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Cross-Border Spillovers in Foreign Currency Credit

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Abstract

This paper examines the presence of cross-country spillovers in foreign currency loans. We use spatial econometric techniques and a unique monthly dataset of loan shares in foreign currency denomination, extending over three decades for 23 emerging countries, to assess how changes in local monetary policy affect domestic banks' currency lending portfolios and how the latter changes transmit to other countries. We find strong evidence of cross-border spillovers in the proportion of foreign currency credit. Spillovers are channelled by geographic linkages between countries and pass through to all countries in a network with higher potency for more proximate countries. Monetary policy interventions that influence lending in foreign currency in one country can, therefore, affect lending in neighboring countries.

JEL Classification: C23; E51; F3; F42; G15

Keywords: Foreign currency lending; Spillovers; Monetary policy; Bank net worth; Emerging economies; Spatial econometrics

1. Introduction

Lending in a foreign currency extended by local banking institutions to the non-financial sector is a widely observed phenomenon in many countries around the world. Since the early 2000s, worldwide on average 25 percent of loans are granted in a foreign currency, with significant dispersion across countries (see Bannister et al., 2018).[1] Research has indicated that large credit exposures denominated in foreign currencies limit the flow of the transmission of domestic monetary policy (Ongena et al., 2018), while they also contribute to financial fragility and raise the likelihood of balance of payments crises (see De Nicoló et al., 2005; Levy Yeyati, 2006). Yet, despite the prevalence of foreign currency lending and its established effects on monetary policy transmission and financial instability, there is no empirical work that examines the presence of spillovers in foreign currency lending beyond national borders. Existing work has largely limited its attention to the determinants of foreign currency credit within each country, thereby assuming that influences on foreign currency lending are country-specific or independent of developments in foreign currency lending in other countries.

To fill this gap in the literature, this paper investigates whether foreign currency lending spills over across countries. To achieve this, we resort to an economic mechanism through which banks sift the currency composition of their lending, and then use spatial econometrics techniques to capture and measure the extent of spillovers across countries. The transmission mechanism resorts to the bank lending channel of monetary policy *a la* Kashyap and Stein (2000). The empirical model accounts for interconnections and cross-sectional dependence within a network of countries that reflect exogenous geographic characteristics that allows for spillovers in foreign currency lending to be transmitted across country lines.

Our identification strategy borrows elements from the bank lending channel of monetary policy, which advances the hypothesis that capital-constrained or less capitalized banks exhibit a stronger response to changes in local monetary conditions than their capital-abundant or better-capitalized counterparts.[2] Our strategy however,

[1] The highest shares are experienced by Eastern Europe (in excess of 40 percent) and Latin America (about 30 percent), whilst the lowest share is observed for Africa, ranging between 10-15 percent.

[2] For instance, in response to tighter monetary conditions and a rise in domestic interest rates (i.e., higher cost of lending for local banks), banks reduce the supply of loans. The effect however is not homogeneous

does not hinge on identifying a bank lending channel per se. This would require a mechanism that disentangles credit demand from credit supply to credibly infer that the transmission reflects bank-specific supply effects. To isolate these two channels, recent studies use micro-level bank data based on comprehensive credit registers of the monetary authorities containing granular information on all loans extended by all credit institutions operating nationally, matched with firm financial statement data and balance-sheet data (see Jiménez et al., 2012; Jiménez et al., 2014; Ongena et al., 2018; Abuka et al., 2019; Morais et al., 2019). This allows better controlling for firm-level credit demand with time-varying borrower characteristics and firm-time fixed effects, so that one can identify the bank lending channel from the differential responses to changes in monetary conditions by banks with different capitalization ratios.

In our analysis instead identification relies on the use of macro-level aggregate data, necessary to test for spillovers at the cross-country level. By doing so, the identification of cross-border spillovers in foreign currency credit takes place by allowing the network effect of all other countries' monetary policy to vary with own bank capital while simultaneously controlling for any links with the domestic monetary policy stance and bank balance sheet strength. In terms of our specification, this means that controlling for country-fixed effects and time-fixed effects, we regress each country's proportion of loans in foreign currency on a weighted-average of all other countries' share of foreign currency loans, i.e., the spatial lag variable, where weights are dictated by the relative geographical distance between countries. Since the weighted share of foreign currency loans is endogenous and subject to a reflection problem, we adopt an instrumental variable approach similar to that used by König et al. (2017). Our identification strategy exploits the exogenous variation in the average monetary policy stance faced by the countries in the geographic network and the way the effects of monetary policy vary across banks with different capitalization ratios.

The focus on monetary policy changes and their heterogeneous effect across banks with different capital holdings is motivated by the literature documenting that these

across banks because banks with stronger balance sheets have greater capacity to obtain financing from their own financiers, implying they are not as exposed as less-capitalized banks to changes in monetary policy. This means that higher net-worth banks respond to changes in monetary policy to a lesser extent than those banks with lower net worth (see Holmstrom and Tirole, 1997; Holmstrom and Tirole, 1998; Bernanke et al., 1999; Gertler and Kiyotaki, 2011).

have important effects on the aggregate volume of credit in an economy (Kashyap and Stein, 2000; Jiménez et al., 2012; Abuka et al., 2019) but also on the currency composition of credit extended by banks (Ongena et al., 2018). It is the latter channel that is relevant in our case, which states that contractionary monetary conditions in the domestic currency (issued by the domestic central bank) raise the local banks' cost of funding in the domestic currency but does not in the foreign currency, generating a differential impact on banks' loan supply decisions in the different currencies. This, in turn, prompts banks to alter the currency composition of supplied loans toward more loans in foreign currency and less loans in local currency.

Our estimation strategy exploits panel variations in the monthly share of foreign currency loans in 23 emerging economies located in Central and Eastern Europe in 1996-2016. These countries provide an almost ideal setting to examine the presence of spillovers in foreign currency loans, arising from the currency compositional effect in domestic monetary policy transmission. The economic system in these countries is heavily dominated by banks in which both private firms and households resort to for their borrowing needs (Ongena et al., 2013). This means there are no leakages arising from the application of monetary policy interventions by monetary authorities so that economies experience the full transmission of monetary policy via the banking sector.

In addition to the identification strategy applied to the weighted regional measure of foreign currency lending, our estimation technique takes into account spatial dependence in the data and corrects the estimated standard errors with respect to the unobserved determinants of foreign currency lending collected in the error term (spatial HAC error correction). Specifically, the econometric method relies on generalized method of moments estimation and provides consistent estimates under heteroskedastic disturbances. Moreover, it is immune against a certain degree of misspecification of the spatial dependence of the disturbances (see Kelejian and Prucha, 2007).

Given the above ingredients we can identify cross-border spillovers in foreign currency lending. We find that tighter domestic monetary conditions substantially increase lending from banks in foreign currency, at the expense of domestic currency, with the effect being more pronounced for banks with lower capitalization ratios. Through the network (i.e., geographic) linkages of countries, the induced higher bank lending in foreign currency in one country strongly transmits to the other countries in the region. This supports the argument that foreign currency lending indeed spills over to other countries. The magnitude of the spillover effect varies depending on the chosen spatial weights matrix, having different implications about the way countries are linked to each other. For our preferred measure, the inverse distance matrix, the externalities are quantitatively large and economically relevant. A one standard deviation increase in the spatial lag variable from its mean translates into a 1.63 percentage point increase in domestic foreign currency lending. Given that the sample average share of lending in foreign currency is 44.2 percent, spillovers represent a 3.7-percentage point contribution to local foreign currency lending. In other specifications, the size of the estimated semi-elasticity reaches up to 28 percentage points.

Our findings are robust to alternative samples and model specifications, whilst also controlling for additional factors in the regressions does not alter main results. The implications for monetary policy making are straightforward. Local bank lending in foreign currencies reacts to domestic monetary policy that is subsequently transmitted across countries, changing the currency composition of the local bank loan supply in favor of foreign currencies.

Our study speaks to two strands of the literature. First, we add to the existing evidence on the determinants of foreign currency loans (Barajas and Morales, 2003; Arteta, 2005; Honig, 2009). This phenomenon has gained particular attention in Central and Eastern European countries due to their dynamic financial developments and expansion in foreign currency loans (Luca and Petrova, 2008; Neanidis and Savva, 2009, 2013; Neanidis, 2010; Basso et al., 2011; Firdmuc et al., 2013; Brown et al., 2014; Kishor and Neanidis, 2015). Our work acts complementary to these studies by offering a new mechanism that promotes bank lending in foreign currency in this region of the world: cross-country spillovers in the share of foreign currency loans transmitted via domestic monetary policy changes. The importance of this mechanism is illustrated by the magnitude of the spillover effects.

Second, our study fits in the literature that examines the bank lending channel of monetary policy. This originated with studies that used macro and credit aggregates (see Bernanke and Blinder, 1992; Kashyap and Stein, 2000) and more recently took advantage of micro-level firm and bank data (Jiménez et al., 2012; Becker and Ivashina, 2014; Jiménez et al., 2014; Abuka et al., 2019). Our study is closest to Ongena et al. (2018) who identify both a local and an international bank-lending channel of monetary policy in Hungary regarding the currency composition of loans in this country. They show that looser domestic monetary conditions substantially increase lending from banks with lower capital ratios in the domestic currency but not in the foreign currency, whereas looser foreign monetary conditions spur lending in the foreign currency but less so in the domestic currency. As explained earlier, we do not claim to identify a bank-lending channel, domestic or international. Rather, we use the ingredients of this channel as instruments to identify cross-country spillovers in foreign currency lending by utilising the rationale of the currency composition channel of monetary policy, first put forth by Ongena et al. (2018).

The remainder of the paper is organized as follows. Section 2 presents the data, while section 3 describes the empirical strategy. Section 4 reports the findings of the analysis and, finally, section 5 concludes.

2. Data

We use a panel of monthly observations from July 1995 to December 2016 drawing on a variety of data sources.[3] The unit of analysis is at the country*x*month level. Details about the data and their construction can be found in Table 1. In the rest of this section, we provide a summary description of the dataset.

Countries – Our setting is in Central and Eastern Europe because it provides an ideal laboratory to study cross-border spillovers in foreign currency lending. The corporate landscape in emerging Europe is dominated by small and medium enterprises, with up to 99% of all firms being classified as such companies (Ongena et al., 2013). With less developed capital markets and rudimentary corporate bond financing, banks are by far the main provider of external funds, especially in foreign currency. The same applies to

[3] This time period looks favorable in length compared to those used in recent papers that analyze the drivers of foreign currency lending. For instance, Firdmuc et al. (2013) cover 2007 to 2010, Brown et al. (2014) analyze data ranging from 2003 to 2007, while more recently Capasso and Neanidis (2019) study data from 1993 to 2009.

households, which rely fully on local banks for access to foreign currency loans. This environment allows identifying the impact of monetary policy on the currency composition of bank credit and its subsequent transmission across borders. In addition, Central and Eastern Europe has been particularly prone to high levels of foreign currency lending where in recent years more than forty percent of credit by resident financial institutions to the non-financial sector is granted in a foreign currency, a figure well above any other region in the world (Bannister et al., 2018). These two characteristics permit exploiting this rich experimental setting to test for foreign currency lending spillovers beyond national borders.

We choose a sample of 23 emerging economies with comprehensive coverage of bank lending in foreign currency. The sample includes Albania, Armenia, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, North Macedonia, Moldova, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Turkey and Ukraine.[4] Figure 1 presents a map that illustrates our country selection strategy.[5] In terms of the period coverage, the sample includes observations before and after the onset of the 2008-09 financial crisis, giving rise to a total number of 4,042 observations. With ample evidence that *international* bank lending dwindled rapidly following the Lehman Brothers collapse as funding constraints forced banks to reduce foreign exposures (Brown and De Hass, 2012; De Haas and Van Horen, 2012), our sample period allows examining a complementary issue that thus far has gone unexplored: whether the magnitude of cross-border spillovers in foreign currency loans *provided locally* has also been less pronounced during the post-crisis period. Table 2 presents the summary statistics.

<u>Foreign currency loans</u> – Reports from National Central Banks (NCBs) contain information on all outstanding loans extended by all credit institutions operating within

[4] The end-of-period coverage for the Slovak Republic and Slovenia is at the end of 2008 and 2006, respectively, as a way of avoiding the periods after which these countries formally adopted the Euro as their legal tender. This means that we focus in the periods during which countries were using their own national currency, against which the share of foreign currency loans is calculated.

[5] The only emerging markets we have excluded are ones where there are no data on foreign currency loans available for the entire period (e.g., Turkmenistan, Uzbekistan), or ones where foreign currency loan data are available for only a limited period of time (e.g., Azerbaijan since 2005, Tajikistan since 2011).

each country in our sample. These are loans extended by domestic commercial banks, branch offices of foreign banks, saving cooperatives, credit unions, and specialized credit institutions, to the non-financial private sector of the economy, i.e., households and non-financial firms. Outstanding loans are denominated in the domestic or foreign currency at a monthly frequency. A foreign currency is any currency other than a country's legal tender, which in our sample is composed of US dollars, Euros, Swiss Francs, and (for four countries) the Russian Rubble.[6] In line with the aforementioned literature that examines the determinants of foreign currency lending, the variable of interest in our analysis is the *share* of foreign currency loans. This is defined as the ratio of foreign currency loans to total outstanding loans of domestically-based banks to a country's residents, and represents our dependent variable in the analysis. We aggregate the loan data to the country-month level, the focal unit of observation in our study.

As indicated earlier, the countries in our sample exhibit on average a high share of foreign currency lending, more so compared to other geographic regions in the world (Bannister et al., 2018). This is illustrated in Figure 2 where since the late-1990s the fraction of loans in foreign currency hovers above 40 percent on average. Table 2 places this figure at 44.2 percent for the entire sample period. However the distribution is not uniform across countries as the sample exhibits substantial heterogeneity. There are countries with low shares of foreign currency loans on average, such as the Czech Republic (11 percent), Serbia (9 percent) and the Slovak Republic (14 percent), while other countries experience high shares: Albania (64 percent), Estonia (66 percent), and Latvia (69 percent). This heterogeneity is also evident from the upper and lower curves in Figure 2 which show respectively the maximum and minimum fraction of foreign currency loans observed in each month-year. Table 2 corroborates this variance by reporting average shares ranging between 3.8 and 92.8 percentage points. Also, while not illustrated graphically, the vast majority of countries have experienced high variation in foreign currency lending over time.

