SOVEREIGN RISK AND THE BANK LENDING CHANNEL: DIFFERENCES ACROSS COUNTRIES AND THE EFFECTS OF THE FINANCIAL CRISIS

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Abstract

This article analyses how sovereign risk affects the bank lending channel of monetary policy, and tests whether these effects differed before, during, and after the onset of the financial crisis. This issue was analysed only in the eurozone during the sovereign debt crisis. However, these results are difficult to extrapolate to other countries. First, Europe is the only developed region that has experienced sovereign risk concerns. Secondly, it has a centralised monetary regime controlled by the European Central Bank, so it is more difficult to adapt monetary decisions to the specific level of sovereign risk in each country. To overcome these limitations, our analysis is based on two country scenarios: 1) developed countries (eurozone vs. non-eurozone countries); and 2) developing countries. We find that the role of sovereign risk in the transmission of monetary policy is very complex, and its significance not only varied before, during, and after the global financial crisis, but also in developed and developing countries.

Keywords: sovereign risk; financial crisis; monetary policy; bank lending channel.

JEL classification: E44; E52; G21.

1. INTRODUCTION

Knowing the role played by banks as loan suppliers is essential in order to understand how monetary policy affects the economy, as they are a key element in this process. In recent years, there has been a renewed interest in analysing the bank lending channel as a monetary policy transmission mechanism.[1] Supporters of this channel suggest that monetary policy impulses alter loan supply by affecting the access of banks to loanable funds (Bernanke and Blinder 1988).

Most studies show that banks' reactions to monetary policy depends on their financial strength. Banks with weaker balance sheets are less able to insulate their lending from monetary shocks because they have more difficulties accessing funding (Altunbas, Gambacorta and Marqués-Ibañez 2010, Kashyap and Stein 1995, 2000, Kishan and Opiela 2000, 2006).

Another factor that affects the bank lending channel, which received a lot of attention in Europe during the crisis, is sovereign risk. According to Cantero et al. (2014), greater sovereign risk pushed up the cost and reduced the availability of funding for some banks, thereby impacting the bank lending channel. The monetary policy of the European Central Bank (ECB) was consequently transmitted in a heterogeneous way across countries, leading to a process of financial fragmentation. Cantero et al. found that eurozone banks that operate in higher sovereign risk countries are more sensitive to monetary contractions. Banks in very high sovereign risk countries also reduce lending both during monetary restrictions and expansions.

Despite the important repercussions that sovereign risk has on monetary policy transmission, very little research has been carried out on this issue. To our knowledge, only

Cantero et al. (2014) focus on this issue in Europe, and no one has analysed it in other regions. The effects of sovereign risk on monetary policy transmission might be different in other countries for several reasons.

On the one hand, sovereign risk concerns in developed countries have been focused exclusively on the eurozone in a very specific time period: the global financial crisis. Sovereign risk would therefore probably not affect monetary transmission in other developed countries. On the other hand, similar to the eurozone, developing countries have also experienced sovereign debt crises. The monetary regime of the eurozone differs significantly from other regimes in the world, however. In the eurozone, monetary policy has been centralised and controlled by the ECB since 1999, and national governments control their own fiscal policy. In the rest of the world, central banks operate their own monetary policy. The developing economies can therefore use their own monetary policy to offset the effects of a high sovereign risk.

The relationship between sovereign risk and monetary policy is not clear and, thus, it would be difficult to extrapolate the results found by Cantero et al. (2014) to other countries. Due to these limitations, it is necessary to further analyse the role of sovereign risk in the monetary policy transmission to determine whether this risk is relevant by itself, or whether its relevance varies across regions or economic cycles. In this regard, our paper makes a contribution to the literature on sovereign risk and monetary policy. In particular, we extend the study of Cantero et al. and analyse how sovereign risk affects the bank lending reaction to monetary policy in two different country scenarios: 1) developed economies, by comparing the eurozone with the other developed countries; and 2) developing economies. We quantify how the marginal effect of monetary policy on the growth of loans varies with the level of sovereign risk in each scenario. We then test

whether these effects differed before, during, and after the onset of the financial crisis. The inclusion and comparison of different country scenarios adds evidence regarding the role of sovereign risk in monetary policy transmission and provides a broader interpretation of the results obtained by Cantero et al.

The analysis of developed economies involves 840 banks from 28 countries (7,641 observations) over the period of 2004 to 2015, and developing economies include 218 banks from 20 countries (1,935 observations) between 2004 and 2015. We found the presence of the bank lending channel in developed countries before the crisis. Moreover, this channel is more effective as sovereign risk increases. During the crisis, there was no significant evidence of the bank lending channel in the non-eurozone developed countries. However, in the eurozone the effects of monetary shocks on loan supply were the opposite of those posited by the bank lending channel, and these effects were more intense in higher sovereign risk countries. After the crisis, the bank lending channel tended to be reactivated in certain non-eurozone countries but was less powerful than in the years before the crisis, while in the eurozone this channel was not significant. Regarding the developing countries, there was no evidence of the bank lending channel either before, during, or after the global financial crisis.

These results highlight the fact that sovereign risk played a role in the transmission mechanism of monetary policy in developed countries only. Moreover, during and after the global financial crisis, sovereign risk impaired the functioning of the bank lending channel, especially in the eurozone. These findings also illustrate the augmented complexity of the task that is carried out by central banks in developed regions and question the effectiveness of monetary expansions during the crisis. In a sense our results highlight the importance of

considering both the level of sovereign risk and the global economic cycle when adopting monetary policy decisions.

The remainder of the article is structured as follows: Section 2 reviews the previous literature. Section 3 focuses on the empirical analysis and the discussion of the results. Section 4 presents the conclusions.

2. LITERATURE REVIEW

Monetary policy exerts its influence through several mechanisms, which include the interest rate channel, the exchange rate channel, the assets price channel, the expectations channel, the risk-taking channel, the balance sheet channel and the bank lending channel (Mishkin 1995).

The bank lending channel, which is the main focus of this article, highlights the special role played by banks as loan suppliers. According to this channel, a restrictive monetary policy gives rise to a reduction in bank lending because it reduces the access of banks to loanable funds (Bernanke and Blinder 1988). A restrictive monetary policy that increases the level of required reserves that banks must hold in the central bank limits the issuance of bank deposits to the availability of bank reserves (Kashyap and Stein 1995). On the other hand, monetary policy restrictions reduce the yields of deposits relative to other assets, thereby influencing the willingness of households to hold them (Ehrmann et al. 2003). Apart from reducing deposits, monetary restrictions also increase the cost of market funding for banks (Disyatat 2011). On the contrary, an expansionary monetary policy alleviates financial frictions and increases the assets that banks have available to lend

(Gibson 1997). Additionally, low interest rates reduce the overall risk portfolio of banks, which induces them to increase loan supply and to loosen credit standards (Maddaloni and Peydró 2011).

Most of the studies about the bank lending channel have found that banks with weaker balance sheets are more sensitive to monetary shocks because these banks have more difficulties accessing alternative sources of funds. In general, smaller, less liquid and more poorly capitalised banks experience a greater reduction in lending after a restrictive monetary policy (Altunbas, Gambacorta and Marqués-Ibáñez 2010, Kashyap and Stein 1995, 2000, Kishan and Opiela, 2000, 2006). Other authors have considered the characteristics of the banking market in the analysis of the monetary policy. Olivero, Li and Jeon (2011) revealed that banks that operate in more concentrated banking markets reduce their lending to a lesser extent after monetary contractions. Gambacorta and Marqués-Ibáñez (2011) found that financial innovation and changes in banks' business models amplify the effects of the bank lending channel. Sanfilippo et al. (2018) suggested that the bank lending channel is more effective in more developed financial systems.

