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FOREIGN BANK PENETRATION AND THE BANK LENDING CHANNEL IN EMERGING AND DEVELOPING COUNTRIES, 2000-2014

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Abstract

This paper analyzes the effect of foreign bank penetration on the real credit growth during the crisis and the bank-lending channel of monetary transmission in developing and emerging economies. Based on a panel data of over 50 countries from six different regions during 2000-2014, we specifically explore whether countries with a large number of foreign banks suffered more from the contraction in lending during the 2007-2009 financial crisis and whether foreign bank penetration weakened the monetary policy transmission through the bank lending channel as argued in the literature. Applying the system GMM method, we find consistent evidence that the increased level of foreign bank penetration has mitigated the contraction in bank credit during the crisis, lending support for the existence of internal capital markets for global banks. Additionally, our results indicate that host countries' banking sectors with a larger number of foreign banks become more responsive to changes in monetary policy, independent of various macroeconomic and bank-specific measures as such as capitalization and credit risk.

Keywords: Real Credit Growth, Foreign Banks, Bank Lending Channel, Emerging and Developing Economies

JEL Classifications: G21, E51, E4

1. Introduction

In recent years, an extensive literature investigated whether foreign bank presence enhanced the pro-cyclicality of bank credit and destabilized bank lending, especially during the 2008-2009 financial crisis. A strand of this literature argued that foreign banks often played a stabilizing role during the crises of the host countries, by providing more capital and credit (De Haas and van Lelyveld, 2006, 2010; Dages *et al.* 2000; Crystal *et al.* 2001; Arena *et al.* 2007; Claessens and van Horen, 2012). On the other hand, some authors argued that foreign banks contracted credit supply more dramatically especially in "bad times" with serious consequences for banking stability, transmitting the crisis from the parent countries to the local markets (Cetorelli and Goldberg, 2012; Popov and Udell, 2012). Arena et al. (2006) provide an analysis of the lending behavior of foreign banks during the crisis periods for a sample of banks in 20 countries from

Latin America and Asia, and find that loan growth decreases during the crisis periods, but domestic and foreign banks do not differ much in their lending patterns. Most of these research articles employ bank-level panel data for individual or a selected number of countries in the developing world. Since the late 1990s, there has been a considerable increase in foreign bank penetration into the developing and emerging banking markets. During the 1999-2009 period alone, the share of bank assets held by foreign banks registered a dramatic increase from 26 to 46%. Yet, lending in European emerging markets, characterized by the greatest number of foreign banks, fell more than that of domestic private banks during the crisis (Cull and Peria, 2012). By contrast, as noted by Kamil and Rai (2010), in Latin America with smaller degree of foreign bank penetration, state banks acting counter-cyclically maintained lending during the crisis. Hence, it should come as no surprise that there has been a significant surge in the amount of research that focus on foreign banks' lending behavior during crisis and off-crisis periods and whether foreign banks, despite their favorable impact on financial efficiency and availability of bank credit, come as a "mixed blessing." Overall, however, the results of the literature on whether presence of foreign banks enhanced or weakened the procyclicality of lending especially during crisis periods remained inconclusive so far.

There exists a large body of research on the bank-lending channel of monetary policy transmission (Bernanke and Blinder, 1992; Kashyap *et al.* 1993; Peek and Rosengren, 1995; Hancock and Wilcox, 1998; Kishan and Opiela, 2000; Kashyap and Stein, 2000; Cetorelli and Goldberg, 2012). Most of these empirical studies have exploited cross-sectional heterogeneity in banks' characteristics such as liquidity, capitalization and size as the main determinants of banks' responses to monetary shocks and their ability to supply loans but with inconclusive empirical evidence. A series of related research also examined the impact of foreign bank penetration on the effectiveness of monetary policy transmission, namely through the bank lending channel, in emerging and developed economies. Mostly, it was argued that foreign banks are less responsive to monetary shocks than domestic banks and hence, the bank lending channel in both emerging and developed economies has been weakened due to the presence of foreign banks (Wu *et al.* 2011; Ashcraft, 2006; Arena *et al.* 2006; Houstan and James, 1998; Gambacorta, 2005; De Haas and Naaborg, 2005 and 2006; Matousek and Sarantis, 2009). Houstan and James (1998), for instance, find that the loan growth of banks affiliated with a multi-bank holding company is less sensitive to their cash flow, liquidity, and capital positions than in the case of unaffiliated banks. Gambacorta (2005) also finds that affiliated banks' loan growth is less sensitive to monetary shocks relative to unaffiliated banks. De Haas and Naaborg (2005, 2006) argue that parent banks use internal capital markets to steer the credit of their subsidiaries located in Central and Eastern Europe.

A typical explanation for the smaller sensitivity of foreign banks to domestic monetary policy shocks has been the existence of internal capital markets for global banks, that is, foreign subsidiaries tend to have access to funds from their parent companies to shield them against adverse host country monetary shocks. According to Wu *et al.* (2011), additionally, countries with more foreign banks have suffered less from a slowdown in real credit growth during the crisis- possibly, because of the existence of such internal capital markets reinforcing better diversification opportunities as well as better liquidity management.

Our paper explores the effects of foreign bank penetration on the banking sectors' credit stability and its responsiveness to monetary transmission in developing and emerging economies during the global financial crisis and off-crisis periods using System GMM estimation. We base our paper on a cross-country comparison of aggregate real lending growth for countries with different degrees of foreign bank penetration. Hence, our study most closely follows Wu *et al.* (2011) and Bakker *et al.* (2013) who argue, in the context of European emerging markets that foreign ownership was associated with higher credit growth before the crisis, but this positive effect declined since 2008. As differently from Wu *et al.* (2011) who focus on the behavior of individual banks, however, we conduct our analysis based on country level panel data from six different regions, including Central and Eastern Europe, Latin America and Asia over the 2000-2014 period. Hence, we investigate whether foreign bank penetration make the country's banking system more sensitive to monetary transmission in terms of lending or whether monetary policy becomes more or less effective as the degree of foreign bank

penetration in a given country. Admittedly, this is a different question than whether individual banks differ in terms of their reaction to monetary policy shocks. We assess whether greater amount of foreign bank penetration as measured by the number of foreign banks has been associated with less responsive banking systems to changes in monetary policy as measured by the different proxies of the policy rate. More specifically, we analyze mainly two central research questions in the context of developing and emerging economies: 1) countries with different levels of foreign bank penetration, how did they differ in terms of credit growth in crisis and off-crisis periods, and (2) countries with different levels of foreign bank penetration, how did they also differ in terms of their responsiveness to monetary policy shocks?

