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The internationalization of domestic banks and the credit channel of monetary policy*

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Abstract

How does the expansion of domestic banks in international markets affect the bank lending channel of monetary policy? Using bank-firm loan-level data, we find that loan growth and loan rates from international banks respond less to monetary policy changes than domestic banks and that internationalization partially mitigates the risk-taking channel of monetary policy. Banks with a large international presence tend to tolerate more their credit risk exposition relative to domestic banks. Moreover, international banks tend to rely more on foreign funding when policy rates change, allowing them to insulate better the monetary policy changes from their credit supply than domestic banks. This result is consistent with the predictions of the internal capital markets hypothesis. We also show that macroprudential FX regulation reduces banks with high FX exposition access to foreign funding, ultimately contributing to monetary policy transmission. Overall, our results suggest that the internationalization of banks lowers the potency of the bank lending channel. Furthermore, it diminishes the risk-taking channel of monetary policy within the limit established by macroprudential FX regulations.

Keywords: Bank-lending channel; internationalization of banks, banks' business models, monetary policy, bank risk-taking, macroprudential FX regulation

JEL Codes: E43, E52, F23, F34, F44.

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1. Introduction

How does the expansion of domestic banks in international markets affect the bank lending channel of monetary policy? Monetary policy theory predicts that reductions in short-term policy rates lead to increases in credit supply. The bank lending channel intermediates this mechanism: banks with better liquidity and higher capital tend to respond less to monetary policy changes.[1] In the case of a monetary policy tightening, this means that the reduction of credit supply is less pronounced for banks with better capital and liquidity. Besides, during monetary policy loosening, weaker banks tend to engage in more risk (i.e., they lend more to risky borrowers) in the so-called risk-taking channel of monetary policy. While the empirical literature has extensively confirmed these predictions, little is known on how the internationalization of banks, a recent phenomenon observed in the banking system of major emerging economies, can affect the transmission of monetary policy.[2] In particular, does the higher access to foreign funding and foreign investment opportunities by international banks lower the potency of the bank lending channel? And, if so, do international banks engage in less risk-taking during loosening monetary policy? Does internationalization operate beyond the capitalization and liquidity mechanisms of the bank lending channel? Can macroprudential FX regulation limit banks' access to foreign markets and reduce the dampening effect of internationalization on monetary policy transmission?

This paper answers these questions by analysing the effects of the unprecedented foreign expansion of Colombian banks on the transmission of monetary policy through the bank lending channel. Between 2006 and 2017, the assets of Colombian banks in Central American banking systems grew 7.5 times, from USD$ 10 billion to USD$ 85 billion, while the number of subsidiaries and branches in that region increased from 17 to 234. The more significant expansion was observed between 2009 and 2011, coinciding with the affluence of capital inflows to emerging economies and the retrenchment of euro area banks from this region as a result of the banking and prudential regulation implemented after the global financial crisis of 2007-09, and the sovereign debt crisis in 2010 (BIS, 2018). This dramatic change in the Colombian banks' business model led to regulatory changes to enhance the surveillance of the banks' subsidiaries, including FX

[1] Bank capital alleviates asymmetric information problems, while liquidity provides an alternative to raising expensive funding and determines the bank's agency borrowing costs (see Holmstrom and Tirole, 1997; Gertler and Kiyotaki, 2010).

[2] See for instance, Boyd and De Nicoló (2005); Jiménez et al. (2012); Jiménez et al. (2014); Ioannidou et al. (2015); Becker and Ivashina (2015); Dell'Ariccia et al. (2017); Morais et al. (2019); Acharya et al. (2020).

macroprudential regulation aimed at reducing currency mismatches and excessive foreign borrowing. This regulatory landscape offers a unique scenario for identifying the effects of internationalization over monetary policy transmissions. To our knowledge, this is the first paper that evaluates the impact of the internationalization of banks on monetary policy transmission in emerging markets.

Mainly, we evaluate the effects of internationalization on monetary policy transmission and the risk-taking channel of monetary policy. We also examine how the funding structure of domestic and international banks reacts to changes in policy rates. Further, we look at the role of macroprudential FX regulations in the transmission of monetary policy. For identification purposes, we employ quarterly bank-firm-loan level data using the Colombian credit registry from 2006Q1 till 2017Q2. We focus on firms' borrowing from multiple banks. Banks in our sample have different characteristics (i.e., size, capitalization, liquidity, credit risk exposition, and internationalization). Moreover, we include bank and firm fixed effects to control for unobserved bank and firm heterogeneity and include firm-bank fixed effects to control for firm-specific changes in credit demand (as in Khwaja and Mian, 2008). Thus, the within-firm differences can be attributed to differences in bank characteristics. We also employ a sample of 'new loans' (i.e., loans granted to new borrowers), identified in the credit registry database by means of the loans' issuance date and the borrower's identification number. The use of the 'new loans' sample is aimed at observing how the bank lending channel operates in the supply of credit to new borrowers (i.e., as in Jiménez et al., 2012).

Our baseline specification relates changes in the loan growth and the loan rates of corporate loans with the changes in the monetary policy rate and the bank characteristics, including the number of bank subsidiaries. Hence, we compare international banks (that can lend abroad) against domestic banks (that only lend locally), but both have access to domestic and foreign funding sources. Moreover, by exploiting the within-borrower-time variation, we can address the potential endogeneity issue of changes in the policy rate to the state of the economy (Jiménez et al., 2012). We also exploit the credit registry data granularity for gauging borrowers' creditworthiness, aimed at testing the risk-taking channel of monetary policy (Dell'Ariccia et al., 2017). The detailed data set on loan characteristics allows to control for specific observables on the firm-bank relationship: the bank and firm relationship's length and whether the firm has fallen in arrears with its creditor,

ultimately being crucial for bank lending activities (Detragiache et al., 2000; Bolton et al., 2016; Beck et al., 2018).

Our evidence on the effects of internationalization on monetary policy transmission and the risk-taking channel of monetary policy is consistent with the internal capital markets hypothesis predictions (i.e., the global operations of international banks reduce the sensitivity of bank lending to domestic monetary policy conditions (de Haas and van Lelyveldt 2010; Cetorelli and Goldberg, 2012b). We find that internationalization allows banks to have more access to foreign markets, which insulates the effects of changes in monetary policy on their credit supply, including the search for yield associated with the risk-taking channel. We also show that macroprudential FX regulation reduces the access to foreign funding by banks with high FX exposition, including international banks, contributing to the monetary policy transmission. Thus, our results suggest that the internationalization of banks weakens the potency of the bank lending channel and the risk-taking channel of monetary policy within the limit established by macroprudential FX regulations.

Our baseline model using bank-firm loan-level data shows that international banks have a dampened response to changes in monetary policy rates compared to domestic banks. We find that loan growth and loan rates from banks with a high number of subsidiaries respond *less* to policy changes than banks without subsidiaries.[3] For instance, a 100-bps increase in the policy rate decreases the supply of credit of international banks by 0.70 pp *less* than by domestic banks (banks without subsidiaries), which corresponds to 63 percent of the estimated reduction in the supply of credit by domestic banks (1.11 pp). With respect to loan interest rates, we find that after a 100-bps increase in the policy rate, international banks tend to increase loan rates two quarters afterward by 13 bps lower, which is 48 percent of the estimated increase on loan rates for domestic banks (27 bps).[4] This suggests that internationalization can insulate in a high degree the supply of credit

[3] We define international banks as those with more than 12 subsidiaries and domestic banks as those with no subsidiaries (i.e., 90th and 10th percentiles of the distribution of the number of subsidiaries). In an alternative specification, we define international and domestic banks by using an indicator variable equal to 1 (0) for banks with a share of assets abroad to total assets above (below) the median in the evaluation period. International banks are large banks that account for roughly 52% of corporate loans and 55% of the deposits in the banking system during the evaluated period.

[4] We observe that the changes in the policy rate are partially transmitted to loan growth and loan rates during the first three quarters and that monetary policy losses its influence on loan conditions after four quarters. The partial transmission of monetary policy to the credit supply coincides with previous evidence for Colombia using bank-level data (Holmes et al., 2015). Galindo and Steiner (2020) use aggregated data on the Colombian banking system and find evidence on a complete transmission of monetary policy rates to loan rates after twelve months. We find a lower

from the changes in monetary policy conditions. We also observe that for the same level of capitalization and liquidity, banks with international presence reduce loan growth (and increase loan rates) by *less* during a tightening than banks without subsidiaries. The effects of internationalization are more significant on the supply of credit to new borrowers. These results indicate that internationalization lowers the potency of the bank lending channel of monetary policy. Moreover, this mechanism operates beside the traditional bank lending channel focused on capitalization and liquidity.

Using detailed information on the firms' credit risk rating, we find that international banks seem to tolerate their credit risk exposition better. In addition, we conclude that the risk-taking channel of monetary policy is partially mitigated by internationalization. Using the information on the disbursements of corporate loans (new loans) and borrowers credit risk rating, we gauge the supply of new credit to risky borrowers to assess the risk-taking channel of monetary policy (Jiménez et al., 2014). In particular, we observe that international banks increase lending (and reduce loan rates) to riskier firms following monetary policy expansions to a lesser degree than banks without subsidiaries. This result confirms that international banks appear more insulated from the impact of monetary policy changes and that internationalization can alleviate the search for yield due to the higher access to foreign investment opportunities.

In alternative specifications using bank-level data, we find that international banks tend to rely more on foreign funding (and less on domestic funding) during changes in policy rates. Following an increase of 100 bps in the policy rate, international banks increase foreign funding by 1.31 pp more than domestic banks, which is around 57 percent more of the estimated increase in foreign funding for domestic banks (2.28 pp). In the case of deposits, we observe that international banks increase deposits by 0.81 pp following an increase of 100 bps in the policy rate, which is 44 percent less of the observed change in deposits for domestic banks (1.46 pp). These results explain why international banks can better insulate the monetary policy changes over the credit supply as banks that raise deposits, also reduce their lending by more than other banks during a monetary policy tightening (Drechsler et al., 2017). The higher reliance on foreign funding by international banks supports the internal capital markets hypothesis. We also find that macroprudential FX regulation constrains the access to foreign funding by banks with high FX

degree of transmission explained by the financial frictions involved in the bank lending channel (see Jimenez et al., 2012; 2014; Ongena et al., 2021).

exposition, which contributes to monetary policy transmission. We observe that banks approaching the regulatory limit of FX exposition tend to reduce foreign funding and rely more on domestic funding, which indicates that those banks are more affected by monetary policy conditions. International banks with a high FX exposition are also affected by this regulation, albeit their reduction in foreign funding is less pronounced relative to domestic banks. Thus, macroprudential FX regulations can effectively reduce borrowing in foreign currency by banks (Anhert et al., 2021) and hence reinforce the monetary policy transmission.

Our work contributes to three strands of literature. First, we show that banks' internationalization contributes to insulating their credit supply due to changes in policy rates, extending thereby the evidence on the traditional bank-lending channel through the strength of banks' balance-sheets (i.e., capitalization and liquidity) (Kashyap and Stein, 1995, 2000; Altumbas et al., 2010; Jiménez et al., 2012; Gertler and Kiyotaki, 2010; Cantú et al., 2020; Altavilla et al., 2020a). We also observe that internationalization is associated with a lower search for yield, suggesting that banks with higher operations abroad have more access to foreign investment opportunities (i.e., higher diversification), and reduce their risk-taking during periods of easing domestic monetary policy. This result extends the literature on the risk-taking channel of monetary policy and the risk-taking behaviour of financial intermediaries (Boyd and De Nicoló, 2005; Jiménez et al., 2014; Ioannidou et al., 2015; Becker and Ivashina, 2015; Dell'Ariccia et al., 2017; Morais et al., 2019; Acharya et al., 2020).

Second, we show that, compared to domestic banks, international banks rely less on deposits and more on foreign funding in the face of changes in monetary policy conditions. Supporting the deposits channel of monetary policy (Drechsler et al., 2017) and the internal capital market hypothesis (Campello, 2002; Cetorelli and Goldberg, 2012b; Jeon et al., 2013; Correa et at., 2016). Moreover, our results provide further evidence on the role of banks' external borrowing for domestic credit growth (Baskaya et al., 2017; Dinger and te Kaat, 2020; Doerr and Schaz, 2021; Ongena et al., 2021) and the effects of macroprudential FX regulations to limit excessive foreign borrowing by banks (Bruno and Shin, 2014, Anhert et al., 2021), extending the evidence on the potential role of macroprudential regulation on monetary policy transmission (Dias et al., 2019; Basu et al., 2020). Finally, by showing the effects of internationalization on bank lending, we contribute to the literature on the determinants of cross-border expansions of banks (Berger et al.,

2003, Buch and Lipponer 2007, de Haas and van Lelyveldt 2010, Buch et at., 2013; Demirgüç-Kunt et al., 2020).

Overall, our results indicate that banks with a higher international presence can better insulate the effects of monetary policy changes by relying more on foreign funding and lending. Moreover, by holding a more diversified loan portfolio, internationalization allows banks to tolerate credit risk better and alleviates the search for yield. We also show that macroprudential FX regulation constrains the access to foreign funding by banks with high FX exposition, which ultimately contributes to monetary policy transmission. Thus, our evidence suggests that the internationalization of banks weakens the potency of the bank lending channel. Moreover, it diminishes the risk-taking channel of monetary policy within the limit established by macroprudential FX regulations.

This paper unfolds as follows. Section 2 discusses the internationalization process of Colombian banks and depicts evidence on the transmission of monetary policy to credit growth and loan rates. Also, it describes the FX macroprudential regulation in Colombia. Section 3 describes the data sources. Section 4 presents the empirical specification used to study the bank lending channel and the role of internationalization. Section 5 discusses the results. Finally, section 6 concludes.