Another factor that has affected the ability of banks to obtain funding and, therefore, monetary policy transmission, is sovereign risk. The global financial crisis of 2008 was intensified in Europe due to the onset of the sovereign debt crisis. Sovereign risk increased sharply, mainly in peripheral countries (Portugal, Ireland, Italy, Greece and Spain), which negatively affected the financial conditions of the domestic banking sector through several channels: asset holdings, collateral, sovereign rating and the government guarantees channel (CGFS 2011).

First, the asset holdings channel proposes that higher sovereign risk leads to losses in banks' holdings of public debt, which impacts negatively on their balance sheet (Correa et al. 2014). Secondly, the collateral channel states that sovereign risk reduces the collateral of banks to access to wholesale funding (Davies and Ng 2011). Thirdly, the sovereign rating channel suggests that downgrades of sovereign ratings are often followed by downgrades in domestic bank ratings (Alsakka, ap Gwilym and Vu 2014). Fourth, the government guarantees channel proposes that sovereign risk reduces the implicit and explicit guarantees that systemic banks receive from their governments (Gray and Malone 2012). These four channels contribute to increasing bank credit risks and makes it more difficult for them to obtain funding.

The previous channels thus all suggest that the deterioration of the financial conditions of banks caused by sovereign risk will reduce loan supply,[2] thereby impacting the bank lending channel of monetary policy. Cantero et al. (2014) found that eurozone banks that operate in higher sovereign risk countries are more affected by monetary restrictions. When sovereign risk is very high, banks reduce their lending during both monetary contractions and expansions. These facts made it increasingly difficult to implement a single monetary policy in the eurozone during the crisis.

It would be difficult to extrapolate the previous results to other countries. The other developed economies have never experienced relevant sovereign risk concerns, so this risk would probably not be significant in monetary policy transmission. Developing countries have experienced sovereign debt crises, however, but their sovereign risk and their monetary regimes are very different from Europe due to several reasons. Unlike in Europe, sovereign risk in developing countries is usually high, even before the global crisis. The

financial sector of these countries could also be more exposed to the funding restrictions caused by sovereign risk because banks in developing economies are the primary financial intermediaries, and have more difficulty raising alternative funds to deposits (Freedman and Click 2006). In Europe, the financial support provided by the ECB to certain banks was essential to avoid the worsening of the crisis. Unlike the ECB, whose funds come from several countries, central banks in developing countries do not normally have enough resources to adopt a similar measure (Cavallo, Fernández-Arias and Powell 2014). Unlike European countries, however, the developing economies can control their own monetary policy to offset the effects of a high sovereign risk. Moreover, the bank lending channel of monetary policy could be less effective in developing countries because the legal environment is weaker, financial markets are less developed, capital is scarce, and people and firms have limited access to loans (Abuka et al. 2019, Sanfilippo et al. 2018). It would therefore be difficult to determine whether the results found by Cantero et al. (2014) apply to the developing countries.

These limitations to the applicability of the existing results across countries highlight the need to study the role of sovereign risk in monetary transmission in depth. In order to address this gap in the literature, we conduct an empirical analysis in the next section based on two country scenarios: 1) developed countries (eurozone vs. non-eurozone countries); and 2) developing countries.

3. EMPIRICAL ANALYSIS

3.1. Selection of the sample

To select the sample for the analysis, we started with all the banks in the Datastream database. For the developed countries scenario, we focused on high-income economies, and for the developing countries scenario, we considered the low and middle-income economies.[3] We eliminated banks with no available data in each scenario. Then, following Cantero et al. (2014), we removed banks in the following cases: 1) banks with negative values of assets, loans, deposits, interest income, and expenses; 2) banks with growth rates of loans and/or deposits greater than 300%; 3) banks with loans 100 times greater than deposits. Moreover, we removed the countries without the necessary macroeconomic data.

We also excluded banks with data available for less than six consecutive years between 2004 and 2015 (as we use lagged growth variables). This condition is essential in order to test for second-order serial correlation, which is performed to ensure the robustness of the estimates made by System-GMM (Arellano and Bond 1991).

The final sample for the developed economies scenario includes 840 listed banks in 28 countries[4] between 2004 and 2015 (7,641 observations). The sample for the developing economies scenario comprises 218 listed banks in 20 countries[5] between 2004 and 2015 (1,935 observations).[6] The financial information on each bank comes from the Datastream database. The macroeconomic information comes from the S&P Capital IQ platform, the World Development Indicators database of the World Bank, the International Monetary Fund databases and the central banks of some countries.

3.2. Econometric model and data

To analyse the relationship between sovereign risk and monetary policy, we propose the following model based on the approach of Kashyap and Stein (1995):

$$\begin{aligned}\Delta \ln(\text{loans})_{i,t} = {} & \beta_0 + \beta_1 \Delta \ln(\text{loans})_{i,t-1} + \beta_2 \Delta \ln(\text{GDP})_{m,t} + \beta_3 \Delta \text{i}_{m,t} + \beta_4 SR_{m,t} \\ & + \beta_5 PRECRISIS_t + \beta_6 CRISIS_t + \beta_7 POSTCRISIS_t \\ & + \beta_8 (\Delta \text{i}_{m,t} * SR_{m,t} * PRECRISIS_t) + \beta_9 (\Delta \text{i}_{m,t} * SR_{m,t} * CRISIS_t) \\ & + \beta_{10} (\Delta \text{i}_{m,t} * SR_{m,t} * POSTCRISIS_t) + \beta_{11} (\Delta \text{i}_{m,t} * SR_{m,t} * EZ_{m,t}) \\ & + \beta_{12} SIZE_{i,t-1} + \beta_{13} LIQ_{i,t-1} + \beta_{14} CAP_{i,t-1} + \beta_{15} (\Delta \text{i}_{m,t} * SIZE_{i,t-1}) \\ & + \beta_{16} (\Delta \text{i}_{m,t} * LIQ_{i,t-1}) + \beta_{17} (\Delta \text{i}_{m,t} * CAP_{i,t-1}) + \sum_{t=1}^{t} \pi_t \text{Year}_t + \\ & + \sum_{m=1}^{m} \vartheta_m \text{Country}_m + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The dependent variable, $\Delta ln(loans)_{i,t}$, measures the growth rate in loan supply from bank *i* in year *t* relative to year *t-1*. This variable has been widely used in the bank lending channel literature (Ehrmann et al. 2003, Gambacorta 2005, Gambacorta and Marqués-Ibáñez 2011, Jimborean 2009). As many previous studies, we include the loan growth lagged one year as an independent variable ($\Delta ln(loans)_{i,t-1}$) to capture the persistent effects of the dependent variable.

$\Delta ln(GDP)_{m,t}$ represents the gross domestic product (GDP) growth rate and serves to control for the economic cycle. GDP growth affects the supply of credit positively (Jimborean 2009, Wu, Luca and Jeon 2011).

The monetary policy indicator Δi is measured by the change in the short-term money market rate. As the bank lending channel suggests, an increase in the short-term money market rate gives rise to a reduction in the growth of bank lending (De Bondt 1999, Ehrmann et al. 2003, Olivero, Li and Jeon 2011).

SR denotes sovereign risk and is calculated as the sovereign credit default swap (CDS) spread in basis points (bps) on 5-year senior debt contracts, since these are considered to be the most actively traded and the most liquid ones (Alter and Schüler 2012, Anderson 2011, De Bruyckere et al. 2013, Yu 2017).[7] Banks in higher sovereign risk countries have more financial restrictions and, hence, extend fewer loans (Cantero et al., 2014).

Sovereign CDS spreads are considered better proxies of sovereign risk than other measures, such as rating agencies or government bond yields (Aizenman, Hutchison and Jinjarak 2013, Cantero, Sanfilippo and Torre 2019). On the one hand, they reflect timelier market perceptions of risk, while rating agencies take more time before changing the rating of the countries. On the other hand, government bond yields have the difficulty of dealing with time to maturity and include, apart from default risk, inflation expectations and demand/supply for credit conditions. However, CDS spreads capture explicitly default risk.