This paper contributes to the existing literature in a number of ways: First, we explore the specific role of foreign bank penetration on lending growth both during crisis and off-crisis periods after controlling for various macroeconomic and bank-specific measures in the context of a large number of developing countries from 6 different regions. Second, the literature so far focused on the individual countries or specific regions to study the effect of foreign banks on bank credit. Studies based on cross-country comparison of their lending behavior or their response to monetary policy is still mostly missing (an exception is Chen and Wu, 2014). In this paper, we examine the differential responses of the host countries' banking sectors characterized by different degrees of foreign bank presence to the changes in monetary policy. We thereby seek to add to the literature by providing a cross-country analysis of how foreign bank presence may have altered the lending channel of monetary transmission. Hence, the novelty of our paper is that it contributes to the literature, based on the insights and testable hypotheses from the cited research, by providing empirical evidence on how the banking sectors with varying degrees of foreign bank penetration respond to changes in monetary policy and external crisis shocks simultaneously.

Our findings shed new light on the functioning of the bank lending channel and indicate that countries with a greater degree of foreign banks have experienced a smaller amount of contraction in lending during the 2008-2009 crisis, confirming the existence of internal capital markets for global banks. Hence, the presence of foreign banks seems to have mitigated the adverse effect of the crisis on real lending growth in developing and emerging economies rather than transmitting the external crisis to the host countries in contrast to findings of Cull and Peria (2013) for emerging Europe. Additionally, we find that presence of foreign banks increases the sensitivity of credit growth to the changes in the short-term money market rate- a proxy for the monetary stance. As such, monetary transmission through the bank lending channel has been strengthened rather than weakened in countries with a more significant presence of foreign banks. This latter result, again, contrasts with the findings of Wu *et al.* (2011) who argue that foreign banks weaken the monetary transmission of changes in policy rates via the lending channel. Our findings suggest that the internal capital market of foreign banks seem to be operative only during the crisis periods but is not responsive to changes in the host countries' domestic monetary policy changes.

The rest of the paper is organized as follows. Section 3 describes our dataset and provides descriptive statistics, correlation analysis and relates expected signs to existing literature. Section 4 presents the econometric methodology and discusses the empirical results. We conclude in Section 5 and provide directions for future research.

2. Literature Review

Research on the relationship between real credit growth and banks' ownership structure, especially during the 2008-2009 financial crisis has been growing in the past decade (Wu *et al.* 2011; Gambacorta and Marques-Ibanez, 2011; Ashcraft, 2006; Arena *et al.* 2006; Houstan and James, 1998; Gambacorta, 2005; De Haas and Naaborg, 2005 and 2006; Matousek and Sarantis, 2009). This paper relates to numerous of these studies but most closely follows Wu *et al.* (2011), Chen and Wu (2014), Bakker *et al.* (2013), and Cull and Peria (2013).

Bakker *et al.* (2013) focus on the European emerging markets and find that foreign ownership is likely to be associated with higher credit growth before the crisis, but this positive effect vanishes or turns negative during the crisis. Cull and Peria (2013) find that in the

European emerging markets, lending by foreign banks fell more than that of domestic private banks during the crisis. Similarly, Allen *et al.* (2017) examine bank lending dynamics and effects of banks' ownership on lending during the 2008 crisis based on bank-level data and argue that ownership structure as well as other bank-specific characteristics, such as deposit growth and profitability play an important role for credit growth during the crisis. In a cross-country study based on data that covers 80 countries for the period 2002- 2009, Aisen and Franken (2010) identify the main determinants of bank credit growth before and after the 2008-2009 financial crisis. They find that a credit boom in the years before the crisis is an important determinant of credit slowdown in the years right after the crisis. Furthermore, their study shows that among world regions bank credit behavior is different, which can be attributed to the differences in countries' structural characteristics.

For 15 central and eastern European countries, Laidroo (2014) finds that GDP growth and money growth positively influence bank lending, whereas banks' credit risk has a negative impact on credit growth. Additionally, Laidroo (2014) observes that cyclicality of bank lending is greater during the crisis period as compared to the off-crisis period. Chen and Wu (2014) examine bank credit growth in emerging markets during the crisis and off-crisis periods, focusing on the role of differential bank ownership using annual data for the period 2004-2011 and conduct cross-country comparison. They come to the conclusions that foreign banks' lending in emerging Europe, Asia, and Latin America fell more than domestic banks' lending with state banks playing a counter-cyclical role during the crisis. Moreover, they argue that expansionary monetary policy, better capitalized, and more profitable banks all lead to faster credit growth. Similarly, Gambacorta and Marques-Ibanez (2011) find that banks with weaker core capital positions, greater dependence on market funding and on non-interest sources of income restricted the loan supply more strongly during the crisis period for a sample of developed countries.

The bank lending channel of monetary policy transmission, pioneered by Bernanke and Blinder (1988, 1992) and further explored by Kashyap and Stein (1995), assumes that deposits and other sources of bank finance are imperfect substitutes and when the central bank tightens the monetary policy, banks cannot fully substitute reduced deposits with other funding sources and hence, they are forced to contact lending. However, banks with different characteristics (standard proxies are size, capital and liquidity) face similar credit demand but they respond differently to monetary policy shocks due to the differences in their financial constraints, individual bank characteristics and their ability to shield their loan granting activities- "the balance-sheet channel." In a similar vein, Kashyap and Stein (1995) and Kashyap and Stein (2000) find different sensitivity across banks of different sizes to monetary shocks: small banks are more responsive to monetary policy shocks than big banks and more liquid banks exhibit higher lending growth than less liquid banks in a period of tightening monetary policy. Kishan and Opiela (2000) find that the effects of monetary policy on bank loans depend also on bank capitalization in addition to bank size. Undercapitalized and small banks are more responsive to monetary shocks than well-capitalized and large banks, respectively, because they are unable to raise alternative funding for loans under restrictive monetary policy. Gambacorta (2005) also confirms the heterogeneity in the reaction of banks with different capitalization and liquidity levels.

