

MONETARY AND FINANCIAL IMPLICATIONS OF FOREIGN BANK ENTRY IN
EMERGING AND DEVELOPING ECONOMIES

by

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DEDICATION

This dissertation is dedicated to my wonderful parents Chithra Gopalan and T.N. Gopalan, who have patiently waited for 29 years to see me complete this journey.

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Miracles happen once in a lifetime. It did in my life too, just once and there was no turning back. It was business as usual in Singapore and little did I realize that I was going to run into this gentleman, who would end up transforming my life from that very moment. Summer 2009 was when I met Prof. Ramkishen Rajan and my life assumed a new meaning since then. While I always wanted a PhD, I was convinced that I would not pursue one until I stumble upon a suitable mentor who would be more than just a ceremonial supervisor. True to the good old Sanskrit adage that reads *Matha, Pitha, Guru, Deivam* (Mother, Father, Teacher and God), after your parents who give you life, it is your teacher who dons the role of the *Matha (mother)* and the *Pitha (father)* and is responsible for the evolution of his disciple, guiding him to the path of enlightenment. My association with Prof. Rajan has been one such – a truly intellectually rewarding experience and a journey that is bound to continue to eternity. He gave me what most people in this world crave for – an opportunity – an opportunity to rediscover myself, to harness noble values, to develop an insatiable appetite for learning, to handle the vicissitudes of life better and in all, to be a better and wiser human being. He literally adopted me and sculpted my life in every possible way, which I believe is a rarity in today's day and age. I am not sure whether I have lived up to his expectations but I am glad I have him in my life to keep pushing me to do more all the time, reminding me that I have miles to go before I sleep. I can perhaps write a longer acknowledgement than my dissertation thanking him, but I must stop here by expressing my hearty gratitude once again to my *Guru* who has brought me to where I stand today – indeed my indebtedness is beyond words.

My PhD life has been filled with several pleasant encounters and there are a number of people who have played a part in making this journey special. First on this list are the members of my dissertation committee - Professor Andrew Hughes-Hallet, Professor Kenneth Reinert and Prof. Siona Listokin – who have been instrumental in helping me complete my PhD. I thank them sincerely for their generous time and unflinching support that helped me stay on course. A special word of thanks to Dr. Alice Ouyang for agreeing to serve on my committee as an external reader and providing valuable feedback which helped me refine my chapters significantly.

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grateful for all her guidance through my PhD as well as for her generous financial assistance. The second is Ashwin Samuel – a friend who has always been an elder brother to me since my college days and who placed his trust and confidence in me and stood by me financially too at times of need.

I have greatly benefitted from various discussions with Venkataramana Yanamandra, with whom I have professionally collaborated in research in similar areas of interest. My evolution in the program was also shaped by constant interactions with a lot of my friends– both within and outside the programme. Particularly I would like to thank Vijay Muralidharan, Ragupathy Venkatachalam, Dr. Jaya Krishnakumar, Lokesh Dani, Phil Pedlikin, Vipin Veetil, Ian Stanford, Beth Tschopp, Tasia Rayton, Ammar Malik, Lotta Moberg, Amit Patel and Lazaro Sandoval for their valuable time to have coffee as well as telephonic conversations on various issues pertinent to my dissertation.

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Outside the school, a special word of thanks is in order to Harminder Chyle for her unflinching moral support, not to mention her culinary delights which helped me keep my sanity intact. Another friend I must thank is Chandrasekhar Godavarthi for spending considerable time of his, cooking a variety of South Indian delights for me, whenever there was an opportunity. My hearty thanks to the folks at North Side Social, the coffee shop where I literally spent my most memorable days of my graduate life.

Finally, I am blessed with a closely-knit family who has played a defining role in helping me complete this journey. While I do not think I can do justice in this given space to explain the role each of them played, I would specifically like to list a few of them here as a mark of my deep gratitude for being a great source of strength. Particularly, I am grateful to Prakash Sampathkumar, Prakas Kannan and TK Narayanan– the closest cousins in my extended family who have for long been waiting to see me complete a PhD and have supported me in this endeavor in numerous ways. Thanks are also due to the Renganathan family including Vykunth Ashok, Abishek Madhavan, Usha Renganathan, Ashok Renganathan, their parents and Perumalswamy for doing their best to help me out whenever there was a need for it. A note of thanks also to Janani Kedarnath for being a support system since my school. I am only left teary-eyed when I think about what all these folks have done to me in my life.