[6] Unfortunately, loan data are not available for each of the foreign currency denominations. For this reason, foreign currency loans refer to the sum of all loans extended in foreign currency.

Monetary policy and bank net worth – For the purpose of our instrumental variable strategy, we use data on (i) monetary policy and (ii) the net worth of banks, in each country. A well-accepted measure proxying the change in the stance of monetary policy, fully in line with the literature analyzing the credit channel of monetary policy at the micro level, is variations in a short-term interest rate.[7] Typical choices are annual changes to: the overnight interest rate, the interest rate on interbank market with maturity of seven days, and the three-month interbank interest rates. We opt for the last measure due to its wider availability across our country sample, drawn either from NCB reports or from Federal Reserve Economic Data (FRED). This measure is used for changes in the stance of monetary policy both for the domestic economies and for the economies that issue the foreign currencies that are employed often, the latter represented by the annual change in the three-month interbank rate in the US, the Euro Area, Switzerland, and Russia.

Figure 3 illustrates the cost of short-term borrowing by banks in local currency as an average of the 23 countries in the sample, and compares it to the respective cost in foreign currencies. Although the average cost of borrowing in domestic currency has been trending downwards throughout the sample period, it has remained above that of foreign currencies. This is also shown in Table 2 where the average change in the three-month interest rate in the 23 local economies during the sample period is -0.1 percentage points. This is far above the yearly change in three-month interest rates from the Eurozone, Switzerland and the USA standing at -2, -1.5 and -1 percentage points respectively. Figure 3 also confirms that local monetary authorities in the emerging countries set, on average, interest rates mostly independently from the European Central Bank, the Swiss Central Bank and the Fed.[8]

A rich theoretical literature (Holmstrom and Tirole, 1997, 1998; Bernanke et al., 1999; Gertler and Kiyotaki, 2011) attaches a prominent role to banks' net worth in determining the ability of banks to obtain financing from their own financiers. This, in turn, determines their ability to get long-term currency funding to match their corporate lending. Hence, a higher net worth reduces the agency costs of borrowing and allows

[7] For earlier studies, see Kashyap and Stein (2000), Jayaratne and Morgan (2000), Kishan and Opiela (2000), Ashcraft (2006), while more recently see Jiménez et al. (2012) with an application to Spain, Ongena et al. (2018) for Hungary, and Abuka et al. (2019) for Uganda.

[8] This is consistent with the main objective of local monetary authorities, which are preoccupied in setting the monetary policy rate to keep a low and stable domestic inflation environment.

banks to draw more resources from their financiers, particularly in the face of higher borrowing costs in the interbank market (say due to a contractionary monetary shock). This means that banks with high net worth will be reducing the asset side of their balance sheet, by cutting down on the supply of loans. But by not as much as banks with low net worth, which are more resource constraint. The empirical literature has picked up on this argument by identifying a key bank balance-sheet strength variable that proxies for bank net worth: the ratio of bank capital to total assets (Bernanke et al., 1996; Kashyap and Stein, 2000; Jiménez et al., 2012, 2014; Ongena et al., 2018; Abuka et al., 2019). Further, to exploit the heterogeneity in the effects of monetary policy across banks in their balance sheet characteristics, the proposed step is to interact the change in the interest rate with the bank capital-to-total-assets ratio. Following the literature, this is the variable we are also using, defined as the ratio of bank equity to total bank assets, available from NCB reports and the IMF's International Financial Statistics (IFS).[9] As we use the book value of equity and assets are not risk adjusted, our measure is equivalent to a pure leverage ratio. Thus measured it has an average value of 14 percent, ranging between 3.5 percent and 37.1 percent. Overall, the above show that both the interbank cost of borrowing and the bank capital ratio vary considerably both across countries and over time.

Covariates (macro, bank, regulatory) – As independent variables we include a host of macroeconomic conditions to control for country-specific time-variant changes in credit demand conditions. These include the change in domestic GDP growth and the inflation rate (also as further determinants of the monetary policy rate (Taylor, 1993)), the local currency-USD exchange rate, the minimum variance portfolio (MVP) dollar share which captures movements in the second moments of inflation relative to that of real depreciation, and bilateral trade openness. We collect data for these variables from the IMF's IFS and Direction of Trade Statistics (DOTS). The macro variables are available monthly, except for GDP growth, which is measured quarterly. For interim months, we use the end-of-quarter GDP growth rate values.

[9] The ratio is also particularly meaningful in emerging Europe because off-balance sheet activity by banks has been almost nonexistent. Total bank assets therefore cover most of the banks' business.

We also include as control variables an array of bank characteristics that capture time-variation in the banks' loan supply. In particular, we use the natural logarithm of total assets to proxy for bank size and the ratio of bank deposits to total assets to measure bank liquidity. We also use the share of foreign bank penetration, defined as the percentage of domestic banks with assets of foreign ownership in excess of 50 percent. This proxies the exposure of a country's banking system to the international financial network (Brown and De Haas, 2012; Claessens and van Horen, 2014).[10] Further, we include the interest rate margin between local and foreign currencies for loans as a way of capturing the relative financial benefit of bank lending in either currency (Neanidis and Savva, 2009; Basso et al., 2011). We also add banks' net foreign assets representing alternative bank investment opportunities to loans, so that higher net foreign assets limit the need of banks for foreign currency lending. Finally, we include the share of banks' deposits in foreign currency as control because it has been found that banks lend more in foreign currency as they receive more foreign currency deposits in an effort to limit their exchange rate risk exposure (Luca and Petrova, 2008; Neanidis and Savva, 2009). Bank data are collected from the IFS, NCBs and the European Bank for Reconstruction and Development (EBRD). All bank balance-sheet and income statement variables are available at the monthly frequency.

The last set of control variables we add refer to the regulatory and institutional environment of each country that can influence the share of loans in foreign currency extended by local banks. These are proxied by three dummy variables. First, a dummy that proxies for restrictions set by local monetary authorities regarding the holdings of loans in foreign currency (Arteta, 2005). Second, a dummy associated with a country's European Union (EU) admission process (Neanidis, 2010) since the majority of countries in the sample are formally affiliated with the EU. Third, a dummy variable that controls for periods where countries experience high shares of foreign currency loans, i.e., in excess of 50 percent of total loans (Neanidis and Savva, 2009), as an indicator of time and country persistence in foreign currency holdings. The summary statistics of the covariates are displayed in Table 2.

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[10] The rationale is that the more exposed a country's banks are to foreign ownership, the greater the transmission of shocks from one country to the next, including changes in foreign currency lending (Cocozza and Piselli, 2010; De Haas and van Horen, 2012).

3. Empirical strategy

Our goal is to examine whether foreign currency lending extended domestically by the banking sector in one country spills over to other countries. Hence, the main question of interest is to what extent, if at all, the share of one country's lending in foreign currency affects the respective shares extended by local banks in other countries. Answering this question calls for an econometric model that allows for cross-sectional interdependence. A class of models that supports such interdependence is known as spatial econometrics models. These models, originally developed in geographical statistics, have been recently gaining ground in economics and have been used to identify strategic interactions, learning effects and interdependence brought about by general equilibrium effects.[11]

Spatial econometric methods for data with cross-sectional dependence require modelling the channel of interdependence. Anselin (2003) notes that in the standard linear regression model there are two ways to incorporate spatial dependence. The first is to add an additional regressor in the form of a spatially lagged dependent variable, where a spatial-weights matrix captures the channels of interdependence. This is known as the spatial lag model. The second is to incorporate the spatial dependence in the error term, giving rise to the spatial error model. Below first we describe our specification that combines both the spatial lag model and the spatial error model and, then, explain our estimation strategy.

Specification – For cross-country panel data, conventional models assume independent observations across countries. Spatial econometrics models are designed to tackle situations when observations in one country are dependent on observations in other countries. Following this methodology, we employ a specification where the variation in the share of foreign currency loans of a country over time is driven by the endogenous response of the group, which, in turn, hinges on the network structure. The normal

[11] Examples include the empirical analysis of economic growth (Conley and Ligon, 2002), regional development (Sanso-Navarro et al., 2017), corruption (Becker et al., 2009), international R&D (Coe et al., 2009), military conflict (König et al., 2017), FDIs (Lin and Kwan, 2017), and fiscal consolidations (Poghosyan, 2017).

practice in the spatial econometrics literature is to represent the network structure between group members by an *n x n* spatial-weights matrix that is row-normalized so each row sums to 1. Before showing the model for *n* countries, let's first consider a two-country example:

$$FCL_{1t} = \alpha_1 + \beta_1 FCL_{2t} + \delta X_{1t} + \varepsilon_{1t},$$
$$FCL_{2t} = \alpha_2 + \beta_2 FCL_{1t} + \delta X_{2t} + \varepsilon_{2t},$$

where *FCL* is the share of foreign currency loans in a country at time period *t*, *X* is a vector of covariates with coefficients δ, and ε is an i.i.d. zero-mean unobservable error term. This system of equations implies a simultaneous data generating process, where the value of *FCL* in country 1 depends on the value of *FCL* in country 2, and vice versa. Expanding this model to *n* countries, gives rise to ($n^2 - n$) cross-country relations which leads to over-parameterization. To solve this issue, the spatial econometrics literature proposes a parsimonious relationship between cross-country observations in the form of a spatial autoregressive process:

$$FCL_{it} = \alpha_i + \beta \sum_{j=1}^{n} w_{ij}\, FCL_{jt} + X'_{it}\delta + \varepsilon_{it}; \qquad \varepsilon_{it} = \rho \sum_{j=1}^{n} w_{ij}\, \varepsilon_{jt} + u_{it}, \tag{1}$$

where α_i is an unobservable time-invariant country-specific shifter (i.e., a country-fixed effect), ε_{it} is a spatially correlated error term, and u_{it} is the remainder disturbance term which is independently (but not necessarily identically) distributed across countries *i*. The term $\sum_{j=1}^{n} w_{ij}\, FCL_{jt}$ is the spatial lag for country *i*, representing the linear combination of values of the dependent variable constructed from observations of the other *j* countries. The coefficient β is the spatial lag coefficient, which measures the direction and intensity of cross-country dependence, while ρ is the parameter reflecting spatial correlation in the residuals. If the spatial lag coefficient is insignificant, it would imply that the data generating process follows the conventional panel data structure, with independent observations across countries. Alternatively, if the spatial lag coefficient is significant, it would imply spatial dependence and the existence of cross-country spillovers.

The spatial-weights matrix w_{ij} is of crucial relevance for the estimation. It allows us to incorporate the cross-country connections that capture spillovers in foreign currency lending. In most economics applications, interdependence is generally associated with geography and space where weights reflect the strength of linkages amongst countries. The main advantage of using weights based on geographical proximity is that they are exogenously given. We follow this principle in our application and proxy connectivity with the inverse geographical distance between countries, so that interdependence declines with distance. Bilateral distance between two countries is measured by the great-circle distance between the two economies' capital cities. For a country pair i and j, the inverse-distance-based weight matrix is defined as $w_{ij} = \frac{[1/\sqrt{dist_{ij}}]}{\sum_{j=1}^{n}[1/\sqrt{dist_{ij}}]}$, where $dist_{ij}$ denotes the value of bilateral distance in kilometers between two countries.[12] The estimation of equation (1) requires the assumptions that $\sum_{j=1}^{n} w_{ij} = 1$ and $w_{ii} = 0$ so that both coefficients of interest have the property that $|\beta| < 1$ and $|\rho| < 1$ (see Kelejian and Prucha, 2007). Both assumptions are satisfied by way of construction of the weights matrix so that it is symmetric, the row-sum equals one, and the diagonal elements are zero.

Estimating equation (1) with standard panel data OLS techniques can lead to inconsistent estimates of the marginal effects of the explanatory variables in the model due to neglecting the correlation of the spatial lag variable with the error term. It further leads to inefficient parameter estimates and less precise estimates due to the omission of spatial dependence in the residuals. For this reason, we rely on a panel IV spatial regression model.

Instrumental variables – Equation (1) models the variation in the proportion of foreign currency loans extended by the domestic banking sector of a country over time as being driven by the realization of observable shocks and country-specific shocks, amplified or offset by the endogenous response of the other countries, which, in turn, hinges on the

[12] We experiment with two further weighting matrices, thus exploring different channels of spillover transmission, also based on geographical proximity: country-adjacency and length of neighbors' shared borders. Weights based on the economic size of neighboring countries were also considered, since economically larger countries may exert a greater spillover effect compared to smaller countries. However, weighting matrices using economic measures, such as GDP, are endogenous, causing biased parameter estimates (Kesina, 2018). For this reason, we abstain from using endogenous weights in our analysis. Recent work relaxing the assumption of exogenous spatial weights matrices, includes Kelejian and Piras (2014) and Kuersteiner and Prucha (2018).

network structure. To these drivers we also add monthly period time-fixed effects to absorb global shocks that may change the local provision of loans in foreign currency, such as the setting of monetary policy in the USA, Euro Area and Switzerland that control the major foreign currencies. Further, the covariates enter the regression with a time lag, i.e., in *t-1*, to minimize any simultaneity bias.

Nevertheless, the estimation is subject to a simultaneity or reflection problem, a common challenge in the estimation of network externalities (Manski, 1993). In this class of models, it is usually difficult to separate contextual effects (i.e., the influence of countries' characteristics) from endogenous effects (i.e., the effect of outcome variables via network externalities). We tackle the problem through an IV strategy similar to König et al. (2017). They study how a network of military alliances and enmities affects the intensity of a conflict using as instruments exogenous time-varying shifters affecting the fighting intensity of allies and enemies over time. This approach has the advantage that it differences out any time-invariant heterogeneity, thereby eliminating the problem of correlated effects.

