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Abstract

In this paper, we assess evidence on international monetary policy spillovers to domestic bank lending in Chile, Korea, and Poland, using confidential bank-level data and different measures of monetary policy shocks in relevant currency areas. These three emerging market economies are small and open, their banking systems do not have significant presence overseas, and they can be considered as price takers in the world economy. Such features allow for better identification of binding financial constraints and foreign monetary policy shocks. We find that the monetary policy shocks spill over into domestic bank lending, modifying the degree to which financial frictions tighten or relax, and this evidence is consistent with international bank lending and portfolio channels.

Keywords: monetary policy spillovers, international bank lending channel.

JEL Classification Number: E32; F32; F34; G21; G15

1. Introduction

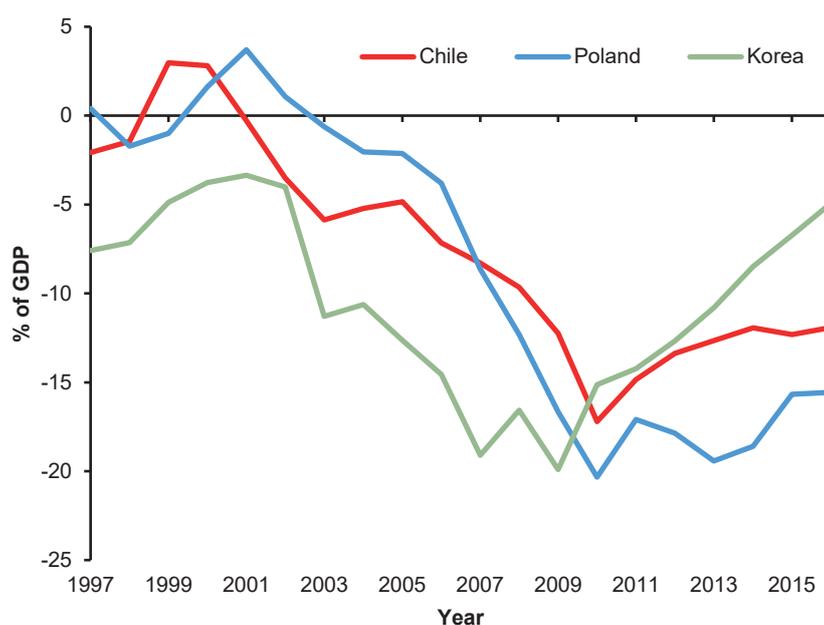
As a result of financial globalization, banking sectors around the world have become increasingly interconnected, especially through the actions of internationally active banks which intermediate capital flows across borders. Therefore, the lending supply of individual institutions depends not only on local developments, but also on foreign policy makers' decisions (particularly those from the global financial centers). In particular, changes in monetary policy in advanced economies can spill over to emerging markets by affecting banks' lending supply in different jurisdictions (i.e., inward transmission of monetary policy).

This article studies the potential effects of changes in monetary policy in the United States, the United Kingdom, the euro area, and Japan on the domestic lending of banks in Chile, Korea, and Poland (referred to as CKP hereafter). In doing so, we contribute to the currently limited evidence on international spillovers of monetary policy from advanced economies into emerging market economies (e.g., Chen, Wu, Jeon, & Wang, 2017). The article is part of the International Banking Research Network initiative (see Buch, Bussière, Goldberg, & Hills, 2018).

CKP offer a unique testing ground to understand international spillovers, as their banking sectors share some important features that expose them to a myriad of international shocks such as regulation or monetary policy. First, these economies are small enough to reasonably consider changes in the monetary policy of advanced countries to be exogenous to developments in their domestic sectors. Second, banks located in CKP provide financial services mainly to domestic borrowers, and thus have limited activity overseas. In terms of their net international investment positions, CKP's resident banking

systems hold more foreign liabilities than foreign assets (Figure 1), meaning that a significant portion of their funding needs are met using foreign capital markets. Third, resident banks in CKP have been among the most profitable around the world due to rapidly developing banking systems, thus attracting significant foreign direct investment into the sector. Indeed, foreign parent banks kept financing their CKP subsidiaries during recent turbulent periods, despite the limitations to their activities by newly introduced macroprudential regulations (Pawłowska, Serwa, & Zajączkowski, 2015; Gajewski & Krzesicki, 2017; Jara & Cabezas 2017, Park & Lee 2017).

Figure 1. Net International Investment Position of banks, by country



Sources: Banco Central de Chile, Bank of Korea, and Narodowy Bank Polski.

Finally, in terms of economic policy, these three economies feature inflation targeting frameworks with a similar degree of exchange rate flexibility according to the classifications of Ilzetzki, Reinhart, & Rogoff (2008). As such, monetary policy shocks

from abroad are mainly absorbed by movements in the exchange rates, as central banks in CKP have avoided serious interventions in their foreign exchange markets. Consequently, a priori we would expect the Mundellian trilemma to hold and that we would observe no significant aggregate effect of monetary policy shocks from abroad on domestic lending.

Despite the above-mentioned similarities, there are several differences between these economies, which may help explain some discrepancies in results. First, the presence of foreign ownership in the banking system in Chile and Poland is somewhat similar: 37% and 59% of total assets of the banking system, respectively, are held by foreign-owned banks. In contrast, in Korea, banks rely less on intragroup funding as foreign ownership of banks amounts to only 8% of total assets.

Second, CKP banking systems are located in different geographical areas, therefore their main financial counterparts are different. For Chile and Korea, it is the United States, and for Poland, the euro area. There is also a different currency composition in the banks' liabilities. In Chile and Korea, the U.S. dollar plays the most important role, whereas for Polish banks, the euro is more important.

Third, the reliance on foreign currency denominated loans also differs. In Chile and Poland, loans in foreign currency account for around 20% of all loans, while in Korea they account for only 8% of total loans, making borrowers in Korea less exposed to potential foreign monetary policy spillovers through the liability side of their balance sheets. In Poland, the portfolio of foreign currency loans consists mainly of mortgage loans linked to the Swiss franc that were widely being granted before 2012 (immediately

before the outbreak of the global financial crisis, nearly 70% of newly granted housing loans in Poland were denominated in a foreign currency¹). In Korea and Chile, foreign currency loans were being granted to corporations rather than households. In Chile, 42% of loans (mostly mortgage loans) are CPI-adjusted, while in Poland and Korea such contracts are non-existent.