Gambacorta and Marques-Ibanez (2011) argue in the context of the bank lending channel for the Eurozone that during the recent credit crisis, many large firms were able to raise substantial amounts of funding by directly tapping into the corporate bond market even if at very high interest rates, bypassing the credit supply constraints in the banking sector. In their view, this casts some doubt on the main hypothesis of the Bernanke and Blinder (1988) model, namely the imperfect substitutability between bank lending and bonds, at least for large borrowers. This means that the bank lending channel is also evolving over time as a result of the development of alternative forms of funding for firms.

Arena *et al.* (2006) examine the differences in the behavior of domestic banks and foreign banks in response to changes in monetary conditions in 20 Asian and Latin American countries during 1989–2001. Matousek and Sarantis (2009) also explore the relevance of the bank lending channel and monetary transmission focusing on several Central Eastern European

countries. Wu *et al.* (2011) analyze the lending behavior of numerous banks, based on bank level data from emerging economies, and conclude that foreign banks are less responsive to monetary shocks in host countries, as they adjust their outstanding loan portfolios and interest rates to a lesser extent than domestic private banks, independent of their liquidity, capitalization, size, efficiency, and credit risk.

3. Data, Variables, and Expected Signs

We use annual panel data, covering a sample of 86 emerging and developing countries from six regions (East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, South Asia, Middle East and North Africa, and Sub-Saharan Africa) for the period 2000-2014. Because of missing values in our extended data for some small countries, in most regression specifications, our sample covered around 50-55 countries. The sources of our data set are the IMF's International Financial Statistics (IFS) and the Financial Soundness Indicator (IFS), and World Banks' World Development Indicators and Global Financial Development.

Macroeconomic variables mainly stand for the credit demand (Real GDP growth, *RGDPGR* and Inflation, *INFL*) and the lending rate, *LEND_RATE* is a proxy for the average cost of credit in a given country. We employ various bank-specific variables account for the determinants of credit supply as in the literature such as the credit to deposit ratio, *CR_DEP* (a proxy for access to foreign or external funding), deposit to GDP ratio, *DEP_GDP* (a measure of financial deepening), liquid reserves to asset ratio, *LIQ_ASR*, number of foreign banks, *FOR_BANK*, return on assets, *ROA* and logged total banks assets, *BANKSIZE* as a proxy for the size of the banking system. *CAP_ASR* stands for the average capitalization of banks relative to their assets as in Peek and Rosengren (1995) who find that capital plays an important role in determining banks' credit growth. We also control for the overall credit risk of a country's banking system using non-performing loans to total loans, *NPL* as in Wu *et al.* (2011) and Laidroo (2014).

At the macro-level, bank lending is pro-cyclical and is strongly related to countries' real GDP growth (Albertazzi and Gambacorta, 2009). Therefore, we expect real GDP growth, *RGDPGR*, to have a strong positive current and lagged effect on real credit growth. Inflation, *INFL*, stands as a measure of macroeconomic instability. The increase in inflation reflects unstable macroeconomic conditions in emerging and developing economies of all 6 regions included in our analysis. Moreover, high inflation may worsen market conditions during the crisis period and force banks to limit the supply of credit even if the borrowers are willing to pay higher interest rates (Boyd *et al.* 2001). Therefore, we expect the coefficient of the inflation variable, *INFL* to have a negative sign.

We capture the stance of monetary policy with the monetary indicator, i.e. the short-term money market rate, *STINT_RATE*. Monetary authorities in most of these countries target specific interest rates as one of their main forms of monetary policy implementation. It is generally assumed that movements in the short-term interest rates are best in capturing the stance of monetary policy. Our criteria for the selection of the short-term rates for each country in our sample have been as follows: first, choose the money market rate; if it is not available, then use the annual yield on government bonds. *DCRISIS* is the time (period) dummy capturing the independent impact of the 2008-2009 financial crisis and heightened risk perceptions on the real credit growth. We expect *MONEYGR* to have a positive sign as in Laidroo (2014) and Arena *et al.* (2015). We also use several interactive dummies as listed in Table 1 to capture the relative strength of the bank lending channel of monetary transmission in countries with greater degree of foreign bank penetration.

Table 1. Definition of Variables

Variable name	Definition of variables
DLCREDIT	Real credit growth, differenced logarithm of the domestic real credit to the private sector (the dependent variable)
Macro Variables	
RGDPGR	Real GDP growth
INFL	Annual Rate of Inflation
Bank specific Variables	
CR_DEP	Credit to Deposit ratio
DEP_GDP	Deposits to GDP ratio
LIQ_ASR	Cash and liquid assets to total assets of the banking system
LEND_RATE	Average lending rate for the banking system
ROA	Average Return on Assets for the banking system
FOR_BANK	Number of foreign banks in the banking system
CAP_ASR	Total Capital to Total Assets ratio of the banking system
NPL	Non-Performing Loans to Total Loans of the banking system
BANKSIZE	Natural logarithm of the total assets of the banking system
Monetary Policy Indicators	
MONEYGR	Growth rate of money supply (M2)
STINT_RATE	Short-term money market rates or 1-year government bond yields (annual)
Crisis/ Interactive Dummies	
DCRISIS	Crisis period, equal to 1 if years are 2007-2012, and 0 otherwise
FOR_IRATE	Interactive dummy variable, *FOR_BANK* LEND_RATE*
FOR_CRIS	Interactive dummy variable, *FOR_BANK* DCRISIS*
FOR_MONGR	Interactive dummy variable, *FOR_BANK* MONEYGR*
FOR_STRATE	Interactive dummy variable, *FOR_BANK* STINT_RATE*
REGION2	Dummy variable equal to 1 if the country is located in Central and Eastern Europe, and 0 otherwise. There are countries from six regions in our data set.
CRIS_REGION2	Interactive dummy variable, *REGION2* DCRISIS*