2. The internationalization of domestic banks

The internationalization of Colombian banks is widely considered the most important structural change in the Colombian banking system in recent years. The internationalization process of Colombian banks is ongoing and has been driven by a combination of several factors. First, the retrenchment of UK and euro area banks from Central and South American banking systems followed the global financial crisis of 2007-09 and the sovereign debt crisis that began in late 2010. After the global crisis, UK and euro area banks reduced their leverage to meet the new Basel III standards. Afterward, the increased concerns regarding the creditworthiness of European banks that experienced difficulties in the 2010 sovereign debt crisis catalysed these banks to reduce their international operations, especially in emerging markets (Cull and Martínez-Pería, 2013; BIS, 2018), and to contract both domestic and interbank lending (see, Becker and Ivashina, 2018; Acharya et al., 2018; Abbassi et al., 2020; Bottero et al., 2020).

Second, the impact of the global financial crisis of 2007-09 on the Colombian economy was smaller than in other emerging economies (Kamil and Rai, 2010), and mainly with real effects associated with trade finance (Ahn and Sarmiento, 2019). The rapid recovery led to sovereign bonds obtaining investment grade in mid-2010, which increased Colombian banks' access to external sources of funding (cross-border loans and bonds). Foreign flows quickly flooded the market, motivated by the lower international interest rates and the excessive liquidity from the unconventional monetary policy in advanced economies (Tillmann, 2016; Albagli et al., 2019; Dias et al., 2019)[5]. Third, the impact of the relatively higher intermediation margins in Central America compared to Colombia and lower entry barriers to the banking system in Central American countries (Uribe, 2013b). In this regard, Cardozo et al. (2021) find that Colombian banking expansion to countries with large GDP co-movements and lower regulatory qualities is associated with higher levels of banks' risk. Moreover, they find that complex banks increase their demand for external funds when the internal cost of capital increases, an aspect in which we add evidence based on the bank-lending channel of monetary policy.

Since 2006, Colombia's largest banks have expanded their cross-border activities considerably, quickly becoming important financial players in the region and becoming a challenge to financial authorities, as their operations have become more complex and harder to trace.[6] Between 2006 and 2017, banks' subsidiaries and branches assets abroad grew 7.5 times from USD$ 10 billion to USD$ 85 billion, while the number of subsidiaries and branches increased from 17 to 234. In **Figure 1**, the peak of said expansion reached between 2009 and 2011, coinciding with the retrenchment of European banks from this region. In Central America, Colombian banks owned roughly 23 percent of the region's banking assets. By country, in El Salvador, these institutions held approximately 53 percent of the system's assets. For Panama, this figure was 22 percent. Overall, 12 Colombian banks operated across 25 jurisdictions with 234

[5] The lower interest rates and the excessive 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).

[6] Financial regulation in Colombia has geared for banks to conduct financial services using either the bank subsidiary or the bank-holding company models (Law 1994). Regulation has aimed at enhancing the supervision of credit institutions, controlling agency conflicts and contagion risk. As financial conglomerates have become more complex, financial authorities intended, with this bill, to strengthen the prudential and risk management standards of these agents. In 2017, Congress approved a bill that enhances the regulatory and supervisory powers over financial conglomerates for the *Superintendencia Financiera de Colombia* (Colombian financial regulatory agency for banks, insurance companies, and exchanges - SFC).

subsidiaries in Central American countries alone. At the bank level, the expansion began in 2007 with Bancolombia, the largest Colombian bank, acquiring Banco Agrícola in El Salvador. Then, in 2010, Banco de Bogotá (the second largest bank in Colombia) acquired BAC Credomatic (a Central American financial conglomerate). Between 2012 and 2013, Colombian banks purchased Spanish and UK banks' operations across Central and South America jurisdiction. Davivienda, the third largest bank in Colombia, acquired HSBC's operations in Central America (excluding Panama). Banco de Bogotá acquired Grupo Reformador in Guatemala and BBVA in Panama. Bancolombia acquired 40% of Agromercantil Group and an additional 20% in 2015.

Domestic and foreign funding sources financed the acquisitions of those banks in Central America by Colombian banks under a strict banking and macroprudential regulation in Colombia. For instance, since 2007, the central bank of Colombia has limited banks' currency mismatches' exposition by imposing a ceiling to the banks' ratio of the foreign currency gross position to equity capital. Namely, a ceiling on the gross leverage position (GLP): the sum of the bank's foreign currency liabilities and assets should be less than 500% of the bank's equity capital.[7] This macroprudential FX regulation in Colombia has addressed prudential concerns due to banks' high FX exposures and the counterparty risks involved (see Dias et al., 2019). In 2010, South Korea implemented a leverage cap on banks' foreign currency derivative positions and a levy on banks' non-deposit foreign currency liabilities. These measures reduced banks' short-term foreign borrowing, improved their maturity structures (IMF, 2012), and lowered the volatility of cross-border bank flows to Korea (Bruno and Shin, 2014). In our analysis, we evaluate whether this FX prudential regulation influences the potential role of internationalization over monetary policy transmission.

3. Data

We employ three primary datasets for our analysis. First, we use the Colombian credit registry that contains information about individual commercial loans reported by financial

[7] This metric aims at complementing financial intermediaries' FX exposures regulation that has been implemented since 2001. The regulation establishes that all financial intermediaries participating in the FX market should meet the following requirements: i) assets in foreign currency minus liabilities in foreign currency, including FX off-balance-sheet activities, should be within -5% and 20% of the bank's equity capital; ii) the difference (in cash) between assets and liabilities in foreign currency (the net cash position) should be positive and cannot exceed 50% of the bank's equity capital. See Vargas et al. (2017) for details on the implementation of FX macroprudential policies in Colombia.

institutions to the *Superintendencia Financiera de Colombia* (SFC). This dataset provides a detailed look at all the loans granted by the financial system to firms quarterly. It includes loan characteristics such as amount, maturity, collateral, interest rate, and bank-firm relationships measures. The dataset consists of 2,956,311 loans granted by 28 banks to 135,055 firms during the period 2006q1-2017q2, from which 546,623 correspond to loans granted to new borrowers. The second dataset contains banks' financial statements collected by the SFC that we use to compute bank characteristics of capitalization, liquidity, leverage, and size, among others. The latter dataset is complemented with regulatory information on the banks' FX exposition reported to the *Banco de la Republica*. This dataset contains 1,259 bank-quarter level observations for the entire period. The third dataset contains quarterly information on the international presence of Colombian banks, including assets abroad. The SFC collected this information between 2014 and 2017, and we complement the rest of the sample period using public sources. Finally, we include an array of macroeconomic characteristics used to control external imbalances, demand effects, and the business cycle.

Table 1 presents summary statistics of bank, firm, and macroeconomic characteristics of the final sample. Among the bank variables, we include four leading bank-lending channel indicators (Kashyap and Stein, 2000; Jiménez et al., 2012; Jiménez et al., 2014): *log (Total Assets)*, which corresponds to the natural logarithm of total assets of the bank (in COP), *Capital ratio*, the ratio of equity to total assets (average 13.53%), *Liquidity ratio*, the ratio of current assets over total assets (average 1.01%), and as a measure of the bank's credit risk exposure we use the *Doubtful loan ratio*, the ratio of doubtful loans over total loans (average 3.41%).[8] Our main variable of interest is *Subsidiaries*, which corresponds to the number of foreign bank subsidiaries of the local bank, which on average is 4.67. We use other bank controls such as the *loan-loss provision ratio*, measured as the ratio of loan-loss provisions over the total loan portfolio (average 2.95%), *Commissions ratio*, the ratio of commissions to total income (average 9.57%), *Short-term funding ratio*, the ratio of short-term funding over total liabilities (average 38.6%), *foreign currency funding ratio*, the ratio of funding in foreign currency over total liabilities (average 4.07%) and the Return on Assets (ROA) (average 2.18%), as a measure of profitability.

[8] Doubtful loans are loans rated differently from A (less than 30 days past due debts), on a scale from A to E, where E is the lowest rating.

Given that the sample of borrowing firms changes over time, we control for changes in the credit demand by including a set of firm characteristics, including the log of their age as a borrower (average 3.34) and a dummy variable indicating past arrears (52.88% of firms in the sample have fallen in arrears at least once). We use the firm's credit risk rating to distinguish between risky and safe firms in our sample of borrowers. We define *risky firm* as an indicator equal to one for firms with credit risk ratings below A and zero for firms with credit risk rating equal to A. The credit risk rating information is recorded at the bank-firm-quarter level in the credit registry database. The firm's credit risk rating is assigned by each bank on a scale from A to E, where A is granted to firms without loans in arrears, B for firms with loans with less than 30 days in arrears, C for firms with loans with less than 60 days in arrears, D for 90, and E for more than 350 days in arrears. We also include specific observables on the firm-bank relationship: length of relationship (on average 18.5 quarters, or 4.5 years) and a dummy variable indicating whether the firm has fallen in arrears with the bank (28.87%), as relationship banking is crucial for lending over the business cycle (Detragiache et al., 2000; Beck et al., 2018; Bolton et al., 2016).

Finally, as macroeconomic controls, we include the quarterly change in the log of real GDP (Δ *Log Real GDP*$_{t-1}$), the quarterly change on the exchange rate (Δ Exchange rate $_{t-1}$), and the quarterly change on the current account (Δ Current account $_{t-1}$). We use the quarterly change in the domestic monetary policy rate (Δ MP rate$_{t-1}$) as our measure of monetary policy. We lag all macro variables in one period except for the monetary policy change, which is included in the models with 2 and 3 lags, as explained in the following section.

In **Figure 2**, we use bank-level data to examine the behaviour of domestic and international banks during our period of study. For comparison, we define international banks as those with more than 12 subsidiaries and domestic banks as those without subsidiaries (i.e., 90th and 10th percentiles of the distribution of the number of subsidiaries). During the evaluated period, international banks account for roughly 52% of corporate loans and 55% of the deposits in the banking system. We compare the evolution of the main bank characteristics: capitalization, liquidity, and the doubtful loans' ratio (doubtful loans/total loans). Panel A and B show that capitalization and liquidity have been growing over time for both types of banks. In addition, international banks tend to hold more capital and more stable liquidity positions than domestic banks. The doubtful loans- ratio is relatively higher for domestic banks than international banks and tends to increase more during economic downturns (Panel C).

In **Figure 3**, we use bank-firm-loan level data to compute loan growth and loan rates for the sample of banks during the evaluated period 2006Q1-2017Q2. We show the evolution of corporate loan growth and loan rates along with the monetary policy rate. In Panel A, we observe that the credit cycle is relatively similar for both types of banks and that increases in monetary policy rates are followed by lower credit growth. We also observe that during the economic downturns (2007Q2-2009Q3 and 2016Q1-2017Q1), domestic banks exhibited a faster decline in loan growth compared to international banks and that during 2009Q3 and 2011Q2, loan growth for international banks rapidly increased from -3.37% to 21.39%, coinciding with the expansion of these banks in Central America. In Panel B, loan rates granted by domestic and international banks closely follow the monetary policy rate, and domestic banks seem to be more sensitive with respect to changes in policy rates (i.e., on average, compared to international banks, domestic banks increase (reduce) loan rates to a larger extent during tightening periods than in loosening periods).

Note that the credit expansion in recent years has not been accompanied by a rising trend in the doubtful loans' ratio (**Figure 2**). This downward trend in the banks' credit risk can be attributed to more robust macroprudential policies in the domestic avenue (i.e., loan provisions based on expected losses rather than on incurred losses) and oversight of the financial system's constituents, which ultimately have led them to tightening lending standards and to the putting in place of necessary controls to handle the different risks these institutions face (see, Gómez et al., 2020; Morais et al., 2020). Overall, our descriptive analysis suggests that domestic banks show a higher procyclical behaviour than international banks and are more sensitive to monetary policy changes.

4. Empirical Strategy

Our empirical strategy consists in estimating panel data specifications that relate changes in corporate loan terms and changes in banks' funding to specific bank characteristics, monetary policy conditions, and the internationalization of domestic banks. To mitigate the common endogeneity problem of OLS regressions, the specifications include alternative sets of fixed effects, including bank and firm*bank fixed effects (among others). To understand the effects of internationalization, we proceed gradually. We first estimate the specification in (1), which seeks to estimate the evolving influence of individual bank characteristics and their interaction with

changes in monetary policy on the response of lending to firm f by bank b in quarter t. We focus on firms' borrowing from multiple banks, where banks differ in their characteristics and include firm*bank fixed effects to control for firm-specific changes in credit demand (Khwaja and Mian, 2008). The specification is:

$$\Delta Y_{fbt} = \varphi + \sum_{k}^{K}\sum_{j=0}^{2} \delta_{kj} \Delta \text{MP rate}_{\text{t-j}} \times \boldsymbol{B}_{bkt-1} + \sum_{k}^{K} \alpha_k \boldsymbol{B}_{bkt-1} + relationship_{fbt-1} + \boldsymbol{\theta_{fb}} + \boldsymbol{\theta_b} + \varepsilon_{fbt} \quad (1)$$

Where ΔY_{fbt} corresponds to the first difference of either the (log) stock of loans or the interest rate to firm f by bank b in quarter t. $\boldsymbol{B}_{bkt}$ refers to a specific bank characteristic (i.e., capitalization, liquidity, and credit risk exposition) included lagged one period, as monetary conditions may determine the capital of liquidity ratios banks optimally choose (Jiménez et al., 2012). The vector of bank characteristics also includes our measure of internationalization, an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (Subsidiaries$_{bt-1}$). The variable $\Delta \text{MP rate}_{t-j}$ corresponds to the quarterly change in the monetary policy rate set by the Central Bank of Colombia (in percentage points). The $relationship_{fbt-1}$ variable corresponds to bank-firm relationship effects (i.e., length of the relationship and a dummy variable indicating whether the firm has fallen in arrears with the bank), which are crucial in the supply of corporate credit (Detragiache et al., 2000; Beck et al., 2018; Bolton et al., 2016). We employ bank fixed effects ($\boldsymbol{\theta_b}$) to capture unobserved bank heterogeneity, and firm*bank fixed effects ($\boldsymbol{\theta_{fb}}$) to control for demand effects at the firm level and gauge the credit supply. In this specification, $\sum_{j=0}^{2} \delta_{kj} > 0$ will be taken as an indication that a period of monetary policy tightening combined with an increase in the specific bank characteristic *k*, translates to the increase in ΔY_{fbt}[9]. This specification allows for the studying of the general effects of the bank business models' particular characteristics (including the degree of internationalization) on lending.