Identification requires exogenous sources of variation in the shares of foreign currency loans given by local banks in all other countries *j* that do not influence directly country *i*'s share of foreign currency lending. To this aim, we resort to the "currency composition channel" of monetary policy, first brought about by Ongena et al. (2018), itself firmly grounded in the bank lending channel of monetary policy in the spirit of Kashyap and Stein (2000). The former channel identifies economic mechanisms through which banks sift the *currency composition* of their lending, while the latter identifies mechanisms via which banks change the *level of credit* they provide. Specifically, the bank lending channel exploits the heterogeneity across banks in their balance sheet characteristics and asserts that the amount of credit extended by banks in response to a change in monetary policy varies with a bank's net worth. So, when the monetary policy rate increases, banks with lower net worth are lending much less than banks with higher net worth. The intuition is that banks with higher net worth are better able to buffer their lending activity against shocks in the availability of external finance, by drawing on their stock of assets.

The currency composition channel takes this line of thought further and applies it to the type of currency banks extend credit at. As such, a tightening of monetary conditions in the domestic currency (issued by the domestic central bank) increases the local banks' cost of funding in the domestic currency but not (or at least not to the same extent) in the foreign currency, generating a differential impact on banks' loan supply decisions in the different currencies. This impact is heterogeneous between lowly and highly capitalized banks, where the former respond more strongly and extend more loans in foreign currency. As a result, an increase in the domestic currency interest rate raises the proportion of foreign currency loans supplied locally but at a decreasing rate for highly capitalized banks.

In line with the currency composition channel, we use as instruments the time-varying monetary policy rate, the bank capital-to assets ratio, and their joint interaction for countries j. This follows closely the established empirical literature on the identification of the bank-lending channel (Kashyap and Stein, 2000; Jiménez et al., 2012; Jiménez et al., 2014; Abuka et al., 2019; Agarwal et al., 2019). More formally, our set of three instruments is $MP_{jt-1} = \sum_{j=1}^{n} w_{ij} \Delta IR_{jt-1}$, $NW_{jt-1} = \sum_{j=1}^{n} w_{ij} BKR_{jt-1}$ and their interaction $MP_{jt-1} * NW_{jt-1}$, where ΔIR_{jt-1} denotes the annual change in the local currency three-month interest rate in period *t-1* and BKR_{jt-1} is the bank capital ratio at time *t-1*, both for countries *j*. An increase in short-term interest rates in countries *j*, contracts credit in these countries, more so in the costlier local currency, leading to a rise in the share of foreign currency credit. At the same time, for a given increase in short-term interest rates in countries *j*, banking sectors with more capital should be in a better position to support the supply of loans in local currency because they have more loanable funds or liquidity and, hence, are expected to dampen the positive effects of a monetary contraction on foreign currency lending growth. In other words, although a monetary contraction increases the opportunity cost of lending in domestic currency, this cost is declining in the capital strength of the banking system. This mechanism implies that the spatial lag rises in MP_{jt-1} and declines in its interaction with NW_{jt-1}.

To be a valid instrument, changes in monetary policy rates and their interaction with the banks' balance sheet strength indicator in countries *j* must be correlated with countries *j*'s shares of foreign currency bank lending. We document below that this is so in the data. In addition, the instruments must satisfy the exclusion restriction that monetary policy and the bank-capital-to-assets ratio in countries *j* have no direct effect on country *i*'s share of foreign currency loans. A first concern is that monetary policy is correlated across countries and so is the strength of the banking sectors' balance sheets, due to unobservable characteristics—not controlled by the covariates, or the country- and time-fixed effects—that link countries *j* to country *i*. However, this problem is addressed by controlling for the stance of monetary policy and the bank capital ratio (along with the interaction term) in country *i* in the second stage regression. For instance, suppose that country *j*'s monetary policy reacts to the interest rate set by country *i*'s Central Bank. In this case, monetary policy in country *j* is a valid instrument for *j*'s share of foreign currency loans, as long as monetary policy in country *i* is included as a non-excluded instrument. By including changes in country *i*'s interest rates we in effect account for these additional elements that may be present in an open economy monetary policy rule.

Another potential issue is the reaction of domestic monetary authorities to changes in policy rates introduced by the major economic powers, particularly the US and the Euro Area, those exact countries where the foreign currencies in our sample are controlled by. This concern is tackled by controlling for time-period effects that absorb any common shocks hitting uniformly our sample of countries.[13] The above considerations mean that our regression specification becomes

$$FCL_{it} = \alpha + \alpha_i + \alpha_t + \beta \sum_{j=1}^{n} w_{ij}\, FCL_{jt} + \gamma_1 \Delta IR_{it-1} + \gamma_2 BKR_{it-1} \qquad (2)$$

$$+\gamma_3 (\Delta IR_{it-1} * BKR_{it-1}) + X'_{it-1}\delta + \varepsilon_{it};$$

$$\varepsilon_{it} = \rho \sum_{j=1}^{n} w_{ij}\, \varepsilon_{jt} + u_{it},$$

where α_t is a monthly time-fixed effect, ΔIR_{it-1} is the annual change in the local currency three-month interest rate in period *t-1*, and BKR_{it-1} is the domestic bank capital ratio at time *t-1*.

[13] In some regressions, we opt not controlling for time-fixed effects but add directly controls for the stance of monetary policy by the US, the Euro Area and Switzerland. This allows testing for the international transmission of local monetary policy, supported by numerous studies (Grab and Zochowski, 2017; Ongena et al., 2018; Temesvary et al., 2018; Morais et al., 2019).

There are two potentially additional threats to the exclusion restriction. The first concerns the exogeneity of the monetary policy changes in country *j* to foreign economic conditions in country *i*. For instance, an increase in the GDP growth rate of country *i*, say due to local productivity improvements, could spill over to the GDP growth rate of country *j* via the two countries' trade transactions, assuming *i*'s demand for imports from country *j* rises. If the expansion in *j*'s GDP growth rate is significant, this may prompt the local monetary authorities to raise its interest rate to avoid overheating the economy. Such a channel may be important in well-integrated economies with large bilateral trade shares. In this case, the exclusion restriction would be violated. To avoid such concerns and to obtain a measure of domestic monetary policy in country *j* not driven by foreign factors, we include in the regression as control variables a host of macroeconomic indicators for country *i*. These are the rate of GDP growth, the rate of inflation, the rate of local currency depreciation vis-à-vis the US dollar, and an indicator of bilateral trade openness. The inclusion of these variables serves another purpose, as they also control for changes in the demand for credit in foreign currency.[14]

The second threat to the exclusion restriction is related to the inclusion of Russia in our country sample due to the use of rubbles as currency denomination in which some of the other countries in the sample are extending loans in foreign currency. Although this is restricted to just four countries in the sample (i.e., Belarus, Georgia, Kazakhstan and Ukraine) in which the proportion of loans in total loans in rubbles only ranges between 0.08-0.28 percent, it means that changes in monetary policy rates in Russia perceived by being one of countries *j*, can simultaneously influence both the spatial lag variable and the dependent variable. The former effect is part of our identification strategy where a monetary policy contraction in Russia is expected to raise the local banks' reliance on foreign currency loans in Russia and, through the weight matrix, in the spatial lag. But at the same time, the monetary contraction in Russia will raise the cost of lending in rubbles in the four countries that provide loans in foreign currency expressed in rubbles. For

[14] A further argument for not being concerned about potential domestic macroeconomic feedback effects from country *i* into the monetary policy of countries *j*, is based on the way we set our identification strategy. We identify monetary transmission from the *differential* response of funding-constrained versus funding-abundant banks to changes in monetary policy. Hence, even if macroeconomic shocks in country *i* simultaneously impact all banks' loans through monetary policy in countries *j*, the cross-bank *differences* in the strength of transmission should not be impacted (see Temesvary et al., 2018).

these countries, it will be more cost-effective ceteris paribus to raise the provision of loans in their local currencies, hence, reducing the local proportion of foreign currency loans.[15] Although this latter effect is likely to be negligible, it runs counter to the direction of the effect documented by the identification strategy. If operational, then it can generate conservative estimates of the spillovers in foreign currency lending, thus underestimating the magnitude of true spillovers. To control for this possibility we also present regressions where we drop Russia entirely from the sample.

A final point to note is that our identification strategy relies on the assumption that the distribution of loans in foreign currency across countries is similar in the two groups of lenders granting loans by highly versus lowly capitalized banking systems. In this way, it is not the capital ratio of banks per se that determines their share of foreign currency loans, but it is rather how the level of bank capitalization affects banks' portfolio response when a monetary policy shock hits the economy. In our data, highly and lowly capitalized banks have similar loan portfolios where the proportion of foreign currency loans is 45.2 percent for the former and 43.1 percent for the latter.[16]

In the estimation of equation (2) we are interested in the spatial lag coefficient β that identifies spillovers in the proportion of foreign currency lending across countries, but we also present the coefficient estimates for $\gamma_i,\ i = 1, 2, 3$, to examine the direct effect of the change in domestic monetary policy on bank loans' currency denomination conditional on banks' net worth. If spillovers are operational, we expect that $0 < \beta < 1$. If country banking sectors that are rich in capital change their share of foreign currency loans by less in response to a change in domestic monetary policy than the banks that have a lower capital ratio, we expect to find $\gamma_1 > 0$ and $\gamma_3 < 0$. The same principle applies to the first-stage regression of the spatial lag on the weighted monetary policy

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[15] It is possible that full substitution takes place from foreign currency loans denominated in rubbles to those loans denominated in US dollars, the Euro or the Swiss franc. If so, the share of foreign currency loans will not change, meaning the identification strategy will not be compromised. But given the lack of data for loans at the level of foreign currency denomination, it is impossible to know whether full substitution is indeed taking place. For this reason, we prefer being on the cautious side and control for the possibility where partial substitution is indeed effective.

[16] The distinction of banking sectors into highly and lowly capitalized is based on splitting the sample at the mean value of the bank capital ratio. Splitting the sample at the median value yields the same findings.

shocks and their interaction with the weighted bank-capital ratio, that is, we expect a positive coefficient on MP_j and a negative coefficient on its interaction with NW_j.[17]

Spatial autocorrelation – It is very likely that both the share of foreign currency credit and monetary policy rates are clustered in space, so it is important to take into account spatial dependence in our data. For this reason, we estimate standard errors with a spatial heteroscedasticity and autocorrelation consistent (HAC) correction allowing for both cross-sectional spatial correlation and location-specific serial correlation, first developed by Conley (1999). König et al. (2017) developed a method for panel IV regressions that allows estimating Conley standard errors, thus performing the HAC correction.[18] In the spatial dimension, we retain a radius of 1606km for the spatial kernel, which according to the CEPII geodist dataset corresponds to the average internal distance in our sample of countries. More specifically, the weights in the covariance matrix are assumed to decay linearly with the distance from the central point of country *i*, reaching zero after 1606km. In the time dimension, we impose no constraint on the temporal decay for the Newey-West/Bartlett kernel that weights serial correlation across time periods. This means that observations within the spatial radius can be correlated over time without any decay pattern. We also explore robustness to alternative spatial and temporal kernels.

A typical challenge with this error-correction technique is to test for the weak identification of the excluded instruments, i.e., the Kleinbergen and Paap (2006) rk Wald F-statistic, and the overidentification test of all instruments, i.e., the Hansen J test statistic. These represent rank tests of the first-stage VCE matrix that are standardly used with IV estimators and cluster robust standard errors. These statistics are valid under general assumptions, and the main requirement is that the first-stage estimates have a well-defined asymptotic VCE. Using König et al. (2017)'s routine we produce both test statistics.

[17] We avoid discussing too many coefficient estimates, including the spatial dependence parameter in the error terms, ρ, since interdependence in the observable characteristics is more interesting than interdependence in the disturbances. Nevertheless, we do illustrate that accounting for interdependence in the errors makes a significant difference to the results.

[18] Hsiang (2010) provides a useful STATA code to calculate spatially correlated standard errors in panel regressions. However, he does not address spatial correlation in panel IV regressions.

4. Results

In this section, we estimate the regression equation (2) using a panel of 23 emerging economies over 1995-2016 at monthly frequency that includes 158 months prior to and 99 months after the start of the global financial crisis. In all specifications, we include country fixed effects and period dummies (unless we explicitly state otherwise), and estimate standard errors assuming spatial and within-group correlation as discussed above. In addition, all controls that proxy for the macroeconomic environment, the monetary policy, and all bank-related variables enter with a time lag in period *t-1*.

4.1 Estimates of the spillovers

Table 3A displays the estimates of β and γ_i, $i = 1, 2, 3$, from second-stage regressions.[19] Column 1 is an OLS specification. It shows that the spatial lag is not statistically associated with a country's share of loans in foreign currency, nor are the changes in monetary policy or its interaction with bank capital. Column 2 applies the HAC correction to OLS taking into account cross-sectional spatial correlation and location-specific serial correlation in the error term. Now although the size of the coefficient estimates remains the same, they all turn highly statistically significant (at the 1 percent level) because they are more precisely estimated, illustrated by the lower values of the standard errors.[20] All of them also have the expected signs: a positive spatial lag coefficient and higher interest rates associated locally with more foreign currency loans, the response of which is more pronounced for banks with lower levels of capital holdings. The bottom panel in Table 3A presents the economic relevance of the estimated coefficient on the spatial lag variable. The spillover denotes the size of cross-border spillovers in the proportion of foreign currency credit, estimated at 0.24 percent, with a semi-elasticity of 0.54 percent.[21] The estimated spillover effect, standing at just one quarter of a percentage point, is not economically sizable.

[19] All other control variables within vector X are also included in the regressions but to assure the readability of Table 3A the estimated coefficients are reported in Appendix Table A.3 (in the grey box).

[20] The uptake of statistical significance of the estimated variables when correcting the errors for spatial HAC indicates the importance of including the spatial dependence parameter, ρ, in the error term. This improves the efficiency of the estimated parameters.

[21] The spillover size is calculated as the product of the coefficient estimate of the spatial lag (from any respective column-Table) and its own standard deviation from Table 2. The semi-elasticity refers to the size of the spillover divided by the mean value of the foreign currency loan share (from Table 2).