In this article we address the following questions: Do changes in the monetary policy being implemented in the United States, the United Kingdom, the euro area, and Japan affect the domestic bank lending behavior in emerging market economies such as Chile, Korea, and Poland? If so, what types of banks' specific heterogeneities or frictions explain this transmission? How do these responses change during periods of conventional and unconventional monetary policy? Do different measures of monetary policy provide different spillover effects?

To address these questions, we apply the inward transmission approach as described in Buch et al. (2018) to a selected group of internationally active banks in CKP. In particular, we study whether different monetary policy measures in key foreign partner countries can affect domestic bank lending in CKP. These potential spillovers of monetary policy are identified through frictions that capture banks' cross-border positions and banks' balance sheet characteristics, such as those that measure banks' funding structure, leverage, and asset composition.

¹ Currently such loans are not granted anymore. The first regulations prohibiting foreign currency loans in Poland entered into force in 2014, although banks had effectively stopped granting them earlier in 2012. However, they still remain an important part of bank balance sheets as of 2018.

Our main findings show that financial frictions may indeed result in negative effects of monetary policy on local lending. The types of frictions that are relevant for transmitting international monetary policy shocks differ across CKP. Additionally, U.S. monetary policy is the most relevant for spillovers, and foreign exposures of banks amplify the effects of a monetary easing, particularly during unconventional monetary policy periods.

In the following section, we provide descriptions of the data used in this research and the banking sectors in Chile, Korea, and Poland. Section 3 discusses the empirical strategy used and section 4 presents the results and our interpretations. The final section offers some conclusions about our findings.

2. Data

We collect quarterly growth rates of lending to the local non-financial private sector (defined as quarterly log changes) by domestically and foreign owned banks in CKP. We deal with mergers by constructing fictitious banks along the period of estimation, as usual in this literature, and dropping the banks that are being merged. We also drop those loan growth rates above 100 and below -100.

The presence of international monetary policy spillovers can be tested using interactions of foreign monetary policy shocks with local banks' cross-border positions and certain banks' balance sheet characteristics such as: (a) liquidity and capital ratios, (b) the importance of total loans over total assets, and (c) bank currency exposures of total liabilities (net and gross) and total assets. In the case of Korea, bank currency exposures are also separated by the sector of the counterpart (bank and non-bank); while in the case of Chile, it is possible to separate intragroup funding. Other controls include Bank for International Settlements's measures of business and financial cycles, the VIX volatility index, and bank- and time-fixed effects. The bank characteristics indicate the presence of some market frictions in banks that amplify effects of monetary policy, as discussed in Buch et al. (2018). This allows us to interpret some effects of financial frictions as transmission channels of monetary policy.

Monetary policy shocks from the United States are included in estimations for all three countries, while those from the euro area are investigated for the cases of Korea and Poland. Shocks from the United Kingdom and Japan are considered only in the case of Korea. The choice of currency areas relates to their relative share in the currency denomination of foreign exposures in each country. As we see in Table 2, an

overwhelming majority of Chilean banks' foreign exposure is in U.S. dollars; in Poland, the banks' foreign exposure is dominated by U.S. dollars and euros. Only in the case of Korea do other currency denominations prevail to a more significant extent.

2.1. A comparison of the national banking systems

In this section we compare some key characteristics of the banking systems across CKP. The Chilean banking system is highly heterogeneous in terms of size, business orientation, and funding structure. Traditionally, banks in Chile are classified in the following categories: big and medium-sized banks, retail, and treasury banks (Jara & Oda, 2015). Big and medium-sized banks are standard commercial banks that participate in all market segments (corporate, consumer, and mortgage credits). At the end of 2013, these banks comprised 12 institutions, seven of which were domestically owned and five that were subsidiaries of foreign banks. As a whole, they account for more than 95% of total assets. Retail banks are domestically owned, smaller in size, and focus on household finance (i.e., consumer and mortgage loans). Finally, treasury institutions are mostly subsidiaries of foreign banks whose core activity is to provide investment banking services (corporate finance business and derivatives). Foreign banks own a significant share of total loans in Chile, similar to the situation in Poland, and in both countries, foreign banks mainly take the form of subsidiaries rather than branches. In contrast, in Korea, most banks are domestically owned and foreign banks do not comprise a significant share of the total assets of the Korean banking system.

In addition to the differences in size, market focus, and ownership structure, Chilean banks also differ in terms of international balance sheet exposure. Treasury banks hold the highest relative level of assets and liabilities overseas in comparison to other Chilean

banks; the international activity of retail banks is negligible. Because the purpose of this article is to study potential foreign monetary policy spillovers into the domestic lending market, we consider only the sub-group of big and medium-sized banks. We leave aside the retail and treasury banks, due to their small impact on domestic lending and, in the case of retail banks, because of their lack of foreign exposure.

During the past two decades in Chile, mergers have resulted in a substantial drop in the number of banks and a significant increase in the participation of foreign banks. However, this occurred mainly during the 1990s and early 2000s (Ahumada & Marshall, 2001), and therefore has a minor impact on this study. For the few mergers and acquisitions during the period of analysis (2002–2015), we follow the traditional approach of creating a fictitious bank and treating the merged institutions as if they had been merged for the entire sample period. As a result, we end up with a mostly balanced panel of 12 banks.

In Korea, the number of banks decreased after the 1997 Asian financial crisis. After a wave of mergers and acquisitions, only 15 banks of the 29 that existed before the crisis remained as of the end of 2016. The vast majority of banks are domestically owned and account for more than 92 percent of total assets. Only two subsidiaries of foreign banks entered the Korean market by acquiring domestic banks in the mid-2000s. As with the Chilean case, we follow the traditional approach of creating representative fictitious banks to deal with mergers.

Korean banks are normally classified as commercial or specialized banks.² Commercial banks are established and operate in accordance with the Korean Banking Act; specialized banks operate in accordance with specialized banking acts. The latter banks act as supplementary financial institutions to address weak spots in commercial banking in terms of fund management, and as specialized financial institutions for other purposes. Their funding relies heavily on government funds and bond issuance, in contrast with commercial banks that rely more on deposits. The analysis includes both commercial and specialized banks, because demand for policy financing has declined and many specialized banks now operate in what was previously the exclusive domain of commercial banks.

