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Isabel Argimón

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Abstract

We analyze how a change in ECB monetary policy affects lending of internationally active banks, depending on whether the currency of the claim is the one of the counterparty country, using Spanish individual bank data. We analyse the transmission from an outward perspective, exploring how banks adjust their foreign lending denominated in local and in foreign currency to changes in monetary policy, both cross-border and also through their affiliates located in other countries. We find that non-bank private claims in local currency respond much less to the ECB monetary policy stance than claims in foreign currency. We also find that the spillover effects on cross-border lending denominated in foreign currency depend on banks' characteristics. When we broaden the analysis to include claims to the public and the financial sector, the transmission of monetary policy is mainly through foreign currency loans, but bank heterogeneity plays a role in the transmission to local currency loans. In general, a tightening of the ECB monetary policy results in an increase in lending abroad. Exchange rate changes only affect foreign currency-denominated lending.

Keywords: monetary policy, international banking, bank credit, spillovers.

JEL classification: F34, F42, G15, G21.

Resumen

El artículo analiza cómo un cambio en la política monetaria del BCE afecta a los créditos concedidos por los bancos españoles con actividad internacional, dependiendo de si la moneda del préstamo es la del país de contraparte, utilizando datos bancarios individuales. Analizamos la transmisión desde una perspectiva externa, explorando cómo los bancos ajustan sus préstamos externos denominados en moneda local y en moneda extranjera a los cambios en la política monetaria, tanto si son transfronterizos como si son a través de sus filiales ubicadas en otros países. Encontramos que los créditos al sector privado no bancario en moneda local responden mucho menos a cambios en la política monetaria del BCE que los préstamos en moneda extranjera. También encontramos que el impacto sobre los préstamos transfronterizos denominados en moneda extranjera depende de las características de los bancos. Cuando ampliamos el análisis para incluir los préstamos al sector público y financiero, encontramos que la transmisión de la política monetaria se realiza principalmente a través de préstamos en moneda extranjera, pero la heterogeneidad bancaria desempeña un papel en la transmisión a préstamos en moneda local. En general, un endurecimiento de la política monetaria del BCE genera un aumento de los préstamos en el exterior. Los cambios en el tipo de cambio solo afectan a los préstamos denominados en moneda extranjera.

Palabras clave: política monetaria, banca internacional, crédito bancario, *spillovers.*

Códigos JEL: F34, F42, G15, G21.

1   Introduction

The financial crisis has reactivated the debate over the possibility that monetary policy pursued by lending countries could have negative spillover effects in counterparty countries, through the international activity of banks that operate in foreign countries either through local affiliates or cross-border lending (e.g. Hofmann and Takats 2015, Bruno and Shin 2015, Cetorelli and Goldberg 2012, Fratzscher et al. 2016, Chen et al. 2016, Correa and Murry, 2010). Such effect may further depend on the currency of the international transaction (Takats and Temesvary, 2016). The costly access to hedging of foreign currency risk or to borrowing in local currency may play a role in the cross-border transmission of monetary policy. Moreover, banking groups have followed different internationalization strategies (McCauley et al. 2010), which can be characterized in terms of the relevance of the role played by subsidiaries and local claims, in contrast to a strategy based on cross-border activity and intragroup funding (Gambacorta and van Rixtel, 2013). Both strategies have implications in terms of the currency denomination of loans, and through this channel may reinforce or mitigate the transmission of monetary policy abroad.

Recent studies find empirical evidence of international transmission of monetary policy through its effects on the supply of loans abroad by internationally active banks[1] . However, they reach conflicting conclusions as to the size and direction of such effect, with differential lending responses depending, in a large part, on the relevance of cross-border assets and liabilities in relation to total assets (Buch et al. 2018).

Another line of research is devoted to addressing how monetary policy in a given currency spills over national borders (e.g. Takats and Temesvary, 2016; Avdjiev and Takats, 2016; Avdjiev et al, 2018; Loeffler et al, 2017). These works, using BIS international data, either find that cross-border lending in a currency is affected by changes in the monetary policy of that currency (Takats and Temesvary, 2016) or that monetary easing in the currency of denomination of a loan (dollar or euro) typically leads to an expansion in cross-border bank lending denominated in that currency (Avdjiev et al. 2018). Loeffler et al. (2017) do not find evidence of outward transmission of monetary policy, but find that inward transmission of US monetary policy is larger, the more a bank funds its operations in US dollars.

Digging deeper into the mechanism of transmission, some empirical and theoretical work has been devoted to the role of centralized funding, currency mismatches and liquidity management in credit allocation (Bruno and Shin, 2015; Cetorelli and Goldberg, 2012; Ivashina et al. 2015 ; Schmidt-Eisenlohr, 2017). Using loan-level data on international syndicated lending activity, Ivashina et al. 2015 show that cross-border lending can depend on the bank's currency choices used in funding and lending, with disproportionate responses to the lending that has a currency mismatch with the funding shock. Schmidt-Eisenlohr, 2017 show that the effects of currency volatility on banks risk do not only depend on the currency composition of banks' balance sheet as borrowing firms do not perfectly hedge against exchange rate risk and therefore it may translate into credit risk for banks.

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1 See, for instance, the work that the International Banking Research Network (IBRN) has coordinated on the cross-border transmission of monetary policy through bank lending. (Buch et al. 2018). See Argimon et al 2018, for monetary policy transmission through other types of financial institutions.

The goal of this paper is to explore how changes in domestic monetary policy affect foreign lending of domestic banks, via their affiliates located in other countries and via direct cross-border lending by headquarters or other affiliates abroad, depending on whether the loans are in local currency or in foreign currency. We want to assess whether the international portfolio of a bank is affected by domestic monetary policy shocks, distinguishing between claims denominated in local currency and those denominated in foreign currency, as they may have different relative risks and may be differently affected by the monetary policy induced exchange rate changes. As a monetary tightening at home leads to exchange rate appreciation, we can expect that the bank's management of exchange rate risk may lead to different effects depending on the currency of the claims, controlling for its change in denomination[2] . The paper considers the transmission of monetary policy from an outward perspective, using supervisory data for banks headquartered in Spain to assess the relevance of spillover effects. The paper follows the strategy of analysis introduced by Kashyap and Stein (2000) and later applied by Cetorelli and Goldberg (2012) to the international context to better identify the channels and the effect of monetary policy, following the approach in Buch et al. (2018) of identification through bank heterogeneity.

We find that non-bank private claims in local currency respond much less to the ECB monetary policy stance than claims in foreign currency. We find evidence that the cross-border transmission of monetary policy to the real sector takes place, mostly, through cross-border claims denominated in foreign currency. We also find that the spillover effects on cross-border lending denominated in foreign currency depend on banks' characteristics. When we broaden the analysis to include claims to the public and the financial sector, the transmission of monetary policy is mainly through foreign currency loans, but bank heterogeneity plays a role in the transmission to local currency loans. In general, a tightening of the ECB monetary policy results in an increase in lending abroad. Finally, we also gather evidence that exchange rate changes only affect lending denominated in foreign currency.

Our contribution to the literature is threefold. First, the use of individual bank-level data allows us to better identify the effects of monetary policy on the foreign claims of banks and the channels of transmission or form of friction. Second and more importantly, we focus on the differential effects of local versus foreign currency for the outward transmission of monetary policy shocks taking into account the counterparty country, which to our knowledge, has not been addressed yet[3]. And third, we provide evidence on the relevance of bank's reliance on local activity in local currency, as an internationalization model, for the cross-border spillover effects of monetary policy.

The paper is organized as follows. Section 2 presents the data. Section 3 describes the empirical approach. The results for bank lending to the private sector by currency of denomination and distinguishing by type of claims are in Section 4. Section 5 presents the results for lending to the whole economy. Section 6 addresses the direct relevance of exchange rate changes and Section 7 concludes.

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[2] The stock of assets denominated in foreign currency is automatically reduced with an exchange rate appreciation (when converted back into the reporting currency, which is the home currency.

[3] Loeffler et al. 2017 analyse the inward transmission of monetary policy, i.e. the effects on the home country of monetary policies of jurisdictions where the bank has activity.

2   Data

We use quarterly balance sheet confidential reports submitted by Spanish banks to the Banco de España, for the prudential supervision of the Spanish banking system, covering the period 2000Q1 to 2014Q4. We analyse the international activity of all Spanish banks and, among them, of those that have foreign affiliates that are classified as credit institutions or financial credit institutions[4]. Spanish banks expanded internationally, mostly at the end of the nineties, although some banks increased their geographical scope in the twenty first century, so that we observe several banks changing from domestic to international in our database.

We use and combine different supervisory reports provided by banks to the national central bank. The data for the foreign activity of Spanish banks are taken from bank-specific reporting to the Banco de España for the BIS International Banking Statistics, so that they are internationally comparable. These bank-specific data are accessible within the Banco de España for research and policy purposes, besides its supervisory use, but are not publicly shared. Each banking group (or individual bank) has to provide data to the supervisor, in relation to each foreign affiliate or when its cross-border activity to a specific country is above 5 million €. In particular, we use the information provided by banks by counterparty country. We consider the claims of a bank in a given country that are provided by either branches or subsidiaries established abroad with residents in that country (local lending) or which are provided from other affiliates of the banking group not located in that country (cross-border lending). We analyze them jointly and separately to test for the possibility of different transmission effects between these two types of claims on top of the potential differences by currency denomination. The initial database consists of 72 internationally active Spanish banks in 103 countries.

For the Spanish banking system as a whole the weight of total foreign claims over total assets has been above 40% since 2005 and has been increasing since the crisis, in contrast to the sharp decline observed in international bank loans in most jurisdictions (Cetorelli and Goldberg, 2011). This does not imply that Spanish banks have been alien to the generalised tendency of global banks since the crisis to retrench from some geographical regions and/or business lines, but the overall weight of foreign activity has increased. Moreover, the weight of local claims over total foreign claims (and of local liabilities over total foreign liabilities) has been above 75% (Figure 1) in the same period, which makes the Spanish banking system stand out as one with the largest share of local activity among the major banking systems (McCauley et al. 2010).