The above OLS estimates are subject to an endogeneity bias, which we correct in the remaining columns by running a set of IV regressions. Column 3 replicates the specification of column 2 in an IV setup using as excluded instruments the stance of monetary policy for the countries in the spatial network and of its heterogeneous effect based on the bank capitalization. In line with expectations, the estimated coefficient of the spatial lag is positive, large and highly statistically significant suggesting the strong presence of spillovers in foreign currency lending. This indicates that the estimated economic effect of spillovers is high, standing at 1.63 percent or a semi-elasticity of 3.7 percent. Column 3 also shows that domestic short-term interest rate hikes raise the proportion of loans extended in foreign currency, while the negative coefficient of the interaction of the interest rate with the bank capital ratio implies that a higher interest rate boosts foreign currency credit granting especially by banks with low capital-to-asset ratios. This finding is consistent with the existence of a currency composition channel, first illustrated by Ongena et al. (2018) for Hungary who, in a somewhat different setup, find that when banks grant loans in different currencies, the supply of credit in domestic currency rather than in foreign currency, reacts most vigorously to tightened domestic monetary conditions, leading to a relative currency readjustment of the loan portfolio toward more foreign currencies.[22]

The associated first-stage regressions are reported in the corresponding columns of Table 3B, where, for presentational purposes, only the coefficients of the excluded instruments are displayed. It is reassuring that a monetary policy contraction in the spatial network countries has a positive effect on their own spatially weighted share of foreign currency loans and that this effect is mitigated by banking systems with higher levels of capital. This pattern, which conforms to the response of domestic monetary policy shown in Table 3A, is confirmed in all specifications of Table 3B. The first-stage regressions yield large Kleinbergen-Paap statistics (111.7 in column 3), suggesting no weak

[22] Ongena et al. (2018) find that a 25-basis point decrease in the domestic interest rate increases loan granting in the domestic currency by lowly capitalized banks by 13 percent more than by highly capitalized banks, compared to only 4 percent differential impact when lending takes place in a foreign currency, where the difference in bank capitalization is defined to be equal to two standard deviations of the sample capitalization ratio. An important difference between their and our setup is the definition of the dependent variable, for which they use the likelihood of banks' first-time credit granting in a certain currency. Although this is different to ours, when it is expressed in terms of relative shares of loans in foreign vs. domestic currency, it conveys the same message as our finding.

instrument problem. Also, the null hypothesis of the Hansen J test is not rejected in any specification, indicating that the overidentification restrictions are valid. Column 3 represents our preferred specification and will be the basis of our robustness checks in the following sections below.

In the specification of column 3, we control for month fixed effects to control for global shocks that may change the demand or the supply of credit in domestic vs. foreign currencies. These may include the monetary policy stance of central banks abroad that are issuing the foreign currency. However, these international time-varying shocks may affect asymmetrically the spatial networks countries' incentives to extend loans in foreign currency, in such a way that the coefficient of interest may be affected. To filter out such time-varying heterogeneity, in columns 4–6 we control explicitly for foreign monetary policy set by the USA, the Euro Area and Switzerland, one at a time.[23] Hence, we extend our basic specification by including the annual change in the US dollar, Euro and Swiss Franc interest rates, as well as the corresponding interactions between interest rates and bank capitalization ratios.[24] Doing so, also allows us to examine the currency compositional loan effect of domestic vs. foreign monetary policy.[25]

Column 4 presents our results concerning the impact of changes in the Euro interest rate on banks' currency composition loan supply decisions, while columns 5 and 6 do the same respectively for the Swiss Franc and the US dollar interest rates. First, the estimated coefficients in columns 4-6 continue to feature a positive spillover of foreign currency lending across countries. In every case, the magnitude of the spillover coefficient is larger than in column 3, while the coefficients are precisely estimated as in column 3 and continue to be statistically significant at the 1 percent level. The size of the estimated spillovers (and semi-elasticities) is also larger, ranging from 2.25 to 3 (5 to 6.8) percentage points. Second, our earlier findings concerning the effect of domestic

[23] These are the three countries whose domestic currency represents the vast majority of loans offered in foreign currency denomination by the 23 emerging markets in our sample, in excess of 95 percent of foreign currency loans.

[24] The description of these three variables can be found in Section 2 above. In unreported regressions, instead of changes in the three interest rates, we include changes in the interest rate *spreads* between local country-USA, local country-Euro Area, and local country-Swiss. Results of the currency compositional effects of the domestic and foreign monetary policies are unchanged, as is that of the spatial lag.

[25] Changes in monetary policy set by the Fed, the European Central Bank and the Swiss National Bank are exogenous to credit conditions abroad, eliminating concerns about a feedback effect from foreign credit conditions to monetary policy changes in these countries.

monetary policy on the currency composition of domestic loan supply is confirmed by all models, as is the heterogeneous response of banks with different capitalization ratios. Local monetary tightening induces banks to switch loan provision in foreign currency, with the transmission being driven by banks with lower levels of capital. Third, monetary changes in the Euro area, Switzerland and the USA influence the currency composition of the local supply of credit in our sample of emerging countries. The strong significance of the variables for the foreign monetary policy and of its interaction with the local bank capital ratio, suggest that an increase in the foreign currency interest rate (euro, franc or dollar) forces banks to shift their loan portfolio toward the local currency since now it is relatively less costly to borrow the local currency in the interbank market. The negative effect of foreign monetary policy on the local share of foreign currency loans is differentiated between local banks, with those having a stronger balance sheet shifting their portfolio by less. Our results are once again in line with Ongena et al. (2018) who find that monetary loosening in the Euro area and Switzerland cause a relative contraction in credit supply in the Hungarian currency and a relative expansion in the supply of Euro and Swiss Franc credit. This in turn gives a role to central banks abroad regarding the local supply of credit, supporting the existence of an international bank lending channel that transmits the impact of foreign monetary conditions to the local economy through changing the currency composition of banks' loan supply.[26]

Our sample of countries includes Russia, which could be problematic insofar some of the other countries' banks use the Russian rubble as a currency for extending loans in foreign currency in their local markets. As discussed earlier there are four such countries in the sample, which could compromise the identification strategy and underestimate the size of the spillovers. An easy fix to this concern is to exclude Russia entirely from the country sample and add its monetary policy changes and its interaction with local bank capitalization ratios as controls in our preferred specification, in much the same way we did this for the monetary policies of the USA, Euro Area and Switzerland. We do this in column 7 and find that results echo those of columns 4-6. We continue to find cross-country spillovers in foreign currency lending which are now even larger in

[26] Two further recent studies that have also identified the international bank lending channel are Temesvary et al. (2018) for the case of the US monetary policy across the globe and Morais et al. (2019) for the US, UK and Euro Area monetary policies in Mexico.

magnitude, reaching a size of almost 5.5 percent and giving rise to a semi-elasticity of 12 percent.[27] We also continue to find an operational currency composition channel of local monetary policy, the transmission of which is heterogeneous across banks with different capital holdings. Further, we find that Russian monetary authorities influence directly the currency denomination of bank loans given abroad, once again with the local banks' capitalization ratios playing an important role in the way this effect is transmitted domestically. This implies the existence of an international credit transmission channel of Russian monetary policy in emerging Europe, in addition to those channels already identified by the US, the Euro Area and Switzerland.

Concerning the effects of the other control variables, shown in Table A.3, the estimated coefficients on a number of bank characteristics, macroeconomic variables and the regulatory environment, are across all specifications statistically significant, economically relevant, stable, and in line with straightforward priors. These results suggest, therefore, that these controls are at once needed and relevant. Starting with the bank characteristics, banks with more assets and especially so in the form of deposits lend less in foreign currency and so do those that can more easily diversify resources to other forms of foreign assets. Banks that are predominantly under foreign ownership offer more loans in foreign currency, while those with more deposits in foreign currency seem to loan less in foreign currency—a finding that goes against the well-established "currency matching" behavior of banks. The positive effect of the interest rate margin states that when banks are faced with a relatively higher cost of lending in local currency compared to foreign currency, they offer more loans in a foreign currency. The effects of the macro variables are summarized as follows. High GDP growth, high inflation and more bilateral trade transactions within the group of countries in the sample, reduce credit granting in foreign currency. On the other hand, a loss in the value of the local currency and a more volatile inflation compared to real depreciation promote more loans in foreign currency. The regulatory dummies are also significant for the share of foreign currency loans, where less loans in foreign currency are granted when (i) a country is in the accession process to becoming an European Union member, (ii) there are no restrictions

[27] Although the inclusion of Russia in the country sample exerts a negative effect on the size of spillovers, we retain this country in our further analysis acknowledging that the estimated size of spillovers represents a lower bound.

to holding loans in foreign currency, and (iii) foreign currency loans are not popular, i.e., when banks operate in a low-foreign-currency-loan environment.

4.2 Robustness analysis

In this section we test the robustness of our estimates in three different dimensions. First, we consider different levels of cross-sectional spatial correlation and also use alternative spatial weights matrices for the country network. Second, we examine the heterogeneity in bank response to changes in the macro environment and bank characteristics. Third, we test whether the spillover effects are heterogeneous across a host of macro and bank variables. All these checks include the standard set of control variables and instruments considered in our preferred specification (column 3, Table 3A), although not reported in the results, while continue correcting for spatial correlation.

Alternative spatial kernels – Recall that following Conley (1999 and 2008), our baseline results estimate standard errors with a spatial HAC correction allowing for both cross-sectional spatial correlation and location-specific serial correlation. Specifically, we allow serial correlation to be present for an infinite horizon across time and a spatial radius of 1606 kilometers. In this way, the weights in the covariance matrix are assumed to decay linearly with the distance from the central point of a country *i*, reaching zero after 1606km. Here, we check whether spillovers in foreign currency loans are affected by assuming alternative spatial kernels.

The choice of the spatial kernels is such that we consider the minimum distance between any pair of countries in our sample (Croatia to Slovenia, 117km), the maximum pairwise distance (Kazakhstan to Slovenia, 4824km), and the average minimum (Moldova, 1170km) and average maximum (Kazakhstan, 3845km) distance of every country from the rest of the countries in the region. Columns 1-2 in Table 4 report that a lower cut off kilometric distance than the baseline of 1606km, raises the size of the spillover coefficient estimate but at the expense of a less precisely estimated coefficient. Columns 3-4, on the other hand, show that a higher kilometric cut off both stabilizes the spillover coefficient estimate and at the same time improves its estimation precision. In every case the spillover coefficients remain statistically significant at the 1 percent level and the semi-elasticity is roughly 4 percent, confirming earlier findings. The effects of local monetary policy on banks' loan supply decisions with regards to currency denomination and its dependence on banks' net worth is also confirmed, by being highly significant and stable. We find these results reassuring.

Different spatial weights matrix – The estimates of cross-country spillovers are so far based on a spatial weights matrix that considers exogenous bilateral distances as the mechanism of transmission across countries. However, it is important to test whether different linkages amongst countries give rise to different transmissions that affect the size of the spillover coefficient. For this reason, we rerun our specification by using weights in spatial matrix based on (i) adjacency and (ii) the length of shared borders between countries. Both measures represent networks of countries that are geographical neighbors, hence they reflect a more concentrated measure of transmission compared to the inverse-distance measure used earlier.[28]

Columns 5-6 in Table 4 report the results. They show that our key coefficient estimates retain their strong statistical significance and are larger in magnitude, indicating stronger transmission of foreign currency loans across neighbors. The adjacency weights matrix yields a spillover size of 4.55 percent and a semi-elasticity of 10.3 percentage points. The size of the spillover increases even further for countries that share a bigger portion of their borders—the spillover size jumps to 12.45 percent and the semi-elasticity to 28.14 percentage points. This finding supports the notion that compared to countries that are geographically closer, more geographically distant countries by not being well-connected or well-integrated exert lower spillovers to each other and experience a weaker transmission mechanism. Results continue to support the finding that banks with higher

[28] We have also experimented with two other ways of constructing the spatial weights matrix, by taking into account the economic size of the countries in our sample. Given the endogeneity of GDP, we opted for the countries' area in squared kilometers and their population size. In both cases, Russia is dominating the sample of countries since it captures 74.3 percent of the total area in the region and 35.5 percent of the total population (for comparison, the countries immediately following Russia in these two categories are Kazakhstan with 11.8 percent in terms of relative area and Turkey with 16.9 percent in terms of population). As such, Russia has been assigned by far the highest weight in the construction of both weights matrices which in conjunction with the underestimation of the spillover estimates when Russia is included in the sample, led as expected to a large drop of the spillover coefficient estimate also turning it not statistically significant. To conserve space we do not show these results but are available upon request.

levels of capital pass on a monetary tightening to the supply of foreign currency credit less than banks with lower levels of capital.

<u>Macroeconomic conditions and bank characteristics</u> – In this section we examine whether cross-border spillovers in granting loans in foreign currency are sensitive to changes in other macroeconomic variables and bank characteristics. In particular, we add in our preferred specification interactions of macro conditions with banks' capital-asset ratios or interactions of changes in domestic monetary policy with bank variables. Table 5 presents the results.[29]

Column 1 includes the interaction of GDP growth with the bank capital ratio to examine if the impact of GDP growth on the proportion of loans given in foreign currency depends on banks' capital strength, and whether such heterogeneity influences the size of spillover effects. Jiménez et al. (2012) find for Spanish banks that high GDP growth spurs total loan granting and this effect is stronger for banks with low capital. Ongena et al. (2018) confirm this result for banks in Hungary and further show that the differential impacts of changes in GDP growth between lowly and highly capitalized banks are magnified when lending occurs in the domestic currency and minimized when lending occurs in a foreign currency. Our results are in line with these studies since we also find GDP growth to boost lending, this time in foreign currency, and "weaker" banks to be more procyclical in GDP in terms of loan granting in foreign currency than stronger banks. Importantly, this consideration does not affect the presence or significance of cross-country spillovers in foreign currency lending which exhibits an estimated semi-elasticity of 4 percentage points. The estimates in columns 2-3 add interactions of the MVP dollar share and of the EU accession dummy with bank capitalization ratios. They show that both variables reduce the share of loans offered in foreign currency but that the effect is heterogeneous with more capitalized banks reacting less strongly compared to less capitalized financial institutions. This finding has no effect on the existence of spillovers in loans granted in foreign currency across countries, although the size of the

[29] To conserve space, we only present the coefficient estimates of the spillovers, the changes in monetary policy and their interaction with bank capital balance sheet strength, and the macro/bank variables along with their interactions.

spillover is smaller in magnitude with semi-elasticity in the range of 1.7-3.4 percentage points.