[9] We perform the analysis with different combinations of lags of monetary policy changes and find the first two lags to be the more relevant ones. As for robustness checks, we also report results using three lags of monetary policy changes. The number of lags also depends on the length of the time series and the state of the economy (see, Kashyap and Stein, 2000; Jiménez et al., 2012; Jiménez et al., 2014; Altavilla et al., 2020).

The second specification in (2) combines the effects (triple-interaction) of monetary policy changes and internationalization in the following fashion:

$$\begin{aligned}\Delta Y_{fbt} = \varphi + \sum_{k}^{K}(\alpha_k + \omega_k Subsidiaries_{bt-1}) \times \boldsymbol{B}_{bkt-1} \\ + \sum_{k}^{K}\sum_{j=0}^{2}\left(\delta_{kj} + \vartheta_{kj} Subsidiaries_{bt-1}\right) \times \Delta\text{MP rate}_{\text{t-j}} \times \boldsymbol{B}_{bkt-1} \\ + relationship_{fbt-1} + \theta_{fb} + \theta_b + \varepsilon_{fbt}\end{aligned} \tag{2}$$

Where $Subsidiaries_{bt-1}$corresponds to our indicator variable that distinguishes between international vs. domestic banks and, in this case, $\boldsymbol{B}_{bkt}$ does not include this internationalization variable. When the estimated value of $\sum_{j=0}^{2}\vartheta_{kj} > 0$ for some k in specification (2), it will be taken as an indication that during periods of domestic monetary policy tightening, an increase on the specific bank characteristic *k* for international banks translates to an increase of ΔY_{fbt}. Therefore, this specification will allow us to disentangle which bank characteristics play an essential role in defining the net effect that internationalization has on the transmission of monetary policy to the supply and cost of credit. The interaction of the indicator of subsidiaries with the bank-specific characteristics and the changes in monetary policy rates in equation (2) allows us to identify whether the effects of internationalization on the monetary policy transmission are observed beyond the traditional bank-lending channel.

To evaluate the risk-taking channel of monetary policy, we use a similar specification to the one in equation (2). In said estimation, we use the same strategy and set of variables as in the baseline models but with a different combination of fixed-effects, given that to identify the changes in the supply of credit to risky borrowers, we include the firm's credit risk rating, which varies at the bank-firm-time level.

Then, we analyse how the internationalization of banks affects their funding structures and how it responds to monetary policy changes. To do this, we employ bank quarter-level data and estimate the following specification:

$$\begin{aligned}\Delta Y_{bt} = {} & \omega Subsidiaries_{bt-1} + \delta \Delta \text{MP rate}_{\text{t-j}} \\ & + \vartheta Subsidiaries_{bt-1} \times \Delta \text{MP rate}_{\text{t-j}} \\ & + ß\, FX\ Fund\ Limit_{bt-1} \times Subsidiaries_{bt-1} \times \Delta \text{MP rate}_{\text{t-j}} + \varphi \boldsymbol{B}_{bt-1} \\ & + \theta_t + \theta_b + \varepsilon_{bt}\end{aligned} \quad (3)$$

The specification in (3) is estimated at the bank-time level, where $Y_{b,t}$ refers to the change in the log of deposits (or foreign funding) for bank *b* at time *t*. The parameter ϑ tests whether international banks rely more on foreign funding (and less on domestic funding) during changes in policy rates as predicted by the internal capital markets hypothesis (Cetorelli and Goldberg, 2012b). We then test whether FX macroprudential regulation can reduce foreign borrowing and hence reinforce the monetary policy transmission. The FX exposition limit states that the bank's assets plus liabilities in foreign currency should be less than 500% of the bank's capital equity. We define the variable *FX Fund Limit*$_{bt-1}$ as an indicator equal to 1 for banks in the 90th percentile (and 0 for banks in the 10th percentile) of the distribution of the FX exposition limit. Hence, the parameter ß checks whether international banks reduce the use of foreign funding (and rely more on deposits) following a change in the policy rates when approaching the FX exposition limit. In the estimation of model (2), we control for time-variant bank characteristics and include bank fixed effects and time fixed effects. In alternative specifications of equations (2) and (3), we employ the share of assets abroad to total assets as an indicator of the degree of internationalization (*Int. Banks*$_{bt-1}$), and the change in the monetary policy rate lagged three periods (Δ*MP rate*$_{t-3}$).

5. Results

5.1.The bank lending channel of monetary policy

This section presents the results of the baseline models stated in equation (1) to identify the effects of bank-specific characteristics in the transmission of monetary policy on the supply of credit. As mentioned in the previous section, we first want to check how banks' balance sheets and their credit risk exposition influence the transmission of monetary policy. Then, we include our measure of internationalization to identify how it affects the bank lending channel. The results are presented in **Table 2** for $\Delta\, log\ credit_{fbt}$ and **Table 3** for $\Delta\ loan\ rates_{fbt}$. The specifications in

columns (1) to (3) use the full sample of loans composed by 2,956,311 observations, while the specification in column (4) uses a sample of 546,623 new loans (i.e., loans granted to new borrowers), which are identified in the credit registry database by using the loans' issuance date and the borrower identification number.[10] The use of new loans is proposed in order to observe how the bank lending channel operates through the supply of credit to new borrowers (i.e., as in a similar exercise in Jiménez et al. (2012) using new loan applications).

We proceed gradually. In column (1) of **Table 2,** we include all the bank-specific characteristics and the interactions of changes in the monetary policy rate with the key bank characteristics (capital ratio, liquidity, and doubtful loans) to observe how the supply of credit varies depending on bank-specific characteristics, and how the bank lending channel intermediates the transmission of monetary policy. We find that increases in the banks' size and capital ratios are associated with higher lending growth. We also observe that an increase in the banks' credit risk exposition (i.e., banks with more doubtful loans over total loans) is associated with lower lending growth. In column (2), we observe that banks with a high international presence exhibit higher lending growth compared to domestic banks, an effect that remains statistically significant in model (3), where we replace the bank-firm relationship controls by firm*bank fixed effects, and in model (4) where the sample of loans granted to new borrowers is employed instead of the sample with the full set of borrowers.

We identify that changes in the monetary policy rate are associated with lower loan growth. The estimated coefficient is statistically significant across all the specifications. In column (3), when all the bank-specific characteristics are included in the specification, the estimated coefficient of $\Delta\, MP\ rate$ suggests that an increase of 100 basis points (bps) in the policy rate is associated with a decline of 1.11 percentage points (pp) in the supply of credit two quarters afterward. Given that our measure of changes in policy rates is symmetric, the results indicate that a 100 bps decrease in the policy rate is associated with a 1.11 pp increase in the supply of credit.[11]

The results of the interaction terms between the bank-specific characteristics and the changes in the domestic monetary policy rate suggest that banks' credit risk exposition and internationalization influence the transmission of monetary policy. We observe that banks with

[10] We compute the change in the log of loan volume for loans granted to new borrowers. Hence, we compare the lending growth among the pool of existing borrowers vs. the pool of new borrowers.

[11] Consistent results are found when we remove the global financial crisis period, which affected the real economy more via the availability of cross-border lending to Colombian banks (see Ahn and Sarmiento, 2019).

risky portfolios respond more to changes in monetary policy rates than banks with less risky portfolios: they reduce lending more during tightening and increase lending by more during loosening. On the contrary, banks with more international presence seem to be less affected by changes in monetary policy rates (columns 2 to 4). In column (3), for instance, a 100-bps increase in the policy rate decreases the supply of credit of international banks (banks with more than 12 subsidiaries) by 0.70 pp *less* than by domestic banks (banks without subsidiaries), which corresponds to 63 percent of the estimated reduction in the supply of credit by domestic banks (1.11 pp). A similar effect is observed in the sample of new loans (column 4). We confirm that banks with lower quality portfolios respond more to changes in policy rates: they reduce lending to *new borrowers* more during tightening and increase new lending by more during loosening.

In column (4), we observe that after a 100-bps increase in the policy rate, a standard deviation increase in the ratio of doubtful loans to total loans (i.e., around 2.27 percent) is associated with a reduction in loan growth by 1.68 pp after two quarters, which is 1.3 times the estimated reduction for the mean bank (1.29 pp), implying that banks with risky portfolios react more to changes in monetary policy conditions. We also observe that banks with better capitalization tend to respond *less* to monetary policy changes (i.e., the positive coefficient of the interaction terms indicate that as bank capital increases, the negative effect of a monetary policy tightening on lending growth is reduced). Following a 100-bps increase in the policy rate, one additional standard deviation in the banks' capital ratio (i.e., around 3.53 percent) is associated with a lower reduction in loan growth by 1.18 pp after two quarters, which is approximately 91 percent of the estimated reduction in loan growth for the mean bank (1.29 pp). This result implies that, in the case of a monetary policy tightening, the decline of the credit supply is less pronounced for banks with better capital (as documented in Jiménez et al., 2012.)

The results in **Table 3** indicate that banks' characteristics influence loan rates and monetary policy transmission. In column (1), we find that increases in the banks' assets are associated with lower lending rates, while in column (2), internationalization is associated with lower loan rates. In the specification that includes all the bank-specific characteristics (column 3), we observe that liquidity becomes more relevant in determining loan rates: increases in the liquidity ratio are associated to higher loan rates as banks are employing more expensive funding (Kashyap et al., 2002; Altumbas et al., 2009). The estimated liquidity coefficient suggests that an increase of one standard deviation in liquidity is associated with higher loan rates by around 24 bps on the sample

of total loans and by 38 bps in the sample of new loans (columns 3 and 4). As expected, changes in policy rates affect loan rates. The estimated coefficient of $\Delta\, MP\ rate$ suggests that an increase of 100 bps in the policy rate is associated with an increase of 24 bps in the loan rates after two quarters (column 1), an effect that remains statistically significant and in similar levels across the specifications in columns (2) to (4).

The interaction of the bank characteristics with changes in monetary policy rates suggests that banks with higher liquidity respond *less* to monetary policy changes. The estimated effect of liquidity in column (1) remains in models (3) and (4), suggesting that the dampened effect of liquidity over the transmission of monetary policy to loan rates is observed for both total lending and the issue of new lending. This result indicates that more liquid banks can better protect their loan portfolios against monetary tightening by drawing down cash and securities compared to less liquid banks. The lack of statistical significance of the interaction between bank capital and monetary policy changes in columns (3) and (4) might indicate that the role of liquidity overcomes the effect of capitalization in the monetary policy transmission (Kashyap and Stein, 2000).

In line with the results in **Table 2**, we find that loan rates of the new credit granted by banks with higher credit risk exposition react more to monetary policy changes than those for banks with less credit exposition (column 4). That is, banks with risky portfolios increase/reduce their loan rates in tightening/loosening periods, compared banks with less risky portfolios (consistent with the view that banks with higher credit risk exposition seem to be more procyclical (Laeven and Majnoni, 2003; Huizinga and Laeven, 2019; Morais et al., 2020).

Interestingly, we observe that the loan rates charged by international banks respond *less* to changes in policy rates compared to loan rates from domestic banks (columns (2) to (4)). Albeit the effect is relatively small, the estimated effect is also observed in the sample of new loans (column 4), indicating that internationalization partially diminishes the potency of the bank lending channel. The estimated coefficient in column (3) suggests that after a 100-bps increase in the policy rate, international banks increase loan rates two quarters afterward by 13 bps *less* than domestic banks, which is 48 percent of the estimated increase in loan rates for all banks (27 bps). Thus, these results indicate that internationalization can insulate (to some degree) the supply of credit from the changes in monetary policy conditions.

5.2. The bank lending channel of monetary policy and the internationalization of banks

In this section, we present the results of the estimation of equation (2) to understand how the internationalization of banks affects the bank lending channel in the transmission of monetary policy. In this specification, we interact our measure of internationalization with the bank-specific characteristics and changes in monetary policy to test for the effects on credit growth and loan rates. The results are presented in **Table 4** for $\Delta \log \text{credit}_{fbt}$ and in **Table 5** for $\Delta \text{loan rates}_{fbt}$. The specifications include the same set of controls and fixed effects used in **Table 2** and **Table 3**. As before, columns (1) to (3) employ the full sample of loans, while column (4) only uses the sample of new loans.[12]

In **Table 4**, we observe that our baseline results on the effects of bank characteristics over lending growth remain as reported in **Table 2**. International banks are associated with higher loan growth and increases in banks' size and capitalization (columns 1 and 2). We then find that the supply of credit from banks with more liquidity and higher credit risk exposure varies with the degree of internationalization. In column (3), we find that, banks with more than 12 subsidiaries lend more than banks without subsidiaries for the same level of doubtful loans. This effect is also observed in the sample of new loans (column 4). It means that the credit supply from international banks seems to react less to the negative effect loan growth credit risk compared to domestic banks (i.e., international banks tolerate better their credit risk exposition than domestic banks). We also find that internationalization increases more the supply of new loans for liquid banks. For the same level of liquidity, banks with high number of subsidiaries are associated with more loans to new borrowers than banks without subsidiaries.

The estimated coefficients of the interactions of the banks' characteristics with changes in monetary policy confirm the main features of the bank lending channel previously identified. As reported in **Table 2,** we observe that increases in the monetary policy rate are associated lo lower lending growth in all the specifications. In column (3), the estimated coefficient of Δ *MP rate* suggests that an increase of 100 bps in the policy rate is associated with a decline of 1.44 pp in the

[12] As mentioned in Section 2, the largest banks in Colombia were the ones that expanded their operation abroad. Therefore, equation (2) to be biased, we include the log of bank assets without interacting our internationalization measures. That is, we control for the size of the bank and test the influence of bank size on monetary policy transmission, and now test how bank size and internationalization influence loan growth or loan rates in the face of monetary policy changes.

supply of credit two quarters afterward. We also confirm that more liquid banks respond less to changes in policy rates than less liquid banks (column 1). Banks with risky portfolios react more to monetary policy than banks with less risky portfolios (column 2). Both results hold when we include the complete set of bank controls interacting with the changes in monetary policy (column 3) and in the sample of new loans (column 4); which shows robust evidence on how the potency of the bank lending channel is affected by the banks' liquidity and credit risk exposure.[13]

We observe that banks with more international presence react less to monetary policy changes. In column (1), we find that banks with more than 12 subsidiaries respond *less* to policy rates than banks without subsidiaries. The estimated coefficient remains statistically significant in column (2) that only includes the measures of internationalization and credit risk, and in columns (3) and (4) that use the complete set of banks controls and for a sample of new loans, respectively. Indicating that internationalization lowers the potency of the bank lending channel. In column (3), a 100-bps increase in the policy rate decreases the supply of credit of international banks after two quarters by 0.67 pp less than domestic banks, that is 47 percent less than the estimated reduction for domestic banks (1.44 pp) and around 54 percent lower than the supply of new credit of domestic banks (column 4).