Finally, in Poland, banks are almost universally commercial, with foreign-owned banks representing 57% of total assets at the end of 2015. The banks focus on lending to local firms and households and their lending abroad is negligible. The banking sector in Poland went through a turbulent period of rapid development in its infancy in the mid-1990s when numerous small banks started operations and quickly failed. The sector stabilized in the 2000s when stronger international banks acquired many local banks and others merged into larger and sounder institutions. Interestingly, the basic financial services offered by Polish banks over the years and strict advisory policies helped the system to remain exceptionally stable during the credit boom period and the global financial crisis. Currently, there are 60 commercial banks present in the Polish market.

In our analysis, we dropped a few special-case banks (one state-owned special purpose bank, and all cooperative and affiliates, and captive automotive banks) from our analysis.

² See Bank of Korea (2011) for a detailed description of financial institutions in Korea.

We include both subsidiaries and branches of foreign banks, although the latter play a minor role in the Polish banking system, as their market share has rarely exceeded 5% during the sample period. We excluded banks with less than 5% of their liabilities towards foreign banks due to their weak international links.

2.2. Data on foreign exposures at the bank level

In this section we describe our bank-level data on foreign exposures. In Chile, foreign exposures are denominated mostly in U.S. dollars (90% of all foreign currency exposures), reporting extra- and intra-group foreign exposures, as well as counterparty country and currency denomination. For Korea, intra-group funding data is not available for most of the sample period, and bank-level cross-border liabilities data are available only since 2007Q4. In the case of Poland, only data on foreign liability exposures are available.

For the purposes of our study, we focus on the currency denomination of foreign exposures instead of the country of counterparty dimension, since for the monetary policy spillovers it is the currency of transaction that is the most important. We use exchange rate adjusted values in order to eliminate transitory direct effects of exchange rate fluctuations on the value of those exposures.

2.2.1. Dependent variables

The dependent variable used in our estimations is the log quarterly change of total loans to the private non-financial sector ($\Delta Y_{b,t}$). Therefore, lending to the financial sector is not included, particularly inter-bank loans, nor are loans to the public sector. It is also worth noting that loans denominated in a foreign currency are converted to local currency values using the quarterly averages of exchange rates instead of end-of-period rates, to remove

the noise added by very short-term currency movements. Also, for loans in CPI-indexed units in the case of Chile, these are converted into the local currency – the Chilean peso – using quarterly averages as well, although sharp movements in particular days are not present.

2.2.2. Control variables

As control variables, we consider a set of banks' balance sheet characteristics related to the asset and liability side of each bank's balance sheet ($X_{b,t}$). In particular, we include: (1) a measure of bank size, defined as the log of total assets, (2) the ratio of tier one capital to total risk-weighted assets, (3) the share of liquid assets to total assets (liquidity ratio), and (4) the ratio of core deposits to total deposits. We consider the size of banks as a measure of scale economies (see Buch et al. (2018) for the rationale on including these variables).

We also use individual banks' information reported to central banks and other supervisory institutions regarding outstanding assets, liabilities, and contingent claims held with non-residents. This information is reported on a quarterly basis. With this information at hand, we construct an additional control variable: the ratio of net intra-group liabilities to total assets.

2.3. Monetary policy shocks

In our empirical analysis below, we evaluate the impact of monetary policy shocks in country c (ΔMP^c) defined as (1) the quarterly change in the short-term policy rate, and (2) the changes in the shadow interest rate from Krippner (2016). Periods of unconventional monetary policy are captured by changes in the central bank balance sheets' measure of quantitative easing (ΔQE^c) when the short-term money market fund

rates are used, and by the dummy that captures the period when the policy rate is at the zero-lower-bound (ZLB^c) when using the shadow interest rate.

2.4. Financial frictions

Monetary policy spillovers are identified through banks' specific heterogeneities or frictions. These frictions are represented by banks' balance sheet characteristics ($W_{b,t}$), such as liquidity and capital ratios; and by banks' cross-border positions ($W_{b,t}^c$), such as the cross-border liabilities from a given currency, the net cross-border liabilities from a given currency, and the net intra-group funding from abroad (by currency). All of these variables are scaled by the total assets.

3. Empirical strategy

In this section we describe our empirical strategy, which is organized in two main blocks. First, we look at the spillovers generated by shadow interest rates (Krippner, 2013). Here, the effects of conventional and unconventional monetary policy shocks are analyzed in and out of the zero-lower bound periods. Second, we study spillovers generated by the short-term policy rates, and compare the effects generated during conventional and unconventional monetary policy periods when looking at the short-term policy rate in conjunction with quantitative easing policies.

In each case, we first look at the direct effect of international monetary policy shocks on domestic lending. Then, as suggested by Buch et al. (2018) we look at the role played by frictions. Spillovers occur when these frictions become active or, similarly, when these frictions matter in the dynamic of domestic lending.

3.1. Spillovers from shadow policy rates

In equation (1) we estimate the direct effect of changes in the foreign monetary policy on domestic lending growth rates, regardless of banks' heterogeneity. Both immediate and medium-term effects (after three quarters) are measured here. We also identify the direct effect during the period when the monetary policy rate in currency c was at its ZLB.

When the ZLB is considered, the results are split into three separate effects. First, the effect that a monetary policy shock has during the conventional monetary policy (CMP hereafter) period, and outside the ZLB periods. Second, the relative increase or decrease in the effect of a monetary policy shock during the ZLB periods in comparison to non-ZLB periods, and third, the aggregate impact of monetary policy during the ZLB periods.

The summary tables also show the significance of the ZLB itself in explaining domestic lending growth.

Therefore, we estimate the following specification:

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{c=1}^C \left(\sum_{k=0}^K (\alpha_{1,k}^c \Delta MP_{t-k}^c + \alpha_{2,k}^c \Delta MP_{t-k}^c ZLB_{t-k}^c + \alpha_{3,k}^c ZLB_{t-k}^c) + \alpha_4 Z_{t-1}^c \right) \\ & + \alpha_5 X_{b,t-1} + \alpha_6^{domestic} Z_{t-1}^{domestic} + \alpha_7^{domestic} \Delta MP_{t-1}^{domestic} + \alpha_8 VIX_{t-1} \\ & + f_b + \varepsilon_{b,t} \end{aligned} \quad (1)$$

$\Delta Y_{b,t}$ is the log change in domestic lending of bank b at time t . ΔMP_{t-k}^c represents the monetary policy shock (i.e., quarterly change in the shadow interest rate) from currency c lagged by k quarters. ZLB_{t-k}^c represents the dummy variable indicating the ZLB periods for a given currency of exposition c . $X_{b,t-1}$ is the single quarter lagged vector of control variables, which captures the degree to which banks are exposed to changes in monetary policy abroad controlling for ex-ante bank specific characteristics. Z_{t-1}^c and $Z_{t-1}^{domestic}$ are vectors of time-variant factors (measures of business and financial cycles) from country c and domestic factors, respectively. VIX_{t-1} is a measure of risk aversion lagged by one period, and f_b is the vector banks' fixed effect. The effects of changes in monetary policy are evaluated contemporaneously and up to three lag periods, i.e., $K = 3$ and $k \in \{0,1,2,3\}$.