So far we have focused on bank equity to total bank assets as the only bank balance-sheet characteristic that may affect changes in banks' lending decisions regarding the currency denomination of the loan following monetary policy changes (Holmstrom and Tirole, 1997). We now alter the measurement of bank capital and also follow the previous literature by examining whether bank size (the natural logarithm of bank assets) and bank deposits (the ratio of bank deposits to total bank assets) also affect the impact of interest rate changes on banks' loan supply composition. Furthermore, we examine whether bank holdings of net foreign assets and bank foreign ownership matter. Our main finding survives all these considerations and continues to support a strong spillover effect, with semi-elasticities between 2-8 percentage points.

In column 4 we follow Kashyap and Stein (1995) and focus on the impact of monetary policy changes on the currency supply of loans by banks of different size, measuring bank size by total assets. The estimated interaction coefficient enters with a negative sign suggesting that following a tightened monetary policy there is a currency compositional effect in the supply of loans identifiable from the adjustment of banks of different size. This effect acts complementary to the compositional loan supply effect identified from the reaction of banks with different capital ratios (i.e., the negative coefficient of the interaction term between monetary policy changes and the bank capital ratio). In column 5, inspired by Agarwal et al. (2019), we examine the impact of monetary policy changes on the supply of foreign currency credit by banks with different deposit-to-asset ratios. The estimate suggests a differential impact of interest rate changes along the bank deposits characteristic. It indicates that when interest rates increase, the transmission of monetary policy is mainly conducted by banks with high deposit ratios, in addition to those banks with low capital ratios. However, the estimates indicate that between the two bank characteristics it is especially the bank capital ratio that drives adjustments in banks' loan supply decisions following monetary changes.

Bank net foreign assets have been consistently associated with a lower fraction of loans in foreign currency (see Neanidis and Savva, 2009), a finding also confirmed in our results. The rationale behind this result is that banks prefer to match the level of their overall assets and liabilities by currency. This implies that banks can substitute foreign currency loans granted to domestic borrowers with foreign assets, so that an increase in net foreign assets reduces reliance on foreign currency loans. Given the importance of net foreign assets for banks' composition of loans, we examine whether they also affect the impact of monetary policy changes. For this reason, in column 6 we add an interaction term between net foreign bank assets and changes in interest rates. The negative coefficient means that monetary policy changes are transmitted more vigorously by banks that have lower net foreign assets, thus reinforcing the passing of monetary policy changes on the share of foreign currency loans by banks with lower levels of capital.

A further dimension that may influence the way monetary policy is transmitted in the banks' decision to alter its currency composition of loans is the degree by which banks are foreign-owned.[30] To test this, we add in our regression an interaction term between interest rate changes and the share of bank assets under foreign ownership. Column 7 reports that foreign banks directly promote lending in foreign currency but in response to a monetary contraction they increase foreign currency lending less relative to locally-owned banks. Hence, it is the domestically-owned banks that amplify the effects of monetary policy on the currency composition of supplied loans. This finding does not bode well with Ongena et al. (2018) who could not identify a role for foreign- vs. locally-owned banks in the transmission of monetary policy changes. Our sample however contains a more variable measure of foreign bank ownership, where the share of bank assets under foreign ownership ranges from zero to 1.5. This greater degree of variability could explain the difference in our results.

Moreover, we test for non-linearities on the effect of monetary policy and of its differential impact between banks of low vs. high capitalization ratios. To achieve this, we add squared and cubed terms for changes in the domestic interest rates, the bank capital ratio, and their interaction term. To conserve space we choose not to report these

[30] Foreign-owned banks may have the capacity to better manage liquidity on larger regional scale. They may also have more foreign currency-denominated liabilities on their balance sheets or more foreign currency assets, including loans. The latter is certainly true in our sample, where banks that are majority foreign-owned extend more loans in foreign currency (47 percent of total loans) compared to locally-owned banks (37 percent of total loans). Furthermore, foreign banks may follow a different business model (e.g., Giannetti and Ongena, 2009; Giannetti and Ongena, 2012; Beck et al., 2017) than domestic banks which may change their sensitivity to changes in monetary conditions.

specifications (that load in these extra terms and become somewhat unwieldy to present). Our results remain robust in this case as well.

From the above exercises we can, therefore, conclude that there is no indication of a bias from omitted interaction variables in our specifications, overall supporting a robust cross-border spillover effect of foreign currency loans.

Heterogeneous effects – Our main result suggests that a country's share of foreign currency loans is affected by the respective shares of foreign currency loans granted by banks in other countries, increasingly so by those countries that are geographically more proximate. This collective spillover effect is manifested by monetary policy changes in each individual country in the network, whereby monetary contractions reduce the proportion of lending in domestic currency and raise that in foreign currency, driven by banks with lower levels of capital which increase foreign currency lending more relative to banks with higher capital holdings. Keeping up with the heterogeneous channel of transmission of monetary policy across banks with different capitalization ratios, we now examine whether there are also in operation direct channels of heterogeneity in the size of spillovers in foreign currency loans. This allows estimating whether the strength of the spillovers varies along various dimensions. We do this in Table 6 by adding interactions between the spatial lag variable and an array of bank, macro and regulatory conditions. The last row of Table 6 shows the spillover size and semi-elasticity *net* of the heterogeneous effect of the interacted variables.[31]

Column 1 picks up from the last column of Table 5 and tests if foreign bank ownership directly affects the size of the spillover effect, in addition to its indirect effect via monetary policy changes already identified. It shows that a higher share of foreign ownership raises bank supply of foreign currency loans but also reduces the magnitude of the spatial lag estimate, implying that more foreign owned banks contribute to less cross-country spillovers in foreign currency loans. In terms of the semi-elasticity, foreign banks reduce spillovers by 1 percentage point. This finding supports the counterbalancing role

[31] We do not dwell on the heterogeneous effect of monetary policy changes across banks with low vs. high capital because it is strong and stable across the various specifications.

of foreign banks in the granting of loans in foreign currency: they extend more foreign currency loans within a country but reduce their spillover across countries.

The analysis thus far has treated symmetrically the time period before the onset of the global financial crisis and the subsequent recession. In column 2 we add a multiplicative term between the spatial lag and a dummy variable that takes the value of 1 after September 2008 (and 0 otherwise) to account for the start of the global financial crisis signifying the filing for bankruptcy by Lehman Brothers on 15 September 2008. Our dataset extends through 2016, including a sufficient number of time periods in the aftermath of the onset of the crisis that eventually also spread to emerging Europe to allow for a study of cross-country spillovers in foreign currency loans in a manner comparable to the pre-crisis analysis. The estimated coefficient of the interaction term is negative and statistically significant indicating the decline in spillovers during and after the onset of the financial crisis. The size of the coefficient estimate implies a strong and economically relevant drop in cross-country spillovers, reaching for the post-Lehman collapse period a decline in the semi-elasticity by 4.25 percentage points, thus yielding a net spillover semi-elasticity of 1.62 percentage points.

In an effort to track the evolution of the spillover size and get a better understanding of the time-varying role of the financial crisis on its magnitude, we estimate the spatial lag for every year from 2002 onwards. This gives rise to an annual cumulative effect of the spillover size from mid-1996 to every year of the sample until the end of 2016. Figure 4 presents the 95 percent confidence interval for the estimated semi-elasticity of spillovers. The vertical line along the horizontal axis corresponds to September 2008. There is a clear demarcation regarding the spillovers magnitude between the two sub-periods. Before the crisis the semi-elasticity hovered above 10 percentage points, while post-crisis it gradually declined reaching its lowest level of 3.7 percent at the end of the sample period. This means that spillovers in foreign currency lending did not react abruptly immediately after the Lehman Brothers collapse but decreased steadily early on and declined significantly only later in the period. What may be driving the weaker post-crisis response of spillovers? A first reason could be that banks may have substantially changed their lending policies due to various regulatory limits becoming binding (Rosenberg and Tirpák, 2009), if not voluntarily (e.g., Cetorelli and Goldberg, 2011; de Haas and van Lelyveld, 2014). A second explanation is that due to unconventional monetary policies, changes in short-term interest rates may have become less representative of changes in monetary conditions. These reasons are cited by Ongena et al. (2018) who cannot identify a local bank lending channel in operation in Hungary between domestic and foreign currency loans in the post-crisis period. They are also discussed by Temesvary et al. (2018) when they identify a weaker post-crisis international monetary transmission effect of US banks' cross-border lending.

In columns 3-5 we analyze the role of three further macro variables to assess whether our results are driven by (i) changes in the local currency exchange rate with the US dollar, (ii) the trade integration within our country sample, and (iii) a country's level of forward market liberalization (Luca and Petrova, 2008). All macro variables contribute to higher share of loans in foreign currency and in all cases we find these variables to diminish the size of spillovers in foreign currency loans, by 0.86, 0.3 and 3.48 percent respectively in terms of estimated semi-elasticities.[32] These results suggest that the currency compositional supply spillover effect we identify is not driven by these variables since the remaining semi-elasticity ranges between 2.5-4.8 percent.

Finally, in column 6 we focus our analysis on countries that underwent or currently undergo the admissions process to join the European Union (EU).[33] Levy-Yeyati (2006) and Rosenberg and Tirpák (2009) offer the view that EU membership by leading eventually to euro adoption, triggers higher shares of foreign currency lending in anticipation of admission to the Economic and Monetary Union (EMU). The mechanism of this positive channel is expressed by an increased volume of financial transactions with the EU, a growing acceptance of the euro as a store of value, and a higher degree of lending in foreign currency in the expectation of diminishing currency risk. But, at the same time as countries converge toward EU membership their monetary policies align with that of the European Central Bank (ECB) due to eventual euro currency adoption of

[32] In particular, a high degree of forward market liberalization allows banks with foreign currency holdings to insure locally against currency risk and hedge their exposure in the form of forward contracts, thus limiting the scope for cross-border externalities in foreign currency lending.

[33] The countries in our sample affiliated with the EU either as members or candidates for membership are Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Slovenia, Slovakia (members as of 1 May 2004), Bulgaria and Romania (members as of 1 January 2007) and Croatia (member since 1 July 2013), while those under accession are Albania, North Macedonia, Serbia and Turkey.

the member states. This monetary policy cooperation and coordination amongst EU candidate and member countries leads to converging interest rates, eventually weakening the potency of the currency composition channel of monetary policy. As a result, and as member states become more integrated with regard to ECB monetary policy, the size of the spillovers should be getting smaller. Our findings in column 6 are consistent with these expectations. We find that EU association raises the domestic share of foreign currency loans granted by banks, while it simultaneously reduces the strength of the spillover effect.[34] The reduction in the semi-elasticity due to EU affiliation is sizeable and corresponds to 70 percent of the total semi-elasticity. This yields a net spillover semi-elasticity of less than 1 percentage point.

We conclude this section by reporting that we detect strong heterogeneous effects in cross-country spillovers, owing to countries' macroeconomic conditions and EU affiliation. These heterogeneous effects, although they reduce the size of spillovers, they do not fully offset them. Across regressions, the coefficient of the spatial lag is always positive and highly significant. In terms of our central result, it proves to be robust throughout our analysis.[35]

5. Conclusions

Research on the determinants of loans denominated in foreign currency has documented its drivers and provided policymakers with useful guidance regarding the role of domestic monetary policy and bank sector characteristics. A common thread in this research, however, is that it implicitly assumes that the share of foreign currency loans (as fraction of total loans) is due to country-specific conditions and is, therefore, independent across countries. This paper is the first attempt to explicitly test this

[34] The admission process is comprised of three stages: (i) the beginning of the EU accession negotiations up until the end of the negotiation process, (ii) the dates decided by the EU for negotiating countries to join the EU up until before full EU membership, and (iii) full membership to the EU. Our results are unchanged if we include in the regression the three separate stages and their interactions with the spatial lag.

[35] In unreported regressions, we also test for potentially heterogeneous effects by changing our sample size, specifically by dropping one country at a time. Results are robust to this exercise implying findings are not contingent to any one particular country, although the country exclusion leads to spillover coefficient estimates of different magnitude. The value of semi-elasticities varies from the minimum value of 1.11 percent (when excluding Albania) to the maximum of 13.31 percent (when excluding Russia). This means that the higher the estimated semi-elasticity in a country's absence, the less this country is facilitating spillover transmission.

assumption by examining cross-country spillovers in the proportion of foreign currency loans, and their evolution, in a geographic region of the world with a prolonged and diverse experience of this phenomenon—a sample of 23 emerging European countries over 1996-2016 at monthly frequency.

The approach we use is different to those used in previous studies. We apply an empirical model that allows for spatial econometric effects that also tackles a reflection problem through an instrumental variable strategy. We find that tighter monetary conditions increase lending from banks in foreign currency, at the expense of domestic currency, with the effect being more pronounced for banks with lower capitalization ratios. Through the exogenous geographic linkages between countries, the induced higher bank lending in foreign currency in one country strongly transmits to the other countries in the network. This finding supports the argument that foreign currency lending spills over to other countries. The result is strongly statistically significant and the implied magnitude is economically relevant—depending on the chosen weights matrix it produces a spillover semi-elasticity that ranges between 3.7-28 percentage points. We perform numerous sensitivity and heterogeneity tests and show that the results are robust to a variety of alternative specifications. Amongst them, we find that the size of the spillover has been reduced after the global financial crisis and that it is particularly low for countries with a formal association, either as members or candidates, with the European Union. We also find that foreign monetary policy changes appear to transmit to local bank lending in foreign currency, through an international bank-lending channel that changes the currency composition of the local bank loan supply.