Stressing yet again that this work is dedicated to my parents, let me also add that I have been the luckiest in this world perhaps in being blessed with such great caring parents, though it might sound a bit clichéd. But then, I really feel that I could not have asked for more. I am not just living my dream but also theirs. Without their unconditional love and support, this dissertation would not have been possible. I hope that they feel that my stay, tens of thousands of miles away from them, leaving them to battle all kinds of physical and emotional stress on their own, has been worth the while, fruitful and productive.

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LIST OF ABBREVIATIONS

ACPR	Augmented Component Plus Residual
ADF	Augmented Dickey Fuller
AFC	Asian Financial Crisis
ATMs	Automatic Teller Machines
CPI	Consumer Price Index
EMDEs	Emerging and Developing Economies
FDI	Foreign Direct Investment
GATS	General Agreement on Trade in Services
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GLS	Generalized Least Squares
GMM	Generalized Method of Moments
GNI	Gross National Income
IFS	International Financial Statistics
IMF	International Monetary Fund
IRPT	Interest Rate Pass-Through
IV	Instrumental Variables
LOWESS	Local Weighted Scatterplot Smoothing
M&A	Mergers and Acquisitions
MLE	Maximum Likelihood Estimation
OLS	Ordinary Least Square
OMO	Open Market Operation
PPI	Producer Price Index
REER	Real Effective Exchange Rate
TSLs	Two-Stage Least Squares
USD	United States Dollar

ABSTRACT

MONETARY AND FINANCIAL IMPLICATIONS OF FOREIGN BANK ENTRY IN EMERGING AND DEVELOPING ECONOMIES

Sasidaran Gopalan, Ph.D.

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Dissertation Director: Dr. Ramkishen S. Rajan

An important feature of international financial liberalization in several emerging and developing economies (EMDEs) over the last two decades has been the rising foreign bank participation in their domestic banking systems.

Allowing foreign banks into a host economy could generate a variety of benefits, including enhanced domestic banking efficiency, greater financial sector development and even an element of lending stability during times of crisis owing to its deep pockets.

However, foreign banks could also entail significant costs to an economy especially if they increase the vulnerability of the host economy by transmitting exogenous shocks leading to domestic credit volatility. Alternatively, foreign banks could 'cherry-pick' the creditworthy borrowers, leaving the riskier pool of borrowers to the domestic banks which may result in a net reduction in aggregate credit supply in the economy.

While the literature examining the various implications of foreign bank entry continues to grow, it is worth underlining that bank-based financial systems play a systemically important role in EMDEs. In this context, the need for these countries to assess the cost-benefit tradeoffs of foreign bank entry and design appropriate policies assumes significance.

In this light, this dissertation examines three related yet different dimensions of the impact of foreign bank entry in EMDEs which have immense policy relevance. Chapter 2 of the dissertation begins by examining how foreign bank entry affects financial depth in a panel of 57 EMDEs over 1995 to 2009. Considering the ambiguity in the literature on the impact of foreign banks on financial depth, this chapter uses alternative measures of financial depth to illustrate the impact of greater foreign bank entry. Further, the chapter also tests whether this relationship varies by various income thresholds of EMDEs. The empirical results find foreign banks to have a direct positive impact in furthering financial depth, though the marginal effects of foreign bank entry diminish as income levels rise. In other words, the impact of foreign bank entry tends to become smaller as the country attains a higher level of economic development. This, we believe, has important policy implications for several EMDEs that are in the process of gradually liberalizing their banking sectors to foreign competition.