The interaction of the bank characteristics with changes in internationalization and monetary policy reveals some interesting features the influence of internationalization in the bank lending channel. We observe that internationalization dampens more the negative effect of monetary policy tightening on loan growth for well-capitalized banks. In other words, for two banks with the same capitalization level, the one that has more than 12 subsidiaries responds less to monetary policy changes than the bank without subsidiaries. This effect is observed in column (1) but loses its statistical significance in column (3), the baseline model including the credit risk exposure with the complete set of bank characteristics. However, the estimated effect is observed again in the sample with only new loans (column 4), suggesting that internationalization has a greater influence on new loans the supply.

The interaction term of the bank liquidity ratio with subsidiaries and changes in the monetary policy rates remains statistically significant across the specifications (1) to (4). The

[13] Using a large sample of European banks, Altunbas et al. (2010) show that banks characterized by lower expected default frequency (i.e., lower credit risk exposition) can offer a larger amount of credit and better insulate their loan supply from monetary policy changes.

estimated coefficient indicates that banks with the same level of liquidity that have more subsidiaries respond *less* to changes in policy rates than banks without subsidiaries. The more significant effect of liquidity compared to capitalization in the specifications might indicate that the operational channel of internationalization is via higher liquidity rather than the signalling channel of bank capital. That is, internationalization allows banks to tap greater liquidity in foreign markets compared to more domestic banks. We confirm this prediction in the next section when we evaluate the role of domestic and foreign funding.

In **Table 5,** we find that the baseline results over the effects of bank characteristics on loan rates remain as reported in **Table 3**. Moreover, that internationalization has an important influence on loan rates and influences monetary policy transmission. We observe that an increase in the banks' assets is associated with lower loan rates (column 1) and that banks with a high number of subsidiaries charge lower rates compared to domestic banks (column 2), even for new loans (column 4). The interactions between liquidity and capitalization with the indicator of subsidiaries do not provide further evidence on the role of internationalization on loan rates. However, in column (4) we observe that, for the same level of liquidity, banks with a high number of subsidiaries are related to lower loan rates in new loans than banks without subsidiaries. We also find important differences in loan rates associated with the bank's credit risk exposure and the degree of internationalization. In column (2), we observe that international banks with risky portfolios charge lower loan rates than domestic banks with similar risky portfolios. This result aligns with the higher supply of credit found in international banks with higher credit risk exposure (**Table 4**).

Regarding monetary policy transmission, the estimated coefficient of Δ *MP rate* suggests that an increase of 100 bps in the policy rate is associated with an increase of 31 bps in the loan rates two quarters later (column 1). This effect remains statistically significant across the specifications in columns (2) to (4), confirming that monetary policy has an important influence on loan rates. We find that international banks transmit *less* of the changes in monetary policy rates to their credit supply than domestic banks, indicating that internationalization dampens banks' response to changes in monetary policy. This result, observed in the full sample of loans (columns 1 to 3) and the new loans' sample (column 4), is consistent with the dampening effect of internationalization on loan growth found in **Table 4**. The estimated coefficient in column (3) indicates that after a 100-bps increase in the policy rate, banks with more than 12 subsidiaries

increase loan rates by 15 bps *less* than domestic banks, which corresponds to 42 percent of the estimated effect for domestic banks (36 bps)). In other words, internationalization reduces around 42 percent of the transmission of monetary policy rates to loan rates. Taken together, these results suggest that internationalization partially reduces the reaction of banks to changes in monetary policy, which can be associated with greater investment opportunities abroad (i.e., lending in different jurisdictions) and higher access to sources of foreign funding.

The effects of internationalization on the transmission of monetary policy also vary with some bank characteristics. In the case of capitalization, the results indicate that for the same level of capital, banks with more than 12 subsidiaries respond less to changes in policy rates: they increase loan rates by less during tightening and reduce loan rates by less during loosening compared to banks without subsidiaries. This effect is observed in the full sample (columns 1 and 3) and new loans' sample (column 4), indicating that internationalization lowers the potency of the bank lending channel by reducing the effects of monetary policy on loan rates. In the case of liquidity, we find that banks with higher liquidity transmit less the policy rate changes to loan rates compared to banks with less liquid assets (columns 3 and 4), confirming our findings in **Table 3**, and in line with the evidence in Kashyap and Stein (2000), Jiménez et al., (2014); Cantú et al., (2020). We also observe that, for the same level of liquidity, banks with higher subsidiaries transmit less the changes in policy rates to the interest rates of new loans than more domestic banks (column 4). Although this effect is not statistically significant for the full sample of loans (column 3), it confirms our findings over the impact of internationalization on the supply of new credit reported in **Table 4**.

Our results suggest that credit risk plays a crucial role in monetary policy transmission. In **Table 5**, we find that the effect of credit risk on loan rates changes with the degree of internationalization. The estimated coefficient of the triple interaction between doubtful loans, subsidiaries, and changes in monetary policy rates in columns (3) and (4) suggests that for the same level of credit risk, banks with more than 12 subsidiaries transmit *less* of the changes in policy rates to loan rates than banks without subsidiaries. Therefore, we can argue that internationalization affects the potency of the bank lending channel by lowering the sensitivity of the supply of loans to the bank's credit risk exposition during changes in monetary policy conditions.

5.3.The risk-taking channel of monetary policy and the internationalization of banks

In the previous section, we show that credit risk has an important effect on bank lending and monetary policy transmission and that more international banks seem to tolerate better their credit risk exposition against changes in monetary policy (i.e., for the same level of credit risk exposition, they do not reduce lending—or increase loan rates—as much as domestic banks during a monetary policy tightening). To understand this result in more depth, in this section, we analyse the potential effects of the internationalization of banks over their risk-taking behaviour associated with changes in the monetary policy. To do so, we perform a similar analysis to that in Altumbas et al. (2014), Ioannidou et al. (2015), and Dell'Ariccia et al. (2017) to evaluate the risk-taking channel of monetary policy, but with two distinctive features. First, based on the granularity of the credit registry data, we use a variable named *risky firm*, equal to one for firms with credit risk rating below A and 0 for firms with credit risk rating equal to A (i.e., risky firm vs. safe firm). The firm's credit risk rating can vary across banks; that is, banks assign the credit risk rating to each firm depending on the firm's creditworthiness (*risky firm*$_{fbt-1}$). This allows for comparing the loan conditions for firms with different credit risk assessments and requires the inclusion of firm fixed effects and bank*firm fixed effects to control for the potential differences in the firm's credit risk rating across banks. This variable is included lagged one period to identify the lending behaviour of the bank associated with the observed credit risk of its borrower. Second, we include our measure of internationalization interacting with the variable "risky firm" to identify whether the supply of credit from international banks to risky borrowers differs compared form of more domestic banks. Then, we include the triple interaction with changes in monetary policy to compare the response of international banks (i.e., how the supply of credit to risky borrowers reacts) to changes in policy rates compared to domestic banks. Thus, the proposed approach allows for identifying whether or not internationalization can alleviate the search for yield associated with the risk-taking channel of monetary policy.

The results are presented in **Table 6**. In columns (1) to (3), we show the results for the full sample of loans without including the loans granted to the new borrowers (i.e., 2,409,688 bank-firm-quarter observations). In comparison, in column (4), we use only the sample of new loans composed by 546,623 bank-firm-quarter observations). This differentiation in the sample of loans allows testing the results over the sample of old and new borrowers. The specifications include bank-fixed effects, bank-firm relationships, and bank-specific and macroeconomic controls, as in

our baseline model presented in **Table 4**. However, in contrast to our baseline model, in columns (2) to (4), we include bank*time-fixed effects instead of the firm*time-fixed effects to control for the potential differences of the firm's credit risk rating across banks, since the triple interaction of interest varies at bank-firm-time dimension. The dependent variable in all the specifications is the $\Delta \log \text{credit}_{fbt}$.

We find similar results as in our baseline model in **Table 4**, suggesting that the credit supply varies depending on bank-specific characteristics. In column (1), we find that increases in the banks' assets and capital ratios are associated with more lending growth. In column (2), we observe that, as expected, banks tend to lend less to riskier firms compared to safer ones (in line with the evidence in Jiménez et al., 2014; Ioannidou et al., 2015). On average, a risky firm receives 13.4 percent less credit than a safer firm (column 3). Interestingly, in all the specifications we observe that banks with high number of subsidiaries are associated with higher loan growth than domestic banks. The estimated coefficient of the interaction between the number of subsidiaries and risky firms suggests that the internationalization of banks dampens the negative effect of firms' riskiness on receiving new loans. The estimated coefficients are statistically significant in columns (2) to (4), indicating that these effects are observed over the exiting pool of borrowers and the new set of borrowers.

The interaction terms of the bank characteristics with changes in monetary policy rates remain relatively similar as in our baseline models. As found in **Table 2** and **Table 4,** we observe that increases in the monetary policy rate are associated lo lower lending growth in all the specifications. In column (3), the estimated coefficient of Δ *MP rate* suggests that an increase of 100 bps in the policy rate is associated with a decline of 1.32 pp in the supply of credit after two quarters. In columns (1) and (4), increases in bank capital and liquidity are associated with a lower response of the supply of credit to monetary policy rates (i.e., capitalization and liquidity reduce the negative effect of increases in policy rates over lending growth). We find that the supply of credit to both existing and new borrowers from international banks responds *less* to policy rates changes than to the one from more domestic banks. In column (3), a 100-bps increase in the policy rate decreases the supply of credit of international banks by 0.73 pp less than domestic banks, which means a lower reduction in loan growth on about 55 percent of the estimated reduction for domestic banks (1.32 pp). We also observe that banks with more subsidiaries that are otherwise better capitalized or with higher liquidity have a more muted response to monetary policy changes

(columns 1, 3, and 4). This confirms our previous results, indicating that for the same level of capitalization or liquidity, banks with a high number of subsidiaries react less to changes in policy rates compared to banks without subsidiaries.

The results also reveal that increases in the policy rate are associated with fewer loans received by risky firms, meaning that during monetary policy loosening, banks tend to lend more to risky borrowers (columns 2 and 3) and to extend more credit to new borrowers (column 4) (i.e., higher search for yield), as predicted by the risk-taking channel of monetary policy. In column (3), a 100-bps increase in the policy rate decreases the supply of credit to risky firms by 7.7 percent more than safer firms. The interaction of the risky firm variable with changes in policy rates and internationalization indicates that the observed risk-taking channel of monetary policy is partially mitigated by internationalization: banks with higher subsidiaries increase lending to riskier firms by less following monetary policy expansions as compared to more domestic banks (columns 2 to 4). This result confirms that international banks appear more insulated from the impact of monetary policy changes and that internationalization alleviates search for yield based on the higher access to foreign investment opportunities. The internal capital market hypothesis can explain this finding. The global operations of international banks reduce the sensitivity of bank lending to domestic monetary policy conditions (de Haas and van Lelyveldt 2010; Cetorelli and Goldberg, 2012b).

In **Table 7,** we present the results for loan rates using the Δ loan rates $_{fbt}$ as dependent variable. We confirm our findings on the role of banks' characteristics in the transmission of monetary policy to loan rates over both the existing pool of borrowers and the new set of borrowers. We observe that an increase in the bank's size is associated with lower loan rates (column 1). Moreover, international banks charge lower loan rates compared than domestic banks either in loans granted to known borrowers (columns 1 to 3) or new borrowers (column 4). We find that for the same level of liquidity, banks with a high number of subsidiaries charge lower loan rates to new borrowers than banks without subsidiaries (column 4). In column (2), we find that risky firms are associated with higher loan rates and that banks with more international presence charge lower loan rates to these firms than domestic banks. This result is observed in the sample of existing and new borrowers (columns 2 to 4), confirming that international banks better tolerate the borrowers' riskiness as compared to domestic banks.

We confirm that international banks transmit *less* the changes in monetary policy rates to loan rates than domestic banks (columns 1 to 4). The estimated coefficient in column (3) indicates

that after a 100-bps increase in the policy rate, international banks increase loan rates by 17 bps *less* than domestic banks after two quarters, suggesting that internationalization reduces about 46 percent of the transmission of monetary policy rates to loan rates. Risky firms are associated with higher (lower) loan rates following increases (reductions) in policy rates, supporting the risk-taking channel of monetary policy. Interestingly, we observe that banks with higher international activity do not engage in more risk-taking during an expansionary monetary policy. They do not decrease loan rates by more to risky firms during reductions in policy rates compared to domestic banks, indicating less search for yield as observed with the supply of credit to risky firms in **Table 6**. This result is consistent with international banks' lower sensitivity to monetary policy changes compared to domestic banks.

In **Table A1** we present a robustness test of equation (2) using the full sample of 2,956,311 bank-firm-quarter loan observations and the share of assets abroad to total assets as an alternative measure of internationalization (i.e., $Int.\ Bank_{bt-1}$ is equal to 1 (0) for banks with a share of assets abroad to total assets above (below) the median during the evaluated period). We also employ the change in the monetary policy rate lagged three periods instead of the two-period lag used in the baseline model. The results confirm that international banks react less in the supply of credit (panel A) and loan rates (panel B) to monetary policy changes compared to domestic banks. The estimated effects of the changes in policy rates on both loan growth and loan rates are lower than when we use the two-lags of monetary policy changes, albeit they remain statistically significant, showing evidence on monetary policy transmission to credit conditions.[14] Moreover, the results confirm that international banks engage on less risk taking compared to domestic banks during changes in policy rates.