Our findings have important policy implications. A country's local bank lending in foreign currencies reacts to domestic monetary policy and to the heterogeneous response of its banks to this policy, and is subsequently transmitted internationally across the network of countries and changes the currency composition of the other countries' local bank loan supply in favor of foreign currencies. Overall, these findings suggest that efforts to dampen foreign currency lending in one country are likely to spill over to other countries as well. A mechanism to achieve this is monetary policy coordination amongst countries in the region, especially during normal times.

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Figure 1: Country Sample

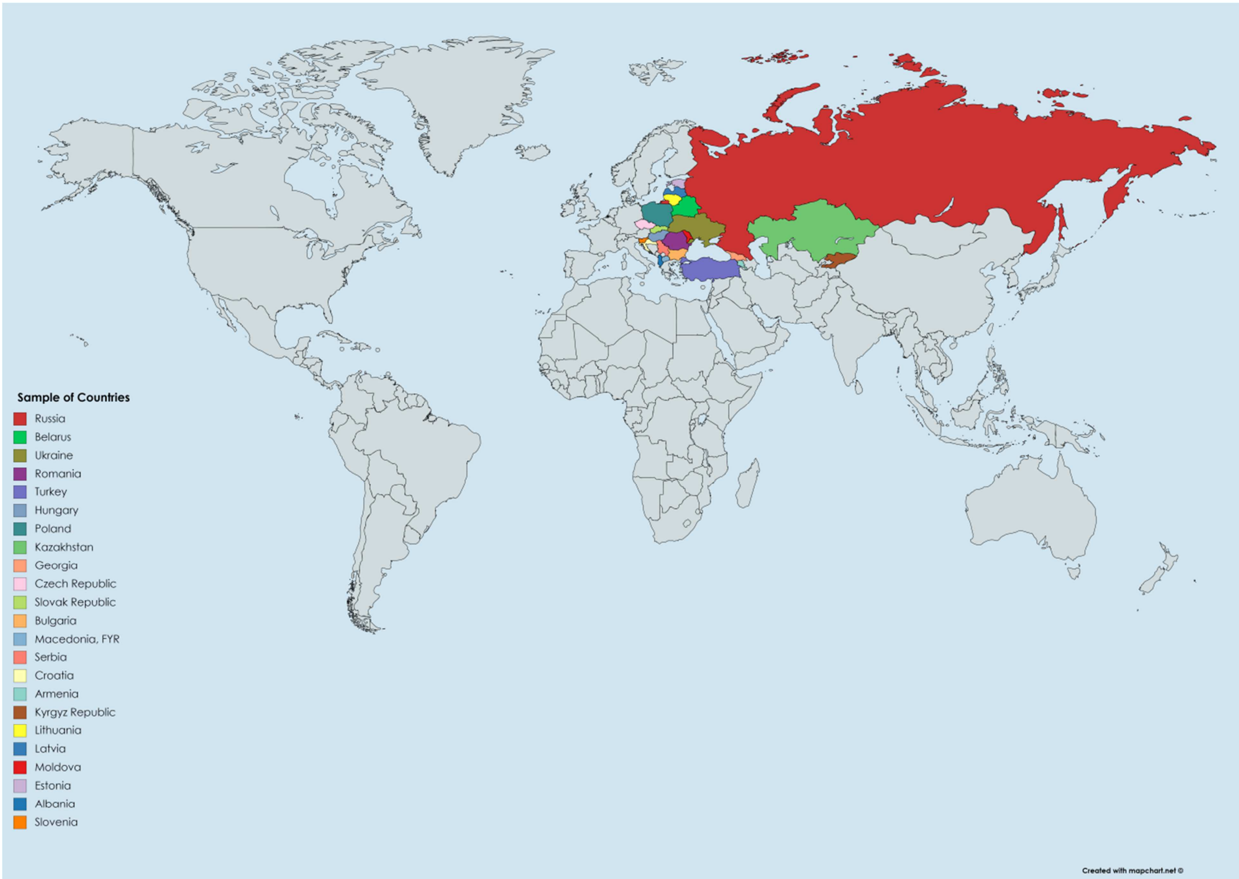

Figure 2: Share of Foreign Currency Lending (FCL)

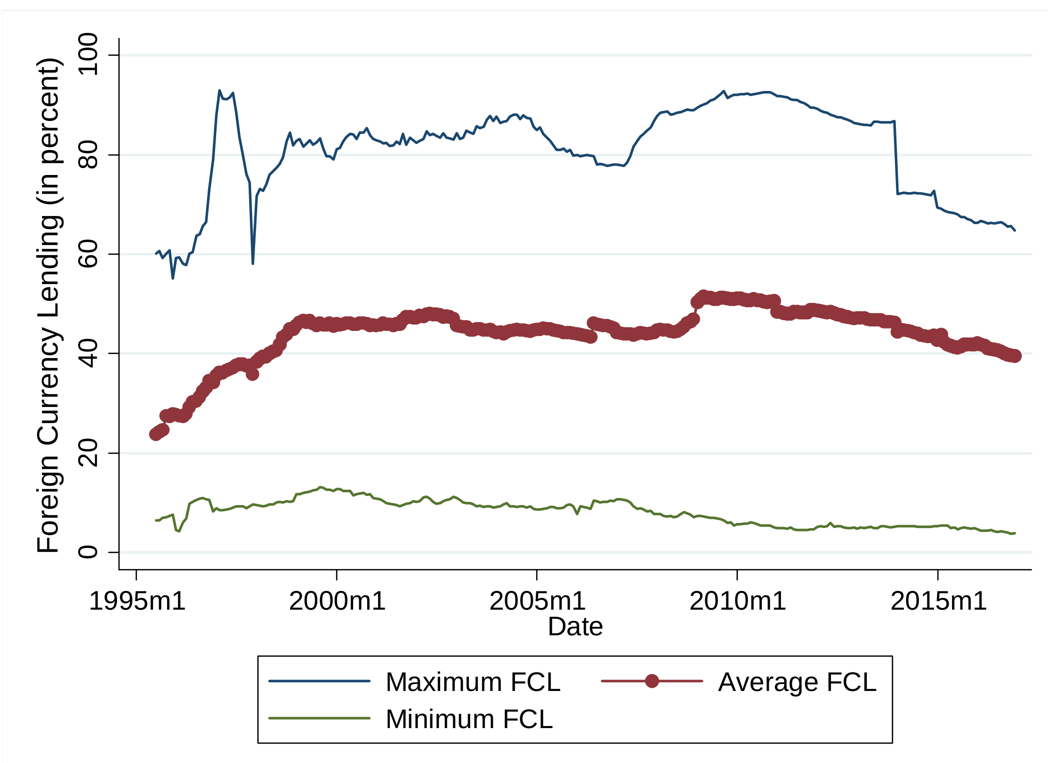

Figure 3: Three-month Interbank Interest Rates, in Local Currency (average for all countries in the region), Euro, US Dollar and Swiss Franc

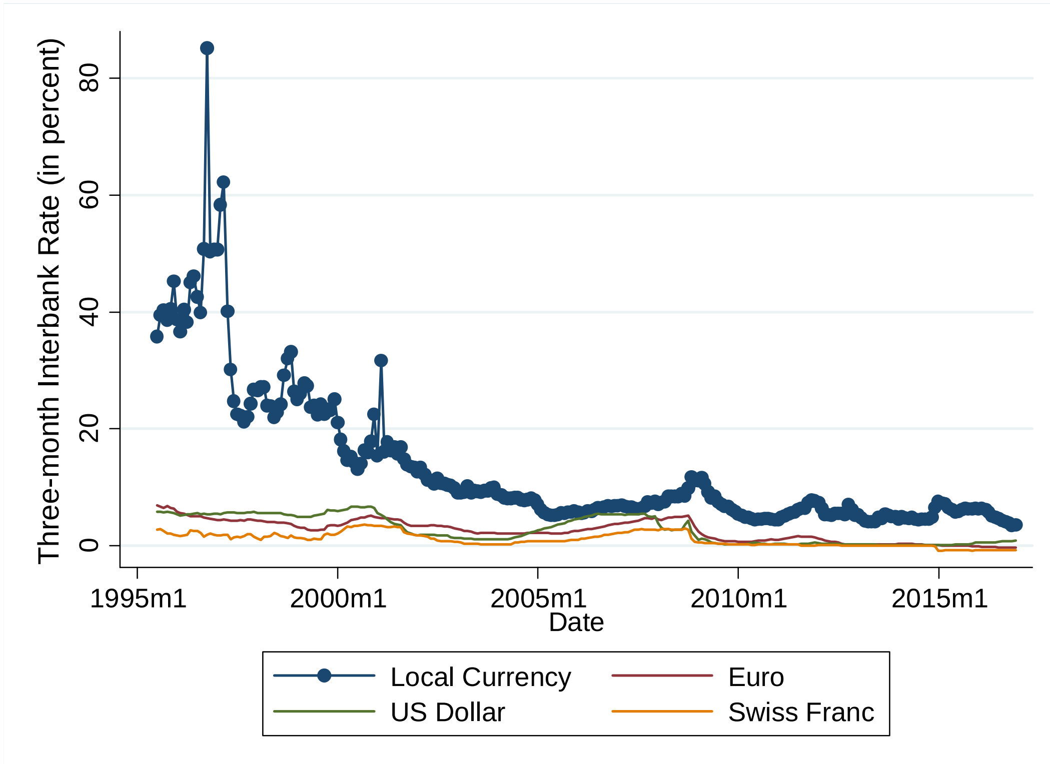

Figure 4: Cumulative Cross-Border Spillovers in Foreign Currency Lending (95% Confidence Intervals), 2002-2016

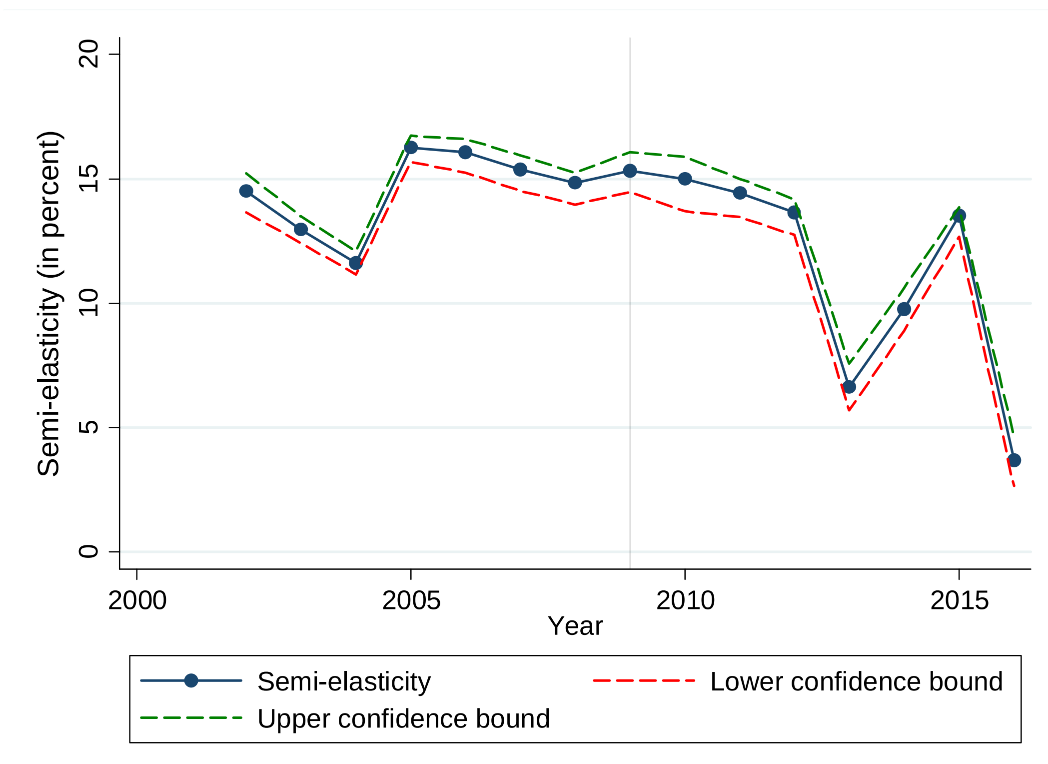

Table 1: Variable Definitions and Sources

Variable	Definition [source]
Dependent variable	
Share of foreign currency lending (FCL)	Ratio of foreign currency denominated credit to total credits of residents issued by resident banks [IMF, International Financial Statistics (IFS); National Central Banks (NCB)]
Control variables	
Bank variables	
Spatially weighted FCL in the rest of region (or spatial lag)	Sum of FCL in all other countries located in the region weighted by the bilateral inverse distance of each country from all other countries in the region, for every time period. Bilateral distance between two countries is measured by the great-circle distance between the two economies' capital cities. For a country pair *i* and *j*, the inverse-distance-based weight matrix is defined as $w_{ij} = \frac{[1/\sqrt{dist_{ij}}]}{\sum_{j=1}^{n}[1/\sqrt{dist_{ij}}]}$, where $dist_{ij}$ denotes the value of bilateral distance in kilometers between two countries. The spatially weighted FCL is then defined by $$Spatial\ FCL_{it} = \sum_{j=1}^{n} w_{ij} FCL_{jt}$$
Bank capital ratio	Ratio of bank equity to total bank assets [IFS and NCB]
Ln(Bank total assets)	Natural logarithm of total bank assets [IFS and NCB]
Bank deposits to assets ratio	Ratio of bank deposits to total bank assets [IFS and NCB]
Foreign bank penetration	Share of bank assets under foreign ownership, defined as banks with assets of foreign ownership in excess of 50% [European Bank for Reconstruction and Development (EBRD) Banking Survey; Claessens & van Horen (2015); NCB Annual Reports]
Interest rate margin	First difference in interest rates charged for loans in local currency vs. US dollar (local currency rate – foreign currency rate)/100 [IFS and NCB]
Net foreign assets	Ratio of commercial banks' and other depository corporations' foreign assets minus external liabilities to total domestic deposits [IFS and NCB]
Share of foreign currency deposits	Ratio of foreign currency denominated deposits to total deposits of residents held in resident banks [IFS and NCB]
Macroeconomic variables	
Δ interest rate	Annual change in the domestic 3-month interbank rate [Federal Reserve Economic Data (FRED); NCB]
Δ interest rate Euro Area	Annual change in the Euro Area 3-month interbank rate [FRED]
Δ interest rate Switzerland	Annual change in the Swiss 3-month interbank rate [FRED]
Δ interest rate USA	Annual change in the US 3-month interbank rate [FRED]
Δ interest rate Russia	Annual change in the Russian 3-month interbank rate [FRED]
GDP growth rate	Annual growth rate in domestic gross domestic product [IFS]
Δ CPI	Annual change in domestic Consumer Price Index [IFS]
Δ Exchange rate	Annual change in the nominal official exchange rate (national currency/USD) [IFS]
MVP dollar share	Minimum variance portfolio dollar share, constructed by Ize and Levy-Yeyati (2003), calculated as $$MVP_{it} = \frac{Var(\Delta\ \mathrm{CPI}) + Cov(\Delta\ \mathrm{CPI}, \Delta\ \mathrm{RER})}{Var(\Delta\ \mathrm{CPI}) + Var(\Delta\ \mathrm{RER}) + 2Cov(\Delta\ \mathrm{CPI}, \Delta\ \mathrm{RER})},$$ where *ΔRER* is the annual change in real exchange rate, *Var* denotes variance and *Cov* denotes covariance. Following Basso et al. (2011), we compute MVP based on all historical information up to the observation point [Author's calculation]