Table 2 gives the descriptive statistics of macroeconomic and bank-specific variables used in all our specifications for both the crisis (2008 to 2012) and the off-crisis periods (pre-crisis from 2000 to 2007 and post-crisis from 2013 to 2014). Our descriptive statistics indicate that the real credit growth decreased significantly in the emerging and developing countries from 6% on average to 3% during the crisis period along with the profitability of their banking systems as measured by the average return on assets (*ROA*). It is also noteworthy that *CR_DEP* displays a relative increase in its mean value from 95.31 to 107.41 during the crisis period but its large standard deviation, however, suggests that developing countries have exhibited a wide variation in their access to external (foreign) source of funding in the same period. This pattern can also reflect the recession-induced contraction in bank deposits or greater reliance on foreign borrowing to finance lending or both. We expect this variable to have a coefficient with a positive sign for our credit growth regressions.

Table 2. Summary Statistics for Selected Variables

	Crisis Period			*Off Crisis Period*		
	N	Mean	Std. Dev	N	Mean	Std. Dev
DLCREDIT	365	0.03	0.12	580	0.06	0.14
RGDPGR	429	3.55	4.26	856	5.99	4.01
INFL	381	-0.02	0.87	690	-0.02	0.82
CR_DEP	401	107.41	87.54	764	95.31	63.36
DEP_GDP	424	46.29	28.18	744	38.61	25.08
LIQ_ASR	365	20.41	15.16	654	21.20	16.53
CAP_ASR	347	11.05	3.63	523	10.82	4.08
FOR_BANK	341	47.19	23.40	607	39.70	23.01
LEND_RATE	364	12.83	5.91	757	15.28	9.69
MONEYGR	365	13.47	11.83	581	16.85	14.01
NPL	348	6.54	5.49	654	9.52	9.02
ROA	427	1.86	2.07	742	2.10	3.37
STINTRATE	320	6.30	4.15	610	7.97	8.18

Deposit to GDP ratio, *DEP_GDP,* has also increased during the crisis period as compared to the off-crisis years, reflecting mostly the effect of contraction in nominal GDP rather than the expansion in the deposit base. We also expect this variable to have a positive effect on real credit growth. Despite the expansionary monetary policies pursued in almost all regions as signified by the smaller size of *STRATE*, *MONEYGR* also decreased during the crisis by 3% when compared with the off-crisis periods, but most significantly in Europe and Central Asia reflecting the recession-induced contraction in deposits (Appendix). The declining trend in the average lending rates, *LEND_RATE,* from 15.28% to 12.83% during the crisis also collaborates the drop in short term money market rates, and implies a strong interest-rate pass-through from policy rates to lending rates. In a preliminary pooled OLS regression of the lending rate on short-term money market rates, we have found the coefficient of the short-term rate to have a value of 1.03 and highly significant at 1%, suggesting that there is an immediate (complete) pass-through effect.

Table 3. Correlation Analysis for Key Variables

	DLCREDIT	*CAP_ASR*	*FOR_BANK*	*STINT_RATE*
DLCREDIT	1.0000			
CR_DEP	0.0961	0.2623	-0.0867	-0.1226
ROA	0.1774	0.2274	0.0082	
LIQ_ASR	0.0737	0.0665	0.0828	0.2741
CAP_ASR	0.1899	1.0000	0.1314	0.2908
FOR_BANK	0.1409	0.1314	1.0000	
LEND_RATE	-0.0251	0.1750	0.0933	0.5891
NPL	-0.1107	0.0070	-0.0759	0.1008
RGDPGR	0.1487	0.0220	0.0352	-0.0646
STINT_RATE	-0.0450	0.2970	0.0562	1.0000
MONEYGR	0.3837	0.2206		0.2313
FOR_STRATE	0.0268			
FOR_CRIS	-0.0287			

Correlation analysis in Table 3 reveals preliminary results and confirms our prior expectations on the sign of these variables in relation to the real credit growth, *DLCREDIT*. None of the variables exhibit unexpected signs in terms of their correlation with the dependent variable except for the sign of the correlation coefficients for the variables, *FOR_STRATE* and *FOR_CRIS*. In our regressions, these two variables appear with opposite signs in the presence of other bank-specific and macroeconomic controls. This suggests that the effect of foreign banks on real credit works at least in part through other controls such as *NPL*, *CR_DEP* and

CAP_ASR. To the extent that foreign banks located in the countries included in our data are characterized by relatively lower credit risk, more reliance on external sources of parental funding as opposed to domestic banks and better-capitalized, they are also more likely to contribute to bank lending growth.

As it is evident from the summary statistics for different regions displayed in the Appendix, in comparison to Asia and Latin America, the fastest real credit growth was observed in Europe and central Asia - a region with an overwhelming dominance of foreign banks in its banking sector- prior to the crisis. Yet, this region also registered the most dramatic contraction in bank lending during the crisis. As noted in numerous studies, foreign banks in emerging Europe traditionally relied on cross-border wholesale funding from parents' resources, which the global financial crisis dramatically curtailed. The Vienna Initiative which brought together key western parent bank groups, home and host-country authorities, and multilateral organizations also helped alleviate the impact of the crisis on foreign banks' lending. On the other hand, East Asia and the Pacific region with a relatively smaller number of foreign banks more or less maintained a stable credit growth in crisis and off-crisis periods. In Latin America, a region with a sizable foreign bank presence, however, credit growth seemed to increase rather than decrease during the crisis, an outcome attributed to the lending behavior of the state banks, which followed a counter-cyclical lending strategy in the same period. This observation is compatible with the claims by Kamil and Rai (2010) who find that the region of Latin America and the Caribbean was considerably less affected by the credit contraction due to foreign banks' sustained lending in domestic currency.