Moreover, in samples of countries from different world regions, CDS spreads capture sovereign risk more effectively because they better isolate the exchange rate risk component. Government bond yields spreads can only be computed if they are denominated in the same currency as the one of the country considered risk free to compare them to (Damodaran 2020). In this regard, government bonds issued in local currency make up the bulk of the global bond market (Burger and Warnock 2006, Niehof 2014). However,

sovereign CDS spreads are denominated in the same currency (the United States Dollar) in almost all the world countries.[8]

To capture how the financial crisis that started in 2008 determined loan supply, and the relationship between sovereign risk and the bank lending channel, we introduce three dummy variables: *PRECRISIS*, *CRISIS* and *POSTCRISIS*. The variable *PRECRISIS*, which represents the years before the crisis, takes a value of 1 in the years before 2008 (in our sample 2004 to 2007), and 0 otherwise. The variable *CRISIS*, which represents the years of the crisis, takes a value of 1 in the years 2008 to 2011, and 0 otherwise.[9] Finally, the variable *POSTCRISIS*, which represents the years after the financial crisis, takes a value of 1 in the years after 2011 (in our sample 2012 to 2015), and 0 otherwise. Moreover, we also include the interaction between monetary policy, sovereign risk and each dummy: (*Δi*SR*PRECRISIS*), (*Δi*SR*CRISIS*) and (*Δi*SR*POSTCRISIS*).

We analyse three different periods because sovereign risk before, during, and after the crisis was completely different across developed and developing economies. Before the crisis, sovereign risk was moderate in developing countries, but very low in developed countries. However, during the crisis, sovereign risk increased sharply—especially in the eurozone. Finally, after the crisis, sovereign risk was more contained, but it has not yet reached the values before the crisis.

Within developed economies scenario, the eurozone has some peculiarities, because it was the most affected by the sovereign debt crisis and has a common monetary regime. To test whether the effects of sovereign risk on the bank lending channel are different in this region, we therefore include the interaction between the monetary policy, the sovereign risk

and a eurozone dummy ($\Delta i*SR*EZ$). The eurozone dummy (*EZ*) takes the value of 1 if the bank belongs to a eurozone country, and 0 otherwise.

We also include as control variables in Equation (1) three bank-specific characteristics: *SIZE*, *LIQ* and *CAP*.[10] *SIZE* is the log of total assets. Larger banks tend to grant more loans (Kashyap and Stein 1995, 2000). *LIQ* is the ratio of securities and cash due from banks to total assets. More liquid banks usually experience higher loan growth rates (Kashyap and Stein 2000). *CAP* is the ratio of total equity to total assets. Higher capitalised banks tend to enjoy higher lending volumes (Kishan and Opiela 2000, 2006).

Following previous studies, we include interaction terms between the change in the short-term money market rate (Δi) and the bank characteristics (*SIZE*, *LIQ* and *CAP*) to control for the effect that these variables might have on monetary policy effects on bank lending (Altunbas, Gambacorta and Marqués-Ibañez 2010, Cantero et al. 2014, Kishan and Opiela 2000).

Finally, country and year effect dummies are included to capture country and year-specific factors. The error term is $\varepsilon_{i,t}$; $i = 1, 2, \ldots, N$ indicates a specific bank i; $m = 1, 2, \ldots, M$ indicates a particular country m; and $t = 1, 2, \ldots, T$ indicates a particular year t.

To correctly interpret the effect of the changes in monetary policy (Δi) on the growth of loans, we need to bear in mind that we are interacting the variable Δi with other continuous variables (*SR*PRECRISIS*, *SR*CRISIS*, *SR*POSTCRISIS*, *SR*EZ*, *SIZE*, *LIQ* and *CAP*). Therefore, we have to take the derivative of Equation (1) with respect to Δi to capture the marginal effect of Δi on the growth of loans:

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta \text{i}_{\text{m,t}}} = \beta_3 + \beta_8\left(SR_{m,t} * PRECRISIS_t\right) + \beta_9\left(SR_{m,t} * CRISIS_t\right) + \beta_{10}\left(SR_{m,t} * POSTCRISIS_t\right) + \beta_{11}\left(SR_{m,t} * EZ_{m,t}\right) + \beta_{15}\left(SIZE_{i,t-1}\right) + \beta_{16}\left(LIQ_{i,t-1}\right) + \beta_{17}\left(CAP_{i,t-1}\right) \quad (2)$$

To facilitate the interpretation of our results, the bank-specific characteristics are normalised with respect to their means across all the banks in the sample.[11]

$$\text{SIZE}_{\text{it}} = \text{logA}_{\text{it}} - \frac{\sum_{\text{i=1}}^{\text{N}} \text{logA}_{\text{it}}}{\text{N}_{\text{t}}} \quad (3)$$

$$LIQ_{it} = \frac{L_{it}}{A_{it}} - \frac{\sum_{t=1}^{T}\left(\sum_{i=1}^{N}(L_{it}/A_{it})/N_t\right)}{T} \quad (4)$$

$$CAP_{it} = \frac{E_{it}}{A_{it}} - \frac{\sum_{t=1}^{T}\left(\sum_{i=1}^{N}(E_{it}/A_{it})/N_t\right)}{T} \quad (5)$$

A_{it} is total assets, L_{it} is securities and cash due from banks, E_{it} is total equity and N_t is the number of banks.

The mean of a normalized variable is zero. Thus, the marginal effect of Δi on the growth of loans for an average bank is:

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta \text{i}_{\text{m,t}}} = \beta_3 + \beta_8\left(SR_{m,t} * PRECRISIS_t\right) + \beta_9\left(SR_{m,t} * CRISIS_t\right) + \beta_{10}\left(SR_{m,t} * POSTCRISIS_t\right) + \beta_{11}\left(SR_{m,t} * EZ_{m,t}\right) \quad (6)$$

The marginal effect of the changes in monetary policy (Δi) on the growth of loans – shown in Equation (6) – depends on the level of sovereign risk (*SR*) and the dummies *PRECRISIS*, *CRISIS*, *POSTCRISIS* and *EZ*. Thus, the effectiveness of the bank lending channel will vary for different values of those variables. β_3 captures the marginal effect when the variable *SR*, or the variables *PRECRISIS*, *CRISIS*, *POSTCRISIS* and *EZ* are zero, while β_8, β_9 and β_{10} capture the effect of *SR* before, during, and after the crisis, respectively. β_{11} captures the effect of *SR* in the eurozone countries. In order to interpret the results properly, we will have to calculate the marginal effect and evaluate its significance for different values of *SR*, *PRECRISIS*, *CRISIS*, *POSTCRISIS* and *EZ*. We will use plots to facilitate the interpretation of the results.

Table 1 presents the descriptive statistics of the variables used in the analysis of each scenario and Table 2 depicts the correlations between these variables. The model in Equation (1) is estimated using a two-step System-GMM (generalised method of moments) with robust errors, which is consistent in the presence of any pattern of heteroscedasticity and autocorrelation. This method allows for controlling the problems of endogeneity and allows us to obtain consistent and unbiased estimates by using lagged independent variables as instruments (Arellano and Bond 1991). All the variables are considered endogenous except for the country and time dummies, which are exogenous. In general, second lags have been used as instruments for the endogenous variables.[12] The exogenous variables are instrumented by themselves. We collapsed the instruments used in our estimation.[13]

[Insert Tables 1 & 2]

3.3. Results and discussion

3.3.1. Results of the developed countries scenario

Table 3 shows the results. In Model (a) we analyse the developed countries scenario. In Model (b) we examine the developing countries scenario. In Table 3, Model (a), the coefficient associated with the first lag of the dependent variable is significant and positive, which indicates the persistence effect of the loan supply. $\Delta ln(GDP)$ also has a significant positive coefficient. Thus, economic growth stimulates loan supply.