Bilateral trade openness	Ratio of a country's bilateral trade with all other countries in the region to the total amount of bilateral trade of all countries in the region with each other. If BT_{ijt} denotes the volume of bilateral trade (sum of exports and imports) between countries *i* and *j* at time period *t*, then $\sum_{j=1}^{n} BT_{ijt}$ is the volume of country *i*'s bilateral trade with every other country *j* in the region. Dividing this by the sum of bilateral trade across countries *i*, we obtain country *i*'s indicator of regional bilateral trade openness as $$BTO_{it} = \frac{\sum_{j=1}^{n} BT_{ijt}}{\sum_{i=1}^{m}\left(\sum_{j=1}^{n} BT_{ijt}\right)}$$ [monthly data on the value of merchandise exports and imports between each country and all its trading partners is from the IMF Direction of Trade Statistics (DOTS) database]
Institutional variables	
Restrictions on FCL	Dummy variable that takes the value of 1 when there are restrictions on residents holdings of onshore foreign currency loans and 0 otherwise [AREAR, IMF]
EU membership	Dummy variable that takes the value of 1 during the dates of (i) the beginning of the EU accession negotiations, (ii) the end of the negotiation process, and (iii) after full membership to the EU, and 0 otherwise. See further below for details on each of these periods and the countries involved [Author's calculation based on information from http://europa.eu/abc/history]
High FCL	Dummy variable that takes the value of 1 if the share of foreign currency lending exceeds 50 percent and 0 otherwise [Author's calculation]
Robustness variables	
Weights matrix based on adjacency	The spatially weighted FCL continues to be defined as before, but now weights are represented by countries' adjacency to each other. Adjacency is reflected by a dummy variable that is equal to 1 whenever two countries *i* and *j* have a common border and 0 otherwise. For a country pair *i* and *j*, the adjacency-based weight matrix is defined as $w_{ij} = \frac{b_{ij}}{\sum_{j=1}^{n} b_{ij}}$, where b_{ij} denotes bordering countries.
Weights matrix based on length of shared borders	The spatially weighted FCL continues to be defined as before, but now weights are represented by countries' length of shared borders (in kilometers), sourced from the CIA World Factbook. For a country pair *i* and *j*, the shared-borders-length-based weight matrix is defined as $w_{ij} = \frac{lb_{ij}}{\sum_{j=1}^{n} lb_{ij}}$, where lb_{ij} denotes the share of borders length in kilometers between two countries.
Dummy for post-Lehman Brothers bankruptcy	Dummy variable that takes the value of 1 after September 2008 and 0 otherwise
Start of EU accession process	Dummy variable that takes the value of 1 during the dates of the beginning of the EU accession negotiations and before the end of the negotiation process and 0 otherwise. The beginning of negotiations started on March 1998 for the Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Rep., and Slovenia; on December 1999 for Bulgaria; on October 2005 for Turkey [http://europa.eu/abc/history]
Decision to join EU	Dummy variable that takes the value of 1 during the dates decided by the EU for negotiating countries to join the EU and before full EU membership and 0 otherwise. The negotiations ended on December 2002 for the Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Rep., and Slovenia; on April 2005 for Bulgaria [http://europa.eu/abc/history]
EU membership	Dummy variable that takes the value of 1 after full membership to the EU and 0 otherwise. Full membership started on May 2004 for the Czech Rep., Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Rep., and Slovenia; on January 2007 for Bulgaria [http://europa.eu/abc/history]
Dummy for forward market liberalization	Dummy variable that takes the value of 1 if there exists a functional forward market and 0 otherwise [AREAR, IMF]

Table 2: Summary Statistics

Variable	Mean	St Deviation	Min	Max
Dependent Variable				
Share of foreign currency lending (FCL)	0.442	0.220	0.038	0.928
Control Variables				
Bank variables				
Spatially weighted share of FCL in rest of region	0.397	0.060	0.118	0.783
Bank capital ratio$_{t\text{-}1m}$	0.140	0.050	0.035	0.371
Ln(Bank total assets)$_{t\text{-}1m}$	9.86	2.01	4.63	14.40
Bank deposits to assets ratio$_{t\text{-}1m}$	0.522	0.149	0.046	1.02
Foreign bank penetration$_{t\text{-}1m}$	0.577	0.289	0.015	1.51
Interest rate margin$_{t\text{-}1m}$	0.064	0.086	-0.086	1.04
Net foreign assets$_{t\text{-}1m}$	-0.103	0.284	-1.72	0.796
Share of foreign currency deposits$_{t\text{-}1m}$	0.413	0.185	0.077	0.868
Macroeconomic variables				
Δ interest rate$_{t\text{-}1m}$	-0.001	0.039	-0.685	1.02
Δ interest rate Euro Area$_{t\text{-}1m}$	-0.020	0.161	-0.945	0.649
Δ interest rate Switzerland$_{t\text{-}1m}$	-0.010	0.183	-1.46	0.818
Δ interest rate USA$_{t\text{-}1m}$	-0.015	0.243	-1.96	0.800
Δ interest rate Russia$_{t\text{-}1m}$	-0.002	0.055	-0.912	0.736
GDP growth rate$_{t\text{-}1q}$	0.029	0.167	-0.730	0.559
Δ CPI$_{t\text{-}1m}$	0.006	0.013	-0.056	0.325
Δ Exchange rate$_{t\text{-}1m}$	0.003	0.038	-0.169	0.709
MVP dollar share$_{t\text{-}1m}$	0.185	0.225	-0.132	0.979
Bilateral trade openness$_{t\text{-}1m}$	0.048	0.058	0.001	0.346
Institutional variables				
Restrictions on FCL	0.643	0.479	0	1
EU membership	0.492	0.500	0	1
High FCL	0.433	0.495	0	1

Notes: The number of observations in the sample equals 4,042. The sample period is July 1995 to December 2016. The time index on each variable indicates the timing of the variable in the main regressions with *t-1* indicating a one-period lag of a month (*m*) or quarter (*q*). Given the frequency of reporting for GDP, the values used are those of the preceding quarter. The only variables that do not enter with a lag but enter contemporaneously are the main control variable (weighted share of FCL in the rest of region) and those that proxy for the institutional environment, the latter in the form of 0/1 dummies (official restrictions on foreign currency loans, high foreign currency lending environment, and European Union membership). The number of countries in our sample is 23. For variable definitions and sources see Table 1.

Table 3A: Baseline Regressions (Second Stage)

	OLS	SPATIAL OLS	SPATIAL IV	Euro Area	Switzerland	USA	Russia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Spatial FCL	0.040	0.040***	0.271***	0.503***	0.375***	0.376***	0.905***
	(0.031)	(0.016)	(0.038)	(0.039)	(0.044)	(0.036)	(0.060)
Δ interest rate	0.043	0.043***	0.077***	0.074***	0.077***	0.074***	0.035***
	(0.067)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Bank capital ratio	-0.064	-0.064***	-0.581***	-0.281***	-0.444***	-0.568***	-0.074
	(0.052)	(0.030)	(0.109)	(0.108)	(0.118)	(0.102)	(0.117)
Δ interest rate * Bank capital ratio	-0.907	-0.907***	-0.675***	-0.649***	-0.683***	-0.655***	-0.315***
	(0.679)	(0.020)	(0.028)	(0.027)	(0.031)	(0.026)	(0.034)
Δ interest rate in Foreign Country				-0.002***	-0.002***	-0.001***	-0.015***
				(0.000)	(0.000)	(0.000)	(0.000)
Δ interest rate in Foreign Country * Bank capital ratio				0.014***	0.017***	0.001***	0.116***
				(0.000)	(0.000)	(0.000)	(0.007)
Controls as reported in Table A.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	No	No	No	No
Kleibergen–Paap F-stat	n.a.	n.a.	111.7	115.2	112.9	113.6	86.55
Hansen J (p-value)	n.a.	n.a.	0.602	0.602	0.602	0.602	0.603
R-squared (centered)	0.751	0.751	0.741	0.741	0.742	0.741	0.725
Obs	4042	4042	4042	4042	4042	4042	3802
Spillover (in percent)	0%	0.24%	1.63%	3.02%	2.25%	2.26%	5.43%
Semi-elasticity (in percent)	0%	0.54%	3.70%	6.80%	5.10%	5.11%	12.05%

Notes: The dependent variable is the share of foreign currency lending (FCL). Constant term not reported. All bank and macroeconomic control variables are lagged one period. Coefficients are listed in the row, robust standard errors adjusted for heteroskedasticity and serial correlation are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. Regression (1) is based on pooled OLS, (2) is based on pooled OLS corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction), (3)-(7) are based on two-step IV estimation corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction). "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "n.a." indicates that the statistical value is not applicable. The Kleibergen–Paap F-stat refers to the Kleibergen and Paap (2006) rk Wald F-statistic, which tests weak identification of the excluded instruments. The null hypothesis is that the first-stage regression is weakly identified. The Hansen J p-value refers to the overidentification test of all instruments, with null hypothesis that instruments are uncorrelated with the error term. Spillover denotes the size of the FCL spillover across borders, calculated as the product of the coefficient estimate of Spatial FCL (from this Table) and the standard deviation of Spatial FCL (from Table 2). Semi-elasticity refers to the size of the spillover as share of the mean value of FCL (from Table 2). ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 3B: Baseline Regressions (First Stage)

	OLS	SPATIAL OLS	SPATIAL IV	Euro Area	Switzerland	USA	Russia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Spatial Δ interest rate	n.a.	n.a.	0.136***	0.068***	0.168***	0.157***	0.082***
			(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
Spatial bank capital ratio	n.a.	n.a.	2.31***	2.32***	2.31***	2.32***	2.28***
			(0.013)	(0.013)	(0.013)	(0.014)	(0.015)
Spatial Δ interest rate * Spatial bank capital ratio	n.a.	n.a.	-2.34***	-1.25***	-2.82***	-2.64***	-1.86***
			(0.188)	(0.189)	(0.201)	(0.208)	(0.227)
Controls as listed in Table A.3	n.a.	n.a.	Yes	Yes	Yes	Yes	Yes
Country fixed effects	n.a.	n.a.	Yes	Yes	Yes	Yes	Yes
Time fixed effects	n.a.	n.a.	Yes	No	No	No	No
Kleibergen–Paap F-stat	n.a.	n.a.	111.7	115.2	112.9	113.6	86.55
Hansen J (p-value)	n.a.	n.a.	0.602	0.602	0.602	0.602	0.603
Obs	n.a.	n.a.	4042	4042	4042	4042	3802

Notes: The dependent variable is the spatial lag of the share of foreign currency lending (i.e., the spatially weighted share of FCL in the rest of region). Constant term not reported. All bank and macroeconomic control variables are lagged one period. Coefficient estimates of the excluded instruments from the first-stage regressions are listed in the row, robust standard errors adjusted for heteroskedasticity and serial correlation are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. Regressions are based on two-step IV estimation corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction). "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "n.a." indicates that the value is not applicable. The Kleibergen–Paap F-stat refers to the Kleibergen and Paap (2006) rk Wald F-statistic, which tests weak identification of the excluded instruments. The null hypothesis is that the coefficients on the excluded instruments equal zero. The Hansen J p-value refers to the overidentification test of all instruments, with null hypothesis that instruments are uncorrelated with the error term. ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 4: Alternative Spatial Kernels and Different Spatial Weight Matrices

Spatial threshold or weight matrix →	**117km**	**1170km**	**3845km**	**4824km**	**Borders**	**Border Length**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Spatial FCL	0.312***	0.272***	0.269***	0.269***	0.341***	0.910***
	(0.131)	(0.045)	(0.025)	(0.022)	(0.114)	(0.042)
Δ interest rate	0.077***	0.077***	0.077***	0.077***	0.018***	0.035***
	(0.012)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
Bank capital ratio	-0.449	-0.577***	-0.586***	-0.586***	-0.612***	0.060
	(0.377)	(0.128)	(0.079)	(0.063)	(0.094)	(0.073)
Δ interest rate * Bank capital ratio	-0.671***	-0.675***	-0.675***	-0.675***	-0.163***	-0.314***
	(0.105)	(0.033)	(0.018)	(0.016)	(0.017)	(0.020)
Controls as listed in Table A.3	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap F-stat	111.7	111.7	111.7	111.7	2.71	3.48
Hansen J (p-value)	0.546	0.601	0.605	0.605	0.604	0.603
R-squared (centered)	0.741	0.741	0.741	0.741	0.724	0.593
Obs	4042	4042	4042	4042	3992	3992
Spillover (in percent)	1.87%	1.63%	1.61%	1.61%	4.55%	12.45%
Semi-elasticity (in percent)	4.24%	3.70%	3.65%	3.65%	10.30%	28.14%