5.4.Domestic vs. foreign funding and the internationalization of banks

In the previous section, we identify international banks seem to respond less to monetary policy than domestic banks. The internal capital market hypothesis explains this behaviour: international banks are better at attracting funds and at reallocating liquidity across the different

[14] We find that the estimated effects of monetary policy changes on credit conditions are very low after five quarters and insignificant after six quarters, which indicates that the agents (banks and firms) fully incorporate expectations on future policy rates after more than one year of a change in the monetary policy stance (see, Kashyap and Stein; 2000; Ashcraft, 2006; Altavilla et al., 2020)

jurisdictions than domestic banks (Cetorelli and Goldberg, 2012b). In this section, we explore how the internationalization of banks affects their funding structures and how it responds to monetary policy changes. To do this, we estimate equation (3) using bank quarter-level data and test the influence of monetary policy on the growth rate of deposits and foreign funding.

The effects of monetary policy on domestic funding are presented in **Table 8**, where the dependent variable $\Delta\ Ln\ Deposits_{bt}$ corresponds to the change in the log of deposits of bank *b* at time *t*. In columns (1) to (3), we employ our main measure of internationalization ($Subsidiaries_{bt-1}$), while in columns (4) to (6), we use the alternative measure ($Int.\ Bank_{bt-1}$). We find that banks with a high number of subsidiaries are associated with higher growth of deposits, between 5.3 pp and 4.2 pp, compared with banks without subsidiaries (columns 1 and 2). Then, we observe that an increase in the policy rate is associated with higher growth of deposits. In column (2), an increase of 100 bps in the policy rate is related to an increase of 1.46 pp in the growth rate of deposits after two quarters. The interaction of the indicator of subsidiaries with changes in monetary policy rates indicates that international banks do not increase deposits as much as domestic banks following an increase of policy rates. The estimated coefficient suggests that international banks increase deposits by 0.81 pp, following an increase of 100 bps in the policy rate, 44 percent less of the observed change in deposits for domestic banks (1.46 pp). This effect survives to the inclusion of bank and time-fixed effects (column 3). Similar results are observed when we use the share of assets abroad as an alternative measure of internationalization (columns 4 to 6), albeit the economic effect is lower than the one observed with the indicator of subsidiaries. These results suggest that banks with a high international presence attract more deposits than domestic banks. Still, in response to a monetary policy tightening, they attract fewer deposits than banks without an international presence.

The results for the effects of internationalization and monetary policy on the growth of foreign funding are presented in **Table 9**. We employ the same model stated in equation (3) but using $\Delta Ln\ Foreign\ Funding_{bt}$ as dependent variable. In columns (1) and (2), we observe that international banks receive a larger amount of foreign funding (around 6.9 pp and 7.15 pp) compared with domestic banks, which can be related to the higher access to foreign markets (Doerr

and Schaz, 2021).[15] We also observe that a monetary policy tightening is associated to higher use of foreign funding: A 100-bps increase in the monetary policy rate is associated with an increase of 2.28 pp in the rate of growth of foreign funding two quarters later. The interaction of the indicator of subsidiaries with changes in monetary policy rates indicates that international banks rely *more* on foreign funding during a policy rate change, than domestic banks (columns 1 to 3). The estimated coefficient in column (2) suggests that, following an increase of 100 bps in the policy rate, international banks increase foreign funding by 1.31 pp more than domestic banks, which is around 57 percent more of the estimated increase in foreign funding for domestic banks (2.28 pp). The results are relatively similar when we use the share of assets abroad as an alternative measure of internationalization (columns 4 to 6). The results suggest that international banks can attract more funds (domestic and foreign). During a monetary policy tightening, they rely more on foreign funding (and less on deposits) than domestic banks. This result can explain the lower sensitivity of their credit supply to changes in policy rates vs. domestic banks, as banks that raise deposits also contract their lending by more than other banks during a monetary policy tightening (Drechsler et al., 2017).

5.5.FX macroprudential regulation, internationalization, and monetary policy transmission

FX macroprudential regulation is an important tool used by the central bank of Colombia to mitigate currency mismatches and excessive FX borrowing by financial intermediaries (see Vargas et al., 2017; Dias et al., 2019). Since 2007, the central bank limited the 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. This FX exposition limit establishes that the sum of the bank's debt and assets denominated in foreign currency should be less than 500% of the bank's capital equity. Thus, the regulation imposes a limit to the use of foreign funding subject to the bank's capital, which could affect the allocation of liquidity across jurisdictions (i.e., reducing the role of the internal capital markets) and, therefore, enhances the monetary policy transmission. In this section, we use the specification in (3) to explore whether international banks approaching the

[15] In our sample there are banks that are not internationalized but have foreign funding. The correlation among the number of subsidiaries and the share of foreign funding is 0.38. The correlation matrix among the bank characteristics including the number of subsidiaries is presented in **Table 2A**.

regulatory FX limit, also reduce their exposition in foreign markets. Hence are more affected by the stance of monetary policy.

The results are presented in **Table 10**. In columns (1) and (3), we confirm that international banks can attract more deposits and foreign funding than domestic banks (in about 4.8 pp and 7.9 pp, respectively) and that international banks rely more of foreign funding (and less on domestic funding) during a monetary policy tightening compared with domestic banks (columns 2 and 4). Then, we observe that banks approaching the regulatory limit of FX funding tend to reduce foreign funding and rely more on domestic funding, indicating that FX macroprudential regulation does limit higher foreign borrowing. These effects in the funding structure are also observed for international banks, albeit at a lower magnitude. We find also that monetary policy conditions reinforce the constraining effect of the FX regulation on foreign borrowing: the interaction of our indicator of banks approaching the FX exposition limit with changes in monetary policy shows that those banks rely more on domestic funding and less on foreign funding during a monetary policy tightening. Thus, banks approaching the regulatory limit of FX funding tend to reduce their exposition in foreign markets and hence are more affected by the domestic monetary policy. The estimated coefficient of the triple interaction between internationalization, FX funding limit, and the policy rate suggests that during a monetary policy tightening, the reduction in foreign funding for banks with high FX exposition is lower if they have a high number of subsidiaries vs. those without subsidiaries, while the associated increase in the use of deposits is similar for both international and domestic of banks.

Taken together, these results indicate that international banks tend to rely more on foreign funding (and less on domestic funding) to insulate the policy rate changes over the supply of credit, which is explained by their advantages in the use of internal capital markets. Furthermore, we show that FX macroprudential regulation could limit the banks' reliance on foreign funding as banks approaching the regulatory FX funding limit tend to reduce the use of foreign funding and to rely more on domestic funding even for banks with high international presence, which makes those banks more affected by monetary policy conditions. Thus, FX macroprudential regulation can effectively reduce borrowing in foreign currency by banks (Anhert et al., 2021) and hence reinforce the monetary policy transmission (Altavilla et al., 2020b).

6. Conclusions

The internationalization of domestic banks has been a recent trend in most emerging markets that poses additional challenges to monetary and financial authorities. In this paper, we evaluate how the transmission of monetary policy to the supply of credit (i.e., the bank lending channel) is affected by the internationalization of banks. In our identification, we exploit the significant expansion of Colombian banks abroad, mainly driven by domestic and external conditions, including the retrenchment of euro area banks from Central American banking systems in the post-crisis periods (i.e., global financial crisis and sovereign debt crisis). To our knowledge, this is the first paper that evaluates the potential effects of the internationalization of banks over the monetary policy transmission in an emerging economy.

Our evidence on the effects of internationalization on monetary policy transmission and the risk-taking channel of monetary policy is consistent with the internal capital markets hypothesis predictions. That is, internationalization allows banks to have more access to foreign markets, which insulates the effects of changes in monetary policy on their supply of credit. Using bank-firm-loan-level data, we find that international banks have a dampened response to changes in monetary policy rates compared to domestic banks. We find that international banks' loan growth and loan rates respond less to policy changes than domestic banks.

Said internationalization channel extends the traditional bank lending channel focused on capitalization and liquidity because it suggests that internationalization weakens the potency of the bank lending channel of monetary policy. Moreover, we find that banks with more international presence seem to tolerate their credit risk exposition better. The risk-taking channel of monetary policy is mitigated by internationalization partially. Thus, internationalization can alleviate the search for yield due to the higher access to foreign investment opportunities (i.e., diversification).

When the policy rate changes, we show that international banks tend to rely more on foreign funding (relative to domestic funding), which explains the fact that banks can insulate better the monetary policy changes on the supply of credit. In the end, our results support the internal capital market hypothesis, given that international banks seem to have higher access to foreign investment opportunities that reduce their search for yield, and greater foreign sources of funding that shield their credit from monetary policy conditions' changes. Moreover, we find that FX macroprudential regulation constrains the banks' reliance on foreign funding, including those with high international presence. The latter results suggests that FX macroprudential regulation

reinforces the bank-lending channel of monetary policy. Thus, our findings show that the internationalization of domestic banks has implications for the monetary policy transmission and the financial stability of the domestic banking system.

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Figure 1. The internationalization of domestic banks: Subsidiaries and assets abroad

Notes: This figure presents the number of branches and subsidiaries of Colombian banks abroad and the value of total assets of those branches and subsidiaries (in USD million) for the period 2006Q1-2017Q2. Data is from SFC.

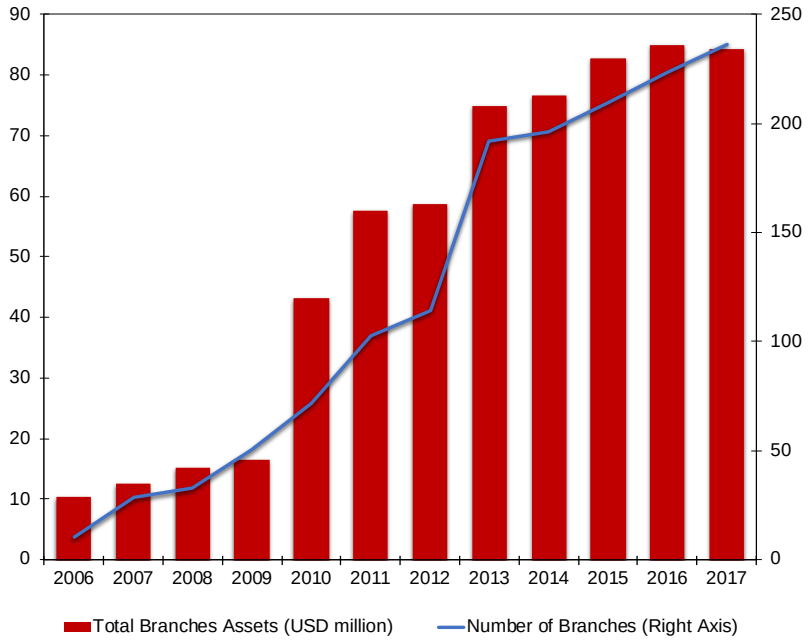
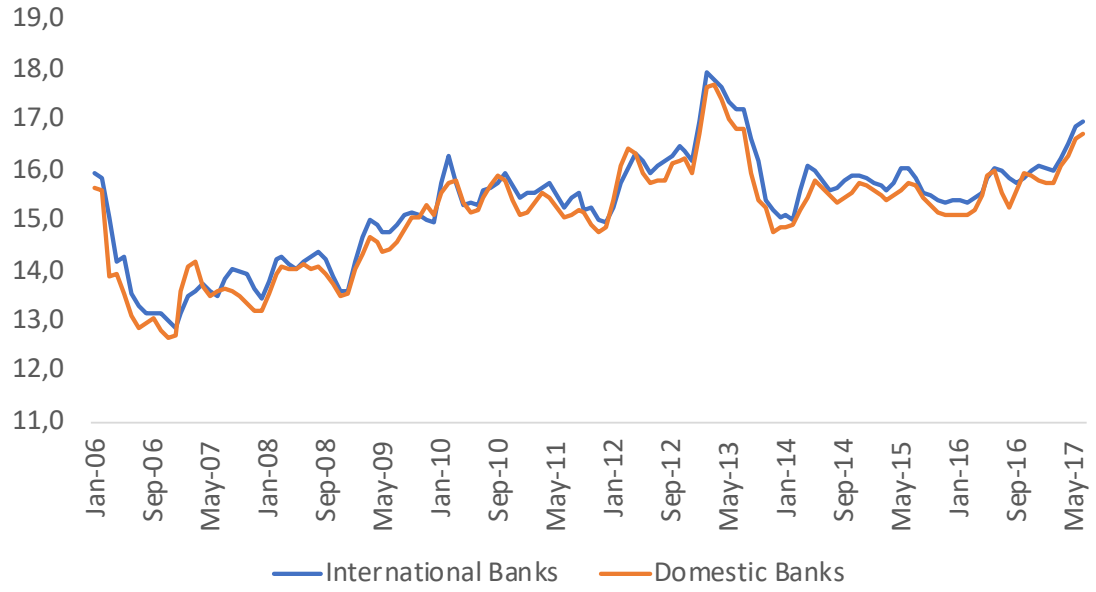


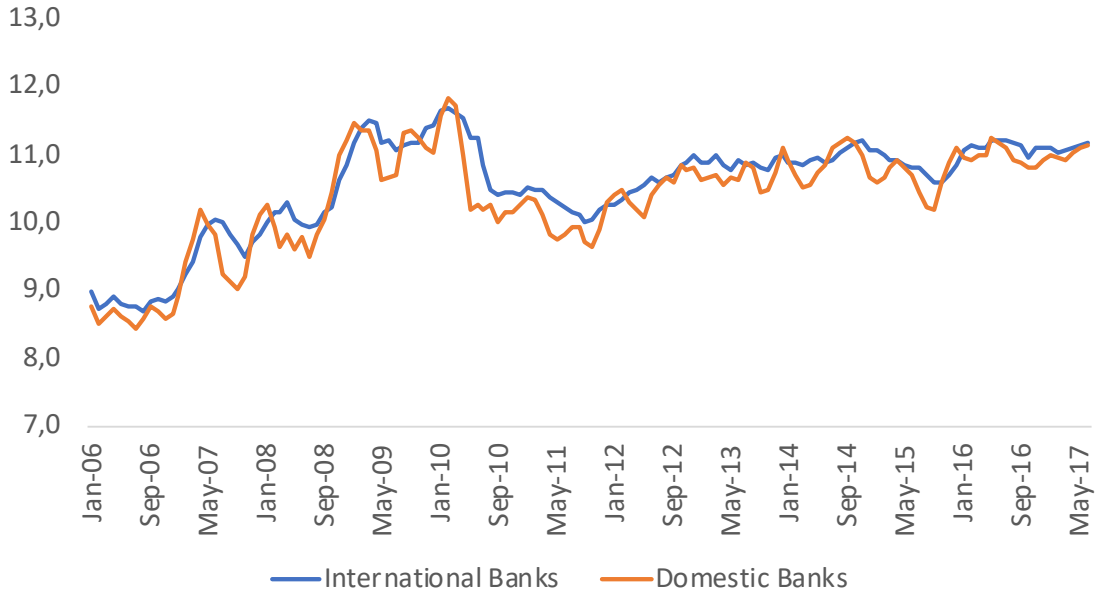
Figure 2. Banks' characteristics, credit risk and internationalization

Notes: These figures show the evolution of the Colombian banks' balance sheet and credit risk exposition for domestic and international banks. International banks are those banks with more than 12 subsidiaries and domestic banks are those without subsidiaries (i.e., 90th and 10th percentiles of the distribution of number of subsidiaries during the evaluated period). Panel A shows the evolution of capital ratio (Tier 2 capital over risk-weighted assets) in %. Panel B presents the liquidity ratio (liquid assets over total assets, in %). Panel C corresponds to the non-performance loans ratio (in %). Monthly data from SFC for the 2006Q1-2017Q2 period.