We focus the analysis on total claims on the private non-financial sector of each country[5], which on average account for half the total claims abroad, as we are interested in the real sector effects. We use claims on non-euro-area residents only, as claims on euro-area residents should be considered domestic because we are trying to assess the effect of the common ECB monetary policy. We distinguish between lending in foreign and in local currency in each counterparty country. Table A1 contains the average, minimum and maximum values,

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4 The so-called «Filiales entidades de crédito y filiales establecimientos financieros de crédito". We link bank subsidiaries to their parent bank when it holds at least 50% of a bank's equity or has its control.

5 In particular, we use total financial assets which are not capital instruments, nor derivatives and which are not to Public Administrations, Central Banks or Credit institutions.

calculated on a yearly basis, of the weight that local and foreign denominated loans in a country have on total foreign loans.

For the Spanish banking system as a whole, the weight of foreign claims denominated in local currency (i.e. the domestic currency of the counterparty country) over total foreign claims to the private sector is over 65% in all the period of analysis and nearly reaches 90% since 2009, as recorded in Figure 2. However, this reflects the activity of large banks, as if we consider bank averages, the weight of claims denominated in foreign currency is above 77% of total private claims (Figure 3). In fact, the relevance of currency denomination and type of claim differ between largest and smallest banks, so that for small banks cross-border claims denominated in foreign currency account on average for more than 87% of total foreign claims, while for large banks this proportion is reduced to 46%. In particular, for the largest two banks, the proportion of claims denominated in foreign currency is below 20%. At the level of banks, local claims account for more than 90% of total activity in local currency, while cross-border claims are more concentrated in foreign currency (Figure 3), for both large and small banks. Cross-border claims in local currency still account on average for over 11% of total claims, a proportion which is 18% for the largest eight banks.

A change in reporting took place in the second term of 2005, which resulted in changes in the definitions of some reported variables, among which total assets. While we have a homogeneous series for the assets at the consolidated level, we do not have such homogeneity in the data referring to the activity of subsidiaries abroad and cross-border data, although the changes need not be very large and should not affect the results.

3   Empirical method and variable definition

To analyse how changes in domestic monetary policy affect changes in Spanish banks' lending to the non-bank private sector abroad, we start by estimating equations of the type:

$$\Delta Y_{b,j,t} = \alpha_0 + \sum_{k=0}^{3} \alpha_{1,k}\, \Delta MP_{t-k}^{domestic} + \alpha_4\, X_{b,t-1} + \alpha_5\, Z_{t-1}^{domestic} + \alpha_6\, Z_{j,t-1} + \alpha_7 VIX_{t-1} + f_b$$

$$+ f_j + \varepsilon_{b,j,t} \tag{1}$$

The dependent variable $\Delta Y_{b,j,t}$ is the lending provided by Spanish bank b in country j in quarter t, obtained as the log change in lending, adjusted for exchange rate fluctuations, to proxy banks' foreign flows. Specifically, it is the difference between the natural log of the claims at t and the natural log of the exchange rate-adjusted outstanding claims at $t-1$. We drop observations if the change in log claims is > 1 or < -1 (thus excluding most major changes due to mergers and acquisitions and other structural breaks). We exclude bank-country observations at time t if only one bank operates in that country at time t. We also drop bank-country observations for which we do not have eight consecutive observations, that is, two full consecutive years of a bank's activity in a given country. Finally, we drop foreign claims in countries for which we do not have information on their macroeconomic variables, which we need as controls.

We initially focus the analysis on total loans to the private non-financial sector and in Section 5 we present the results considering all foreign exposures. Therefore, in this initial part lending to the financial sector is not included, particularly inter-bank loans, nor are loans to the public sector. Total claims are obtained as the sum of local lending in foreign and domestic currency and cross-border lending in both types of currencies.

$\Delta MP^{domestic}_{t-k}$ is the change in domestic monetary policy at time $t-k$ and has only time variation. We include the contemporaneous value and three lagged quarters of the change in the monetary measure in the regression, as monetary policy may affect banks with a lag (so k goes from 0 to 3). Our main interest is the sign and statistical significance of the cumulative and impact effect of domestic monetary policy. We capture the stance of monetary policy with two variables, given that the period covers the years when the central bank followed unconventional approaches. The first one is the European Central Bank refinancing rate. The second one is the shadow rate defined in Krippner (2013, 2015), which allows to capture the effects of monetary policies at the Zero Lower Bound on the portfolio composition of banks and other financial institutions.

We include four main sets of control variables: individual bank variables, home country control variable, host country control variables and international market indicators. These variables enter the regression lagged one period. $X_{b,t-1}$ is a vector of time-varying bank control variables. These include bank's size as captured by the log of total assets (*log total assets*), the unweighted capital ratio, i.e capital divided by total assets, without any risk weighting (*Tier1 ratio*) [6], its liquidity ratio (*liquid asset ratio*) and core deposit ratio (*core deposits ratio*), measured

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6 For confidentiality reasons, we do not have access to own resources data and requirements on own resources.

by core deposits over total assets. Z_{t-1} includes counterparty country specific demand factors also lagged 1 period. In particular, the control variables for the business cycle is the output gap (BIS, 2014) (*business cycle$_j$*) and for the financial cycle is the credit to GDP gap (Drehmann et al (2011) as updated by the BIS (*financial cycle$_j$*). We also include the counterparty monetary policy stance as captured by the change in the relevant short term policy rate. $Z^{domestic}_{t-1}$ includes Spanish specific supply factors. In particular, as for counterparty countries, the control variables for the business cycle is the output gap (BIS, 2014) (*business cycle domestic*) and for the financial cycle is the credit to GDP gap (Drehmann et al (2011) as updated by the BIS (*financial cycle domestic*). Finally, we include VIX to control for international market conditions. Buch et al (2018) describe in detail the rationale behind each explanatory variable.

We estimate the unbalanced panel data with OLS and include destination-country fixed effects and bank fixed effects. The number of banks that operate in each country is rather limited, as banks' heterogeneity in the destination of foreign activity is rather broad. The largest banks which are those that operate through subsidiaries tend to have a broader country coverage. Small banks are active in much less countries at a time. It is thus not possible to control for country-time effects, so that we do not include them. *t ratios* are clustered by bank and we report the corresponding *p-values*.

We explore bank-level characteristics to analyze the mechanisms of monetary policy transmission and the different channels discussed in the literature. Bank heterogeneity captures funding and portfolio frictions (Buch et al. 2018, Barbosa et al. 2018), as reflected in the capital and liquidity position of individual banks, access to different types of funding such as through the wholesale market, availability of collateral, or access to an internationally active banking network, that may influence how monetary policy impacts bank lending (domestic or cross-border). We run regressions where the friction that banks are facing and that relate to traditional channels of transmission interacts with the monetary policy variable, so that their general expression is:

$$\Delta Y_{b,j,t} = \alpha_0 + \sum_{k=0}^{3} \alpha_{1,k} \Delta MP^{domestic}_{t-k} + \sum_{k=0}^{3} \alpha_{2,k} \Delta MP^{domestic}_{t-k} * Friction_{b,t-4} +$$

$$\alpha_3 Friction_{b,t-k} + \alpha_4 X_{b,t-1} + \alpha_5 Z^{domestic}_{t-1} + \alpha_6 Z_{j,t-1} + \alpha_7 VIX_{t-1} + f_b + f_j + \varepsilon_{b,j,t} \qquad (2)$$

The new variable Friction $_{b,j,t-k-1}$ proxies the funding and portfolio frictions that lead to the channels of transmission of monetary policy and enter the regression at the fourth lag to ensure that they are not affected by monetary policy changes from *t* to *t-3*. The Friction variable is, in general, bank-time-specific, but has no counterparty country dimension.

We distinguish two main international bank-based transmission channels. The bank-lending channel and the portfolio channel, which give rise to opposite reactions from banks. The bank lending channel operates through the liability side as follows: a bank operating in a country where a contractionary monetary shock takes place, reduces its reserves and its deposits. As long as there is no perfect substitutability of retail bank deposits with other sources of funds or banks are not able to obtain other sources of financing, the bank could transmit the shock cross-border and reduce external loans. As this channel works by changing the short-term funding rate paid by banks or by affecting liquidity constraints, we use variables that capture frictions related to the different sources of bank's funding such as the wholesale financing ratio (*wholesale ratio*), calculated as the non-deposit funding over total liabilities, the liquidity ratio (*liquid asset ratio*), defined as the ratio of cash and central bank deposits over total assets, that tries to capture the possibility of liquidity shortages, which could precede

solvency problems, and the bank size proxied by the ln of total assets (*log total assets*), as larger banks may be able to fund themselves at cheaper rates (Kashyap and Stein, 2000). As for the portfolio rebalancing channel, which changes the composition but not the size of banks' balance, it operates as follows: a tightening of monetary policy reduces the creditworthiness of domestic borrowers in relation to foreign ones, as the value of the collateral declines. This prompts banks to substitute away from domestic credit and toward foreign credit to safer locations and borrower types, leading to an increase in bank lending abroad (Correa et al., 2015). As this channel operates through the change in the risk structure and composition of bank's assets, we use variables that may capture these portfolio frictions. In particular, we include the capital ratio (*Tier 1 ratio*), which not only provides a good proxy of the capital restrictions that a bank may face, but it will determine the types of assets that the bank can purchase, the proportion of private loans over total assets (*private loans/total assets*), which proxies the most traditional activities in the bank's balance sheet, the proportion of net securities over total assets (*securities/total assets*) as a proxy of portfolio management, and the international bank activity calculated as the ratio of total claims on foreign borrowers over total assets (*foreign loans/total loans*) which provides a proxy of the weight that international activity has on bank's portfolio.

4 Outward transmission of monetary policy to non-financial private sector by currency denomination

We are interested in assessing direct real economic effects. Therefore, we first carry out the analysis of the impact of monetary policy on foreign lending, but limiting it to the non-financial private sector, whether cross-border or local, distinguishing between those denominated in local and foreign currency. We present the results obtained for the two friction types (funding and portfolio) in Tables 1 to 4. Tables 1 and 2 record the results with claims denominated in local currency and Tables 3 and 4 present the results for claims in foreign currency. We present the cumulative effects for monetary policy ($\Sigma\Delta MP\ Domestic_{\_t\ to\ t-3}$), the interaction effect of monetary policy and the proxy for the friction effect ($\Sigma\Delta MP\ Domestic_{\_t\ to\ t-3}*Friction_{\_t-4}$) and the Total effect of both factors for the median bank (*Total effect of $\Sigma\Delta MP$ terms for median bank)*, as a means to show the economic impact. We also include in the last three rows of results, the short-run estimated coefficients for these variables.