Interestingly, the number of foreign banks did not exhibit any decreasing trend; rather such banks continued to penetrate into the developing economies during the crisis as can be seen from Table 2 and Appendix. Hence, foreign banks' crisis-induced ("retrenchment") from developing banking markets did not materialize during the crisis. When we look at the trends by regions, European, Central Asian and African countries show the highest foreign bank penetration, followed by Latin American countries, and then the Southern Asian countries.

4. Empirical Analysis

4.1. Model Specification

We first applied the Fisher-Augmented Dickey-Fuller test with 2 lags, time trends, and drifts to confirm the stationarity of the variables to be used in regressions. Initially, we estimated a fixed effect and a random effect model to address the possible country specific effect in a panel context and conducted the Hausman test, which favored a fixed effect model. Additionally, we conducted a series of serial correlation tests, which revealed that our static model suffered from a significant degree of serial correlation, necessitating a dynamic model to capture the persistence in the dependent variable. In the presence of the country specific cross-sectional heterogeneity, it is well known that the fixed effect estimate of the lagged dependent variable in a dynamic panel model is likely to be biased upward and inconsistent (Blundell and Bond, 2000). On the other hand, Blundell and Bond (2000) point out that Arellano-Bond (1991)'s first-differenced GMM estimators are likely to perform poorly when the time series are persistent. An additional shortcoming of first-differenced GMM is that differencing to remove the country specific effect eliminates valuable information on the cross-country variation in levels. Arellano and Bover (1995) and Blundell and Bond (2000) propose the System GMM that combines the standard set of differenced instruments with instruments derived from the equation in levels. Hence, we estimate the following dynamic specification using the system GMM method:

$$DLCREDIT_{it} = \delta_0 DLCREDIT_{it-1} + \sum \beta_1 MacroVar_{it} + \sum \beta_2 BankVar_{it} + \delta_1 dcrisis_t + \varepsilon_{it} \qquad (1)$$

where

$$\varepsilon_{it} = \upsilon_i + \mu_t + u_{it} \qquad (2)$$

In this model, $DLCREDIT_{it}$ denotes the real credit growth for country i in year t; $DLCREDIT_{it-1}$ is the one-period lagged value of the real credit growth; $MacroVar_{it}$ represents a

vector of all macroeconomic and monetary variables used as explanatory variables in regression specifications; μ_t is the time-specific effect which captures global shocks; v_i is the country-specific effect; and u_{it} is the error term. Real GDP growth, *RGDPGR* is lagged one period in order to account for its possible delayed effect on real credit growth. $BankVar_{it}$ is a vector of all bank-specific variables as listed in Table 1.

4.2. System GMM Estimation and Results

For brevity, we only report the results from our System-GMM regressions (two-step robust specifications) in Table 4. The coefficients on the lagged dependent variable in all the models are found to have a value of less than one and to be statistically significant at the 5% level, providing strong evidence of persistence in all specifications (1)-(4). To deal with the instrument proliferation problem and possible weaknesses in instruments, we control for the number of instruments using the collapse option while limiting instrument lags to 2 and 3 for the lagged dependent variable (Roodman, 2009).

The validity of instruments for first-differenced and System GMM estimator can be evaluated by a set of specification test (Arellano and Bond, 1991). The proper choice of the instruments based on the validity of the moment conditions for the system GMM are checked by applying the Hansen's J test. The application of the Hansen test of over-identifying restrictions provides no ground to reject the validity of the instruments as the reported p-values are all insignificant in different specifications reported in Table 4. Additionally, AR(1) and AR(2) tests show a first order serial correlation in all specifications, but detect no evidence of second order serial correlation which suggests that the regressions are well-specified. There are also several additional advantages in using the System GMM estimator: Not only it provides consistent estimation of the coefficient of the lagged dependent variable, it also permits a certain degree of endogeneity in the other regressors, while optimally using additional information on cross-country variation in levels, not just within-country variation in changes. Hence, System GMM estimation can better deal with reverse causality and the potential endogeneity issues that could be associated with bank-specific variables along with the money growth rate and the lending rate. On the other hand, the short-term money market rate is to be taken as strictly exogenous for our dependent variables. Indeed, the Difference-in-Hansen tests confirm the exogeneity of the instrument subsets in our estimations for all models (1)-(4).

Our main findings are as follows. Our econometric results show that our lagged dependent variable is significant and with a positive sign in all specifications, confirming that real credit growth exhibits persistence. A higher GDP growth rate, *RGDPGR,* which proxies for higher demand for credit, drives higher credit growth as it is evident from the significant positive sign. Inflation, *INFL*, as expected, has a negative effect real credit growth, but turns significant only in model (4). This is because higher inflation leads to the lower credit demand, and also implies macroeconomic instability with a negative impact on real credit growth (Boyd *et al.* 2001). Credit to deposit ratio, *CR_DEP* is positive and significant in only model (4) suggesting that banks' greater reliance on external sources of funding stimulates the real credit growth (Chen and Wu, 2014).

Deposit to GDP ratio, *DEP_GDP* as a proxy of financial deepening and sophistication, liquid reserves to asset ratio, *LIQ_ASR*, return on assets, *ROA* and logged total banks assets, *BANKSIZE* as a proxy for the size of the banking system have entered several specifications with the expected signs, but we dropped them from our final estimations as they were insignificant in the presence of other control variables.