[Insert Table 3]

With regard to the presence of the bank lending channel, Model (a) in Table 3 shows that the coefficient associated with the monetary policy indicator (Δi) is not significant. However, as we are interacting continuous variables, according to Equation (6), this result indicates that for an average bank, monetary policy changes do not affect loan supply when the variable *SR*, or the variables *PRECRISIS*, *CRISIS*, *POSTCRISIS* and *EZ* are zero. The variable *SR* has a negative and significant coefficient, so sovereign risk would negatively affect loan supply growth. Moreover, the variables *PRECRISIS*, Δi*SR*PRECRISIS* and Δi*SR*POSTCRISIS* have significant negative coefficients too, while Δi*SR*EZ* shows a positive and significant coefficient. With regard to the control variables, *SIZE* and *CAP* have a significant positive coefficient, so larger and more highly capitalised banks provide more loans. Moreover, banks with higher capital volumes are less sensitive to monetary restrictions since the coefficient of Δi*CAP* is significant and positive.

In any case, for an average bank the intensity of the bank lending channel, which is represented in Equation (6) by the marginal effect of monetary policy on the growth of loans, will vary for different values of sovereign risk (*SR*), and the dummies *PRECRISIS*, *CRISIS*, *POSTCRISIS* and *EZ*. Thus, in order to calculate this marginal effect and its significance for different values of sovereign risk, we carry out linear restriction tests of the sum of the coefficients β_3, β_8, β_9, β_{10} and β_{11} in Equation (6) for different values of *PRECRISIS*, *CRISIS*, *POSTCRISIS* and *EZ*, and we use plots to interpret the results. According to Equation (6), the marginal effect of Δi on the growth of loans for an average bank in each group of the countries analysed is:

-Non-eurozone developed countries before the crisis (*EZ* = 0, *PRECRISIS* = 1, *CRISIS* = 0, and *POSTCRISIS* = 0):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_8 SR_{m,t} \tag{6.1}$$

-Eurozone countries before the crisis (*EZ* = 1, *PRECRISIS* = 1, *CRISIS* = 0, and *POSTCRISIS* = 0):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_8 SR_{m,t} + \beta_{11} SR_{m,t} * EZ_{m,t} \tag{6.2}$$

-Non-eurozone developed countries during the crisis (*EZ* = 0, *PRECRISIS* = 0, *CRISIS* = 1, and *POSTCRISIS* = 0):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_9 SR_{m,t} \quad (6.3)$$

-Eurozone countries during the crisis (*EZ* = 1, *PRECRISIS* = 0, *CRISIS* = 1, and *POSTCRISIS* = 0):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_9 SR_{m,t} + \beta_{11} SR_{m,t} * EZ_{m,t} \quad (6.4)$$

-Non-eurozone developed countries after the crisis (*EZ* = 0, *PRECRISIS* = 0, *CRISIS* = 0, and *POSTCRISIS* = 1):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_{10} SR_{m,t} \quad (6.5)$$

-Eurozone countries after the crisis (*EZ* = 1, *PRECRISIS* = 0, *CRISIS* = 0, and *POSTCRISIS* = 1):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_{10} SR_{m,t} + \beta_{11} SR_{m,t} * EZ_{m,t} \quad (6.6)$$

Figure 1 reports the marginal effect of monetary policy on the growth of loans in relation to *SR* (the sovereign CDS spread in bps) in the non-eurozone developed countries (*EZ* = 0) before the crisis (*PRECRISIS* = 1, *CRISIS* = 0, and *POSTCRISIS* = 0). The dotted lines represent the 95% confidence interval.[14] Confidence intervals of 95% allow us to determine the conditions under which the monetary policy indicator has a statistically significant

effect on the growth of loans (whenever both upper and lower bounds of the 95% confidence interval are either above or below zero). When the sovereign CDS spread is lower than 2.4 bps, the marginal effect is not significant since the upper bound of the 95% confidence interval is above zero whereas the lower bound is below zero. In these countries, which include Australia, Denmark, Sweden, the United Kingdom, and the United States,[15] monetary policy changes would not significantly affect loan supply growth. Since sovereign risk is very close to zero in these countries, banks would have more financial instruments available to protect themselves against monetary shocks. Moreover, most of these countries have a market-oriented financial system and are less dependent on banking financing, which could explain why the bank lending channel is not significant (Brissimis and Delis 2009, Brissimis and Magginas 2005).

However, in countries with a CDS spread of 2.4 bps or higher, which represents 66% of the sample of the non-eurozone developed countries before the crisis,[16] the marginal effect is significant and negative, which indicates the presence of a bank lending channel. The most intense monetary contractions in our sample took place between 2005 and 2007, so these results would imply that monetary restrictions lead to a reduction in loan supply growth. Moreover, this reduction would be more pronounced as sovereign risk increases. In this regard, the negative marginal effect reaches its minimum (-0.0373) when the CDS spread is equal to 2.4 bps and has a maximum (-1.6043) when the CDS spread is 120.4 bps. These results are similar to those obtained by Cantero et al. (2014) in the eurozone. According to these authors, banks in higher sovereign risk countries have less access to finance and bear higher funding costs, which is why these banks would experience a more significant lending reduction after monetary restrictions.

[Insert Figure 1]

Figure 2 shows the marginal effect of monetary policy on the growth of loans in relation to *SR* in the eurozone countries (*EZ* = 1) before the crisis (*PRECRISIS* = 1, *CRISIS* = 0, and *POSTCRISIS* = 0). The marginal effect is not significant in countries with a CDS spread lower than 2.6 bps.[17] From this point the marginal effect is significant and negative, thus supporting the bank lending channel. Moreover, this negative marginal effect increases as sovereign risk rises, but more slightly than in the rest of the developed economies,[18] so there are less differences in the transmission of the bank lending channel. After the adoption of the Euro, sovereign risk progressively tended to be similar across the member countries. Probably, this fact, along with the common monetary regime, could justify why there are fewer differences in the transmission of the bank lending channel in the eurozone in relation to the rest of the developed countries.

[Insert Figure 2]

Figure 3 represents the marginal effect of monetary policy on loan supply growth in relation to *SR* in the non-eurozone developed countries (*EZ* = 0) during the crisis (*PRECRISIS* = 0, *CRISIS* = 1, and *POSTCRISIS* = 0). The marginal effect is not significant for any level of sovereign risk, which indicates that in this case, the bank lending channel is not supported by our results. During the global crisis, many central banks aggressively eased monetary policy to alleviate financial markets' distress and boost credit (Jannsen, Potjagailo and Wolters 2015). Nevertheless, our results suggest that these monetary expansions would not be relevant for determining credit supply in the non-eurozone developed region, which could be due to several reasons. First, during the crisis, financial institutions faced losses from credit defaults as well as considerable problems obtaining new funding; this impeded them from providing more lending (Bouis et al. 2013). Second, the risk of further credit defaults increased due to high uncertainty, thereby reducing the

willingness of financial institutions to provide bank lending (Valencia 2013). Moreover, the financial crisis marked the end of the previous period with its perceptions of low-risk, asset price bubbles, and credit and consumption booms, which led to strong balance-sheet adjustments and deleveraging (Reinhart and Rogoff 2008).

[Insert Figure 3]

Figure 4 depicts the marginal effect of monetary policy on loan supply growth in relation to *SR* in the eurozone during the crisis (*EZ* = 1, *PRECRISIS* = 0, *CRISIS* = 1, *POSTCRISIS* = 0). On the one hand, the marginal effect is not significant in countries with a CDS spread lower than 150.33 bps, which means that monetary expansions during the crisis would not affect lending growth. After the onset of the crisis of 2008, the access of banks to funding was limited and expensive in most eurozone countries, which would probably outweigh the benefits of the reduction in interest rates implemented by the ECB. On the other hand, in countries where the CDS spread was equal or higher than 150.33 bps (which were mainly the GIIPS countries[19]) the marginal effect was significant and positive, so a decrease in short-term money market rates reduced bank loans. Moreover, this credit supply reduction became more intense as sovereign risk increased. There were also very strong differences across countries because the marginal effect ranged from 0.0877 (if CDS spread = 150.33 bps) to 5.4418 (if CDS spread = 8786.385 bps). These results are similar to those reported by Cantero et al. (2014) for monetary expansions. The GIIPS countries exhibited high default risk and suffered from huge financial restrictions, which could justify these findings. Moreover, some of these countries requested massive bailouts during the crisis, which would force them to cut back lending despite the easing of monetary conditions.