These regressions show that monetary policy does not directly affect private lending abroad in local currency for the median bank (Tables 1 and 2). Neither the cumulative nor the sort-term effect are statistically significant. The exception is the negative impact captured when no friction is analysed and the positive impact obtained when the total assets friction is analysed. This lack of statistical significance is not maintained when we look at private claims denominated in foreign currency. As reflected in Tables 3 and 4, we find instead that the ECB monetary policy affects private lending in foreign currency for the median bank, with a positive sign in the long run. Therefore, more restrictive monetary policy in the home country leads to increased lending to the private sector abroad in foreign currency, so that Spanish banking groups engage in portfolio rebalancing or increase their portfolio towards foreign activity denominated in foreign currency. The transmission seems to be affected by both funding and portfolio frictions. For the funding frictions, we find that the median Spanish bank in terms of wholesale funding ratio and liquidity ratio increase their private claims abroad in response to a tightening of monetary policy at home. For the portfolio frictions, we obtain that median Spanish bank in terms of capital ratio and in the proportion of securities in relation to total assets also increase their private claims abroad in response to a tightening of monetary policy at home. We also find that the higher the proportion of loans in relation to assets, the lower the positive effect of monetary policy and that a higher presence abroad tend to reinforce the positive effect of a tightening of monetary policy on foreign claims in foreign currency. In the short run, we do not find evidence of any impact of monetary policy on private claims denominated in foreign currency.

We also carry out a more direct test of the relevance of currency denomination for the outward transmission of monetary policy. Table 5 shows the regression results where we take directly the weight of local currency denomination into account. We interact the changes in monetary policy with the weight of claims denominated in local currency, and present the results corresponding to the 25%, 50% and 75% percentile level of the variable that measures the weight that local currency has on total claims. In columns 1 and 2 the dependent variable is changes in non-bank private claims and in columns 3 and 4 the dependent variable is total claims, which we will refer to in section 5. We use as measures of monetary policy the changes in the nominal policy rates in columns 1 and 3 and the changes in the shadow rate in columns 2 and 4. The results point at a declining impact of monetary policy as the weight of non-bank private claims denominated in local currency increases. In

particular, an increase from 54% to 100% of claims in local currency, would reduce the transmission effect between 0.0051 and 0.0362 points.

Therefore, the evidence gathered points at a differential impact of home monetary policy on foreign claims depending on the currency. In general, we find spillover effects for claims denominated in foreign currency, whose transmission depends on the type of friction, and which take place in the long run, while in the short run, there is no impact. For claims in local currency, we find some short term impact, which fades away in the long run. The proportion of loans and the proportion of securities are the only frictions of transmission of home monetary policy into foreign claims in local currency, which seem to be statistically significant and which have the same qualitative effect than those in foreign currency.

As for individual's bank determinants, we do not find evidence that the size of a bank affects changes in lending abroad. We find evidence that the higher the liquidity ratio the more rapidly the expansion of total and cross-border credit. Among country controls, we find that Spanish banks reduce their foreign lending denominated in foreign currency during real sector expansions, while the financial cycle has a positive impact, especially for lending in local currency. Moreover, neither the business nor the financial cycle of the counterparty country affect the change in private lending abroad. All the effect of the counterparty economy is channelled through host monetary policy. For the funding frictions associated to the bank lending channel in local currency we obtain a negative and statistically significant coefficient for host monetary policy. Therefore, a tightening of monetary policy in the host country results in a contraction of credit provided by Spanish banks in local currency. However, for foreign currency and especially under the frictonsd of the portfolio channel, we find evidence that the effect is positive, so that more restrictive monetary policy in the host country results in an increase of foreign claims denominated in foreign currency.

4.1 Distinguishing between types of claims

We have just gathered evidence that lending in local currency was less affected by the ECB monetary policy than lending in foreign-denominated currency and as most local activity is carried out in local currency (84.7% on average) it is worth exploring if it is mostly the type of activity and not the currency that drives the results. To do so, we run regressions where the dependent variable is either the local lending in local currency (Table 6) or the local lending denominated in foreign currency (Table 7). If it is the currency which drives the results we would expect that local claims in local currency do not respond to change in the monetary policy stance while local claims in foreign currency do. We only report the values and p-values of the estimated coefficients of the monetary policy variables.

The results for local claims in local currency are aligned with the general results by currency: we do not find evidence that claims in local currency of Spanish banking groups are affected by the ECB monetary policy. This general result has two exceptions: the cumulative effect of a tightening of monetary policy in local non-bank private claims in local currency is mitigated by higher liquidity and higher weight of foreign borrowers. In the short term, larger banks, or with a higher proportion of loans or a higher weight of foreign borrowers mitigate the monetary policy impact (Table 6). As for local lending denominated in foreign currency, the results in Table 7 show that it does not respond to the monetary policy stance in the home country, neither in the short nor the long run, in contrast to the general results by currency. The only exception is when the bank lending channel is proxied through Tier 1 ratio. In this case,

local claims in foreign currency decline with a monetary policy contraction in the home country, but banks with higher solvency mitigate such decline.

Therefore, we do not find evidence, again, that monetary policy in transmitted abroad to claims in local currency, with a few exceptions. However, we cannot find evidence that there is transmission if local claims are denominated in foreign currency. There are practically no differences in the spillover effects of monetary policy on local claims depending on the currency, so that local claims are, in general, isolated from spillovers of domestic monetary policy, independently of the currency in which lending is carried out.

We also explore in the case of cross-border claims whether the choice of currency makes monetary policy in the home country have a different impact. In this case, nearly half of the cross-border activity is, on average, carried out in local currency.

We gather evidence that, only in the short term, a tightening of monetary policy in the home country reduces cross-border lending in local currency, mainly when we consider portfolio frictions (Table 8). Such effect is not statistically significant in the long term except when we use the ratio of securities over total assets. The short-term impact is positive when we consider funding frictions as captured by the log of total assets. In fact, the cumulative effect is also positive, so that banks with larger assets increase cross-border lending in local currency in the face of a tightening of monetary policy. The results in Table 9 for cross-border claims denominated in foreign currency show that both types of frictions affect the transmission of monetary policy. For funding frictions, we find evidence that the median bank in terms of wholesale funding and liquidity ratio increase their cross-border claims in foreign currency when monetary policy in the home country tightens, a result also obtained under the portfolio channel for the median bank in terms of ratio of securities. We also obtain that banks with lower ratio of loans over assets, higher ratio of securities over assets and higher ratio of foreign assets increase their cross-border claims in foreign currency in response to a tightening of monetary policy at home.

Again, we gather evidence that currency matters for monetary policy transmission. Cross-border claims denominated in local currency are less affected by monetary policy than if these claims are denominated in foreign currency. A major difference is the effect in the short term, which is statistically significant for local currency, implying that a tightening of monetary policy results in a reduction in cross-border claims denominated in local currency, but the effect fades away in the long run.

5 Total foreign claims by currency denomination

We next explore the effects of monetary policy and the different potential channels of its transmission on total foreign claims, instead of only on non-financial private claims. The spillovers may differ if claims to the public and the financial sector are also included in the analysis, as their determinants do not necessarily be the same. In particular, private non-finance claims account for 50% of total foreign claims of the overall system. They also account for 48% of total claims denominated in foreign currency and 55% of those denominated in local currency. The average weight by bank of total local claims (10.39%) is slightly lower than for private local claims (12.13%), but the average weight of claims in local currency is slightly higher (25.1 versus 23.4%).

The results, obtained following the specifications recorded in Tables 1 to 4, are summarized in Table 10 for lending denominated in local currency and in Table 11 for lending in foreign currency. We only report the values and p-values of the estimated coefficients of the monetary policy variables, both the cumulative and the short-run effect.

As in the case of non-bank private lending denominated in local currency, we do not find evidence that the median bank changes its total lending abroad in local currency as a result of a change in monetary policy in the home country, whatever the friction. In particular, we do not find evidence that funding frictions are relevant when assessing the cumulative effect of MP effect on total claims in local currency. We do, however, find that the short term impact is negative, with the wholesale funding ratio and the log of total assets mitigating this effect. The only exception to this negative short term impact is when assessing the role of tier 1 capital, as we find that, in the short run, the median bank reduces its total lending abroad denominated in local currency as a consequence of a tightening of monetary policy in the home country. We also find evidence that portfolio frictions may be relevant for the transmission of monetary policy to total lending abroad in local currency. The tightening of monetary policy by the ECB results in an increase in total claims abroad in local currency, which is mitigated by higher solvency and higher proportion of loans on total assets. Bank-specific heterogeneity affects how monetary policy transmits into lending in local currency.

The results differ completely when we refer to total claims denominated in foreign currency. We gather evidence that the median bank increases its total lending abroad in foreign currency when there is a tightening of monetary policy in the home country. Contrary to our findings for local currency, in the short run, there is no impact and we cannot find evidence that the different channels and variables affect the transmission of monetary policy to total lending abroad in foreign currency, neither in the short nor in the long run. Bank heterogeneity does not seem to play a role in the transmission.

As we did before for private claims, we also test directly whether the weight of the currency denomination is relevant for the outward transmission of monetary policy. Columns 3 and 4 of Table 5 show the regression results when we interact the changes in monetary policy with the weight of total claims denominated in local currency, and present the results corresponding to the 25%, 50% and 75% percentile level of the variable that measures the weight that local currency has on total claims. They point at a declining transmission of the positive effect of monetary policy on total claims abroad as the weight of claims denominated

in local currency increases. In particular, an increase from 54% to 100% of claims in local currency, would reduce the transmission effect between 0.0051 and 0.0075 points.

Therefore, the results point at differences in the transmission of monetary policy through total lending to all sectors abroad depending on the currency. They also point at differences between lending to the private sector and lending to the whole economy. In general, we find evidence of frictions affecting the transmission to total lending and not so much to private lending.

6 Direct role of the exchange rate

In the business model of the Spanish banking system, the funding raised by internationally active banks is mostly denominated in the same currency than the assets that the banks intend to fund: the local currency. However, there is still some currency mismatch that may be fully hedged by banks. Costly access to foreign exchange hedging could diminish the returns on lending in foreign markets (Bräuning and Ivashina, 2017). Therefore, we propose controlling for exchange rate effects, as exchange rate fluctuations may have a direct impact on the lending of internationally active banks, beyond the change in the value of the exposure, which will show when we distinguish by currency[7] (Takats et al 2016, 2016b).