Table 4. System GMM Estimation

VARIABLES	System GMM (two-step) (1)	System GMM (two-step) (2)	System GMM (two-step) (3)	System GMM (two-step) (4)
DLCREDIT (-1)	0.3491**	0.2774**	0.3649**	0.2120*
	(2.04)	(1.75)	(2.27)	(1.73)
RGDPGR (-1)	0.0054***	0.0046**	0.0048**	0.0033***
	(3.33)	(2.41)	(2.94)	(2.92)
INFL	-0.0144	-0.0096	-0.0129	-0.0180**
	(-1.57)	(-1.18)	(-1.46)	(-2.55)
CR_DEP	0.0004	-	-	0.0005*
	(1.04)			(1.69)
NPL	-	-0.0031**	-0.0031**	-0.0025**
		(-2.49)	(-2.49)	(-2.03)
LEND_RATE	-	-	-	-0.0026
				(-0.95)
MONEYGR	0.0047***	0.0043***	0.0047***	0.0029**
	(5.03)	(4.67)	(4.72)	(2.21)
STINT_RATE	-0.0022***	-0.0027*	-0.0027	-
	(-1.12)	(-1.92)	(-1.46)	
CAP_ASR	0.0027*	0.0010	0.0037**	0.0037**
	(1.82)	(0.61)	(2.23)	(2.23)
DCRISIS	-0.0502**	-0.0308*	-0.0462**	-0.0419**
	(-2.30)	(-1.80)	(-2.14)	(-2.22)
FOR_CRIS	0.0009*	0.0007*	0.0009*	0.0007*
	(1.98)	(1.84)	(1.87)	(1.68)
FOR_IRATE	-	-	-	0.000007
				(0.22)
FOR_STRATE	-0.0001*	-0.0001**	-0.0001**	-
	(-1.88)	(-2.01)	(-2.11)	
REGION2	-	0.0814***	-	0.0842***
		(3.28)		(3.86)
CRIS_ REGION2	-	-0.0362	-	-0.0815*
		(-1.45)		(-1.81)
No of Obs	358	375	378	450
No of Groups	44	44	44	49
No of Instruments	13	15	12	15
Time Effects	No	No	No	No
AR(1)	0.028	0.042	0.027	0.019
AR(2)	0.183	0.545	0.189	0.291
Hansen J-stats	0.418	0.295	0.210	0.592
Diff-Hansen stats	0.216	0.142	0.087	0.311

Note: The dependent variable is *DLCREDIT* for (1)-(4). t-ratios are in parentheses. All estimations are based on robust standard errors. ***, ** and * indicate significance at 1%, 5%, and 10% level, respectively.

Specifically, despite its positive correlation with the real credit growth, *LIQ_ASR* appeared with a negative coefficient in some regressions which is in line with the explanation provided by Gambacorta and Marques-Ibanez (2011). Financial innovation and improved technology led banks to economize on their requirements for liquid assets. As a consequence, traditional indicators of the bank lending channel such as liquidity may no longer be a viable measure of banks' ability to lend along with *BANKSIZE*.

Non-performing loans to total loans as a measure of credit risk in banking, *NPL* is highly significant with a negative sign in several models and as expected reduces real credit growth. Capital to asset ratio, *CAP_ASR*, is also significant with a positive effect on lending, suggesting that better capitalized banking sectors have greater ability and willingness to extend credit as in

Chen and Wu (2014). As expected, lending interest rate, *LEND_RATE* has a negative effect on real credit growth through its effect on credit demand in model (4); however, it is not significant which is in line with the notion that the cost of credit is not the key determinant of borrowing as well as the loan availability. Our results are consistent with those of Chen and Wu (2014) in the context of the impact of expansionary monetary policy as measured by *STINTRATE*, which leads to higher credit growth.

We have also added regional dummies in some specifications and they turned out to be insignificant with the exception of *REGION2* dummy for the Central and Eastern Europe. The positive and significant sign of this dummy points to the fast credit growth the region experienced during the off-crisis periods as compared to the other regions such as East Asia and the Pacific, Latin America, Middle East and North Africa and Sub Saharan Africa. When we compare the negative coefficient of *DCRISIS* with the negative and significant coefficient of *CRIS_REGION2* interactive dummy in model (4), it is evident that the contraction in real credit growth has been more pronounced than other regions in Central and Eastern Europe.

In several estimations that we do not report, number of foreign banks, *FOR_BANK* has a positive and significant effect on real credit growth indicating that countries with a greater foreign bank penetration have greater capacity for lending growth which is as expected given that the foreign banks tend to be more efficient in loan monitoring and evaluation. On the other hand, despite the weak negative correlation of *FOR_CRIS* interactive dummy with the real credit growth in Table 3, which suggests that banking sectors with greater penetration of foreign banks may have experienced a more pronounced contraction in credit during the crisis, in the presence of several controls in models (1)-(4), we find that the coefficient of *FOR_CRIS* is significantly positive. Since *DCRISIS* has a significant negative effect on real lending, our results consistently show that banking systems with more foreign banks curtailed credit less rather than more dramatically during the crisis period. According to Morgan and Strahan (2004), the relationship between real credit growth and foreign banks is more conspicuous during the crisis periods and it can be either positive or negative. The sign of the coefficient depends on the stability of the foreign banks credit supply, whether they continue to receive funding from their parents during crisis, and the domestic economic fundamentals in the countries in which they operate among others. Overall, a negative correlation is to be expected in the countries with weak and impaired economic conditions as argued by Laidroo (2014). Our finding of a positive coefficient for the *FOR_CRIS* may also mean that along with the number of foreign banks, their relative weight in the banking sectors should be more carefully specified such as with a variable measuring the ratio of their assets, deposits or loans in the aggregate values along with some measures of bank concentration to gain insights into the market structure in which they operate.

Overall our results are consistent with the view that foreign banks tend to contract credit by a smaller amount than domestic peers during the crisis periods (Dages *et al.* (2000) in Argentina and Mexico; Detragiache and Gupta (2004) in Malaysia; and De Haas and van Lelyveld (2010) in the Central and East European countries). One common conjecture for foreign banks' weaker credit contraction during the crisis periods is that they receive emergency credit lines or other forms of financial support from their parent banks, which allow them to preserve lending. Hence, our findings suggest that during crisis periods, foreign bank presence has a mitigating effect on the contraction in lending due to the existence of this form of internal capital market.

In order to measure how foreign bank penetration influences the bank lending channel, we include the short term money market rate *STINT_RATE*, and the interactive dummy, *FOR_STRATE* in our regression specifications. First, we find evidence that banks increase (reduce) the growth rate of their loans in response to an expansionary (restrictive) monetary policy, as it is evident from the negative and significant coefficient of the *STINT_RATE* at 1% and %10% in models (1) and (2). Second, the coefficient on the interaction term, *FOR_STRATE* is negative and statistically significant. This shows that banking systems with more foreign bank participation adjust their growth rate of loans by a greater extent than their counterparts with smaller number of foreign banks after controlling for the effects of the global crisis, different capitalization, access to foreign funding, credit risk levels measures and proxies for credit demand. Hence, foreign bank penetration leads to a greater sensitivity of the banking systems

to domestic monetary policy measures such as the short-term interest rates in contrast to the findings of Wu *et al.* (2011). The finding that foreign bank penetration enhanced the strength of the bank lending channel contrasts with the results of Wu *et al.* (2011) and Ashcraft (2006) who argue that these banks dampen the effects of monetary policy because of the existence of internal capital markets in which they can access parent banks' funding in times of tightening monetary policy.