Continuing with the theme of financial sector development, Chapter 3 of this dissertation analyzes a related dimension of financial development -- financial inclusion – which relates to making finance more accessible for all households and

firms in an economy. The limited literature relating foreign bank entry and financial inclusion raises concerns that the foreign banks could be negatively associated with banking sector outreach owing to their tendency to cater to a smaller segment of the population. There is also an active policy debate that appears to complement the rather limited empirical literature in several EMDEs about the controversial role of financial liberalization in promoting financial inclusion. In this light, the chapter specifically analyzes the impact of foreign banks on financial inclusion covering 52 EMDEs in a panel framework over 2004 to 2009. Additionally, considering the importance of the implications of banking concentration after financial liberalization in EMDEs, this chapter also specifically examines how banking concentration and foreign bank entry jointly influence financial inclusion in EMDEs. The chapter finds that foreign banks have a significantly direct positive impact in furthering financial inclusion, though the relationship turns negative when foreign bank entry is followed by greater banking concentration.

Finally, the last chapter focusses on an important macroeconomic implication of foreign bank entry which pertains to their role in affecting the domestic monetary transmission channel. Among the various channels of monetary policy transmission, of importance and relevance to EMDEs is the interest rate channel. Considering that there is almost no study in the literature that examines how interest rate transmission changes with higher foreign bank participation, we study this issue in Chapter 4 of this dissertation. The chapter estimates the impact of foreign bank entry on interest rate transmission of monetary policy in a panel of 57

EMDEs between 1995 and 2009 and specifically tests for the presence and impact of different foreign bank thresholds on interest rate pass-through. The empirical results suggest that there are strong threshold effects in that foreign bank entry tends to enhance interest rate transmission only in countries with greater degree of foreign bank presence compared to those with limited entry. Finally, the chapter also finds that when foreign bank entry tends to result in greater banking concentration, it significantly lowers the extent of interest rate transmission, a finding that merits policy attention. This result underlines the point that when greater competition in the banking sector is typically followed by higher levels of banking concentration, then it would merely imply that the market structure of the banking industry has merely become more oligopolistic characterized by foreign bank domination, which may eventually result in a likely weakening of the interest rate transmission.

Overall, all the three chapters in this dissertation make an attempt to further the empirical literature on various monetary and financial implications of foreign bank entry in EMDEs. By doing so, we hope to enrich the policy discourse on one of the contentious issues relating to international financial liberalization.

CHAPTER 1. TRENDS IN FOREIGN BANK ENTRY IN EMERGING AND DEVELOPING ECONOMIES: AN OVERVIEW

Abstract

This chapter examines broad trends in foreign bank entry in emerging and developing economies (EMDEs) over the period 1995-2009. The chapter lays out an analytical framework to examine the importance of foreign bank entry in EMDEs and identifies three fundamental gaps that arise from the literature which will be focus of this dissertation. The chapter concludes by providing a brief discussion of the research questions this dissertation addresses, the contributions henceforth to the literature on foreign bank entry as well as a preview of the empirical findings.

1. Introduction

Over the last two decades, several emerging and developing economies (EMDEs) ¹ have embraced domestic as well as international financial liberalization. While there is considerable heterogeneity in the details of the policy mixtures adopted by individual countries, the broad contours have remained constant across the board, with most countries opening up their economies to cross-border flows of private capital and their financial systems to both domestic and foreign entrants.

From a theoretical standpoint, the relationship between financial liberalization and economic growth is ambiguous at best. Beginning with the

¹ We adopt the classification followed by Claessens and Van Horen (2011) of emerging and developing economies. Annex 1.1 provides the sample of countries that is used through this dissertation, unless and otherwise noted.

influential work of Mckinnon (1973) and Shaw (1973), several studies have argued that a movement away from 'financial repressive' policies by eliminating credit controls and deregulating interest rates, as well as allowing greater competition in the banking sector, could bring positive growth benefits. Combined with liberalization of international capital flows, financial liberalization could result in greater economic growth through efficient allocation of capital across borders, transfer of best practices in technological knowhow and management as well as increased production specialization due to better risk management practices (see Williamson and Mahar, 1998 and Bekaert et al., 2005 for reviews).