Then, using equation (2) we study the significance of the different frictions. This specification allows us to see whether banks' heterogeneity amplifies or reduces the average effect of monetary policy shocks on domestic lending.

Therefore, we run the following equation:

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{c=1}^C \left(\sum_{k=0}^K (\alpha_{1,k}^c \Delta MP_{t-k}^c W_{b,t-k-1}^c + \alpha_{2,k}^c \Delta MP_{t-k}^c ZLB_{t-k}^c W_{b,t-K-1}^c \right. \\ & \left. + \alpha_{3,k}^c ZLB_{t-k}^c W_{b,t-K-1}^c) + \alpha_4 W_{b,t-K-1}^c \right) + \alpha_5 X_{b,t-1} + f_b + f_t \\ & + \varepsilon_{b,t} \end{aligned} \quad (2)$$

Here, the country-bank-specific frictions are captured by W_b^c , and the bank-specific friction is expressed by W_b . In this specification, we also add time fixed-effects (f_t).

3.2 Spillovers from short-term policy rates

We then turn to our estimations that take into account spillovers from short-term policy rates. In this case, unconventional monetary policy periods are captured by quantitative easing policies (QE) implemented by the respective central banks.

As in equation 3, we first look at the direct effect of monetary policy shocks:

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{c=1}^C \left(\sum_{k=0}^K (\alpha_{1,k}^c \Delta MP_{t-k}^c + \alpha_{2,k}^c \Delta MP_{t-k}^c QE_{t-k}^c) + \alpha_3 Z_{t-1}^c \right) + \alpha_4 X_{b,t-1} \\ & + \alpha_5^{domestic} Z_{t-1}^{domestic} + \alpha_6^{domestic} \Delta MP_{t-1}^{domestic} + \alpha_7 VIX_{t-1} + f_b \\ & + \varepsilon_{b,t} \end{aligned} \quad (3)$$

Then, we study the role played by different frictions by running the following specification:

$$\begin{aligned} \Delta Y_{b,t} = & \alpha_0 + \sum_{c=1}^C \left(\sum_{k=0}^K (\alpha_{1,k}^c \Delta MP_{t-k}^c W_{b,t-k-1}^c + \alpha_{2,k}^c \Delta QE_{t-k}^c W_{b,t-K-1}^c) + \alpha_3^c W_{b,t-K-1}^c \right) \\ & + \alpha_4 X_{b,t-1} + f_b + f_t \\ & + \varepsilon_{b,t} \end{aligned} \quad (4)$$

When QE is included in the estimation, both the immediate and medium-term effects of a monetary policy shock induced by the specific frictions are presented, as well as the immediate and medium-term effects of QE induced by the specific friction.

Again, W_b^c and W_b represent the country-bank-specific frictions and the bank-specific frictions respectively.

4. Results

4.1. Aggregate impact of international monetary policy shocks

Tables 3 and 4 present the aggregate (average) effect of international monetary policy shocks on domestic lending after estimating equations (1) and (3) described above. In particular, Table 3 shows that shocks from the shadow interest rates do not have an overall effect on domestic lending, whereas shocks from the short-term policy rate do, although these are weak (see Table 4). These results are consistent for all three economies analyzed.

Despite the aggregate consistency of our results across CKP in terms of the relevant policy rate, there are some differences regarding the timing and direction of how short-term policy rates affect domestic lending (Table 4). While in Chile and Korea the aggregate effect is negative, in Poland it is positive. This may be due to the fact that the Polish financial cycle before the global financial crisis was orthogonal to monetary policy changes in the U.S. and euro area: high Polish interest rates and the relatively stable exchange rate increased demand for foreign currency loans, but after the crisis, this demand weakened and additional regulations limited the supply of foreign currency loans. Also, in Chile and Poland the effect prevails during CMP periods, while in Korea, QE seems to play a role that it does not in Chile or Poland.

It is worth noting that the presence of aggregate effects of international monetary policy shocks in domestic lending does not appear to be related to the foreign ownership of local banks or to the share of funding from foreign banks, since the Korean banking sector has a smaller share of foreign-owned banks and less dependence on intragroup foreign funding than the Chilean and Polish banking sectors.

4.2. Spillover effects of international monetary policy shocks

As emphasized by Buch et al. (2018), looking at the aggregate impact does not provide any insight into how the effects of changes in foreign monetary policies are transmitted across borders. Therefore, we now turn to the estimations of equations (2) and (4) to analyze the role played by different frictions that can cause spillovers from changes in monetary conditions abroad. These frictions can relate either to the funding structures of banks or to the composition of the assets side of their balance sheets.

We show our results from equations (2) and (4) in separate tables. Tables 5 and 7 show the analysis of the significance of frictions that measure heterogeneities in the banks' funding structure, so they capture spillovers in a similar manner to that of bank lending channels for domestic monetary policy shocks. Tables 6 and 8 show the analysis of frictions that capture heterogeneities in asset composition and leverage, similar to the literature that studies the portfolio channel effects of monetary policy shocks. All these tables show the effect of the monetary policy shocks, as well as their medium-term (four-quarter) effect.

In Table 5, we show results for frictions captured by variables on banking funding using, as monetary policy proxy, the shadow interest rates and controlling for the ZLB. At a glance, these frictions are present significantly for Chile and Korea, but not for Poland. In the case of Chile, the effects during CMP times are not statistically significant, except for a smoothing role of net cross-border intragroup funding, which was expected given the important share of foreign-owned banking in credit provision. In the case of Korea, there is a slight negative immediate effect through cross-border liabilities.

During the ZLB period, however, effects become more significant. For Chile, the frictions arising from high gross and net cross-border liabilities are relaxed when there is a monetary policy easing abroad, leading to more lending domestically, both immediately and during the following year; intragroup funding moderates this effect only at the time of the monetary policy change. For Korea, only frictions from cross-border liabilities play a role, and only at the time of the monetary policy change.