[Insert Figure 4]

Figures 5 and 6 show the marginal effect of monetary policy on loan supply growth in relation to *SR* in the non-eurozone and the eurozone countries, respectively (*EZ* = 0 and *EZ* = 1) after the crisis (*PRECRISIS* = 0, *CRISIS* = 0, and *POSTCRISIS* = 1). During the postcrisis years, many central banks prolonged – or even intensified – the monetary expansions that were adopted at the beginning of the crisis. Figure 5 shows that the marginal effect was not significant in countries where sovereign CDS spread was lower than 33.015 bps. So, in these countries, which represent almost the 60% of the sample of the non-eurozone developed region after the crisis,[20] bank credit did not significantly react to monetary expansions. In the rest of the countries, the marginal effect was negative and significant, so banks would increase lending when the short-term money market interest rate decreased, as the bank lending channel suggests.[21] However, this lending reaction to monetary policy was much less intense than in the years before the crisis.[22] Regarding the eurozone region, Figure 6 shows that the marginal effect was not significant for any level of sovereign risk, so monetary expansions after the crisis would not affect bank lending.

[Insert Figures 5 & 6]

In general, the results of Figures 5 and 6 suggest that the bank lending channel was not completely reactivated in developed countries after the crisis, although sovereign risk was more contained during these years. The bank lending channel would tend to be reactivated in less than the half of the sample of the non-eurozone countries, but with a less effective power than in the years before the crisis, whereas in the eurozone, this channel was totally inoperative. Several reasons could explain these results. First, some studies reveal that contractionary monetary policies are normally much more powerful than expansionary ones, which could justify why the bank lending channel was less effective after than before

the crisis (Tenreyro and Thwaites 2016). Second, interest rates had been persistently low for many years, and even negative in the eurozone since 2014, which would harm bank profitability.[23] The reduction of the net interest margins would force banks to inhibit loan supply, reducing the effectiveness of monetary expansions (Borio and Gambacorta 2017). Third, the unconventional monetary policies, used along with the interest rate reduction, were less effective in Europe, which could explain why the bank lending channel was not reactivated in this area (Egea and Hierro 2019). In this regard, the fragility of the banking sector limited the effects of the liquidity injections provided by the ECB. These injections allowed banks to maintain liquidity without having to sell assets and incur losses that would degenerate into solvency problems. Against this backdrop, banks would barely grant loans (Hempell and Kok 2010). Additionally, banks would behave according to the liquidity trap prediction and accumulate cash in the absence of assets offering appealing risk-adjusted returns. Therefore, activating the bank lending channel would be unlikely (Baldo et al. 2017).

3.3.2. Results of the developing countries scenario

In Table 3, Model (b), where we analyse the sample of developing countries, the coefficient associated with $\Delta ln(GDP)$ has a significant negative coefficient, so economic growth negatively affects loan supply. With regard to the presence of the bank lending channel, Model (b) in Table 3 shows that the coefficient associated with the monetary policy indicator (Δi) is not significant, so, for an average bank, monetary policy changes do not affect loan supply when the variable *SR*, or the variables *PRECRISIS*, *CRISIS*, and

POSTCRISIS are zero. The variable *POSTCRISIS* has a negative and significant coefficient, so the years after the crisis would negatively affect loan supply growth. Moreover, the variables *Δi*SR*CRISIS* and *Δi*SR*POSTCRISIS* have significant negative coefficients too. Concerning the control variables, *LIQ* has a significant positive coefficient, so more liquid banks provide more loans. However, banks with higher capital volumes provide less loans since the coefficient of *CAP* is significant and negative.

In any case, the intensity of the bank lending channel for an average bank, which is represented in Equation (6) by the marginal effect of monetary policy on the growth of loans, will vary for different values of sovereign risk (*SR*), and the dummies *PRECRISIS*, *CRISIS*, and *POSTCRISIS*. Since the eurozone dummy (*EZ*) is not considered in the analysis of the developing economies, the marginal effect for an average bank in each of the time periods would be:

-Developing countries before the crisis (*PRECRISIS* = 1, *CRISIS* = 0, and *POSTCRISIS* = 0):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_8 SR_{m,t} \tag{6.7}$$

-Developing countries during the crisis (*PRECRISIS* = 0, *CRISIS* = 1, and *POSTCRISIS* = 0):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_9 SR_{m,t} \tag{6.8}$$

-Developing countries after the crisis (*PRECRISIS* = 0, *CRISIS* = 0, and *POSTCRISIS* = 1):

$$\frac{\partial \Delta \ln(\text{loans})_{i,t}}{\partial \Delta i_{m,t}} = \beta_3 + \beta_{10} SR_{m,t} \quad (6.9)$$

Figures 7, 8, and 9 show the marginal effect of monetary policy on loan supply growth in relation to *SR* in developing countries before, during, and after the crisis, respectively. The marginal effect is not significant for any level of sovereign risk, so there is no evidence of a bank lending channel in the developing countries in any of the periods considered. These results are very different from those reported for developed economies.

[Insert Figures 7, 8 & 9]

Several reasons could explain the differences in the role of sovereign risk in the transmission of monetary policy across developed and developing countries. On the one hand, in developing countries, monetary policy transmission is hindered by weaknesses in the legal environment, underdeveloped financial markets, and concentrated banking systems (Abuka et al. 2019). Loan supply would be constrained because capital is scarce and a considerable amount of personal savings are never captured by the banking system as many people keep their money at home (Freedman and Click 2006). Moreover, the majority of people and smaller firms have limited access to bank credit because they are not able to offer enough collateral, they are less likely to repay their loans, and powerful groups try to prevent them from accessing finance (Rajan and Zingales 2003, Sanfilippo et al. 2018). On the other hand, sovereign risk has always been relevant in developing countries, but is more exposed to global events than to country-specific factors (Mauro, Sussman and Yafeh 2002). However, contrary to many of the previous crises, the global financial crisis of 2008 mainly affected the developed regions, whereas the financial sectors of the

developing countries were not as directly affected (Naudé 2009). Sovereign risk would therefore have been more stable during the global crisis in the developing countries than in the developed regions and thus less prone to altering the financial conditions of banks and the transmission of monetary policy.

4. CONCLUSIONS AND IMPLICATIONS

Banks play a key role in the transmission of monetary policy decisions to the real economy. Monetary restrictions lead to a reduction in lending because these restrictions reduce bank access to funding, however, this loan reduction depends on several variables related to the ability of banks to access alternative sources of funding. Among these variables, sovereign risk has attracted a lot of interest during the crisis, due to the impact it has had on European banks, their balance sheet and their ability to grant credit. Cantero et al. (2014) showed that eurozone banks that operate in higher sovereign risk countries are more sensitive to monetary shocks. Nevertheless, Europe is the only developed region where sovereign risk has been important and during the crisis only. Its common monetary policy controlled by the ECB is very different from other monetary regimes in the world, and thus, it would be difficult to extrapolate the results of Cantero et al. to other regions.