On the one hand, we include the euro-local exchange rate change (tc_i) so that a positive value indicates a depreciation of the local currency. Given that bank's results may be relevant for shareholders also at the consolidated level and that a depreciation in local currency would reduce the value of the benefits which the group obtains in that country, and not only the value of the affiliate, exchange rate changes may affect the decision to lend to that country. We also include the US dollar-euro exchange rate change ($tc\_\$US$), as, although Spanish multinational banks fund themselves mostly locally in the counterparty country, as shown in Figure 1, global banks tend to fund themselves in the US money market funds. In particular, European banks borrowed heavily in US dollar currency, especially before the financial crisis. A positive value of $tc\_\$US$ indicates a USD depreciation[8], so that a positive estimated coefficient would imply that a USD depreciation leads to increases in lending to other countries. Finally, the cross-border transmission of the ECB monetary policy may depend on the relevance of euro currency for the transactions of the bank in the counterparty country. Using unconsolidated data (the so-called Locational Banking Statistics (BIS,2015)), which include intragroup positions between offices of the same banking group, we compute the proportion of credits in euros in relation to all positions that the bank has in the counterparty country ($weuro_i$)[9] to proxy the relevance of euro currency for the bank in the host country.

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7 On the other hand, monetary policy may affect the exchange rate. Eichenbaum and Evans (1995) found that a contractionary shock to US monetary policy leads to persistent appreciation in the USD, with an impact that occurs several months after the shock. Bruno and Shin (2015) find evidence of monetary policy spillovers on cross-border bank capital flows and the US dollar exchange rate through the banking sector. Specifically, they find that a decline in the Fed funds rate leads to a depreciation in the US dollar after about 14 quarters and eventually to an increase in the capital flows funded by the US dollar.

8 We have also tried with the inclusion of the US$-local currency exchange rate change, but it was not statistically significant.

9 We have included a multiplicative variable of the the weight of euro assets and monetary policy, but it was not statistically significant. We have considered the potential role that US monetary policy and the alignment of the ECB and the FED monetary policy stance might have played. So we have run additional regressions where we have included the change in the US effective federal funds rate (ΔMPUS) and the multiplicative value of the euro and the US monetary policy variables, to test for the relevance of equal or diverging stance of monetary policy between the FED and the ECB, excluding the US as a counterparty country. Overall, the results for the spillover effects of the ECB MP do not qualitatively change. A tightening of US monetary policy results in increases in lending denominated in foreign currency and in declines or no effects in local currency lending. The alignment of the monetary policy stance between the US and the Eurozone either results in higher lending or has no effect.

Table 12 summarizes the results for lending in local currency and Table 13 for lending in foreign currency to the private non-bank sector[10]. We only report the values and p-values of the estimated coefficients of the cumulative effect of the monetary policy variables and of the three new regressors: $tc\_\$US$, tc_j and $weuro_j$.

The results recorded in Table 12 point at non statistically significant effect of a change in the ECB´s policy rate on the log change in total (cross-border and local) claims to the non-financial private sector in local currency. So the inclusion of these new control variables does not alter the qualitative results presented in the previous section: changes in the ECB monetary policy stance does not seem to affect the local currency exposures to countries outside the euro area.

The weight of the claims in euros to the different counterparty countries has a positive effect on the change in local currency lending to that country. This result could indicate some level of complementarity between lending in local or in euros for the bank. The coefficients for the local currency and for the $US exchange rate changes are not statistically significant. Therefore, when the euro appreciates either in relation to the local currency of the counterparty country or in relation to the $US, there is no change in local currency exposures to the private non-bank sector. These findings are in line with expectations given the predominant business model for the internationalization of Spanish banks.

The results recorded in Table 13 for the exposures in foreign currency point at a different effect of monetary policy in comparison to local currency claims. They suggest a positive and statistically significant effect of a change in the ECB´s policy rate on the log change in total (cross-border and local) claims to the non-financial private sector in foreign currency. So a tightening of ECB monetary policy results in an increase in the non-local currency exposures to countries outside the euro area. So, again, the inclusion of these new control variables does not alter the qualitative results presented in the previous section.

The results for claims in foreign currency also differ from those in local currency as regards the new variables and are aligned with those in Takats el al 2016, 2016b, obtained with aggregate data. The weight of the claims in euros to the different counterparty countries has a negative effect on the change in foreign lending. So, in this case, the euro may be playing a substitute role in the lending in foreign currency, in relation, probably to the $US. The coefficients for the exchange rate changes are statistically significant and positive for the local currency depreciation and negative for the $US depreciation. Therefore, when the euro appreciates in relation to the local currency of a given country, there is a decline in the non-local currency exposures to the private sector of that country. This may be the consequence of a higher exchange rate hedging cost. When the appreciation is in relation to the $US, which can act as a wholesale market for funds, there is an increase in this type of exposures[11]. When banks do some of their business in dollars, lending terms in dollar-denominated credit markets will be affected by shocks such as those in the exchange rate.

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[10] We have also estimated the equations distinguishing between cross-border and local exposures, with similar qualitative results: the inclusion of these additional explanatory variables does not affect the results obtained in relation to the spillover effects of monetary policy and the relevance of the different frictions.

[11] We have also estimated the equation excluding the US, with the same qualitative results.

7   Summary and concluding remarks

The evidence we have gathered so far indicates that changes in lender-country policy interest rates are transmitted to borrower countries as shocks to credit supply volumes, depending on the currency-denomination of the claim, and to a lesser extent, but also, on the type of claim (local or cross-border). We find evidence that the cross-border transmission of monetary policy to the real sector takes place, mostly, through cross-border claims denominated in foreign currency. When total activity is considered (including claims to the public and the financial sector) we find that there is transmission to the median bank only in foreign currency, but there is also some impact in local currency mostly in the short term and when portfolio frictions are considered.

In particular, we find empirical evidence that a monetary policy contraction in the euro zone results in higher Spanish banks' lending to the non-financial private sector denominated in foreign currency in countries abroad within a year period. The impact of monetary policy takes place mostly through cross-border lending, as local lending, either in foreign or local currency is, in general, not affected by home monetary policy. However, in the short-term, the impact is also positive for cross-border claims in local currency. The most prevalent forms of bank heterogeneity that matter for differential lending responses by banks are linked to portfolio frictions and include the solvency ratio, the ratio of securities and the ratio of private loans relative to banks' total assets. For total claims, we find that the heterogeneity of banks matter for the cross-border transmission of monetary policy in local currency in the long run. Moreover, the short run impact for total claims denominated in local currency is negative, so that a tightening of ECB monetary policy results in a contraction of claims abroad denominated in local currency. For total claims in foreign currency, banks' heterogeneity does not seem to influence the positive effect that a contractionary monetary policy has on them.

As for the role played by exchange rate changes our findings point out at great differences depending on the currency-denomination of the loan. Overall, our results indicate that neither the local currency/euro nor the $US/ euro exchange rate are relevant for loans denominated in local currency, but they affect loans denominated in foreign currency. In particular, a cheaper dollar in relation to the euro would result in an increase in foreign currency exposures, a finding that is in line with analysis carried out with aggregate data (Bruno and Shin, 2015, Takats and Temesvary, 2016, Avdjiev and Takats, 2016).

The results obtained are aligned with previous findings that cross-border bank lending is a major channel of monetary policy transmission (Cetorelli and Goldberg (2012) and Temesvary et al (2016)). They are also aligned with previous work showing the relevance of currency denomination for the cross-border transmission of monetary policy (Takats and Temesvary, 2016; Avdjiev and Takats, 2016, Avdjiev et al, 2018; Ivashina et al., 2015) and of the role of exchange rate (Avdjiev and Takats, 2016) . They add to the currency dimension the relevance of the counterparty country and its local currency.

As we observe that global banks are reducing their cross border activity and tend to focus their foreign activity in local claims, we can expect that the spillovers from home-country monetary policy would not be large. Policymakers should be concerned about the spillovers of monetary policy mostly when claims are in foreign currency.

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Table 1. Non-bank private claims in local currency: funding frictions using Δ short rate

Non friction
$$\Delta Y_{b,j,t} = \alpha_0 + \sum_{k=0}^{3} \alpha_{1,k} \Delta MP_{t-k}^{domestic} + \alpha_4 X_{b,t-1} + \alpha_5 Z_{t-1}^{domestic} + \alpha_6 Z_{j,t-1} + \alpha_7 VIX_{t-1} + f_b$$
$$+ f_j + \varepsilon_{b,j,t}$$

Friction
$$\Delta Y_{b,j,t} = \alpha_0 + \sum_{k=0}^{3} \alpha_{1,k} \Delta MP_{t-k}^{domestic} + \sum_{k=0}^{3} \alpha_{2,k} \Delta MP_{t-k}^{domestic} * Friction_{b,t-4} +$$
$$\alpha_3 Friction_{b,t-k} + \alpha_4 X_{b,t-1} + \alpha_5 Z_{t-1}^{domestic} + \alpha_6 Z_{j,t-1} + \alpha_7 VIX_{t-1} + f_b + f_j + \varepsilon_{b,j,t}$$