In Table 6, while still using the shadow interest rates of the advanced economies as a monetary proxy, we turn our attention toward frictions related to asset composition and leverage. Transmission channels corresponding to these frictions seem to be important for Korea only, which can be explained by the higher size of gross balance sheet positions abroad for Korean banks, as compared to Chile and Poland, which make these frictions more significant. For example, during CMP periods, banks with high cross-border assets were lending more than other banks after monetary policy easing abroad. We conjectured that this was due to the loss of value in local currency of those cross-border assets, which shrunk the share of domestic assets and hence made it more difficult to fulfil capital ratio requirements. However, during CMP periods, coefficients next to the capital ratio were not significant, which suggests that other explanations might be better, for example the portfolio reallocation channel could play a role.

During the ZLB period, well-capitalized Korean banks tended to grant less domestic credit when facing foreign monetary policy easing compared to less capitalized banks, probably because the latter might see a relatively smaller reduction in funding costs compared to the former. Usually, the situation where a high capital ratio means better collateral arises from agency problems and moral hazards present in the interbank lending

market. These might have been greater during the ZLB for Korean banks, in comparison to Chilean and Polish banks.

Table 7 repeats the analysis from Table 5, but it changes the monetary policy proxy to the short-term target interest rates, while controlling for QE instead of ZLB periods. Thus, our focus changes from the entire yield curve to liquidity provision by the central banks. In Chile, financial frictions tend to be smoothed out by intragroup funding across borders during CMP, but the relation reverses with QE: high intragroup funding translates to more domestic credit supply under an increase in QE. This is consistent with search-for-yield arguments, that foreign banks lend more to emerging market economies in order to satisfy higher yield requirements. Note also that the effect of QE and CMP are more muted, indicating that the financial frictions captured may not relax nor tighten when monetary policy abroad changes.

In contrast, in Korea, with very few important foreign banks on the scene, frictions after CMP easing abroad reduce lending in banks with higher net and gross cross-border liabilities both immediately and during the following year. However, during QE, only those frictions acting through net cross-border liabilities are statistically significant. Since, gross cross-border liabilities of Korean banks matter after changes in shadow interest rates (as shown in Table 5), these results suggest an effect of liquidity frictions operating through the bank lending channel on bank lending in Korea during a QE period.

In Poland, highly liquid banks tend to have provided less credit under QE than less liquid banks. This is suggestive of negative valuation effects through appreciation of local currency, which might have been more important to preserve liquidity. On the other hand,

less liquid banks might have suffered less from valuation effects and kept their liquidity intact.

In Table 8 we again look at banks' assets (as in Table 6), but with short-term target interest rates and QE. The results are again significant for Korea. Banks with higher shares of cross-border assets lend less during QE, which can be explained from appreciated exchange rates and lower valuation of assets making liquidity and risk frictions tighter. However, during CMP we do not see a significant role for these financial frictions. The case of Poland shows some significant effects for highly capitalized banks which lend less during QE, although this only occurs on impact.

We also attribute the relatively high explanatory power of balance sheet characteristics in our regressions (as measured with an adjusted R-squared statistic) to similarities between analyzed banks in terms of their lending policies and the overall business models in the respective countries, as pointed out in the introduction. More specifically, the bank size and capital ratio are usually related negatively to the growth rate of lending. In turn, the liquid asset ratio is positively correlated with lending growth.

5. Conclusions

Our paper provides unique evidence of international spillovers from the perspective of three emerging market economies, taking into consideration the heterogeneity of banking institutions. We find evidence of negative international monetary policy spillovers to Chile, and Korea, and to a lesser degree in Poland through frictions that capture heterogeneities in the banks' funding structures (cross-border funding and liquidity restrictions), similar to what is found in other financially open economies (Buch et al., 2018). These spillovers are present in several of our specifications regardless of the monetary policy shock being considered.

Foreign monetary policy spills over through frictions captured by heterogeneity in funding structure, which is particularly significant for Chile and Korea, regardless of the monetary policy proxy being considered. Frictions captured by heterogeneity in asset composition are significant for Korea, and are not significant for Chile. This might be explained by the larger gross international investment position of banks in Korea, especially on the asset side. Such an effect could also suggest the presence of the portfolio reallocation channel, i.e. changing the asset structure of banks, in the international transmission of monetary policy.

Some particularities are important to take into account in the analysis. In the case of Korea, foreign bank branches used their advantage in accessing offshore wholesale funding markets and acted as intermediaries of dollar funding for domestic banks. Ree, Yoon, and Park (2015) argue that the foreign exchange liquidity mismatches of foreign banks in Korea made these banks particularly vulnerable to the global financial crisis.

Thus, the open foreign exchange positions might have also been responsible for the significant effect of foreign monetary policy changes on local banks.

The weakest effect of foreign monetary policies spillovers in Polish banks can be explained by the fact that most Polish banks close their FX positions associated with foreign borrowing by using appropriate derivative instruments (CIRS and FX swaps). In this way, these banks are transferring interest rate risk to their local borrowing customers and the banks are almost indifferent to foreign interest rate changes in terms of borrowing costs. While this is also true in Korea and Chile, their exposure to foreign currency denominated loans is smaller than in Poland. The weak impact of international frictions on bank lending in Poland can also be explained by the presence of relatively strong demand channels affecting bank lending. This explanation is backed by our results from regressions containing local and international business and financial cycles, where such cycles are found to be significant factors explaining lending growth.

We see evidence for frictions arising from the use of capital as collateral for interbank cross-border borrowing, which makes highly capitalized banks increase their domestic lending to a lesser degree than less capitalized banks, due to smaller reductions in their funding costs. This is present mostly in Korea, but also to a smaller degree in Poland. On the other hand, these frictions were more relaxed for banks with higher cross-border liabilities during unconventional monetary policy periods, as was the case in Chile and Korea. In Chile, the higher reliance on foreign long-term bonds explains the significance of frictions from gross cross-border liabilities during ZLB with shadow rates, while in Korea, net cross-border liabilities mattered more during QE, due to liquidity frictions related to foreign currency.

An important observation is the role played by intragroup funding. In Chile, during CMP periods, banks with high intragroup funding abroad contracted lending relative to those with low levels when there was a monetary easing abroad. In turn, during the unconventional monetary policy periods, when central banks eased their monetary policy stance, the banks with high intragroup funding abroad could expand more than those less-connected banks, as the global banks were likely looking to take more risk during this period.