However, another set of studies based on the 'theory of the second best' has argued that the removal of one distortion need not necessarily be welfare-enhancing when other market distortions are present. As Kose et al. (2009) and Galindo et al. (2002) note, international capital flows going into certain protective industries could have 'perverse effects' by exploiting the benefits of protection in domestic markets, resulting in welfare losses and sub-optimal growth (Brecher and Diaz-Alejandro, 1977). Similarly, a growing literature building on the work by Stiglitz (2004) has also noted that information asymmetries stemming from a lack of transparency in financial institutions could lead to inefficient allocation of capital flows, generating maturity mismatches and resulting in costly crises (also see Stiglitz and Weiss, 1981). Further, as the comprehensive survey of empirical literature in Kose et al. (2009) reveals, the cross-country empirical literature appears to be fairly inconclusive in establishing that financial openness on the

whole has had a discernible positive impact on growth (Eichengreen, 2001; Contessi and Weinberger, 2009; Kose et al., 2009).

While the growth-effects of financial openness remain heavily contested, what can be said with certainty is that if it does not take place in a well-sequenced and timed manner, it could lead to episodes of severe financial instability and distress (Bird and Rajan, 2001; Cobham, 2002; Prasad and Rajan, 2008). To be sure, while there is no universal model as to what the appropriate sequencing of financial openness must be, there seems to be a consensus that a combination of internal financial deregulation and domestic macroeconomic stabilization are *necessary but insufficient* conditions for countries to benefit from full-fledged external financial liberalization. The sufficiency conditions however would be satisfied only when there are complementary prudential and institutional regulations that accompany the process of financial openness (Eichengreen, 2001; Lee, 2002; Kaminsky and Schmukler, 2008).

In a related strand of work, Kose et al. (2009) propose an alternative unifying framework to examine the impacts of international financial liberalization on growth and emphasize that the indirect benefits such as developing domestic financial markets and improving corporate and public governance may be more important than the direct benefits through the traditional financing channels that has been the focus so far. This literature also emphasizes that for countries to reap even such indirect benefits, a certain “threshold” of domestic financial and

institutional development is required, without which the risk of such financial liberalization may be large (Kose et al., 2011).

Motivated by this burgeoning literature in the area, this dissertation will attempt to study *one* important dimension of international financial liberalization, viz. *international banking liberalization*, with a focus on EMDEs. The remainder of this chapter will proceed as follows. Section 1.1 begins by motivating the topic by shedding some conceptual clarity on what international financial liberalization actually entails. It presents a schematic representation of the related literature that helps place the theme of international banking liberalization in proper context. Section 1.2 outlines some broad trends in foreign bank penetration in EMDEs. A brief summary of the various theoretical and empirical determinants as to why banks go abroad is provided in Section 1.3. Having set the stage for the discussion, Section 1.4 will explain the themes that this dissertation sets out to examine as well as highlight the contributions to the literature. Section 1.5 summarizes the discussion and concludes the chapter.

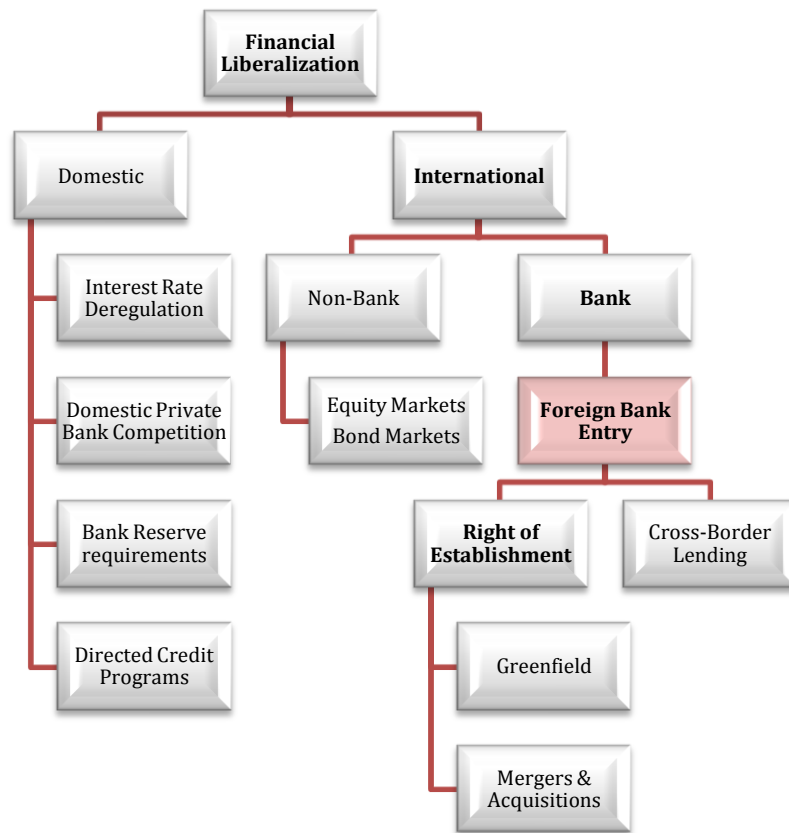
1.1. Understanding International Financial Liberalization