The dependent variable is log changes in non-financial private claims to foreign residents in local currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		(1)	(2)	(3)	(4)
	Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets
ΣΔMP Domestic_t to t-3		-0.00500	0.0743	-0.102	-0.0297
		(0.970)	(0.829)	(0.443)	(0.961)
ΣΔMP Domestic_t to t-3*Friction_t-4			-0.00129	0.0526	0.00356
			(0.822)	(0.362)	(0.932)
Total effect of ΣΔMP terms for median bank			0.0293	-0.0275	0.0142
			(0.867)	(0.817)	(0.930)
Log total assets_t-1		0.0650	0.0313	0.0298	
		(0.108)	(0.396)	(0.479)	
Tier1 Ratio_t-1		0.00136	0.0122	0.0120	0.0130
		(0.875)	(0.243)	(0.215)	(0.236)
Liquid asset ratio_t-1		0.0204**	0.0143*		0.00927
		(0.0395)	(0.0662)		(0.340)
Core deposits ratio_t-1		-0.00390	-0.00545	-0.00896	-0.00615
		(0.280)	(0.430)	(0.110)	(0.170)
Friction_t-4			0.00177	0.0312**	0.0451
			(0.715)	(0.0268)	(0.226)
Business Cycle Domestic_t-1		0.0157	0.00751	0.0115	0.00735
		(0.599)	(0.721)	(0.624)	(0.736)
Business Cycle_j,t-1		2.99e-05	0.00453	0.00245	0.00212
		(0.997)	(0.388)	(0.665)	(0.676)
Financial Cycle Domestic_t-1		0.00236	0.00214	0.00238**	0.00219
		(0.138)	(0.116)	(0.0375)	(0.121)
Financial Cycle_j,t-1		0.000223	-5.32e-05	-0.000129	3.83e-05
		(0.807)	(0.947)	(0.868)	(0.962)
ΔMP_j,t-1		-0.0245***	-0.0185*	-0.0155*	-0.0202**
		(0.000166)	(0.0590)	(0.0706)	(0.0204)
VIX_t-1		-0.00838	-0.00701	-0.00747	-0.00722
		(0.159)	(0.211)	(0.163)	(0.195)
(Impact) ΔMP Domestic_t		-0.195*	-0.193	-0.0652	1.370***
		(0.0770)	(0.606)	(0.521)	(4.35e-05)
(Impact) ΔMP Domestic_t*Friction_t-4			5.47e-05	-0.0323	-0.106***
			(0.993)	(0.313)	(6.08e-05)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			-0.193	-0.0975	1.263***
			(0.600)	(0.318)	(4.44e-05)
Country fixed effects		Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes
Observations		3,323	3,040	3,040	3,040
R-squared		0.014	0.015	0.016	0.015
Adjusted R-squared		-0.00417	-0.00727	-0.00590	-0.00613
Monetary Policy Choice		Short Rate	Short Rate	Short Rate	Short Rate
Friction Studied		Funding	Funding	Funding	Funding

Table 2. Non-bank private claims in local currency: portfolio friction using Δ shadow short rate (1)

The dependent variable is log changes in non-financial private claims to foreign residents in local currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Friction:	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3	0.000627	0.185	0.323	-0.300	0.0793
	(0.996)	(0.382)	(0.158)	(0.179)	(0.406)
ΣΔMP Domestic_t to t-3*Friction_t-4		-0.0348	-0.00522*	0.0196**	-0.00255
		(0.175)	(0.0799)	(0.0173)	(0.424)
Total effect of ΣΔMP terms for median bank		-0.0147	-0.0413	-0.0221	0.0755
		(0.925)	(0.797)	(0.875)	(0.434)
Log total assets_t-1	0.0661	0.0241	-0.00716	0.0180	0.0864**
	(0.148)	(0.495)	(0.929)	(0.776)	(0.0251)
Tier1 Ratio_t-1	0.00271		0.00336	0.0111	0.0207*
	(0.754)		(0.744)	(0.264)	(0.0990)
Liquid asset ratio_t-1	0.0204**	0.0156	0.0116	0.0129	0.0165*
	(0.0452)	(0.146)	(0.203)	(0.104)	(0.0551)
Core deposits ratio_t-1	-0.00453	-0.00648	-0.00831	-0.00852	-0.00600
	(0.208)	(0.136)	(0.129)	(0.124)	(0.190)
Friction_t-4		-0.0210*	0.00246	0.00132	-0.00623**
		(0.0879)	(0.436)	(0.666)	(0.0327)
Business Cycle Domestic_t-1	0.00944	-0.000528	0.00148	0.00637	0.000141
	(0.680)	(0.968)	(0.905)	(0.625)	(0.992)
Business Cycle_j,t-1	0.00413	0.00759	0.00787	0.00559	0.00936
	(0.456)	(0.163)	(0.204)	(0.343)	(0.163)
Financial Cycle Domestic_t-1	0.00272**	0.00193*	0.00164	0.00193	0.00263***
	(0.0141)	(0.0723)	(0.256)	(0.126)	(0.00272)
Financial Cycle_j,t-1	0.000267	0.000322	-0.000138	4.01e-06	0.000131
	(0.767)	(0.678)	(0.868)	(0.996)	(0.876)
ΔMP_j,t-1	-0.00156	0.0113	0.0118	0.0160	-0.00129
	(0.875)	(0.320)	(0.276)	(0.129)	(0.908)
VIX_t-1	-0.00664	-0.00537	-0.00552	-0.00569	-0.00508
	(0.240)	(0.355)	(0.313)	(0.298)	(0.339)
(Impact) ΔMP Domestic_t	-0.0902	-0.0669	-0.192	-0.296	0.0159
	(0.155)	(0.670)	(0.351)	(0.150)	(0.819)
(Impact) ΔMP Domestic_t*Friction_t-4		-0.00937	0.00142	0.0118	-0.00442*
		(0.755)	(0.547)	(0.205)	(0.0708)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4		-0.0762	-0.191	-0.284	0.0115
		(0.567)	(0.349)	(0.149)	(0.866)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	3,323	3,040	3,040	3,040	3,040
R-squared	0.014	0.015	0.016	0.016	0.016
Adjusted R-squared	-0.00469	-0.00627	-0.00553	-0.00606	-0.00555
Monetary Policy Choice	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification.

Table 3. Non-bank private claims in foreign currency: funding friction using Δ short rate (1)

The dependent variable is log changes in non-financial private claims to foreign residents in foreign currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets
ΣΔMP Domestic_t to t-3	0.166***	-0.0780	0.121	-0.0243
	(0.00272)	(0.754)	(0.448)	(0.960)
ΣΔMP Domestic_t to t-3*Friction_t-4		0.00635	0.0439	0.0167
		(0.290)	(0.403)	(0.569)
Total effect of ΣΔMP terms for median bank		0.144**	0.184**	0.182
		(0.0592)	(0.0684)	(0.168)
Log total assets_t-1	-0.0214	-0.0566	-0.0534	
	(0.440)	(0.294)	(0.250)	
Tier1 Ratio_t-1	0.00413	0.00496	0.00491	0.00647
	(0.505)	(0.587)	(0.621)	(0.566)
Liquid asset ratio_t-1	-0.00165	0.00273		0.000294
	(0.762)	(0.750)		(0.946)
Core deposits ratio_t-1	0.00303	0.00383	0.000118	0.00121
	(0.148)	(0.282)	(0.954)	(0.624)
Friction_t-4		0.00473	0.0143*	-0.0417
		(0.506)	(0.0787)	(0.200)
Business Cycle Domestic_t-1	-0.0221**	-0.0153	-0.0160	-0.0169*
	(0.0157)	(0.183)	(0.152)	(0.0716)
Business Cycle_j,t-1	0.00301	0.00200	0.00232	0.00241
	(0.382)	(0.788)	(0.740)	(0.742)
Financial Cycle Domestic_t-1	0.00218**	0.000736	0.00118	0.000917
	(0.0222)	(0.600)	(0.446)	(0.387)
Financial Cycle_j,t-1	0.000142	0.000318	0.000144	0.000267
	(0.787)	(0.531)	(0.802)	(0.625)
ΔMP_j,t-1	0.0143*	0.0203	0.0192	0.0194
	(0.0625)	(0.123)	(0.119)	(0.132)
VIX_t-1	0.00206*	0.00383*	0.00344*	0.00352**
	(0.0774)	(0.0598)	(0.0686)	(0.0451)
(Impact) ΔMP Domestic_t	0.00898	-0.0113	-0.00917	-0.173
	(0.758)	(0.939)	(0.907)	(0.531)
(Impact) ΔMP Domestic_t*Friction_t-4		0.00169	0.0299	0.0163
		(0.518)	(0.244)	(0.376)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4		-0.00958	0.0207	-0.157
		(0.947)	(0.719)	(0.543)
Country fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Observations	4,406	3,944	3,944	3,944
R-squared	0.010	0.015	0.014	0.013
Adjusted R-squared	-0.00556	-0.00378	-0.00411	-0.00476
Monetary Policy Choice	Short Rate	Short Rate	Short Rate	Short Rate
Friction Studied	Funding	Funding	Funding	Funding

(1) See Table 1 for specification.

Table 4. Non-bank private claims in foreign currency: portfolio friction using Δ shadow short rate (1)

The dependent variable is log changes in non-financial private claims to foreign residents in foreign currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		(1)	(2)	(3)	(4)	(5)
	Friction:	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3		0.0816**	0.127	0.780***	-0.0472	0.0484
		(0.0222)	(0.272)	(0.000368)	(0.554)	(0.400)
ΣΔMP Domestic_t to t-3*Friction_t-4			-0.00256	-0.0105***	0.0116**	0.00272**
			(0.885)	(0.000384)	(0.0187)	(0.0315)
Total effect of ΣΔMP terms for median bank			0.113**	0.0441	0.117**	0.0524
			(0.0142)	(0.186)	(0.0166)	(0.353)
Log total assets_t-1		-0.0251	-0.0621	-0.0915	-0.0890	-0.0462
		(0.379)	(0.310)	(0.309)	(0.231)	(0.391)
Tier1 Ratio_t-1		0.00434		0.00148	-4.86e-05	0.00690
		(0.438)		(0.886)	(0.996)	(0.500)
Liquid asset ratio_t-1		-0.00103	0.00342	0.00292	-2.83e-05	0.00429
		(0.841)	(0.575)	(0.578)	(0.996)	(0.413)
Core deposits ratio_t-1		0.00226	0.000911	-0.000989	-0.00105	0.000121
		(0.232)	(0.712)	(0.783)	(0.772)	(0.965)
Friction_t-4			-0.0142	0.000785	-0.00334	-0.000461
			(0.404)	(0.789)	(0.513)	(0.701)
Business Cycle Domestic_t-1		-0.0148*	-0.00669	-8.64e-05	-0.00299	-0.00618
		(0.0902)	(0.603)	(0.995)	(0.813)	(0.609)
Business Cycle_j,t-1		0.00629	0.00576	0.00488	0.00348	0.00517
		(0.110)	(0.413)	(0.516)	(0.660)	(0.473)
Financial Cycle Domestic_t-1		0.00188*	-2.83e-06	-0.000531	-0.000352	0.000378
		(0.0506)	(0.999)	(0.812)	(0.850)	(0.791)
Financial Cycle_j,t-1		3.87e-05	0.000281	0.000175	-4.13e-05	0.000340
		(0.943)	(0.619)	(0.741)	(0.949)	(0.522)
ΔMP_j,t-1		0.0147**	0.0144*	0.0146	0.0158*	0.0168*
		(0.0381)	(0.0969)	(0.103)	(0.0961)	(0.0733)
VIX_t-1		0.00112	0.00193*	0.00110	0.00156	0.00150
		(0.210)	(0.0939)	(0.215)	(0.103)	(0.198)
(Impact) ΔMP Domestic_t		-0.00891	0.0314	0.0104	0.0600	-0.0199
		(0.529)	(0.439)	(0.900)	(0.164)	(0.349)
(Impact) ΔMP Domestic_t*Friction_t-4			-0.00263	0.000138	-0.00281	0.00145***
			(0.683)	(0.915)	(0.242)	(0.00190)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			0.0288	0.0105	0.0572	-0.0185
			0.407	0.897	0.161	0.380
Country fixed effects		Yes	Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes	Yes
Observations		4,406	3,944	3,944	3,944	3,944
R-squared		0.009	0.012	0.016	0.015	0.012
Adjusted R-squared		-0.00649	-0.00596	-0.00198	-0.00335	-0.00591
Monetary Policy Choice		Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied		Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification.