Panel A. Capital ratio (%)



Panel B. Liquidity ratio (%)



Panel C. Non-performing loans ratio (%)

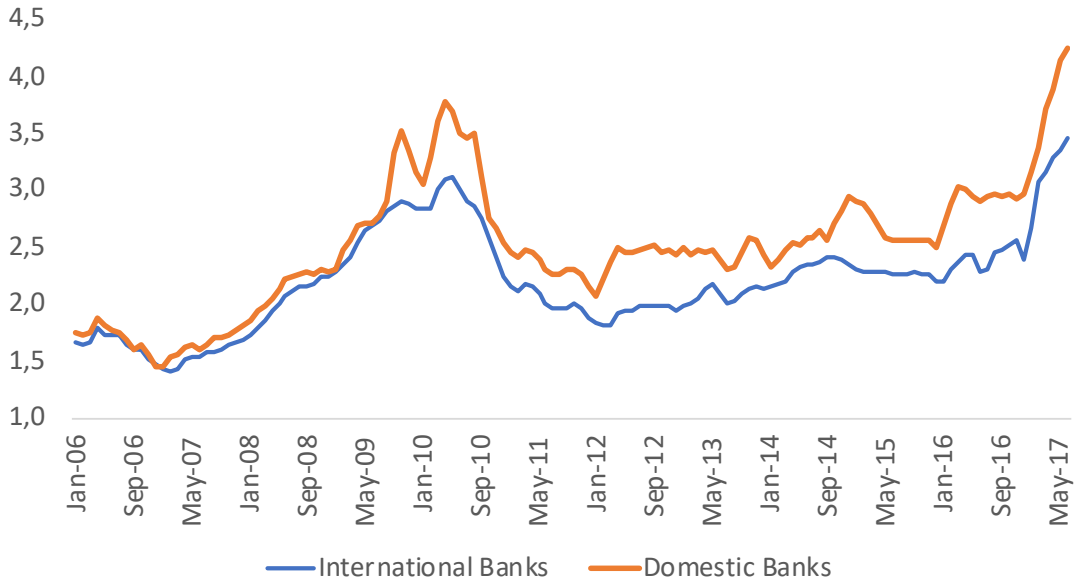
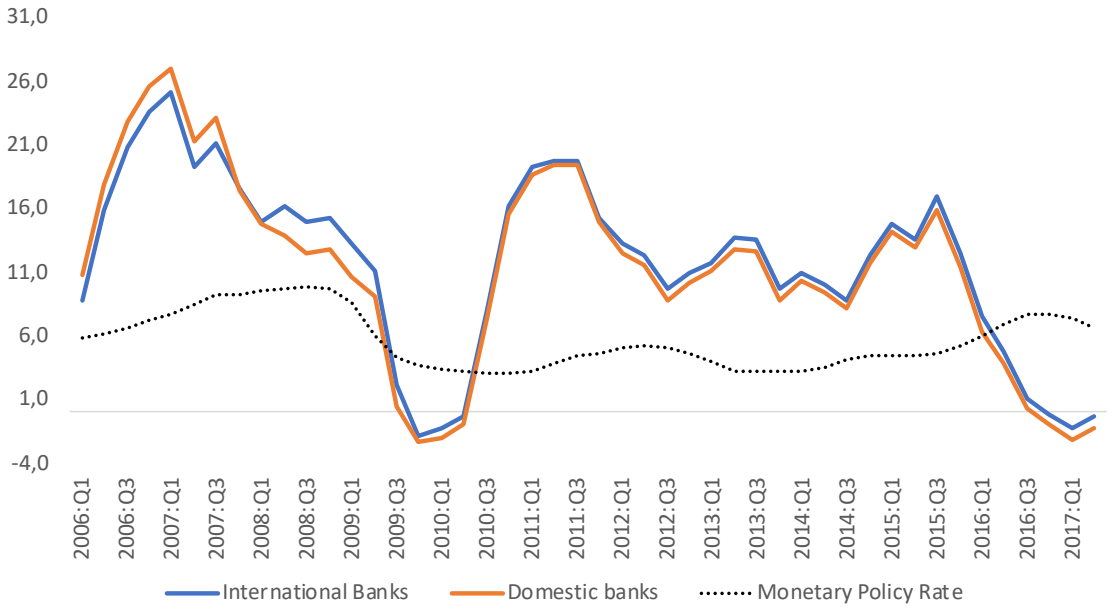


Figure 3. Corporate credit, monetary policy and internationalization

Notes: This figure depicts the evolution of corporate loan growth and loan rates along with the monetary policy rate. International banks are those banks with more than 12 subsidiaries and domestic banks are those without subsidiaries (i.e., 90th and 10th percentiles of the distribution of number of subsidiaries during the evaluated period). Panel A depicts the corporate loan growth in real terms (%) and Panel B presents the corporate loan rates (in %). Quarterly data from SFC and Banco de la República for the 2006Q1-2017Q2 period.

Panel A. Corporate loan growth (%, in real terms)



Panel B. Corporate loan rates (%)

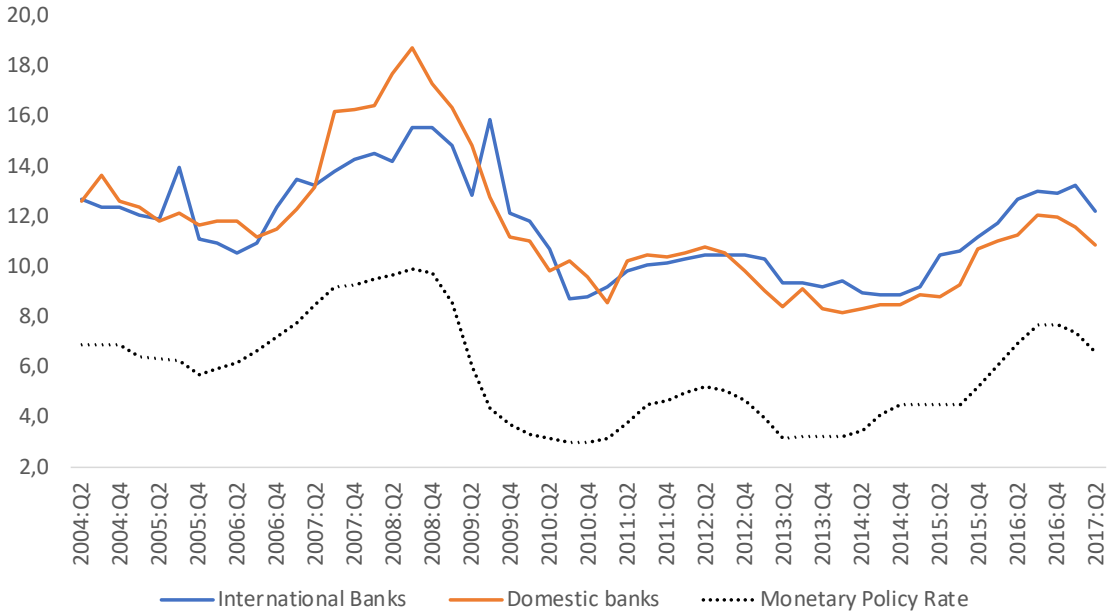


Table 2. Banks' characteristics and the transmission of monetary policy (loan growth)

Notes: The table reports OLS regressions using bank-firm-quarter loan observations for firms with multiple banks relationships for the period 2006Q1 to 2017Q2. The specifications in columns (1) to (3) use the full sample of loans composed by 2,956,311 observations, while column (4) uses a sample of 546,623 loans granted to new borrowers. The dependent variable is $\Delta\, Log\ credit_{fbt}$. $Subsidiaries_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). $\Delta\ MP\ rate_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**
ln (Total assets)$_{bt-1}$	0.0413**		0.0618**	0.0621**
	(0.0170)		(0.0223)	(0.0167)
Bank capital ratio$_{bt-1}$	0.1874**		0.2635***	0.3872***
	(0.0878)		(0.1113)	(0.1228)
Bank liquidity ratio$_{bt-1}$	-0.2183		-0.1872	-0.4125
	(0.2462)		(0.2365)	(0.2974)
Doubtful loans$_{bt-1}$	-0.2018*		-0.1702	-0.3904**
	(0.1125)		(0.0875)	(0.1931)
Subsidiaries$_{bt-1}$		0.0117**	0.0162**	0.0193**
		(0.0052)	(0.0086)	(0.0091)
ΔMP rate$_{t-2}$	-0.0117**	-0.0122**	-0.0111***	-0.0129***
	(0.0045)	(0.0051)	(0.0042)	(0.0049)
ln (Total assets)$_{bt-1}$*ΔMP rate$_{t-2}$	0.0045		0.0056	0.0039
	(0.0037)		(0.0061)	(0.0089)
Bank capital ratio$_{bt-1}$*ΔMP rate$_{t-2}$	0.0108*		0.0127	0.0118**
	(0.059)		(0.0075)	(0.0610)
Bank liquidity ratio$_{bt-1}$*ΔMP rate$_{t-2}$	0.0321		0.0292	0.0246
	(0.0281)		(0.0328)	(0.0321)
Doubtful loans$_{bt-1}$ *ΔMP rate$_{t-2}$	-0.0173***		-0.0156***	-0.0168***
	(0.0057)		(0.0054)	(0.0059)
Subsidiaries$_{bt-1}$ *ΔMP rate$_{t-2}$		0.0061***	0.0070***	0.0063***
		(0.0016)	(0.0012)	(0.0015)
R-squared	0.4723	0.4705	0.4821	0.4874
Firm*Bank FE	No	No	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	No	No
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes

Table 3. Banks' characteristics and the transmission of monetary policy (loan rates)

Notes: The table reports OLS regressions using bank-firm-quarter loan observations for firms with multiple banks relationships for the period 2006Q1 to 2017Q2. The specifications in columns (1) to (3) use the full sample of loans composed by 2,956,311 observations, while column (4) uses a sample of 546,623 loans granted to new borrowers. The dependent variable is Δ *loan rates*$_{fbt}$. *Subsidiaries*$_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). Δ *MP rate*$_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**
ln (Total assets)$_{bt-1}$	-0.0075**		-0.0118*	-0.0123**
	(0.0033)		(0.0065)	(0.0066)
Bank capital ratio$_{bt-1}$	0.0318		-0.0227	-0.0305
	(0.0304)		(0.0201)	(0.0374)
Bank liquidity ratio$_{bt-1}$	0.1834		0.2362*	0.3875***
	(0.1326)		(0.1204)	(0.1441)
Doubtful loans$_{bt-1}$	0.0562*		0.0531	0.0604*
	(0.0298)		(0.0418)	(0.0308)
Subsidiaries$_{bt-1}$		-0.0025***	0.0018	-0.0019*
		(0.0011)	(0.0016)	(0.0010)
ΔMP rate$_{t-2}$	0.2421**	0.1933**	0.2734**	0.2986***
	(0.1119)	(0.0905)	(0.1271)	(0.1013)
ln (Total assets)$_{bt-1}$*ΔMP rate$_{t-2}$	-0.0075		-0.0082	-0.0073
	(0.0044)		(0.0052)	(0.0076)
Bank capital ratio$_{bt-1}$*ΔMP rate$_{t-2}$	-0.0120		-0.1092	-0.1236
	(0.0085)		(0.1041)	(0.1084)
Bank liquidity ratio$_{bt-1}$*ΔMP rate$_{t-2}$	-0.0340**		-0.0421**	-0.0524***
	(0.0138)		(0.0132)	(0.0127)
Doubtful loans$_{bt-1}$*ΔMP rate$_{t-2}$	0.1927*		0.1592	0.1328***
	(0.0932)		(0.1173)	(0.0412)
Subsidiaries $_{bt-1}$*ΔMP rate$_{t-2}$		-0.1315***	-0.1273***	-0.1727**
		(0.0424)	(0.0513)	(0.0874)
R-squared	0.4318	0.4235	0.4416	0.4473
Firm*Bank FE	No	No	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	No	No
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes

Table 4. Monetary policy and the internationalization of banks (loan growth)