The purpose of this article was to analyse the way that sovereign risk determines the effects of monetary policy on bank lending in two different country scenarios: (1) developed countries—by comparing the eurozone with other developed countries, and (2) developing countries. We tested whether these effects differed before, during, and after the global financial crisis in each scenario. We found that sovereign risk conditioned the effectiveness of the bank lending channel in the developed countries only. Before the crisis,

this channel was more effective as sovereign risk increased. During the crisis, the bank lending channel was not significant in the non-eurozone developed countries, whereas in the eurozone the effects of monetary shocks on lending were the opposite of those posited by the bank lending channel. Moreover, these effects were more intense in higher sovereign risk countries. After the crisis, the functioning of the bank lending channel tended to be reactivated in certain non-eurozone countries but was less powerful than in the years before the crisis, whereas this channel was totally inoperative in the eurozone. In contrast to the developed regions, in the developing countries there was no significant evidence of the bank lending channel either before, during, or after the financial crisis.

These results are very interesting for the way monetary policy is conducted in developed economies because they suggest that sovereign risk impaired the functioning of the bank lending channel during and after the global crisis, especially in the eurozone. This impairment would require larger monetary expansions, or the use of non-standard monetary policies during the crisis in order to achieve a given effect, which can lead to other problems, such as excessive risk-taking, increased risk of asset price bubbles, and systemic financial risks. These facts complicate the task of central banks and make it more difficult to predict the outcome of monetary policy decisions. This task is even more complex in the eurozone, where the ECB must deal with different countries and different sovereign risk situations. In any case, central banks in developed countries should consider both the level of sovereign risk and the global economic cycle when implementing monetary policy decisions.

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[1] See, for example, Apergis and Christou (2015), Borio and Gambacorta (2017), Halvorsen and Jacobsen (2016), Salachas, Laopodis and Kouretas (2017).

[2] Several studies have shown that sovereign risk, by increasing the funding costs of banks, leads to a reduction in loan supply (Drago and Gallo 2016, Faia 2017, Grigorian and Manole 2017, Li and Zinna 2018).
[3] We follow the World Bank classification of high and low and middle-income economies, which is based on the gross national income (GNI) of the countries in each of the years of the sample (calculated using the World Bank Atlas method).
[4] Australia, Austria, Belgium, Chile, Croatia, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, the Netherlands, Poland, Portugal, Qatar, Saudi Arabia, Slovakia, South Korea, Spain, Sweden, Switzerland, the United Kingdom and the United States.
[5] Argentina, Brazil, Bulgaria, Chile, Colombia, Indonesia, Lithuania, Malaysia, Mexico, Morocco, Pakistan, Peru, the Philippines, Poland, Romania, Russia, South Africa, Thailand, Ukraine and Venezuela.
[6] Some of the countries changed their income status in some years of the sample, which is why they appear in both scenarios, but in different years. Chile was a low and middle-income economy before 2012, and high-income from this year. Similarly, Poland was a low and middle-income country before 2009.
[7] CDS contracts are bilateral swap agreements mainly transacted in over the counter (OTC) derivative markets and allow the CDS seller to provide protection for the buyer. The spreads represent the regular payments that must be paid by the buyer to the seller for the contingent claim in the case of a credit event.
[8] Only the United States have a sovereign CDS spread quoted in Euros as standard. It is normal for sovereign CDS to be quoted in a different currency denomination than the domicile because otherwise, if the country defaulted, local currency would depreciate and consequently CDS payments would hardly have any value.
[9] There is a debate about the exact period of the financial crisis. Following many papers, we use the period of 2008-2011 (Apergis, Fafaliou and Polemis 2016, Hristov, Hülsewig and Wollmershäuser 2014).
[10] These variables are lagged one year to avoid endogeneity bias (Cantero et al. 2014, Kashyap and Stein 1995, Sanfilippo et al. 2018).
[11] Many previous studies applied the same approach (Cantero et al. 2014, Ehrmann et al. 2003, Gambacorta, 2005, Sanfilippo et al. 2018).
[12] These lags have been used based on the difference-in-Hansen tests of exogeneity of instrument subsets to avoid over-identification problems.
[13] Wintoki, Linck and Netter (2012) found that collapsed instruments, by constraining all of the annually moment conditions to be the same, effectively reduce instrument count and the number of moment conditions used in the difference-in-Hansen test of exogeneity of instrument subsets, which makes this test more powerful.
[14] We followed Aiken, West and Reno (1991) to compute the confidence intervals.
[15] Denmark had a CDS spread below this level in 2004 only, and Australia, Sweden, the United Kingdom, and the United States in 2006 only.
[16] These countries are Australia, the Czech Republic, Denmark, Hong Kong, Japan, Qatar, Slovakia, South Korea, Sweden, the United Kingdom, and the United States.
[17] This part represents only 19% of the sample of the eurozone countries before the crisis.
[18] The marginal effect of monetary policy on loan supply growth before the crisis varied from -0.0382 to -0.2841 in the eurozone, whereas in the rest of the developed countries, it ranged from -0.0373 to -1.6043.
[19] Greece, Ireland, Italy, Portugal, and Spain.
[20] These countries are Denmark, Sweden, Switzerland, the United Kingdom, and the United States in some years of the postcrisis period.
[21] The countries where the bank lending channel was operative during the whole postcrisis period were Australia, Chile, Croatia, the Czech Republic, Hong Kong, Japan, Poland, Qatar, Saudi Arabia, and South Korea.
[22] In the non-eurozone region, the marginal effect of monetary policy on loan supply growth varied from -0.0322 to -0.2839 after the crisis, whereas it varied from -0.0373 to -1.6043 before the crisis.
[23] Banks are reluctant to reduce deposit rates below zero, even when the policy rate crosses that level. Therefore, as deposit rates hit zero, any further reduction in the interest rates would affect the return on lending activities without any corresponding impact on the cost of deposits.

Tables and Figures

TABLE 1: SAMPLE STATISTICS

DEVELOPED COUNTRIES					DEVELOPING COUNTRIES				
Variable	**Mean**	**Standard deviation**	**Minimum**	**Maximum**	**Variable**	**Mean**	**Standard deviation**	**Minimum**	**Maximum**
$\Delta\ln(loans)_{i,t-1}$	0.0840	0.2049	-5.2658	6.6428	$\Delta\ln(loans)_{i,t-1}$	0.2493	0.2859	-1.8101	4.4809
$\Delta\ln(GDP)_{m,t}$	0.0257	0.0605	-0.2252	0.3688	$\Delta\ln(GDP)_{m,t}$	0.0911	0.1322	-0.4288	0.3283
$\Delta i_{m,t}$	-0.2650	1.0865	-4.9300	4.1200	$\Delta i_{m,t}$	-0.0960	2.3001	-9.2148	11.4426
$SR_{m,t}$	57.2947	255.2660	0.6000	8786.3850	$SR_{m,t}$	341.3373	528.4781	5.0000	3905.0000
$SIZE_{i,t-1}$	16.1407	3.3310	10.3988	26.7036	$SIZE_{i,t-1}$	19.5021	3.1476	11.9459	28.3066
$LIQ_{i,t-1}$	0.2754	0.1291	0.0046	0.9919	$LIQ_{i,t-1}$	0.3132	0.1382	0.0145	0.9113
$CAP_{i,t-1}$	0.0941	0.0431	0.0058	0.6704	$CAP_{i,t-1}$	0.1196	0.0700	0.0016	0.7406

Note: The statistics of the variables SIZE, LIQ and CAP are calculated before the normalization to show more comprehensive information.