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Table 1. Summary statistics

This Table provides summary statistics for banks' balance sheets and lending, for the 2002q2-2015q4 period. * For Poland, general inward statistics refer to the whole commercial banking sector, while other statistics – to the estimation sample only (banks with significant international activity).

Variable	Chile			Korea			Poland*					
	Mean	SD	Max	Mean	SD	Max	Mean	SD	Max			
General inward statistics												
Total assets of the resident banking sector (USD mn)	162,822	61,803	82,761	292,023	1,221,397	377,274	645,593	1,903,396	324,973	123,680	114,210	495,977
Total assets of foreign banks (USD mn)	61,406	19,551	35,768	101,894	97,106	18,803	50,992	129,564	230,468	85,940	78,439	396,816
Number of banks	12	0	11	12	16	1	15	18	69	4	63	76
Number of foreign banks	5	0	4	5	2	0	2	2	53	7	36	62
Total bank assets (USD mn)	13,748	12,865	146	50,764	74,185	68,875	1,396	254,516	324,973	123,680	114,210	495,977
Domestic lending (USD mn)	9,322	8,768	46	34,765	47,442	47,975	929	190,264	199,586	86,646	59,604	307,927
Loans to the domestic non-financial private sector (USD mn)	8,718	8,208	26	32,970	45,434	46,023	825	183,848	171,989	78,541	48,163	268,343
Log changes in loans to the domestic non-financial private sector	2.5	4.6	-10.6	35.7	2.5	3.4	-12.3	16.8	5.5	33.5	-442.1	533.1
Frictions from balance sheets characteristics ($W_{b,t}$) (ratios in %)												
Liquid Assets / Total Assets	20.4	7.5	3.1	49.1	25.8	9.2	0.3	59.4	16.72	10.99	0.288	64.70
Tier 1 Ratio	10.6	2.3	6.6	23.0	11.8	2.8	6.2	20.9	14.76	6.581	0.467	30
C&I Loans / Total Assets	38.6	13.9	14.9	114.9	32.6	11.8	11.1	58.1	26.24	17.03	0	93.31
Securities / Total Assets	13.2	6.1	0.2	45.1	17.5	5.3	6.2	45.0	15.41	12.33	0	66.23
Balance sheet controls ($X_{b,t}$) (ratios in %)												
Log total assets	15.2	1.3	11.4	17.1	17.7	1.3	14.4	19.4	16.29	1.617	11.76	19.40
Tier 1 ratio	10.6	2.3	6.6	23.0	11.8	2.8	6.2	20.9	14.76	6.581	0.467	30
Liquid asset ratio	20.4	7.5	3.1	49.1	25.8	9.2	0.3	59.4	16.72	10.99	0.288	64.70
Net IG funding ratio	0.6	4.0	-11.1	50.5	8.7	21.4	-68.0	68.5	18.32	23.12	-40.48	98.17
Core deposits ratio	16.8	8.9	2.5	52.7	23.9	7.4	2.9	51.9	20.65	15.40	0	54.44

Source: Central Bank of Chile, Bank of Korea, and Narodowy Bank Polski.

Table 2. Cross-border positions statistics ($W_{b,t}^c$)

Ratios in % of total assets. Source: Authors' calculations based on the Superintendency of Banks and Financial Institutions and the Central Bank of Chile, Korean Financial Supervisory Service, the Bank of Korea, and Narodowy Bank Polski.

Variable	US		Euro		Yen		Sterling	
	dollar						Pound	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Panel A: Chile								
Cross-border Liabilities <i>in crncy</i>	7.0	10.2	0.1	0.2	0.2	0.8	0.0	0.0
Net Cross-border Liabilities <i>in crncy</i>	4.5	10.1	-0.1	0.3	0.1	0.9	0.0	0.0
Net Intragroup Funding <i>in crncy</i>	0.5	3.9	0.0	0.1	0.0	0.1	0.0	0.0
Cross-Border Assets <i>in crncy</i>	2.5	2.4	0.1	0.3	0.1	0.3	0.0	0.0
Panel B: Korea								
Cross-border Liabilities <i>in crncy</i>	3.9	6.0	0.7	1.8	0.8	0.8	0.1	0.2
Net Cross-border Liabilities <i>in crncy</i>	2.5	3.2	0.3	0.3	0.2	0.2	0.0	0.1
Cross-Border Assets <i>in crncy</i>	1.4	3.2	0.4	1.7	0.6	0.8	0.0	0.2
Cross-Border Assets <i>to Banks in crncy</i>	1.3	1.4	0.2	0.2	0.1	0.1	0.0	0.1
Cross-border Assets <i>to Non-Banks in crncy</i>	1.2	2.4	0.1	0.2	0.1	0.0	0.0	0.1
Panel C: Poland								
Cross-border Liabilities <i>in crncy</i>	5.7	9.2	17.5	16.8				

Table 3. Aggregate inward transmission when using $\Delta(\text{Shadow Short Rate})^*\text{ZLB}$

The dependent variable is log changes in loans to the domestic non-financial private sector. The data are quarterly from 2000Q1 to 2015Q4 for a panel of all resident banks with foreign exposures. For Poland, the sample starts in 2002Q1 due to data availability. Standard errors are clustered by bank. All estimations include bank fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively using robust standard errors. 'Sum of (Impact)' denotes the sum of immediate effects of explanatory variables on the lending growth and 'Sum of Coefficients on all' denotes the sum of immediate and lagged effects of explanatory variables on the lending growth.

	(1)	(2)	(3)
	Chile	Korea	Poland
Sum of (Impact) ΔMP Coefficients	-0.755	-0.161	1.129
Sum of Coefficients on all ΔMP	-0.977	0.707	1.704
Sum of (Impact) $\Delta\text{MP}^*\text{ZLB}$ Coefficients	0.69	0.078	-3.049
Sum of Coefficients on all $\Delta\text{MP}^*\text{ZLB}$	1.054	-0.857	-10.46
Sum of (Impact) $\Delta\text{MP}^*(\text{ZLB})$ and ΔMP Coefficients	-0.065	-0.083	-1.921
Sum of Coefficients on all $\Delta\text{MP}^*(\text{ZLB})$ and ΔMP	0.078	-0.15	-8.76
Time fixed effects	No	No	No
Observations	644	781	772
Adjusted R-squared	0.22	0.206	0.195
Number of banks	12	14	28

Table 4. Aggregate inward transmission when using the Δ (Short-term Policy Rate) and Quantitative Easing (QE)

The dependent variable is log changes in loans to the domestic non-financial private sector. The data are quarterly from 2000Q1 to 2015Q4 for a panel of all resident banks with foreign exposures. For Poland, the sample starts in 2002Q1 due to data availability. Standard errors are clustered by bank. All estimations include bank fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively using robust standard errors. 'Sum of (Impact)' denotes the sum of immediate effects of explanatory variables on the lending growth and 'Sum of Coefficients on all' denotes the sum of immediate and lagged effects of explanatory variables on the lending growth.