Our results might be also due to the relative financial sophistication in the countries in which they tend to operate or their contribution to the level of financial efficiency and sophistication in the host countries. However, when we interpret these results along with the significant positive effect of *FOR_CRIS* variable as discussed above, we come to the conclusion that foreign bank penetration has a mitigating effect on the contraction in credit growth during crisis periods but when the monetary policy is tightened in the host country, the bank lending channel works more effectively in the presence of foreign banks. Hence, the internal capital market is indeed operative only in times of crisis such that the parent banks inject liquidity and/or recapitalize their subsidiaries when there are binding liquidity or capital constraints. This is how foreign banks may behave differently from domestic banks, especially during the crisis periods in a setting of cross-country comparison as opposed to individual country based studies.

4.3. Robustness Checks

We estimated a series of different specifications to test the sensitivity of our results to the conditioning variables included in our regressions. We have observed no notable change in the values of the coefficients and the significance of the coefficients, although some variables lost significance in the presence of others. We report in Table 4 only the most satisfactory results in terms of various specification tests as well as the F-test values. Especially we observe that the relevant policy variables, *STINT_RATE*, *FOR_STRATE,* and *FOR_CRIS* are insensitive to the inclusion of various control variables and do not change signs or significance in a non-trivial manner. Hence, our findings are robust.

5. Conclusion

It has been hotly debated in the recent literature whether foreign banks in emerging and developing economies have played a destabilizing role on the credit supply in the host countries during the 2008-2009 crisis mostly with a focus on individual country experiences. In this paper, based on a cross-country comparison, employing a large data of developing countries from various regions, we provide consistent evidence that the foreign bank presence seemed to have mitigated the adverse effect of the crisis on the credit supply during crisis period. More specifically, we find that during the crisis, the real credit growth turned negative in almost every region and the economy but in countries with a stronger foreign bank presence, this effect was less pronounced, implying that bank credit contracted relatively less. This finding suggests that foreign banks may have played a countercyclical role of stabilization in lending at least in some developing countries. Our result may point to the existence of the internal capital markets for diversification and fund allocation for globally connected foreign banks which is compatible with the arguments of Wu *et al.* (2011) but contrasts with the findings of Cull and Peria (2013) for the central and eastern European countries.

In order to reconcile these contradictory results, future studies should focus on identifying the conditions under which the foreign banks may reduce or increase lending in the host countries during crisis periods. The differences between our results and some findings in the literature could be due to a number of factors such as the host countries' economic fundamentals, the effectiveness of their banking supervisory structures, especially in regulating foreign banks' reliance on internal capital markets and whether the foreign banks in these countries have had a relatively dominant position in banking, have been over-exposed to problem loans and have been the main culprits for excessive and risky lending growth as was the case of central and eastern European emerging economies prior to the crisis. Additionally, through their internal capital markets, foreign banks in a time of crisis could be adjusting their

lending towards more robust and less fragile banking sectors at the expense of more distressed banking systems. For instance, Chen and Wu (2014) find that banks located in countries with sound banking regulations experienced higher credit growth even during the crisis. When the global crisis dramatically curtailed parental funding, foreign banks continued to lend in such countries by rebalancing their funding towards local sources (IMF, 2013). Hence, it seems critical to investigate how diversification and fund allocation processes of the global banks' internal capital markets operate and respond to the these factors mentioned above in order to provide a more realistic assessment of the pros and cons of foreign bank entry. We leave for future research the identification of these specific channels of response for foreign banks.

A limited amount of research work has also explored the role of foreign banks in the monetary transmission mechanism through the bank-lending channel in developed and emerging countries (Gambacorta and Marques-Ibanez, 2011; Wu *et al.* 2011). Our findings indicate that overall, the increased presence of foreign banks strengthens the effectiveness of monetary policy in the host countries by enhancing the influence of the changes in the policy rates on bank lending, captured in this paper with the short-term money market rates. Hence, we argue that banking systems in developing regions respond differently to changes in monetary policy depending on the relative degree of foreign bank presence in their banking systems, confirming the existence of a bank lending channel based on ownership structure.

However, our results contrast with the arguments of Wu *et al.* (2011) who find that foreign banks reduce the sensitivity of bank lending to changes in monetary policy, in particular, to a monetary tightening in the domestic economy. Our findings suggest that the internal capital market of foreign banks seem to be operative only during the crisis periods but it does not react strongly to changes in the host countries' domestic monetary policy changes. Rather the foreign bank presence enhances the bank lending channel by increasing the responsiveness of the banking sectors to monetary policy changes.

It is also noteworthy that in the presence of foreign banks, usually associated with easier access to foreign fund flows as potential conduits for capital inflows, several standard indicators traditionally used in the literature such as liquidity and size (e.g. Kashyap *et al.* 1993; Kishan and Opiela, 2000) turn out to be insignificant and irrelevant in regression specifications for the functioning of bank lending channel of monetary policy transmission, with the exception of bank capital which we find weakly significant. According to Gambacorta and Marques-Ibanez (2011), due to financial innovation, integration of different financial markets, and securitization, bank lending channel started to work in different ways in the past decades. In support of their arguments, our results also lead us to recognize other bank characteristics such as the overall credit risk exposure (as measured by the non-performing loans) and the foreign ownership structure (which in part stands for the capital inflows) to be more important factors influencing monetary transmission than the traditional variables such as size, liquidity and capital. As such, future regulatory changes should focus more strongly on these factors that are more likely to influence monetary transmission especially in a period of crisis.