Table 5. Non-bank private and total:weight of local currency denomination (1)

The dependent variable is log changes in non-bank private claims (cols 1 and 2) and total claims (cols 3 and 4) to foreign residents. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Dependent variable	Δ log(non-bank private claims)	Δ log(non-bank private claims)	Δ log(total claims)	Δ log(total claims)
ΣΔMP Domestic_t to t-3	0.0560	0.0252	0.0867***	0.0461***
	(0.0722)	(0.155)	(1.24e-05)	(0.00678)
ΣΔMP Domestic_t to t-3*Friction_t-4	-0.000169	-0.000117	-0.000418	-0.000314
	(0.587)	(0.572)	(0.126)	(0.122)
Total effect of ΣΔMP terms for 25% bank	0.0466**	0.0186*	0.0640***	0.0291**
	(0.0104)	(0.0722)	(0.00693)	(0.0437)
Total effect of ΣΔMP terms for median bank	0.0439***	0.0168*	0.0570**	0.0239
	(0.00638)	(0.0902)	(0.0310)	(0.117)
Total effect of ΣΔMP terms for 75% bank	0.0391**	0.0135*	0.0449***	0.0148**
	(0.0104)	(0.0722)	(0.00693)	(0.0437)
Log total assets_t-1	-0.0110	-0.0138	-9.62e-05	0.00587
	(0.482)	(0.384)	(0.994)	(0.610)
Tier1 Ratio_t-1	0.00308	0.00275	0.00853**	0.00951***
	(0.346)	(0.374)	(0.0195)	(0.00687)
Liquid asset ratio_t-1	0.00646***	0.00703***	0.00255	0.00233
	(0.00812)	(0.00201)	(0.293)	(0.350)
Core deposits ratio_t-1	0.000965	0.000604	0.000172	-8.85e-05
	(0.286)	(0.454)	(0.916)	(0.957)
Friction_t-4	5.30e-05	5.20e-05	7.99e-05	6.77e-05
	(0.316)	(0.296)	(0.520)	(0.588)
Business Cycle Domestic_t-1	-0.00806*	-0.00603	-0.0128***	-0.0137***
	(0.0768)	(0.141)	(0.000796)	(0.000256)
Business Cycle_j,t-1	0.00188	0.00380***	0.00181	0.00247
	(0.188)	(0.00476)	(0.615)	(0.483)
Financial Cycle Domestic_t-1	0.00122***	0.00113***	0.00122***	0.00140***
	(0.000994)	(0.00156)	(0.00368)	(0.000467)
Financial Cycle_j,t-1	0.000493**	0.000443**	-9.19e-05	-8.29e-05
	(0.0336)	(0.0495)	(0.792)	(0.812)
ΔMP_j,t-1	0.00298	0.00335	-0.00239	-0.00170
	(0.391)	(0.282)	(0.580)	(0.692)
VIX_t-1	-0.00139	-0.00146**	-0.000371	-0.00117***
	(0.102)	(0.0252)	(0.486)	(0.00321)
(Impact) ΔMP Domestic_t	-0.0220	-0.0154**	0.00436	-0.0147
	(0.266)	(0.0308)	(0.832)	(0.160)
(Impact) ΔMP Domestic_t*Friction_t-4	-8.41e-05	8.94e-05	-0.000214	-8.73e-05
	(0.807)	(0.564)	(0.681)	(0.703)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4	-0.0221	-0.0153**	0.00415	-0.0147
	(0.258)	(0.029)	(0.838)	(0.151)
Country fixed effects	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes
Observations	3,759	3,759	3,798	3,798
Monetary Policy Choice	Short Rate	Shadow rate	Short Rate	Shadow rate
Interaction	Weight of local currency	Weight of local currency	Weight of local currency	Weight of local currency

(1) See Table 1 for specification

Table 6. Non-bank private claims in local currency: funding and portfolio frictions (1)

The dependent variable is log changes in local claims to foreign residents in the non-bank private sector in local currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		Funding frictions				Portfolio frictions				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3		-0.181	0.0864	-0.0247	0.401	-0.255	-0.288	-0.334	-0.608	0.255
		(0.387)	(0.784)	(0.881)	(0.440)	(0.357)	(0.315)	(0.424)	(0.274)	(0.124)
ΣΔMP Domestic_t to t-3*Friction_t-4			-0.00493	-0.0528*	-0.0369		0.00126	0.00149	0.0231	-0.0144**
			(0.275)	(0.0530)	(0.305)		(0.965)	(0.634)	(0.316)	(0.0191)
Total effect of ΣΔMP terms for median bank			-0.0862	-0.100	-0.0538		-0.280	-0.230	-0.280	0.234
			(0.706)	(0.586)	(0.781)		(0.320)	(0.374)	(0.314)	(0.150)
(Impact) ΔMP Domestic_t		-0.179	-0.0814	-0.00335	1.342***	-0.147	-0.205	0.136	-0.426	0.159
		(0.187)	(0.854)	(0.985)	(0.00985)	(0.205)	(0.289)	(0.540)	(0.211)	(0.231)
(Impact) ΔMP Domestic_t*Friction_t-4			-0.000908	-0.0434	-0.0973***		0.0127	-0.00456*	0.0202	-0.00808**
			(0.921)	(0.168)	(0.00696)		(0.679)	(0.0973)	(0.265)	(0.0224)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			-0.0823	-0.0467	1.245**		-0.192	0.132	-0.406	0.151
			(0.849)	(0.771)	(0.0102)		(0.257)	(0.549)	(0.208)	(0.245)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		1,739	1,654	1,654	1,654	1,739	1,654	1,654	1,654	1,654
R-squared		0.021	0.025	0.023	0.026	0.023	0.027	0.029	0.030	0.036
Monetary Policy Choice		Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied		Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification

Table 7. Non-bank private local claims in foreign currency: funding and portfolio friction

The dependent variable is log changes in local claims to foreign residents in the the non-bank private sector in foreign currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		Funding frictions				Portfolio frictions				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3		-0.0323	-0.254	0.0809	-0.628	-0.0498	-0.225*	-0.161	0.177	0.133
		(0.736)	(0.511)	(0.677)	(0.324)	(0.629)	(0.0673)	(0.619)	(0.408)	(0.547)
ΣΔMP Domestic_t to t-3*Friction_t-4			0.00774	0.0319	0.0495		0.0481***	0.00381	-0.00802	-0.00197
			(0.274)	(0.603)	(0.218)		(0.00454)	(0.534)	(0.496)	(0.681)
Total effect of ΣΔMP terms for median bank			0.0167	0.126	-0.0183		0.0501	0.105	0.0631	0.130
			(0.911)	(0.280)	(0.905)		(0.56)	(0.414)	(0.478)	(0.543)
(Impact) ΔMP Domestic_t		-0.152	-0.247	-0.0817	0.495	-0.0670	0.00581	-0.285	0.0292	0.0523
		(0.164)	(0.339)	(0.625)	(0.364)	(0.334)	(0.963)	(0.395)	(0.745)	(0.649)
(Impact) ΔMP Domestic_t*Friction_t-4			0.00478	0.0300	-0.0336		-0.00198	0.00442	-0.00254	-0.00126
			(0.299)	(0.212)	(0.306)		(0.891)	(0.378)	(0.777)	(0.500)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			-0.242	-0.0517	0.461		0.00383	-0.280	0.0266	0.0510
			(0.340)	(0.724)	(0.368)		(0.973)	(0.395)	(0.744)	(0.651)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		1,230	1,182	1,182	1,182	1,230	1,182	1,182	1,182	1,182
Monetary Policy Choice		Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied		Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification

Table 8. Non-bank private cross-border claims in local currency: funding and portfolio frictions (1)

The dependent variable is log changes in cross border claims to foreign residents in the non-bank private sector in local currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Funding frictions				Portfolio frictions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3	0.0262	-0.0114	-0.173	-1.014	-0.0484	0.223	0.0110	-0.333**	-0.0862
	(0.756)	(0.981)	(0.464)	(0.121)	(0.406)	(0.421)	(0.964)	(0.0242)	(0.237)
ΣΔMP Domestic_t to t-3*Friction_t-4		-0.000167	0.0708	0.0704*		-0.0537	-0.00142	0.0170***	0.000228
		(0.986)	(0.415)	(0.0944)		(0.264)	(0.715)	(0.00807)	(0.917)
Total effect of ΣΔMP terms for median bank		-0.0172	-0.0724	-0.146		-0.0848	-0.0881	-0.0921	-0.0858
		(0.916)	(0.584)	(0.362)		(0.292)	(0.287)	(0.222)	(0.238)
(Impact) ΔMP Domestic_t	-0.224*	-0.116	-0.110	1.301***	-0.0928**	-0.0534	-0.255***	-0.232*	-0.121**
	(0.0519)	(0.740)	(0.473)	(0.00338)	(0.0150)	(0.410)	(0.00628)	(0.0694)	(0.0311)
(Impact) ΔMP Domestic_t*Friction_t-4		-0.00393	-0.0581	-0.111***		-0.0176	0.00179	0.00517	-0.00114
		(0.499)	(0.275)	(0.00168)		(0.198)	(0.277)	(0.425)	(0.277)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4		-0.120	-0.168	1.191***		-0.0710	-0.254***	-0.227*	-0.122**
		(0.728)	(0.201)	(0.00367)		(0.19)	(0.00578)	(0.0619)	(0.0272)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,911	2,653	2,653	2,653	2,911	2,653	2,653	2,653	2,653
R-squared	0.015	0.018	0.017	0.019	0.013	0.015	0.016	0.015	0.015
Monetary Policy Choice	Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied	Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification

