004:Q2-2014:Q4. We use credit usage as the share of cross-border debt to the quota of the bank b in quarter t. Banks below (above) the median are defined as low(high) use of cross border lending.

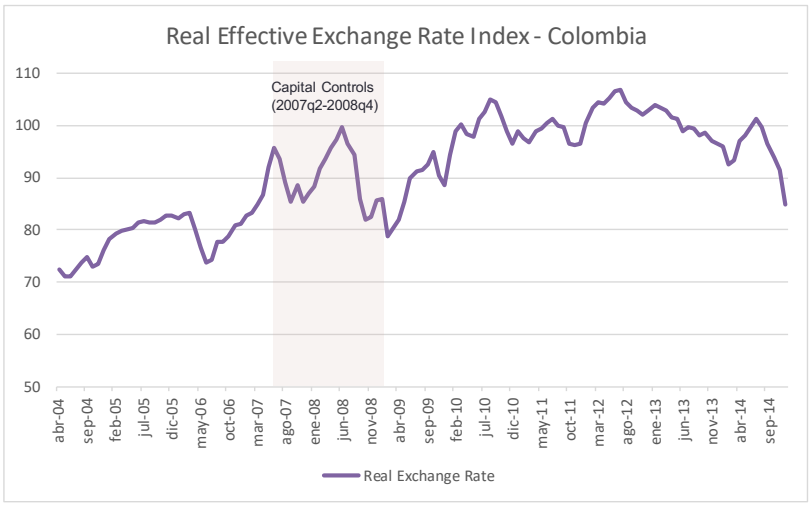
Figure 1. Corporate credit growth and loan rates in Colombia (2004-2014)

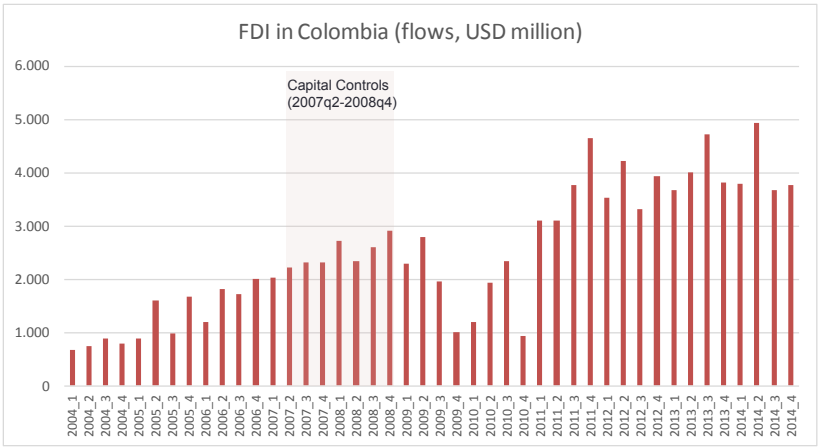


Notes: Real annual loan growth rate (in %); median corporate loan rates (in %) and overnight interbank rate (in %).

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

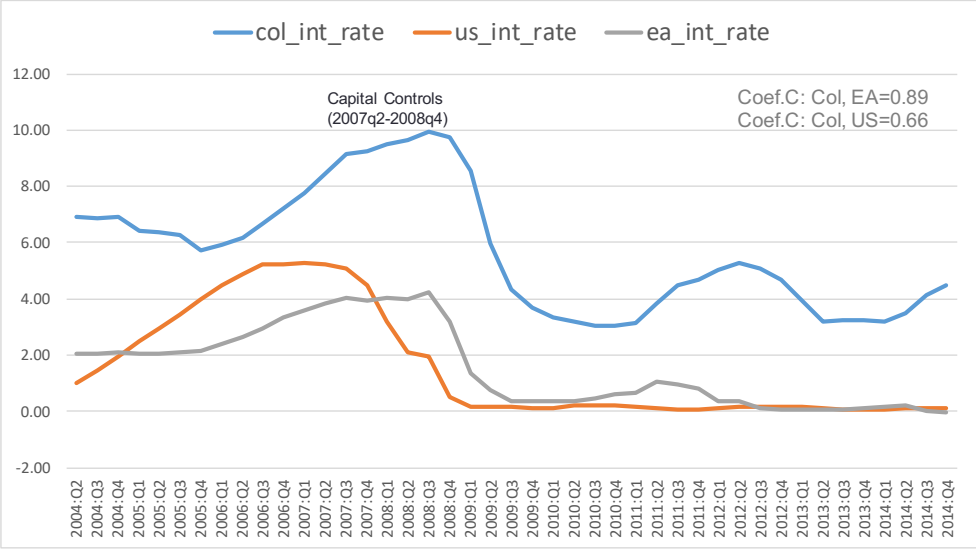






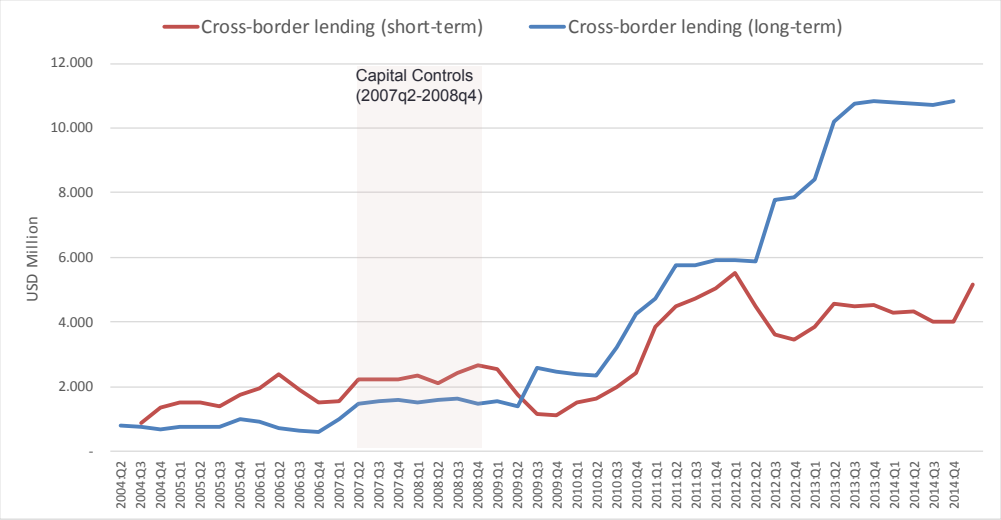
Notes: Data is from Banco de la República.

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



Notes: Data is from Fed, ECB and Banco de la República.

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



Notes: Data is from Banco de la República.

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. IMP 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. IMP 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. Euro area IMP shocks (and QE policies) 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 loans 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 loans 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 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 13. 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 14. *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 15. *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.

Table A1. 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. The impact of Eurozone MP shocks on corporate loan 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. The impact of Eurozone MP shocks (and QE) in Colombia with and without 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 loans 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 A3. The impact of United States MP shocks (and QE) in Colombia with and without 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.