Notes: The dependent variable is the share of foreign currency lending (FCL). Constant term not reported. All bank and macroeconomic control variables are lagged one period. Coefficients are listed in the row, robust standard errors adjusted for heteroskedasticity and serial correlation are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. All regressions are based on two-step IV estimation corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction). "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. The Kleibergen–Paap F-stat refers to the Kleibergen and Paap (2006) rk Wald F-statistic, which tests weak identification of the excluded instruments. The null hypothesis is that the first-stage regression is weakly identified. The Hansen J p-value refers to the overidentification test of all instruments, with null hypothesis that instruments are uncorrelated with the error term. Spillover denotes the size of the FCL spillover across borders, calculated as the product of the coefficient estimate of Spatial FCL (from this Table) and the standard deviation of Spatial FCL (from Table 2). Semi-elasticity refers to the size of the spillover as share of the mean value of FCL (from Table 2). ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 5: Heterogeneity in Bank Response to Changes in the Macro Environment and Bank Characteristics

Macro or Bank variable →	**GDP growth rate**	**MVP dollar share**	**EU membership**	**Bank total assets**	**Bank deposits to assets ratio**	**Net foreign assets**	**Foreign bank penetration**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Spatial FCL	0.294***	0.249***	0.127***	0.592***	0.184***	0.282***	0.145***
	(0.038)	(0.001)	(0.006)	(0.096)	(0.042)	(0.037)	(0.046)
Δ interest rate	0.077***	0.078***	0.051***	0.636***	0.077***	0.077***	0.085***
	(0.003)	(0.004)	(0.002)	(0.041)	(0.003)	(0.003)	(0.003)
Bank capital ratio	-0.462***	-7.05***	-4.45***	-1.45***	0.923***	-0.400***	-0.620***
	(0.109)	(0.198)	(0.280)	(0.153)	(0.058)	(0.085)	(0.143)
Δ interest rate * Bank capital ratio	-0.673***	-0.688***	-0.449***	-1.45***	-1.02***	-0.685***	-0.682***
	(0.028)	(0.034)	(0.017)	(0.103)	(0.040)	(0.026)	(0.032)
Macro or Bank variable	0.464***	-4.61***	-1.70***	-0.097***	-0.175***	-0.025***	0.109***
	(0.039)	(0.159)	(0.064)	(0.043)	(0.042)	(0.006)	(0.008)
Bank capital ratio * Macro variable	-3.19***	29.83***	12.48***				
	(0.258)	(0.965)	(0.465)				
Δ interest rate * Bank variable				-0.044***	0.215***	-0.030***	-0.019***
				(0.003)	(0.008)	(0.003)	(0.009)
Controls as listed in Table A.3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap F-stat	112.6	113.5	121.0	111.2	110.9	111.8	111.5
Hansen J (p-value)	0.603	0.603	0.602	0.602	0.602	0.602	0.603
R-squared (centered)	0.741	0.741	0.743	0.741	0.741	0.741	0.741
Obs	4042	4042	4042	4042	4042	4042	4042
Spillover (in percent)	1.76%	1.49%	0.76%	3.55%	1.10%	1.70%	0.87%
Semi-elasticity (in percent)	4.00%	3.38%	1.72%	8.04%	2.50%	3.83%	1.97%

Notes: The dependent variable is the share of foreign currency lending (FCL). Constant term not reported. All bank and macroeconomic control variables are lagged one period. Coefficients are listed in the row, robust standard errors adjusted for heteroskedasticity and serial correlation are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. All regressions are based on two-step IV estimation corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction). "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. The Kleibergen–Paap F-stat refers to the Kleibergen and Paap (2006) rk Wald F-statistic, which tests weak identification of the excluded instruments. The null hypothesis is that the first-stage regression is weakly identified. The Hansen J p-value refers to the overidentification test of all instruments, with null hypothesis that instruments are uncorrelated with the error term. Spillover denotes the size of the FCL spillover across borders, calculated as the product of the coefficient estimate of Spatial FCL (from this Table) and the standard deviation of Spatial FCL (from Table 2). Semi-elasticity refers to the size of the spillover as share of the mean value of FCL (from Table 2). ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Table 6: Heterogeneity in Spillover Magnitude in Response to Changes in the Macro Environment and Bank Characteristics

Macro or Bank variable →	**Foreign bank penetration**	**post-Lehman dummy**	**Δ Exchange rate**	**Bilateral trade openness**	**Forward market liberalization**	**EU membership**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Spatial FCL	0.233***	0.432***	0.363***	0.211***	0.612***	0.236***
	(0.038)	(0.007)	(0.040)	(0.004)	(0.061)	(0.003)
Δ interest rate	0.077***	0.060***	0.077***	0.035***	0.077***	0.072***
	(0.003)	(0.002)	(0.003)	(0.007)	(0.003)	(0.003)
Bank capital ratio	-0.567***	0.596***	-0.582***	-4.73***	-0.540***	-0.843***
	(0.108)	(0.083)	(0.114)	(0.614)	(0.112)	(0.111)
Δ interest rate * Bank capital ratio	-0.676***	-0.532***	-0.675***	-0.309***	-0.672***	-0.637***
	(0.028)	(0.019)	(0.026)	(0.062)	(0.029)	(0.024)
Macro or Bank variable	0.140***	2.52***	7.69***	1.49***	0.250***	1.27***
	(0.008)	(0.035)	(0.213)	(0.026)	(0.027)	(0.020)
Spatial FCL * Macro or Bank variable	-0.156***	-0.632***	-1.67***	-0.379***	-0.580***	-0.337***
	(0.015)	(0.008)	(0.051)	(0.067)	(0.068)	(0.005)
Controls as listed in Table A.3	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen–Paap F-stat	81.56	71.18	109.8	63.67	29.11	53.24
Hansen J (p-value)	0.603	0.603	0.603	0.609	0.603	0.603
R-squared (centered)	0.740	0.737	0.741	0.742	0.742	0.741
Obs	4042	4042	4042	4042	4042	4042
Spillover (in percent)	1.40%	2.59%	2.18%	1.27%	3.67%	1.42%
Semi-elasticity (in percent)	3.16%	5.87%	4.93%	2.86%	8.31%	3.20%
Spillover via interaction (in percent)	-0.44%	-1.88%	-0.38%	-0.13%	-1.54%	-1.01%
Semi-elasticity via interaction (in percent)	-1.00%	-4.25%	-0.86%	-0.30%	-3.48%	-2.28%
Difference between total spillover and spillover via interaction (in percent)	***0.96%***	***0.71%***	***1.80%***	***1.14%***	***2.13%***	***0.41%***
Difference between total semi-elasticity and semi-elasticity via interaction (in percent)	***2.16%***	***1.62%***	***4.07%***	***2.56%***	***4.83%***	***0.92%***

Notes: The dependent variable is the share of foreign currency lending (FCL). Constant term not reported. All bank and macroeconomic control variables are lagged one period. Coefficients are listed in the row, robust standard errors adjusted for heteroskedasticity and serial correlation are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. All regressions are based on two-step IV estimation corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction). "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. The Kleibergen–Paap F-stat refers to the Kleibergen and Paap (2006) rk Wald F-statistic, which tests weak identification of the excluded instruments. The null hypothesis is that the first-stage regression is weakly identified. The Hansen J p-value refers to the overidentification test of all instruments, with null hypothesis that instruments are uncorrelated with the error term. Spillover denotes the size of the FCL spillover across borders, calculated as the product of the coefficient estimate of Spatial FCL (from this Table) and the standard deviation of Spatial FCL (from Table 2). Spillover via interaction denotes the size of the marginal FCL spillover across borders through the interaction of Spatial FCL with a Macro or Bank variable, calculated as the product of the coefficient estimate of Spatial FCL * Macro or Bank variable (from this Table), the standard deviation of Spatial FCL (from Table 2) and the standard deviation of the Macro or Bank variable (from Table 2). Semi-elasticity refers to the size of the spillover as share of the mean value of FCL (from Table 2). Semi-elasticity via interaction refers to the size of the marginal spillover as share of the mean value of FCL (from Table 2). ***, **, * denote significance at the 1%, 5%, 10% level, respectively.

Appendix

Table A.3: Baseline Regressions (Second Stage)

	OLS	SPATIAL OLS	SPATIAL IV	Euro Area	Switzerland	USA	Russia
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Spatial FCL	0.040	0.040***	0.271***	0.503***	0.375***	0.376***	0.905***
	(0.031)	(0.016)	(0.038)	(0.039)	(0.044)	(0.036)	(0.060)
Δ interest rate	0.043	0.043***	0.077***	0.074***	0.077***	0.074***	0.035***
	(0.067)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Bank capital ratio	-0.064	-0.064***	-0.581***	-0.281***	-0.444***	-0.568***	-0.074
	(0.052)	(0.030)	(0.109)	(0.108)	(0.118)	(0.102)	(0.117)
Δ interest rate * Bank capital ratio	-0.907	-0.907***	-0.675***	-0.649***	-0.683***	-0.655***	-0.315***
	(0.679)	(0.020)	(0.028)	(0.027)	(0.031)	(0.026)	(0.034)
Δ interest rate in Foreign Country				-0.002***	-0.002***	-0.001***	-0.015***
				(0.000)	(0.000)	(0.000)	(0.000)
Δ interest rate in Foreign Country * Bank capital ratic				0.014***	0.017***	0.001***	0.116***
				(0.000)	(0.000)	(0.000)	(0.007)
Ln(Bank total assets)	-0.020***	-0.020***	-0.015***	-0.013***	-0.013***	-0.015***	0.046***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.005)
Bank deposits to assets ratio	-0.138***	-0.138***	-0.607***	-0.606***	-0.619***	-0.594***	-0.629***
	(0.014)	(0.007)	(0.025)	(0.025)	(0.026)	(0.024)	(0.030)
Net foreign assets	-0.130***	-0.130***	-0.029***	-0.018***	-0.024***	-0.018***	-0.021***
	(0.007)	(0.005)	(0.007)	(0.006)	(0.007)	(0.006)	(0.009)
Foreign bank penetration	0.051***	0.051***	0.048***	0.041***	0.053***	0.042***	-0.337***
	(0.009)	(0.007)	(0.007)	(0.007)	(0.008)	(0.007)	(0.027)
Share of foreign currency deposits	-0.029	-0.029**	-0.636***	-0.617***	-0.653***	-0.623***	-1.57***
	(0.019)	(0.013)	(0.022)	(0.021)	(0.023)	(0.021)	(0.063)
Interest rate margin	-0.063**	-0.063***	1.09***	1.10***	1.12***	0.990***	0.929***
	(0.025)	(0.013)	(0.046)	(0.043)	(0.049)	(0.042)	(0.046)
GDP growth rate	0.006	0.006***	-0.052***	-0.052***	-0.036***	-0.047***	-0.086***
	(0.009)	(0.001)	(0.006)	(0.006)	(0.007)	(0.006)	(0.004)
Δ CPI	0.062	0.062***	-8.08***	-8.44***	-8.10***	-6.70***	-10.3***
	(0.133)	(0.016)	(0.293)	(0.292)	(0.310)	(0.258)	(0.453)
Δ Exchange rate	-0.012	-0.012***	1.03***	1.11***	1.03***	0.955***	0.999***
	(0.046)	(0.003)	(0.032)	(0.028)	(0.033)	(0.035)	(0.034)
MVP dollar share	0.138***	0.138***	0.496***	0.491***	0.512***	0.484***	0.690***
	(0.010)	(0.008)	(0.009)	(0.010)	(0.010)	(0.009)	(0.012)
Bilateral trade openness	-0.082	-0.082*	-1.91***	-1.95***	-2.01***	-1.92***	-14.5***
	(0.050)	(0.043)	(0.144)	(0.143)	(0.152)	(0.142)	(0.335)
Restrictions on FCL	0.041***	0.041***	0.044***	0.051***	0.042***	0.041***	-0.036***
	(0.004)	(0.002)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)
EU membership	-0.012**	-0.012***	-0.056***	-0.048***	-0.055***	-0.053***	0.085***
	(0.005)	(0.004)	(0.008)	(0.007)	(0.008)	(0.008)	(0.010)
High FCL	0.305***	0.305***	0.336***	0.327***	0.332***	0.335***	0.144***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	No	No	No	No
Kleibergen–Paap F-stat	n.a.	n.a.	111.7	115.2	112.9	113.6	86.55
Hansen J (p-value)	n.a.	n.a.	0.602	0.602	0.602	0.602	0.603
R-squared (centered)	0.751	0.751	0.741	0.741	0.742	0.741	0.725
Obs	4042	4042	4042	4042	4042	4042	3802
Spillover (in percent)	0%	0.24%	1.63%	3.02%	2.25%	2.26%	5.43%
Semi-elasticity (in percent)	0%	0.54%	3.70%	6.80%	5.10%	5.11%	12.05%

Notes: The dependent variable is the share of foreign currency lending (FCL). Constant term not reported. All bank and macroeconomic control variables are lagged one period. Coefficients are listed in the row, robust standard errors adjusted for heteroskedasticity and serial correlation are reported in the row below in parentheses, and the corresponding significance levels are in the adjacent column. Regression (1) is based on pooled OLS, (2) is based on pooled OLS corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction), (3)-(7) are based on two-step IV estimation corrected for cross-sectional spatial dependence and panel-specific serial correlation (spatial HAC correction). "Yes" indicates that the set of fixed effects is included. "No" indicates that the set of fixed effects is not included. "n.a." indicates that the statistical value is not applicable. The Kleibergen–Paap F-stat refers to the Kleibergen and Paap (2006) rk Wald F-statistic, which tests weak identification of the excluded instruments. The null hypothesis is that the first-stage regression is weakly identified. The Hansen J p-value refers to the overidentification test of all instruments, with null hypothesis that instruments are uncorrelated with the error term. Spillover denotes the size of the FCL spillover across borders, calculated as the product of the coefficient estimate of Spatial FCL (from this Table) and the standard deviation of Spatial FCL (from Table 2). Semi-elasticity refers to the size of the spillover as share of the mean value of FCL (from Table 2). ***, **, * denote significance at the 1%, 5%, 10% level, respectively.