TABLE 2: CORRELATIONS

DEVELOPED COUNTRIES								DEVELOPING COUNTRIES							
	$\Delta\ln(loans)_{i,t-1}$	$\Delta\ln(GDP)_{m,t}$	$\Delta i_{m,t}$	$SR_{m,t}$	$SIZE_{i,t-1}$	$LIQ_{i,t-1}$	$CAP_{i,t-1}$		$\Delta\ln(loans)_{i,t-1}$	$\Delta\ln(GDP)_{m,t}$	$\Delta i_{m,t}$	$SR_{m,t}$	$SIZE_{i,t-1}$	$LIQ_{i,t-1}$	$CAP_{i,t-1}$
$\Delta\ln(loans)_{i,t-1}$	1							$\Delta\ln(loans)_{i,t-1}$	1						
$\Delta\ln(GDP)_{m,t}$	0.0593	1						$\Delta\ln(GDP)_{m,t}$	0.1167	1					
$\Delta i_{m,t}$	-0.0345	0.2779	1					$\Delta i_{m,t}$	0.0621	-0.0694	1				
$SR_{m,t}$	-0.0227	-0.0832	-0.0406	1				$SR_{m,t}$	0.1495	-0.0560	0.3234	1			
$SIZE_{i,t-1}$	-0.0638	-0.1610	0.0641	0.0686	1			$SIZE_{i,t-1}$	0.0502	0.0326	0.0102	-0.1066	1		
$LIQ_{i,t-1}$	-0.1017	-0.0284	0.0947	-0.0401	0.1720	1		$LIQ_{i,t-1}$	0.0179	0.1181	-0.1184	0.0727	-0.1205	1	
$CAP_{i,t-1}$	0.1530	0.1022	-0.0401	-0.0445	-0.4041	-0.0555	1	$CAP_{i,t-1}$	-0.0571	-0.0484	-0.0393	0.0090	-0.2642	0.0921	1

TABLE 3: RESULTS

	Developed countries		Developing countries	
	(a)		(b)	
$\Delta \ln(loans)_{t-1}$	0.2933 (3.31)	***	0.2723 (1.27)	
$\Delta \ln(GDP)_{m,t}$	0.2593 (2.34)	**	-0.8333 (-2.30)	**
$\Delta i_{m,t}$	-0.0055 (-0.28)		0.0131 (0.93)	
$SR_{m,t}$	-0.0001 (-2.21)	**	0.0001 (1.10)	
$PRECRISIS_t$	-0.0921 (-3.33)	***	0.0377 (0.76)	
$CRISIS_t$	-0.0045 (-1.55)		0.0035 (0.46)	
$POSTCRISIS_t$	-0.0058 (-0.53)		-0.0822 (-1.89)	*
$\Delta i_{m,t} * SR_{m,t} * PRECRISIS_t$	-0.0133 (-4.48)	***	0.0000 (0.09)	
$\Delta i_{m,t} * SR_{m,t} * CRISIS_t$	-0.0001 (-0.31)		-0.0001 (-1.90)	*
$\Delta i_{m,t} * SR_{m,t} * POSTCRISIS_t$	-0.0008 (-2.09)	**	-0.0000 (-1.85)	*
$\Delta i_{m,t} * SR_{m,t} * EZ_t$	0.0007 (2.10)	**		
$SIZE_{i,t-1}$	0.0115 (2.82)	***	0.0063 (0.50)	
$LIQ_{i,t-1}$	0.0314 (0.28)		1.0743 (3.95)	***
$CAP_{i,t-1}$	0.8799 (2.39)	**	-0.9466 (-1.71)	*
$\Delta i_{m,t} * SIZE_{i,t-1}$	0.0027 (1.62)		-0.0006 (-0.23)	
$\Delta i_{m,t} * LIQ_{i,t-1}$	-0.0349 (-1.22)		-0.0215 (-0.34)	
$\Delta i_{m,t} * CAP_{i,t-1}$	0.2599 (3.46)	***	-0.0686 (-0.82)	
CONS	0.0917 (2.51)	**	0.3010 (3.71)	***
Country	331.28	***	32.12	**
Year	104.91	***	36.23	***
m_2	0.131		0.677	
Hansen	0.330		0.139	

Notes: Coefficients associated with each variable. In brackets, T-student; *** indicates a level of significance of 0.01, ** indicates a level of significance of 0.05, * indicates a level of significance of 0.1 Country: Wald's test of the joint significance of the country's dummy variables. Year: Wald's test of the joint significance of the year's dummy variables. m2 is the p-value of the 2nd order serial correlation statistic. Hansen is the p-value of the over-identifying restriction test.

Non-eurozone developed countries

Eurozone countries

Before the crisis

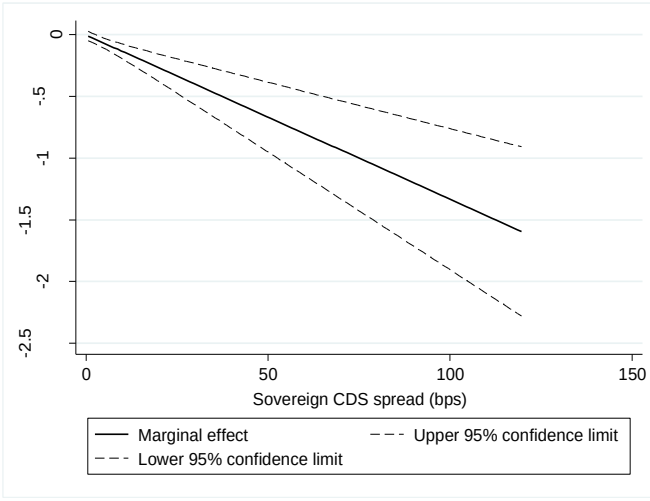

Fig 1. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the non-eurozone developed countries during the precrisis years. Based on Equation (6.1) and the results of model (a), Table 3.

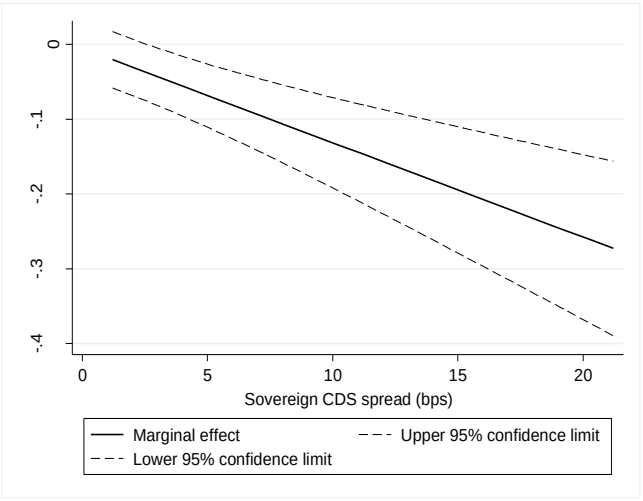

Fig 2. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the eurozone countries during the precrisis years. Based on Equation (6.2) and the results of model (a), Table 3.

During the crisis

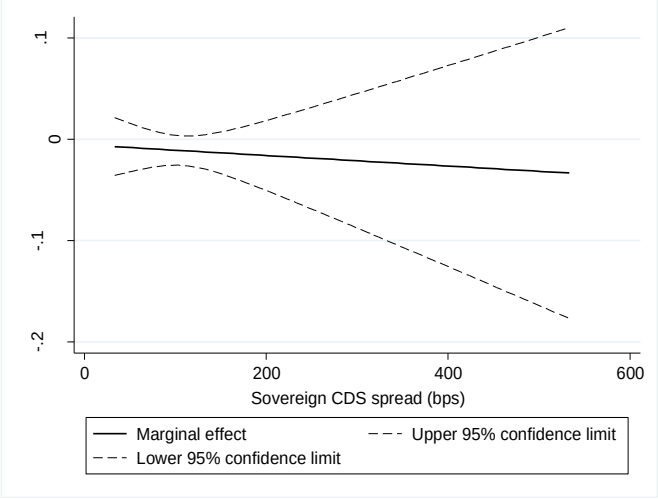

Fig 3. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the non-eurozone developed countries during the crisis years. Based on Equation (6.3) and the results of model (a), Table 3.