Notes: The table reports OLS regressions using bank-firm-quarter loan observations for firms with multiple banks relationships for the period 2006Q1 to 2017Q2. The specifications in columns (1) to (3) use the full sample of loans composed by 2,956,311 observations, while column (4) uses a sample of 546,623 loans granted to new borrowers. The dependent variable is $\Delta \log credit_{fbt}$. $Subsidiaries_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). $\Delta\ MP\ rate_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**
$Subsidiaries_{bt-1}$	0.0128**	0.0136***	0.0127**	0.0175***
	(0.0063)	(0.0045)	(0.0058)	(0.0046)
ln (Total assets)$_{bt-1}$	0.0387***		0.0402**	0.0374**
	(0.0123)		(0.0198)	(0.0181)
Bank capital ratio$_{bt-1}$	0.1062**		0.1435***	0.1563***
	(0.0501)		(0.0613)	(0.0721)
Bank capital ratio$_{bt-1}$ * $Subsidiaries_{bt-1}$	0.0318		0.0321	0.0413
	(0.0273)		(0.0254)	(0.0282)
Bank liquidity ratio$_{bt-1}$	0.1830		0.1725	0.1934
	(0.1102)		(0.1301)	(0.1471)
Bank liquidity ratio$_{bt-1}$ * $Subsidiaries_{bt-1}$	0.0623		0.0425	0.0392**
	(0.0424)		(0.0372)	(0.0184)
Doubtful loans$_{bt-1}$		-0.1425	-0.1358	-0.1471
		(0.1021)	(0.0876)	(0.0962)
Doubtful loans$_{bt-1}$ * $Subsidiaries_{bt-1}$		0.1629	0.1493**	0.1503***
		(0.0931)	(0.0721)	(0.0610)
Δ MP rate$_{t-2}$	-0.0125***	-0.0130*	-0.0144**	-0.0163**
	(0.0045)	(0.0059)	(0.0055)	(0.0065)
$Subsidiaries_{bt-1}$ * Δ MP rate$_{t-2}$	0.0074***	0.0059**	0.0067**	0.0088***
	(0.0031)	(0.0028)	(0.0032)	(0.0035)
ln (Total assets)$_{bt-1}$ * Δ MP rate$_{t-2}$	0.0057		0.0046	0.0051
	(0.0039)		(0.0039)	(0.0035)
Bank capital ratio $_{t-1}$ * Δ MP rate$_{t-2}$	0.0118		0.0123	0.0119
	(0.0063)		(0.0072)	(0.0082)
Bank capital ratio$_{bt-1}$* Subsidiaries $_{bt-1}$*Δ MP rate$_{t-2}$	0.0083***		0.0071	0.0121***
	(0.0039)		(0.0047)	(0.0062)
Bank liquidity ratio$_{bt-1}$* Δ MP rate$_{t-2}$	0.0108***		0.0114**	0.0126**
	(0.0043)		(0.0052)	(0.0062)
Bank liquidity ratio$_{bt-1}$* Subsidiaries $_{bt-1}$*Δ MP rate$_{t-2}$	0.0051*		0.0072**	0.0068**
	(0.0026)		(0.0037)	(0.0035)
Doubtful loans$_{bt-1}$ *Δ MP rate$_{t-2}$		-0.0093***	-0.0081***	-0.0102***
		(0.0024)	(0.0029)	(0.0037)

Doubtful loans$_{bt-1}$* Subsidiaries$_{bt-1}$*Δ MP rate$_{t-2}$		0.0054	0.0067	0.0052
		(0.0077)	(0.0073)	(0.0049)
R-squared	0.4457	0.4521	0.4506	0.4537
Firm*Bank FE	No	No	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	No	No
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes

Table 5. Monetary policy and the internationalization of banks (loan rates)

Notes: The table reports OLS regressions using bank-firm-quarter loan observations for firms with multiple banks relationships for the period 2006Q1 to 2017Q2. The specifications in columns (1) to (3) use the full sample of loans composed by 2,956,311 observations, while column (4) uses a sample of 546,623 loans granted to new borrowers. The dependent variable is Δloan rates$_{fbt}$. *Subsidiaries*$_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). *Δ MP rate*$_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**
Subsidiaries$_{bt-1}$	-0.0113*	-0.0135**	-0.0117***	-0.0128**
	(0.0057)	(0.0052)	(0.0043)	(0.0061)
ln (Total assets)$_{bt-1}$	-0.0136*		-0.0147**	-0.0162**
	(0.0071)		(0.0070)	(0.0078)
Bank capital ratio$_{bt-1}$	-0.0132		-0.0141	-0.0136
	(0.0105)		(0.0134)	(0.0125)
Bank capital ratio$_{bt-1}$ * Subsidiaries$_{bt-1}$	-0.0067		-0.0093	-0.0079
	(0.0072)		(0.0087)	(0.0064)
Bank liquidity ratio$_{bt-1}$	-0.1252		-0.1148	-0.1238
	(0.1021)		(0.1002)	(0.0931)
Bank liquidity ratio$_{bt-1}$ * Subsidiaries$_{bt-1}$	-0.0358		0.0234	-0.0248**
	(0.0221)		(0.0157)	(0.0121)
Doubtful loans$_{bt-1}$		0.0381	-0.0271	-0.0289
		(0.0419)	(0.0391)	(0.0306)
Doubtful loans $_{bt-1}$ * Subsidiaries $_{bt-1}$		-0.0372**	-0.0406***	-0.0421***
		(0.0187)	(0.0190)	(0.0184)
Δ MP rate$_{t-2}$	0.3121****	0.3611**	0.3592***	0.3384**
	(0.1704)	(0.1824)	(0.1721)	(0.1643)
Subsidiaries $_{bt-1}$ * Δ MP rate$_{t-2}$	-0.1841***	-0.1750*	-0.1502**	-0.1632***
	(0.0723)	(0.0863)	(0.0714)	(0.0528)
ln (Total assets)$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.1093***		-0.0872	-0.0921
	(0.0401)		(0.0523)	(0.0648)
Bank capital ratio$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.0832		-0.0792	-0.0629
	(0.0526)		(0.0475)	(0.0484)
Bank capital ratio$_{bt-1}$ * Subsidiaries$_{bt-1}$* Δ MP rate$_{t-2}$	-0.0391***		-0.0476*	-0.0578***
	(0.0115)		(0.0229)	(0.0273)
Bank liquidity ratio$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.1503		-0.1972***	-0.1731***
	(0.0924)		(0.0786)	(0.0819)
Bank liquidity ratio$_{bt-1}$* Subsidiaries $_{bt-1}$* Δ MP rate$_{t-2}$	-0.0572		-0.0536	-0.0582**
	(0.0328)		(0.0329)	(0.0267)
Doubtful loans $_{bt-1}$ * Δ MP rate$_{t-2}$		-0.0721	0.0834	0.0823
		(0.0592)	(0.0652)	(0.0592)

Doubtful loans $_{bt-1}$ * Subsidiaries $_{bt-1}$ * Δ MP rate$_{t-2}$		-0.0264**	-0.0536**	-0.0632***
		(0.0135)	(0.0254)	(0.0262)
R-squared	0.4371	0.4325	0.4753	0.4964
Firm*Bank FE	No	No	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	No	No
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes

Table 6. The risk-taking channel of monetary policy and the internationalization of banks (loan growth)

Notes: The table reports OLS regressions using bank-firm-quarter loan observations for firms with multiple relationships during the period 2006Q1 to 2017Q2. The specifications in columns (1) to (3) use a sample of 2,409,688 observations which corresponds to the full sample of loans without including the loans granted to the new borrowers, while column (4) uses a sample of 546,623 loans granted to new borrowers. The dependent variable is ΔLog credit. $Subsidiaries_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). $\Delta\ MP\ rate_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**
$Subsidiaries_{bt-1}$	0.0729***	0.0623*	0.0834*	0.0934**
	(0.0295)	(0.0301)	(0.0481)	(0.0474)
ln (Total assets)$_{bt-1}$	0.0534***			
	(0.0129)			
Bank capital ratio$_{bt-1}$	0.2451***			
	(0.0813)			
Bank capital ratio$_{bt-1}$* Subsidiaries$_{bt-1}$	0.0827		0.0954	0.1191
	(0.0621)		(0.0723)	(0.0932)
Bank liquidity ratio$_{bt-1}$	0.3627			
	(0.1452)			
Bank liquidity ratio$_{bt-1}$* Subsidiaries	0.0933		0.0822	0.0891**
	(0.0621)		(0.0581)	(0.0471)
Risky firm$_{fbt-1}$		-0.1124***	-0.1321***	-0.1227***
		(0.0418)	(0.0403)	(0.0425)
Risky firm$_{fbt-1}$* Subsidiaries$_{bt-1}$		0.0306**	0.0338***	0.0236*
		(0.0158)	(0.0119)	(0.0121)
Δ MP rate$_{t-2}$	-0.0137***	-0.0136*	-0.0132**	-0.0151**
	(0.0062)	(0.0069)	(0.0065)	(0.0075)
Subsidiaries$_{bt-1}$*Δ MP rate$_{t-2}$	0.0086***	0.0075***	0.0073***	0.0089***
	(0.0027)	(0.0035)	(0.0031)	(0.0029)
ln (Total assets)$_{bt-1}$ *Δ MP rate$_{t-2}$	0.0873*		0.0758	0.0793
	(0.0427)		(0.0492)	(0.0475)
Bank capital ratio$_{bt-1}$ * Δ MP rate$_{t-2}$	0.1922**		0.1565	0.1595**
	(0.0936)		(0.0834)	(0.0774)
Bank capital ratio$_{bt-1}$ * Subsidiaries$_{bt-1}$ * Δ MP rate$_{t-2}$	0.0964***		0.1121***	0.0986***
	(0.0394)		(0.0382)	(0.0373)
Bank liquidity ratio$_{bt-1}$ * Δ MP rate$_{t-2}$	0.3721**		0.3219	0.3531*
	(0.1622)		(0.1971)	(0.1726)
Bank liquidity ratio$_{bt-1}$ *Subsidiaries$_{bt-1}$ * Δ MP rate$_{t-2}$	0.1090***		0.1302**	0.1285**
	(0.0471)		(0.0625)	(0.0673)

Risky firm$_{fbt-1}$ *Δ MP rate$_{t-2}$		-0.0832**	-0.0772***	-0.0824***
		(0.0411)	(0.0381)	(0.0336)
Risky firm$_{fbt-1}$ * Subsidiaries$_{bt-1}$*Δ MP rate$_{t-2}$		0.0421***	0.0459***	0.0490***
		(0.0085)	(0.0093)	(0.0113)
R-squared	0.6426	0.6451	0.6562	0.6578
Firm FE	Yes	No	No	No
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	Yes	Yes
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank*Firm FE	No	Yes	Yes	Yes

Table 7. The risk-taking channel of monetary policy and the internationalization of banks (loan rates)

Notes: The table reports OLS regressions using bank-firm-quarter loan observations for firms with multiple relationships during the period 2006Q1 to 2017Q2. The specifications in columns (1) to (3) use a sample of 2,409,688 observations which corresponds to the full sample of loans without including the loans granted to the new borrowers, while column (4) uses a sample of 546,623 loans granted to new borrowers. The dependent variable is Δ Loan rate$_{fbt}$. *Subsidiaries*$_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). *Δ MP rate*$_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**
Subsidiaries$_{bt-1}$	-0.0142***	-0.0139***	-0.0141***	-0.0137***
	(0.0045)	(0.0039)	(0.0035)	(0.0032)
ln (Total assets)$_{bt-1}$	-0.0123***			
	(0.0038)			
Bank capital ratio$_{bt-1}$	-0.0145			
	(0.0092)			
Bank capital ratio$_{bt-1}$* Subsidiaries$_{bt-1}$	-0.0072		-0.0089	-0.0115
	(0.0061)		(0.0074)	(0.0089)
Bank liquidity ratio$_{bt-1}$	-0.0335			
	(0.0280)			
Bank liquidity ratio$_{bt-1}$* Subsidiaries$_{bt-1}$	-0.0176**		-0.0158**	-0.0172***
	(0.0083)		(0.0077)	(0.0065)
Risky firm$_{fbt-1}$		0.6135***	0.6721***	0.7394***
		(0.1805)	(0.1632)	(0.1286)
Risky firm$_{fbt-1}$* Subsidiaries$_{bt-1}$		-0.1637**	-0.1526**	-0.1736**
		(0.0861)	(0.0791)	(0.0832)
Δ MP rate$_{t-2}$	0.4081***	0.3910**	0.3782***	0.4284***
	(0.1121)	(0.1362)	(0.1105)	(0.1213)
Subsidiaries$_{bt-1}$*Δ MP rate$_{t-2}$	-0.1915***	-0.1814**	-0.1756**	-0.1802**
	(0.0871)	(0.0945)	(0.0861)	(0.0913)
ln (Total assets)$_{bt-1}$ *Δ MP rate$_{t-2}$	-0.0093***		-0.0087*	-0.0079
	(0.0036)		(0.0044)	(0.0042)
Bank capital ratio$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.0823		-0.0736	-0.0821
	(0.0460)		(0.0572)	(0.0529)
Bank capital ratio$_{bt-1}$ * Subsidiaries$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.0418***		-0.0435**	-0.0484**
	(0.0132)		(0.0191)	(0.0226)
Bank liquidity ratio$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.3364**		-0.3485**	-0.3685*
	(0.1561)		(0.1692)	(0.1871)
Bank liquidity ratio$_{bt-1}$* Subsidiaries$_{bt-1}$ * Δ MP rate$_{t-2}$	-0.0693*		-0.0570	-0.0580*
	(0.0372)		(0.0311)	(0.287)

Risky firm$_{fbt-1}$ *Δ MP rate$_{t-2}$		0.1153**	0.1190**	0.1382***
		(0.0529)	(0.0526)	(0.0516)
Risky firm$_{fbt-1}$ * Subsidiaries$_{bt-1}$*Δ MP rate$_{t-2}$		-0.0537**	-0.0594**	-0.0638***
		(0.0264)	(0.0225)	(0.0262)
R-squared	0.4821	0.4839	0.4931	0.5244
Firm FE	Yes	No	No	No
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	Yes	Yes
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank*Firm FE	No	Yes	Yes	Yes