	(1)	(2)	(3)
	Chile	Korea	Poland
Sum of (Impact) Δ MP Coefficients	-1.718*	0.447	1.928
Sum of Coefficients on all Δ MP	-1.036	1.075	7.783**
Sum of (Impact) Δ QE*Channel Coefficients	-0.001	-0.06	-0.394
Sum of Coefficients on all Δ QE*Channel	-0.633	-0.304*	0.332
Time fixed effects	No	No	No
Observations	644	504	772
Adjusted R-squared	0.19	0.161	0.163
Number of banks	12	14	28

Table 5. Spillovers from frictions that capture funding heterogeneities when using $\Delta(\text{Shadow Short Rate}) * \text{ZLB}$

The dependent variable is log changes in loans to the domestic non-financial private sector. The data are quarterly from 2000Q1 to 2015Q4 for a panel of all resident banks with foreign exposures. For Poland, the sample starts in 2002Q1 due to data availability. Standard errors are clustered by bank. All estimations include bank fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively using robust standard errors. 'Sum of (Impact)' denotes the sum of immediate effects of explanatory variables on the lending growth and 'Sum of Coefficients on all' denotes the sum of immediate and lagged effects of explanatory variables on the lending growth. Empty columns indicate that the given friction was not analyzed, e.g. due to lack of data.

Frictions	(1) Cross- border Liabilities/T otal Assets	(2) Net border Liabilities/Total Assets	Cross- Net Intragroup Funding/Total Assets	(4) Liquid Assets/Total Assets
Panel A: Chile				
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})$ Coefficients	-0.005	-0.021	3.335	0.027
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})$	0.006	-0.028	1.944*	-0.027
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})*\text{ZLB}$ Coefficients	-0.059	-0.036	-3.003	-0.021
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})*\text{ZLB}$	-0.181	-0.14	-1.596	-0.08
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})(*\text{ZLB})$ and $\Delta\text{MP}(*\text{Channel})$ Coefficients	-0.064***	-0.058***	0.332***	0.005
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})(*\text{ZLB})$ and $\Delta\text{MP}(*\text{Channel})$	-0.175***	-0.168***	0.348	-0.107
Time fixed effects	Yes	Yes	Yes	Yes
Observations	611	611	611	644
Adjusted R-squared	0.31	0.31	0.32	0.3
Number of banks	12	12	12	12
Panel B: Korea				
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})$ Coefficients	-0.073*	0.049		-0.001
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})$	-0.091	0.029		0.005
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})*\text{ZLB}$ Coefficients	-0.001	-0.005		0.001
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})*\text{ZLB}$	-0.017	0.018		-0.005
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})(*\text{ZLB})$ and $\Delta\text{MP}(*\text{Channel})$ Coefficients	-0.074***	0.044		0.000
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})(*\text{ZLB})$ and $\Delta\text{MP}(*\text{Channel})$	-0.109	0.046		0.000
Time fixed effects	Yes	Yes		Yes
Observations	238	238		772
Adjusted R-squared	0.256	0.283		0.17
Number of banks	11	11		14
Panel C: Poland				
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})$ Coefficients	-0.12			0.013
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})$	-0.1			-0.037
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})*\text{ZLB}$ Coefficients	0.0969			-0.253
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})*\text{ZLB}$	0.379			-0.899
Sum of (Impact) $\Delta\text{MP}(*\text{Channel})(*\text{ZLB})$ and $\Delta\text{MP}(*\text{Channel})$ Coefficients	-0.0229			-0.241
Sum of Coefficients on all $\Delta\text{MP}(*\text{Channel})(*\text{ZLB})$ and $\Delta\text{MP}(*\text{Channel})$	0.279			-0.936
Time fixed effects	Yes			Yes
Observations	759			759
Adjusted R-squared	0.155			0.203
Number of banks	28			28

Table 6. Spillovers from frictions that capture asset side heterogeneities when using $\Delta(\text{Shadow Short Rate}) \cdot \text{ZLB}$

The dependent variable is log changes in loans to the domestic non-financial private sector. The data are quarterly from 2000Q1 to 2015Q4 for a panel of all resident banks with foreign exposures. For Poland, the sample starts in 2002Q1 due to data availability. Standard errors are clustered by bank. All estimations include bank fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively using robust standard errors. 'Sum of (Impact)' denotes the sum of immediate effects of explanatory variables on the lending growth and 'Sum of Coefficients on all' denotes the sum of immediate and lagged effects of explanatory variables on the lending growth. Empty columns indicate that the given friction was not analyzed, e.g. due to lack of data.

	(1)	(2)	(3)	(4)
Frictions	Tier1 Ratio	C&I Loans/Total Assets	Securities/Total Assets	Cross- Border Assets/Total Assets
Panel A: Chile				
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel})$ Coefficients	-0.299	-0.01	0.016	0.064
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel})$	-0.304	-0.095	-0.058	0.103
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel}) \cdot \text{ZLB}$ Coefficients	0.348	-0.016	0.036	-0.245
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel}) \cdot \text{ZLB}$	0.749	0.010	0.039	-0.265
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel}) \cdot (\cdot\text{ZLB})$ Coefficients	0.049	-0.025	0.052	-0.181
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel}) \cdot (\cdot\text{ZLB})$	0.445	-0.085	-0.018	-0.163
Time fixed effects	Yes	Yes	Yes	Yes
Observations	644	644	644	611
Adjusted R-squared	0.3	0.3	0.3	0.29
Number of banks	12	12	12	12
Panel B: Korea				
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel})$ Coefficients	0.007	-0.001	-0.004*	0.029
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel})$	0.125	0.016	0.284	0.157***
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel}) \cdot \text{ZLB}$ Coefficients	-0.002	0.001	0.005	0.005
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel}) \cdot \text{ZLB}$	-0.102	-0.014	-0.28	-0.058
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel}) \cdot (\cdot\text{ZLB})$ Coefficients	0.005*	0.000	0.001	0.034
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel}) \cdot (\cdot\text{ZLB})$	0.022**	0.002	0.004	0.100
Time fixed effects	Yes	Yes	Yes	Yes
Observations	753	773	386	308
Adjusted R-squared	0.223	0.147	0.236	0.137
Number of banks	14	14	14	12
Panel C: Poland				
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel})$ Coefficients	-0.156	-0.103	0.0998	
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel})$	-0.106	-0.0321	0.0567	
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel}) \cdot \text{ZLB}$ Coefficients	0.531	-0.0516	0.0369	
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel}) \cdot \text{ZLB}$	3.993	0.124	-0.259	
Sum of (Impact) $\Delta\text{MP}(\cdot\text{Channel}) \cdot (\cdot\text{ZLB})$ Coefficients	0.375	-0.155	0.137	
Sum of Coefficients on all $\Delta\text{MP}(\cdot\text{Channel}) \cdot (\cdot\text{ZLB})$	3.886	0.0914	-0.202	
Time fixed effects	Yes	Yes	Yes	
Observations	759	759	759	
Adjusted R-squared	0.231	0.204	0.202	
Number of banks	28	28	28	