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Appendix. Summary Statistics for Different Developing Regions

East Asia and the Pacific

	Crisis Period			Off Crisis Period		
VARIABLES	Obs	Mean	Std. Dev	Obs	Mean	St.dev
DLCREDIT	55	0.0292	0.0983	88	0.0547	0.1184
RGDPGR	65	4.9167	3.7241	130	5.3190	3.3791
INFL	59	-0.0771	0.9124	110	0.0235	0.8979
CR_DEP	65	156.8200	190.8730	117	127.8953	121.6049
DEP_GDP	65	53.3557	28.9638	117	49.6165	31.7816
LIQ_ASR	55	28.3749	17.4523	99	23.4501	15.7593
FOR_BANK	45	27.7778	16.1680	80	20.9250	12.5191
LEND_RATE	60	9.6495	4.3739	118	10.9111	6.7069
MONEYGR	55	11.1250	11.8161	88	14.2753	12.4061
ROA	62	2.3200	2.4146	107	2.5083	2.7202
BANKSIZE	65	67.8334	35.8546	117	59.4784	38.3016

Europe and Central Asia

	Crisis Period			Off Crisis Period		
VARIABLES	Obs	Mean	Std. Dev	Obs	Mean	St. Dev
DLCREDIT	90	0.0385	0.1208	141	0.1159	0.1473
RGDPGR	105	1.4987	5.3581	209	6.0847	4.3603
INFL	91	-0.0722	0.8158	166	-0.1257	0.9419
CR_DEP	81	127.2837	40.0222	182	104.3255	58.0303
DEP_GDP	105	40.4030	15.4094	182	28.7178	15.6911
LIQ_ASR	90	17.0929	7.8967	159	20.1137	12.6767
FOR_BANK	105	61.2095	18.8020	189	47.7831	21.6456
LEND_RATE	88	12.4127	4.5905	182	14.6468	9.3236
MONEYGR	90	13.2581	15.0375	141	22.5693	16.9925
ROA	105	0.8698	1.7031	189	2.0829	2.2932
BANKSIZE	81	53.9580	21.0294	175	33.1210	17.8053

Latin America and the Caribbean

	Crisis Period			Off Crisis Period		
VARIABLES	Obs	Mean	Std. Dev	Obs	Mean	St. Dev
DLCREDIT	110	0.0311	0.0871	176	0.0240	0.1321
RGDPGR	119	3.1328	3.4341	239	3.6343	3.4257
INFL	108	-0.0154	1.1018	207	-0.0101	0.6425
CR_DEP	120	96.5364	40.2803	216	91.3013	35.1707
DEP_GDP	120	43.5212	22.3074	216	39.8813	21.1810
LIQ_ASR	110	23.7555	16.7952	199	24.9957	19.9326
FOR_BANK	85	46.6941	22.1187	153	41.5294	20.0552
LEND_RATE	115	14.9573	7.5032	237	18.9708	12.8410
MONEYGR	110	12.1595	9.1030	177	14.5758	14.7645
ROA	120	1.9210	1.1809	208	1.2068	4.5564
BANKSIZE	120	47.5523	26.5140	216	42.9557	22.8386

Appendix Continued

South Asia

	Crisis Period			Off Crisis Period		
VARIABLES	Obs	Mean	Std. Dev	Obs	Mean	St. Dev
DLCREDIT	25	0.0193	0.1379	40	0.0665	0.1282
RGDPGR	25	5.0369	3.4641	48	6.0930	4.3511
INFL	25	0.0642	0.4744	39	0.0789	0.5588
CR_DEP	25	84.2791	21.0169	45	67.6757	21.4790
DEP_GDP	25	47.4768	10.5496	45	38.9674	8.3352
LIQ_ASR	25	23.2151	20.6713	45	28.3049	22.7306
FOR_BANK	15	18.2000	16.9335	27	13.4074	10.4927
LEND_RATE	18	12.2657	2.4794	38	12.8580	2.8341
MONEYGR	25	16.9017	7.9714	40	16.4382	7.0046
ROA	25	2.7685	2.6888	37	1.7668	1.7189
BANKSIZE	25	52.6632	14.0695	45	35.0193	13.5224

Middle East and North Africa

	Crisis Period			Off Crisis Period		
VARIABLES	Obs	Mean	Std. Dev	Obs	Mean	St. Dev
DLCREDIT	20	-0.0440	0.1288	32	0.0045	0.0710
RGDPGR	40	4.2882	3.7791	80	4.6651	3.2552
INFL	29	-0.0080	0.6129	50	0.1293	0.7277
CR_DEP	40	91.8609	39.5439	72	89.4322	36.6101
DEP_GDP	39	77.1547	54.3758	54	61.7752	35.9792
LIQ_ASR	20	14.3330	10.0881	36	15.5276	10.6391
FOR_BANK	31	32.9355	14.0687	50	26.4800	11.6641
LEND_RATE	25	8.3142	2.2325	56	10.0572	3.1703
MONEYGR	20	9.8945	4.6811	32	13.2546	7.6315
ROA	40	1.5601	0.4172	72	1.7293	1.0384
BANKSIZE	39	79.5572	31.3765	54	68.6139	24.1836

Sub-Saharan Africa

	Crisis Period			Off Crisis Period		
VARIABLES	Obs	Mean	Std. Dev	Obs	Mean	St. Dev
DLCREDIT	65	0.0219	0.1847	103	0.0413	0.1623
RGDPGR	75	5.0353	3.3251	150	5.1340	4.5026
INFL	69	0.0202	0.7020	118	-0.0375	0.9612
CR_DEP	70	74.3346	22.9608	132	73.1991	29.3715
DEP_GDP	70	35.7045	21.0338	130	30.7022	22.9801
LIQ_ASR	65	13.4119	11.7989	116	13.2752	8.8444
FOR_BANK	60	52.5167	22.0058	108	49.5556	25.7168
LEND_RATE	58	14.6345	4.6105	126	16.4106	4.6998
MONEYGR	65	17.7344	12.5634	103	16.4005	10.5708
ROA	75	2.6212	2.9268	129	3.5486	3.6116
BANKSIZE	70	37.0850	26.7455	130	33.4155	27.5094