Table 8. Domestic funding, monetary policy and the internationalization of banks

Notes: The table reports OLS regressions for a sample of 1,259 bank-quarter observations for the 2016Q1-2017Q2 period. The dependent variable is the $\Delta Ln\ Deposits_{bt}$. The measure of internationalization in columns (1) to (3) is $Subsidiaries_{bt-1}$ that is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). In columns (4) to (6) the indicator $Int.\ Bank_{bt-1}$ is equal to 1 (0) for banks with a share of assets abroad to total assets above (below) the median during the evaluated period. $\Delta\ MP\ rate_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors that are corrected for clustering at the bank level are reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
$Subsidiaries_{bt-1}$	0.0535***	0.0422***				
	(0.0074)	(0.0083)				
Δ MP $rate_{t-2}$	0.0163***	0.0146***		0.0113***	0.0116***	
	(0.0037)	(0.0041)		(0.0031)	(0.0047)	
$Subsidiaries_{bt-1}$*Δ MP $rate_{t-2}$	-0.0092**	-0.0081**	-0.0073***			
	(0.0047)	(0.0043)	(0.0014)			
Int. $Bank_{bt-1}$				0.0128***	0.0137***	
				(0.0053)	(0.0051)	
Int. $Bank_{bt-1}$*Δ MP $rate_{t-2}$				-0.0048*	-0.0054**	-0.0039*
				(0.0027)	(0.0028)	(0.0021)
R-squared	0.8732	0.8704	0.8819	0.8411	0.8582	0.8618
Time FE	NO	NO	YES	NO	NO	YES
Bank FE	YES	NO	YES	YES	NO	YES
Time-variant bank characteristics	NO	YES	YES	NO	YES	YES

Table 9. Foreign funding, monetary policy and the internationalization of banks

Notes: The table reports OLS regressions for a sample of 1,259 bank-quarter observations for the 2016Q1-2017Q2 period. The dependent variable is the $\Delta Ln\ Foreign\ Funding_{bt}$. The measure of internationalization in columns (1) to (3) is $Subsidiaries_{bt-1}$ that is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). In columns (4) to (6) the indicator $Int.\ Bank_{bt-1}$ is equal to 1 (0) for banks with a share of assets abroad to total assets above (below) the median during the evaluated period. $\Delta\ MP\ rate_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors that are corrected for clustering at the bank level are reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
$Subsidiaries_{bt-1}$	0.0692***	0.0715***				
	(0.0112)	(0.0176)				
Δ MP $rate_{t-2}$	0.0193***	0.0228***		0.0172***	0.0156***	
	(0.0024)	(0.0035)		(0.0042)	(0.0039)	
$Subsidiaries_{bt-1}$*Δ MP $rate_{t-2}$	0.0128**	0.0131***	0.0124***			
	(0.0063)	(0.0064)	(0.0052)			
Int. $Bank_{bt-1}$				0.0215***	0.0208**	
				(0.0074)	(0.0082)	
Int. $Bank_{bt-1}$*Δ MP $rate_{t-2}$				-0.0091**	-0.0104**	-0.0078**
				(0.0046)	(0.0041)	(0.0031)
R-squared	0.7724	0.7781	0.7813	0.7711	0.7725	0.7802
Time FE	NO	NO	YES	NO	NO	YES
Bank FE	YES	NO	YES	YES	NO	YES
Time-variant bank characteristics	NO	YES	YES	NO	YES	YES

Table 10. FX macroprudential regulation, monetary policy and the internationalization of banks

Notes: The table reports OLS regressions for a sample of 1,259 bank-quarter observations for the 2016Q1-2017Q2 period. The dependent variable in Panel A is the $\Delta Ln\ Deposits_{bt}$ and in Panel B is Δ *Ln Foreign Funding*$_{bt}$. *Subsidiaries*$_{bt-1}$ is an indicator variable equal to 1 for banks with more than 12 subsidiaries and 0 for banks without subsidiaries (i.e., 90th and 10th percentile of the distribution of the number of subsidiaries during the evaluated period). *FX Fund Limit*$_{bt-1}$ is an indicator equal 1 for banks in the 90th percentile (and 0 for banks in the 10th percentile) of the distribution of the FX funding limit. The FX funding limit states that the bank's FX assets plus FX liabilities should be less than 5 times the bank's equity). Δ *MP rate*$_{t-2}$ corresponds to the change in the monetary policy rate lagged two periods. Definitions of the variables can be found in Table 1. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(Panel A)** ΔLn Deposits$_{bt}$		**(Panel B)** ΔLn Foreign Funding$_{bt}$	
	(1)	**(2)**	**(3)**	**(4)**
Subsidiaries$_{bt-1}$	0.0482***		0.0787***	
	(0.092)		(0.0153)	
Δ MP rate$_{t-2}$	0.0171***		0.0290***	
	(0.0044)		(0.0051)	
Subsidiaries$_{bt-1}$*Δ MP rate$_{t-2}$	-0.0083**	-0.0072***	0.0127***	0.0134***
	(0.0041)	(0.0023)	(0.0041)	(0.0052)
FX Fund Limit$_{bt-1}$	0.0144**		-0.0172**	
	(0.0073)		(0.0081)	
Subsidiaries$_{bt-1}$*FX Fund Limit$_{bt-1}$	0.0019	0.0021	-0.0061***	-0.0042**
	(0.0015)	(0.0018)	(0.0014)	(0.0019)
FX Fund Limit$_{bt-1}$ *ΔMP rate$_{t-2}$	0.0053*	0.0067***	-0.0034**	-0.0029***
	(0.0027)	(0.0021)	(0.0015)	(0.0011)
Subsidiaries$_{bt-1}$*FX Fund Limit$_{bt-1}$*ΔMP rate$_{t-2}$	-0.0014	-0.0019	0.0013**	0.0016**
	(0.0028)	(0.0037)	(0.0004)	(0.0007)
R-squared	0.8719	0.8726	0.7724	0.7851
Time FE	NO	YES	NO	YES
Bank FE	NO	YES	NO	YES
Time-variant bank characteristics	YES	YES	YES	YES

Table A1. Credit conditions, internationalization of banks, and the risk-taking channel of monetary policy

Notes: The table reports OLS regressions of equation (2) using bank-firm-quarter loan observations for firms with multiple relationships during the period 2006Q1 to 2017Q2 using the full sample composed by 2,956,311 observations. The dependent variable in panel A is Δ Log credit$_{fbt}$ and Δ *Loan rate*$_{fbt}$ in panel B. The variable *Int. Bank*$_{bt-1}$ is equal to 1 (0) for banks with a share of assets abroad to total assets above (below) the median during the evaluated period. Δ *MP rate*$_{t-3}$ corresponds to the change in the monetary policy rate lagged three periods. Definitions of the variables can be found in Table 1A. Robust standard errors are clustering at the bank-time level and reported in brackets. *, **, and *** correspond to significance level at 10%, 5%, and 1%, respectively.

Model	**(Panel A)** Δ Log credit$_{bft}$		**(Panel B)** Δ Loan rates$_{bft}$	
	(1)	**(2)**	**(3)**	**(4)**
Int. Bank$_{bt-1}$	0.0320***	0.0294***	-0.0124***	-0.0117***
	(0.0138)	(0.0130)	(0.0053)	(0.0049)
Risky firm$_{bft-1}$		-0.1245***		0.7436***
		(0.0474)		(0.2582)
Risky firm$_{bft-1}$* Int. Bank$_{bt-1}$		0.0821**		-0.1847***
		(0.0418)		(0.0730)
ΔMP rate$_{t-3}$	-0.0117**	-0.0122**	0.2187***	0.2826***
	(0.0065)	(0.0062)	(0.0722)	(0.0673)
Int. Bank$_{bt-1}$*ΔMP rate$_{t-3}$	0.0042**	0.0051**	-0.1391*	-0.1924**
	(0.0019)	(0.0024)	(0.0702)	(0.0811)
Risky firm$_{bft-1}$ * ΔMP rate$_{t-3}$		-0.0937**		0.1829***
		(0.0321)		(0.0353)
Risky firm$_{bft-1}$ * Int. Bank$_{bt-1}$*ΔMP rate$_{t-3}$		0.0244***		-0.0371***
		(0.0094)		(0.0110)
R-squared	0.5721	0.5815	0.6124	0.6183
Firm FE	Yes	No	Yes	No
Bank FE	Yes	Yes	Yes	Yes
Bank-Firm Relationships	Yes	Yes	Yes	Yes
Bank-specific controls	Yes	Yes	Yes	Yes
Macroeconomic controls	Yes	Yes	Yes	Yes
Bank*Firm FE	No	Yes	No	Yes

Table 1- Descriptive statistics of variables used in the regressions

The table provides definitions and summary statistics for the variables employed in the analysis at the bank, firm, relationship and macroeconomic level. Bank-firm-loan data and banks' balance sheet information are from the credit registry *Superintendencia Financiera de Colombi*a (SFC). Macroeconomic variables are from Banco de la República.

Variables	Units	Definition	N	Mean	St. Dev	25th	Median	75th	10th	90th
Dependent variables										
Δ Log credit$_{bft}$	%	Quarterly change of the total loan amount	2,956,311	-5.94%	8.82%	-2.14%	-8.02%	3.78%	-7.23%	22.50%
Δ Log new credit$_{bft}$	%	Quarterly change of loans granted to new borrowers	546,623	-6.72%	7.21%	-3.71%	-9.26%	2.83%	-15.42%	17.68%
Δ Loan rate$_{bft}$	pp	Quarterly change of the loan rate (in percentage points)	2,956,311	5.30	3.80	3.56	3.26	4.27	-5.66	16.54
Δ Ln Deposits$_{bt}$	Log	Quarterly change of the log of total deposits (COP million)	1,259	12.19	3.36	4.68	13.73	17.38	2.27	21.74
Δ Ln Foreign funding$_{bt}$	Log	Quarterly change of the log of foreign funding (COP million)	1,259	7.24	4.87	5.97	7.09	9.98	3.85	14.23
Bank characteristics	**Units**									
Number of Subsidiaries$_{bt}$	#	Number of subsidiaries of the bank	1,259	4.67	5.04	0.00	2.00	7.00	0.00	12.00
Subsidiaries$_{bt}$	0/1	= 1 if the bank has more than 12 subsidiaries, = 0 for banks without subsidiaries.	1,259	0.52	0.49	0.00	1.0	1.0	0.00	1.0
Int. Bank$_{bt}$	0/1	= 1 (0) for banks with a share of assets abroad to total assets above (below) the median during the evaluated period	1,259	0.38	0.19	0.00	1.0	1.0	0.00	1.0
Log (Total assets)$_{bt}$	Log	Log of total assets (COP million)	1,259	23.98	0.98	23.40	24.12	24.70	24.82	25.51
Bank capital ratio$_{bt}$	%	Ratio of equity over total assets	1,259	13.53	3.56	11.29	13.46	16.04	10.90	19.33
Bank liquidity ratio$_{bt}$	%	Ratio of current assets over total assets	1,259	10.01%	9.99	3.75	7.54	13.03	3.11	14.02

Doubtful loans ratio$_{bt}$	%	Ratio of doubtful loans over total loans portfolio	1,259	3.41%	2,27	1.60	3.12	4.41	1.28	6.27
Loan-loss provision ratio$_{bt}$	%	Ratio of loan-loss provisions over total loans portfolio	1,259	2.95	1.68	1.74	2.66	3.63	1.32	15.19
Commissions ratio$_{bt}$	%	Ratio of commissions over total income	1,259	9.57	3.07	7.35	9.06	11.62	4.26	37.81
Short-term fund ratio $_{bt}$	%	Ratio of short-term funding over total liabilities	1,259	38.60	7.27	33.12	38.37	42.92	8.04	57.28
Foreign currency funding ratio$_{bt}$	%	Ratio of funding in foreign currency over total liabilities	1,259	4.07	2.81	2.04	3.88	5.50	1.73	25.19
ROA$_{bt}$	%	Ratio of net income over total assets	1,259	2.18	0.83	1.78	2.17	2.64	1.21	3.90
FX funding limit$_{bt}$	%	FX assets plus FX liabilities over bank's capital equity	1,259	123.21	130.19	1.40	166.27	240.12	0.17	337.42
Firm characteristics										
Log (Age as borrower)$_{ft}$	Log	The log of one plus the age as borrower (in months)	2.956.311	3.34	0.61	3.00	3.47	3.81	2.04	4.06
Previous default $_{ft}$	0/1	= 1 if the firm delinquent on a loan in the past, = 0 otherwise.	2.956.311	0.52	0.49	0.00	1.0	1.0	0.00	1.0
Risky firm$_{bft}$	1, 0	= 1 if the firm has a credit risk rating below A and 0 otherwise (i.e. from B to E)	2.956.311	0.223	0.380	0.00	0.262	0.00	0.00	1.0
Bank-Firm Relationship variables										
Previous default with the bank$_{bft}$	0/1	= 1 if firm has had an arrear before with the bank, = 0 otherwise.	2.956.311	0.28	0.45	0.00	0.00	1.0	0.00	1.0
Length of relationship $_{bft}$	quarters	Length of the bank-firm relationship.	2.956.311	18.52	13.64	8.00	15.00	27.00	4.00	63.00
Macroeconomic variables										
Δ MP rate$_{t}$	(pp)	Quarterly change in the domestic monetary policy rate (in percentage points)	42	1.91	1.69	-0.10	0.09	0.39	-1.32	1.00

Δ Log Real GDP$_t$	%	Quarterly change of the log of real GDP	42	3.99	1.89	2.61	3.53	5.75	1.16	6.23
Δ Exchange rate$_t$	%	Quarterly change of the exchange rate	42	5.84	16.81	-5.60	1.76	10.49	-19.37	38.41
Δ Current account$_t$	%	Quarterly change in the current account	42	9.02	41.60	-20.46	-1.65	28.43	-42.19	93.52

Table A2. Correlation matrix of the bank-level variables

Notes: This table reports the simple correlation coefficients among bank characteristics, including the number of subsidiaries. * denotes significance level at 1%. The variable definitions are presented in Table A1. Data is from SFC at the bank-level for the period 2006Q1-2017Q2.

	Subsidiaries	Capital ratio	Doubtful loans	Liquidity ratio	Log of Assets	Δ Log Foreign Funding.	Δ Log Deposits
Subsidiaries	1.000						
Capital ratio	0.116*	1.000					
Doubtful loans	0.069	-0.144	1.000				
Liquidity ratio	0.082*	0.093	-0.087	1.000			
Log of Assets	0.294*	0.089*	-0.090	0.427	1.000		
Δ Log Foreign Funding	0.382*	0.316*	0.059	0.105	0.430*	1.000	
Δ Log Deposits	0.134	0.272	-0.183*	0.381*	0.375*	0.179	1.000