Table 9. Non-bank private cross border claims in foreign currency: funding and portfolio frictions (1)

The dependent variable is log changes in cross border claims to foreign residents in the non-bank private sector in foreign currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		Funding frictions				Portfolio frictions				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
$\Sigma\Delta$MP Domestic_t to t-3		0.167***	0.0678	0.0635	-0.161	0.0707**	0.0542	0.383*	-0.107*	0.00583
		(0.00191)	(0.706)	(0.499)	(0.583)	(0.0109)	(0.573)	(0.0520)	(0.0906)	(0.876)
$\Sigma\Delta$MP Domestic_t to t-3*Friction_t-4			0.00206	0.0419	0.0217		-0.000721	-0.00541*	0.0108**	0.00193*
			(0.555)	(0.257)	(0.253)		(0.965)	(0.0616)	(0.0386)	(0.0571)
Total effect of $\Sigma\Delta$MP terms for median bank			0.140*	0.123**	0.107		0.0501	0.00587	0.0467**	0.00872
			(0.0612)	(0.0364)	(0.161)		(0.121)	(0.834)	(0.0442)	(0.812)
(Impact) ΔMP Domestic_t		0.0258	0.141	-0.0553	-0.140	-0.00638	0.0202	-0.0618	0.0348	-0.0243
		(0.438)	(0.458)	(0.389)	(0.733)	(0.697)	(0.520)	(0.402)	(0.467)	(0.253)
(Impact) ΔMP Domestic_t*Friction_t-4			-0.00208	0.0356	0.0120		-0.00463	0.000830	-0.00259	0.000751
			(0.558)	(0.136)	(0.674)		(0.375)	(0.523)	(0.306)	(0.131)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			0.139	-0.0197	-0.129		0.0155	-0.0609	0.0322	-0.0235
			(0.456)	(0.683)	(0.738)		(0.570)	(0.401)	(0.479)	(0.264)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		4,400	3,939	3,939	3,939	4,400	3,939	3,939	3,939	3,939
Monetary Policy Choice		Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied		Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification

Table 10. Total claims in local currency: funding and portfolio frictions

The dependent variable is log changes in total claims to foreign residents to all economic sectors in local currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		Funding frictions				Portfolio frictions				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3		0.0514	-0.396	-0.000572	0.0531	0.0399	0.295*	0.401***	-0.159	0.0267
		(0.309)	(0.289)	(0.997)	(0.909)	(0.391)	(0.0508)	(0.00591)	(0.172)	(0.762)
ΣΔMP Domestic_t to t-3*Friction_t-4			0.0104	0.0359	0.00314		-0.0439*	-0.00568**	0.0144**	0.000768
			(0.127)	(0.384)	(0.913)		(0.0856)	(0.0327)	(0.0151)	(0.659)
Total effect of ΣΔMP terms for median bank			-0.0340	0.0504	0.0916		0.0435	0.00419	0.0457	0.0278
			(0.816)	(0.561)	(0.450)		(0.526)	(0.959)	(0.421)	(0.748)
(Impact) ΔMP Domestic_t		-0.0901**	-0.558**	-0.169	-0.928*	-0.0303*	0.0871**	0.135	-0.162**	-0.0541
		(0.0177)	(0.0375)	(0.155)	(0.0558)	(0.0909)	(0.0415)	(0.441)	(0.0221)	(0.329)
(Impact) ΔMP Domestic_t*Friction_t-4			0.0105**	0.0384	0.0598*		-0.0215***	-0.00269	0.00858**	0.000763
			(0.0325)	(0.264)	(0.0525)		(0.000910)	(0.330)	(0.0270)	(0.447)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			-0.547**	-0.131	-0.868*		0.0656*	0.132	-0.153**	-0.0533
			(0.0376)	(0.134)	(0.0561)		(0.0922)	(0.443)	(0.0224)	(0.328)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		3,913	3,538	3,538	3,538	3,913	3,538	3,538	3,538	3,538
R-squared		0.010	0.014	0.013	0.012	0.010	0.011	0.012	0.012	0.011
Monetary Policy Choice		Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied		Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification

Table 11. Total claims in foreign currency: funding and portfolio frictions

The dependent variable is log changes in total claims to foreign residents to all sectors in foreign currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

		Funding frictions				Portfolio frictions				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Friction:	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3		0.125***	0.406**	0.190*	0.163	0.0745**	0.116*	0.154	0.0769	0.104*
		(0.00453)	(0.0250)	(0.0764)	(0.452)	(0.0106)	(0.0950)	(0.154)	(0.385)	(0.0887)
ΣΔMP Domestic_t to t-3*Friction_t-4			-0.00501	-0.0103	0.000146		-0.00531	-0.00111	0.000535	-0.000714
			(0.119)	(0.782)	(0.992)		(0.646)	(0.537)	(0.902)	(0.620)
Total effect of ΣΔMP terms for median bank			0.231***	0.176***	0.165***		0.0857**	0.0762*	0.0845**	0.103*
			(0.00363)	(0.00876)	(0.00580)		(0.0136)	(0.0692)	(0.0296)	(0.0823)
(Impact) ΔMP Domestic_t		0.0157	0.382	0.0914	0.398	-0.0148	0.0308	-0.0367	0.0117	0.0179
		(0.773)	(0.110)	(0.426)	(0.282)	(0.509)	(0.499)	(0.723)	(0.902)	(0.696)
(Impact) ΔMP Domestic_t*Friction_t-4			-0.00689	-0.0155	-0.0240		-0.00757	0.000343	-0.00169	-0.00119
			(0.112)	(0.599)	(0.339)		(0.362)	(0.849)	(0.745)	(0.222)
(Impact)ΔMP Domestic_t + ΔMP Domestic_t*Friction_t-4			0.375	0.0758	0.374		0.0232	-0.0364	0.00998	0.0167
			(0.110)	(0.406)	(0.279)		(0.548)	(0.721)	(0.911)	(0.709)
Country fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations		4,469	3,993	3,993	3,993	4,469	3,993	3,993	3,993	3,993
Monetary Policy Choice		Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied		Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

(1) See Table 1 for specification

Table 12. Role of exchange rate in local currency private claims : funding and portfolio frictions

The dependent variable is log changes in non-financial private claims to foreign residents in local currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Funding frictions				Portfolio frictions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
$\Sigma\Delta$MP Domestic_t to t-3	-0.0270	0.0703	-0.0932	-0.0293	-0.0130	0.179	0.328	-0.293	0.0828
	(0.869)	(0.839)	(0.522)	(0.959)	(0.928)	(0.378)	(0.128)	(0.191)	(0.346)
$\Sigma\Delta$MP Domestic_t to t-3*Friction_t-4		-0.00110	0.0516	0.00409		-0.0333	-0.00524*	0.0194**	-0.00258
		(0.848)	(0.378)	(0.918)		(0.160)	(0.0599)	(0.0156)	(0.420)
Total effect of $\Sigma\Delta$MP terms for median bank		0.0318	-0.0197	0.0211		-0.0116	-0.0372	-0.0177	0.0789
		(0.860)	(0.880)	(0.896)		(0.941)	(0.817)	(0.899)	(0.379)
Weuro_j,t-1	0.00117***	0.00130***	0.00128***	0.00131***	0.00115***	0.00133***	0.00130***	0.00129***	0.00122***
	(0.00288)	(0.00162)	(0.00189)	(0.00173)	(0.00304)	(0.00136)	(0.000871)	(0.00113)	(0.00271)
Tc_j,t-1	0.000117	0.000308	0.000376	0.000389	7.04e-05	0.000319	0.000244	0.000159	0.000222
	(0.897)	(0.752)	(0.700)	(0.683)	(0.935)	(0.724)	(0.789)	(0.853)	(0.786)
Tc_$US,t-1	0.0724	0.0274	-0.0107	-0.0275	0.110	0.0188	0.00333	-0.0857	-0.0528
	(0.887)	(0.960)	(0.985)	(0.960)	(0.823)	(0.972)	(0.995)	(0.864)	(0.920)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,281	3,040	3,040	3,040	3,281	3,040	3,040	3,040	3,040
R-squared	0.016	0.016	0.017	0.016	0.015	0.016	0.017	0.017	0.017
Adjusted R-squared	-0.00367	-0.00726	-0.00593	-0.00611	-0.00434	-0.00622	-0.00554	-0.00608	-0.00568
Monetary Policy Choice	Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied	Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

See Table 1 for specification

Table 13. Role of exchange rate in private claims in foreign currency: funding and portfolio frictions

The dependent variable is log changes in non-financial private claims to foreign residents in foreign currency. The data are quarterly from 2000Q1 to 2015Q4 for a panel of domestically-owned banks with foreign exposures. All specifications include fixed effects as specified in the lower part of the table. Standard errors are clustered by bank. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