Table 7. Spillovers from frictions that capture funding heterogeneities when using the Δ (Short-term Policy Rate) and Quantitative Easing (QE)

The dependent variable is log changes in loans to the domestic non-financial private sector. The data are quarterly from 2000Q1 to 2015Q4 for a panel of all resident banks with foreign exposures. For Poland, the sample starts in 2002Q1 due to data availability. Standard errors are clustered by bank. All estimations include bank fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively using robust standard errors. 'Sum of (Impact)' denotes the sum of immediate effects of explanatory variables on the lending growth and 'Sum of Coefficients on all' denotes the sum of immediate and lagged effects of explanatory variables on the lending growth. Empty columns indicate that the given friction was not analyzed, e.g. due to lack of data.

Frictions	(1) Cross-border Liabilities/Total Assets	(2) Net border Liabilities/Total Assets	Cross- (3) Net Intragroup Funding/Total Assets	(4) Liquid Assets/Total Assets
Panel A: Chile				
Sum of (Impact) Δ MP(*Channel) Coefficients	-0.104	-0.045	1.268	-0.044
Sum of Coefficients on all Δ MP(*Channel)	-0.037	-0.025	1.248**	-0.067
Sum of (Impact) Δ QE*Channel Coefficients	0.028	0.037*	0.12	0.016
Sum of Coefficients on all Δ QE*Channel	-0.006	-0.008	0.434**	0.091
Time fixed effects	Yes	Yes	Yes	Yes
Observations	611	611	611	644
Adjusted R-squared	0.3	0.3	0.32	0.31
Number of banks	12	12	12	12
Panel B: Korea				
Sum of (Impact) Δ MP(*Channel) Coefficients	-0.226*	-0.209		0.004
Sum of Coefficients on all Δ MP(*Channel)	-1.734*	-0.695**		0.011
Sum of (Impact) Δ QE*Channel Coefficients	-0.081	0.004		0.000
Sum of Coefficients on all Δ QE*Channel	-0.165	0.118***		0.000
Time fixed effects	Yes	Yes		Yes
Observations	230	230		495
Adjusted R-squared	0.243	0.327		0.139
Number of banks	11	11		14
Panel C: Poland				
Sum of (Impact) Δ MP(*Channel) Coefficients	0.152			0.0222
Sum of Coefficients on all Δ MP(*Channel)	0.125			0.137
Sum of (Impact) Δ QE*Channel Coefficients	-0.0196			-0.142*
Sum of Coefficients on all Δ QE*Channel	-0.00372			0.0145
Time fixed effects	Yes			Yes
Observations	759			759
Adjusted R-squared	0.164			0.2
Number of banks	28			28

Table 8. Frictions that capture asset side heterogeneities using the Δ (Short-term Policy Rate) and Quantitative Easing

The dependent variable is log changes in loans to the domestic non-financial private sector. The data are quarterly from 2000Q1 to 2015Q4 for a panel of all resident banks with foreign exposures. For Poland, the sample starts in 2002Q1 due to data availability. Standard errors are clustered by bank. All estimations include bank fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively using robust standard errors. 'Sum of (Impact)' denotes the sum of immediate effects of explanatory variables on the lending growth and 'Sum of Coefficients on all' denotes the sum of immediate and lagged effects of explanatory variables on the lending growth. Empty columns indicate that the given friction was not analyzed, e.g. due to lack of data.

	(1)	(2)	(3)	(4)
Frictions	Tier1 Ratio	C&I Loans/Total Assets	Securities/Total Assets	Cross-Border Assets/Total Assets
Panel A: Chile				
Sum of (Impact) Δ MP(*Channel) Coefficients	-0.425	-0.004	-0.075	-0.334
Sum of Coefficients on all Δ MP(*Channel)	-0.095	-0.071	-0.115	0.085
Sum of (Impact) Δ QE*Channel Coefficients	-0.041	0.014	-0.004	-0.161
Sum of Coefficients on all Δ QE*Channel	-0.102	-0.02	0.081	0.089
Time fixed effects	Yes	Yes	Yes	Yes
Observations	644	644	644	611
Adjusted R-squared	0.29	0.3	0.3	0.3
Number of banks	12	12	12	12
Panel B: Korea				
Sum of (Impact) Δ MP(*Channel) Coefficients	0.004	0.005	-0.005	0.645
Sum of Coefficients on all Δ MP(*Channel)	0.003	0.007	0.077	0.313
Sum of (Impact) Δ QE*Channel Coefficients	0.000	0.000	0.001	-0.022**
Sum of Coefficients on all Δ QE*Channel	-0.001	-0.001*	0.001	-0.12***
Time fixed effects	Yes	Yes	Yes	Yes
Observations	479	496	372	296
Adjusted R-squared	0.204	0.113	0.227	0.251
Number of banks	14	14	14	12
Panel C: Poland				
Sum of (Impact) Δ MP(*Channel) Coefficients	-0.21	-0.174	0.208	
Sum of Coefficients on all Δ MP(*Channel)	0.0953	-0.0371	0.103	
Sum of (Impact) Δ QE*Channel Coefficients	-0.242**	-0.0639	0.142	
Sum of Coefficients on all Δ QE*Channel	-0.00654	0.00501	-0.00822	
Time fixed effects	Yes	Yes	Yes	
Observations	759	759	759	
Adjusted R-squared	0.186	0.186	0.181	
Number of banks	28	28	28	

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