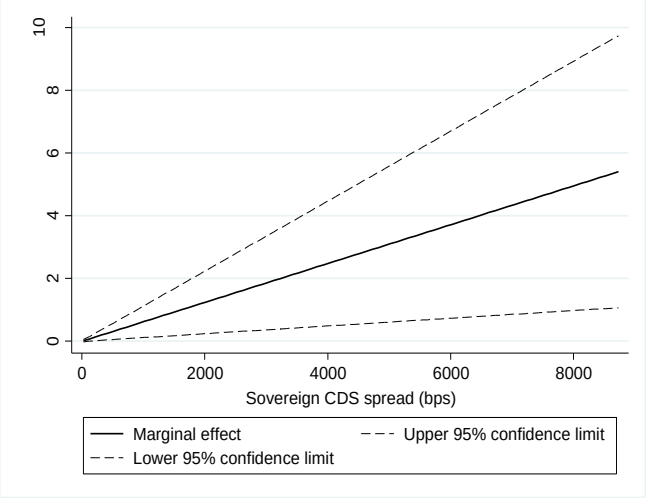

Fig 4. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the eurozone countries during the crisis years. Based on Equation (6.4) and the results of model (a), Table 3.

After the crisis

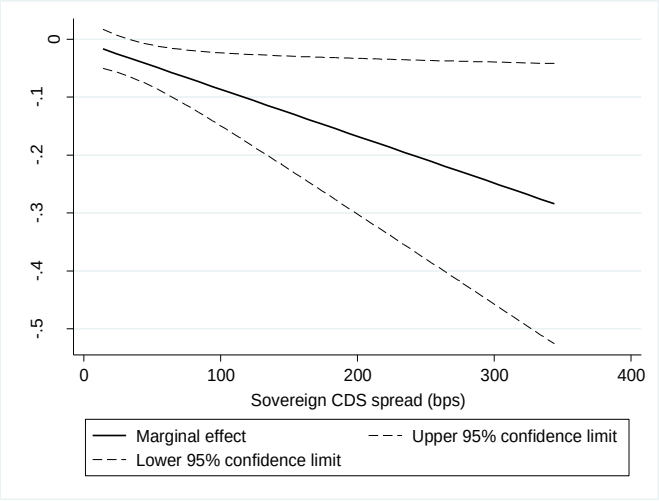

Fig 5. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the non-eurozone developed countries during the postcrisis years. Based on Equation (6.5) and the results of model (a), Table 3.

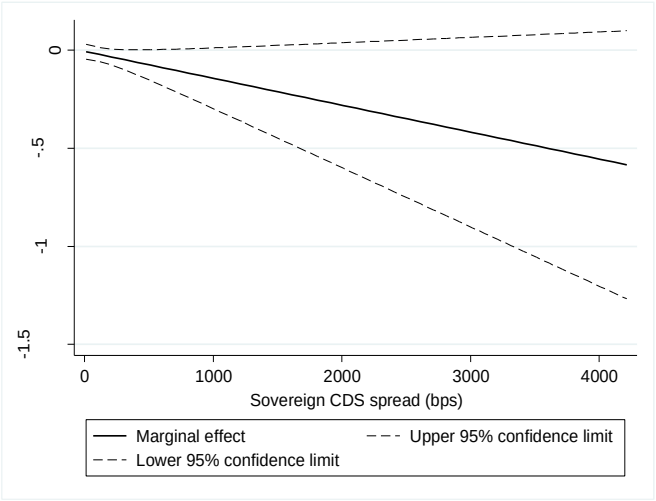

Fig 6. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the eurozone countries during the postcrisis years. Based on Equation (6.6) and the results of model (a), Table 3.

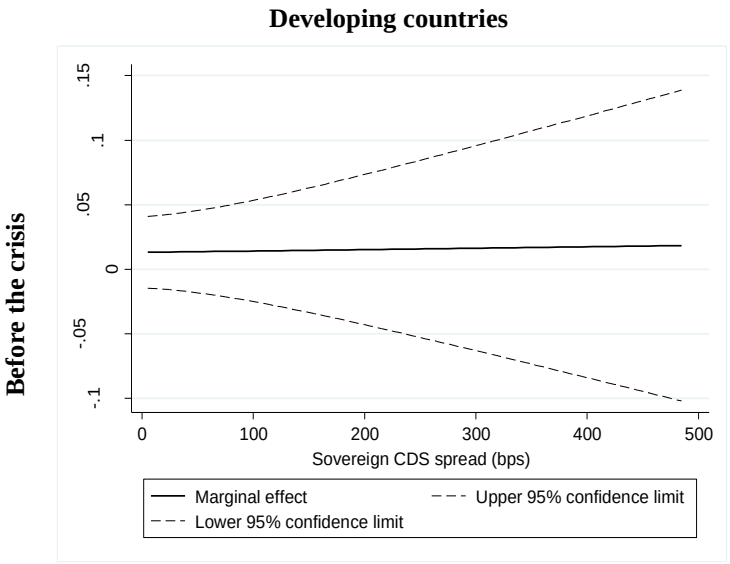

Fig 7. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the developing countries during the precrisis years. Based on Equation (6.7) and the results of model (b), Table 3.

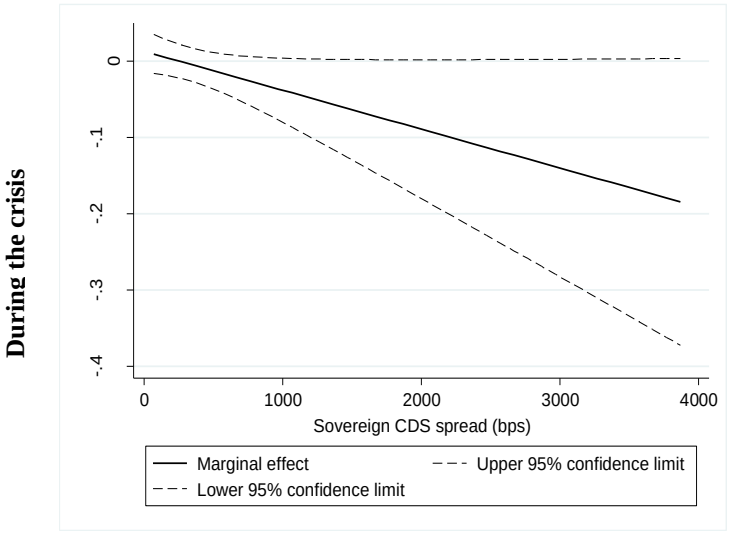

Fig 8. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the developing countries during the crisis years. Based on Equation (6.8) and the results of model (b), Table 3.

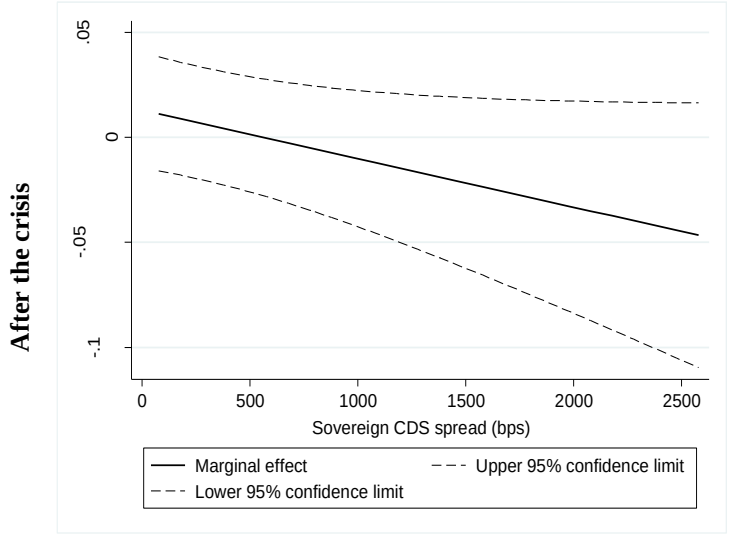

Fig 9. Marginal effect of monetary policy on the growth of loans in relation to sovereign CDS spreads in the developing countries during the postcrisis years. Based on Equation (6.9) and the results of model (b), Table 3.