	Funding frictions				Portfolio frictions				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	None	Wholesale Funding Ratio	Liquid Asset Ratio	Log Total Assets	None	Tier 1 Ratio	Private Loans / Total Assets	Securities / Total Assets	Foreign Loans / Total Loans
ΣΔMP Domestic_t to t-3	0.190***	-0.0662	0.141	0.0643	0.0894**	0.141	0.803***	-0.0576	0.0546
	(0.00108)	(0.793)	(0.392)	(0.898)	(0.0231)	(0.224)	(0.000299)	(0.477)	(0.350)
ΣΔMP Domestic_t to t-3*Friction_t-4		0.00643	0.0421	0.0118		-0.00502	-0.0109***	0.0122**	0.00245*
		(0.287)	(0.431)	(0.699)		(0.774)	(0.000322)	(0.0157)	(0.0806)
Total effect of ΣΔMP terms for median bank		0.159**	0.201*	0.210		0.112**	0.0419	0.115**	0.0583
		(0.0432)	(0.0519)	(0.121)		(0.0148)	(0.222)	(0.0176)	(0.309)
Weuro_j,t-1	-0.000197	-0.000627***	-0.000627***	-0.000629***	-0.000218	-0.000622***	-0.000650***	-0.000638***	-0.000661***
	(0.217)	(0.00327)	(0.00393)	(0.00511)	(0.188)	(0.00181)	(0.00264)	(0.00256)	(0.00225)
Tc_j,t-1	0.000765**	0.000576**	0.000562**	0.000551***	0.000755**	0.000576***	0.000589***	0.000536**	0.000597***
	(0.0268)	(0.0128)	(0.0113)	(0.00864)	(0.0237)	(0.00903)	(0.00982)	(0.0142)	(0.00618)
Tc_$US,t-1	-0.397**	-0.440**	-0.449**	-0.457**	-0.326*	-0.361**	-0.358**	-0.374**	-0.357**
	(0.0359)	(0.0106)	(0.0156)	(0.0116)	(0.0649)	(0.0320)	(0.0463)	(0.0302)	(0.0354)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,352	3,944	3,944	3,944	4,352	3,944	3,944	3,944	3,944
R-squared	0.011	0.017	0.016	0.016	0.010	0.014	0.018	0.017	0.014
Adjusted R-squared	-0.00524	-0.00232	-0.00263	-0.00318	-0.00648	-0.00497	-0.000974	-0.00230	-0.00485
Monetary Policy Choice	Short Rate	Short Rate	Short Rate	Short Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate	Shadow Rate
Friction Studied	Funding	Funding	Funding	Funding	Portfolio	Portfolio	Portfolio	Portfolio	Portfolio

See Table 1 for specification

Figure 1.Local claims and liabilities over total foreign claims and liabilities and weight of foreign activity of Spanish credit institutions (in %)

— local over total foreign claims — local over total foreign liabilities
— foreign over total assets
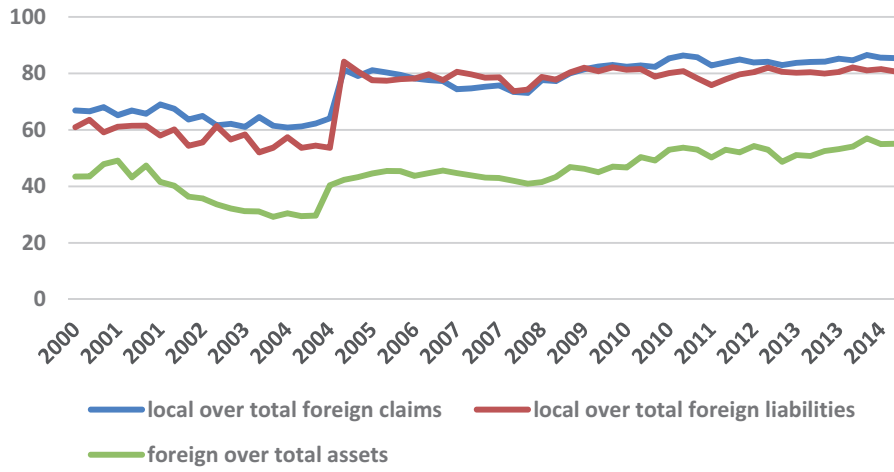
Figure 2. Foreign lending to private sector through cross-border and local exposures of Spanish credit institutions by currency (1000€)

■ in foreign curency ■ in local currency
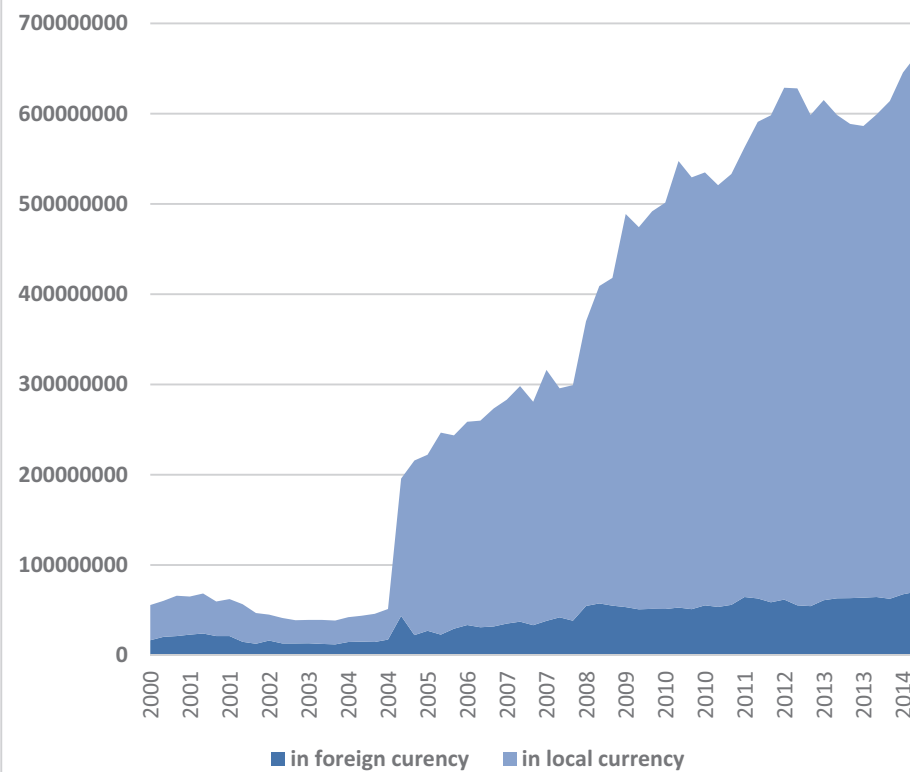
Figure 3. Average weight by bank of local and cross-border lending over private foreign lending by currency. Spanish banks (2000-2014)

8 Smallest banks by total assets

8 largest banks by total assets

- local claims in local currency
- local claims in foreign currency
- cross-border claims in local currency
- cross border claims in foreign currency
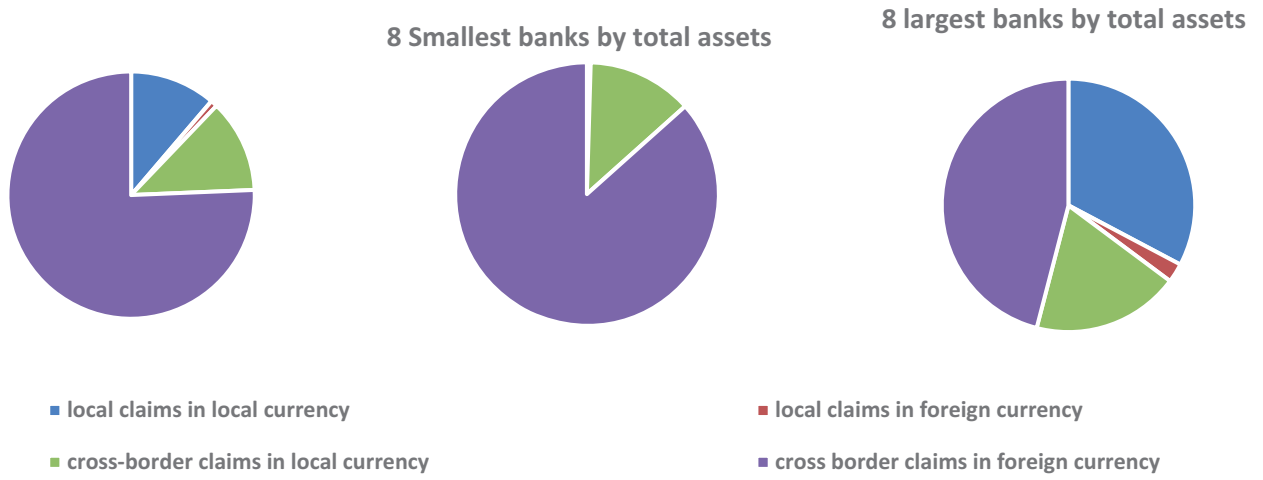
TABLE A1. WEIGHT OF LOCAL AND FOREIN CURRENCY- DENOMINATED LOANS TO THE PRIVATE NON BANK SECTOR BY COUNTERPARTY COUNTRY. SPANISH BANKS (200Q1-2014Q4).

COUNTRY	local currency			foreign currency		
	Yearly mean	Yearly max	Yearly min	Yearly mean	Yearly max	Yearly min
Argentina	1.30	4.00	0.59	1.74	9.39	0.09
Australia	0.10	0.25	0.00	0.11	0.18	0.06
Brazil	6.60	10.30	2.87	1.23	2.92	0.62
Canada	0.02	0.05	0.00	0.07	0.14	0.01
Chile	7.79	18.12	3.76	1.65	4.60	0.55
Hong Kong	0.07	0.15	0.02	0.10	0.32	0.02
China	0.01	0.07	0.00	0.04	0.11	0.00
Denmark	0.01	0.03	0.00	0.10	0.23	0.03
Hungary	0.01	0.04	0.00	0.03	0.09	0.00
India	0.00	0.00	0.00	0.04	0.13	0.00
Israel	0.00	0.00	0.00	0.00	0.00	0.00
Japan	0.02	0.05	0.00	0.01	0.08	0.00
Korea, Republic of	0.00	0.00	0.00	0.01	0.02	0.00
Malaysia	0.00	0.00	0.00	0.00	0.00	0.00
Mexico	6.05	7.29	4.12	1.50	1.81	1.29
Norway	0.47	0.71	0.00	0.04	0.10	0.01
Peru	0.47	0.85	0.18	0.69	1.03	0.49
Poland	0.51	1.86	0.00	0.29	1.02	0.01
Russian Federation	0.01	0.02	0.00	0.15	0.24	0.06
Singapore	0.00	0.01	0.00	0.02	0.04	0.00
Sweden	0.03	0.13	0.00	0.18	0.28	0.10
Switzerland	0.17	0.60	0.05	0.32	0.49	0.22
Thailand	0.00	0.00	0.00	0.00	0.00	0.00
Turkey	0.70	0.99	0.00	0.45	0.62	0.00
United Kingdom	26.80	46.97	0.66	3.39	5.44	1.62
United States	12.48	16.61	6.57	0.83	1.67	0.17

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