The term financial liberalization, while widely used, is often not carefully defined. Figure 1.1.1 schematically represents the different types and degrees of financial liberalization. Broadly, one can represent the types of financial liberalization by first making a distinction between domestic and international financial liberalization. *Domestic financial liberalization* involves, among other

things, the relaxation of domestic credit controls, interest rate controls, and encouraging domestic private bank competition (i.e. the opposite of financial repression) (as well as easing restrictions on domestic balance sheet holdings)². *International financial liberalization*, on the other hand, is generally loosely defined to encompass both capital account liberalization as well as internationalization of financial services. This can in turn be bank-based or non-bank based, with the former specifically involving the banks in cross-border flows of equity or commercial lending and the latter referring to other equity and bond flows excluding banks.

However, many observers of international financial liberalization fail to make a distinction between capital account liberalization per se on the one hand, and banking sector internationalization on the other hand. While capital account liberalization involves the process of removal of all forms of capital controls (implying complete inward and outward capital mobility) and possibly also restrictions on the convertibility of a country's currency (Bird and Rajan, 2000), banking internationalization is broadly defined as the elimination of barriers to entry and discriminatory treatment of foreign competition as well as cross-border provision of banking services (Bird and Rajan, 2000; Rajan and Noy, 2009).

² For more on domestic financial liberalization, see Ang (2009), Williamson and Mahar (1998), Ito (2008) and McKinnon (1991).



Source: Author

Figure 1.1.1: Financial Liberalization – A Schematic Representation

Focusing specifically on international banking liberalization, a country can open up its banking sector to foreign competition in two fundamental ways. One is to allow direct investments in the banking sector (banking FDI or foreign bank entry through right of establishment), while the other is to allow for cross-border banking activities (that involves lending and borrowing activities involving foreign banks).

While the latter essentially involves partial capital account liberalization, the former could be in the form of Greenfield investments or Mergers & Acquisitions (M&A)³.

Tangentially, it is also useful to place this process of liberalization under different modes of financial services trade as outlined by the General Agreement on Trade in Services (GATS). There are four modes of supply through which trade in services occur in general. We explain the case of financial services trade by considering the following hypothetical example (with India as the host country). *Mode 1* (cross-border supply) refers to transactions that involve cross-border supply of the service but not the service supplier, i.e. for example, the granting of a loan by a New York-based bank to an Indian consumer located in India. *Mode 2* (consumption abroad) involves consumption of a service abroad, i.e. opening of a bank account by an Indian resident while travelling in the United States. *Mode 3* (commercial presence) entails the commercial presence of a supplier of one country in the jurisdiction of another country, i.e. when a United States bank (or any other financial institution) establishes an agency, branch or a subsidiary in India to supply financial services in India (this is the mode that is applicable to our discussion of foreign bank entry in this dissertation). *Mode 4* (temporary movement of natural persons) covers the supply of services through the temporary presence of natural persons, i.e. bank officials sent from the parent bank in the United States to the bank's branch or subsidiary in India.

³ Greenfield or M&As can take different organizational forms, i.e. branch or a subsidiary or a representative office.

Keeping this in mind, let us examine the nexus between capital account liberalization and bank internationalization borrowing the framework of Kono and Schuknecht (1999) as shown in Table 1.1.1 (also see Bird and Rajan, 2000).

Table 1.1.1 Domestic vs. International Capital Flows and Bank Internationalization

	Loan provided by Domestic Supplier	Loan provided by Foreign Supplier*
Loan involves Domestic Capital only	<u>Cell I:</u> Neither financial services trade nor international capital flows.	<u>Cell II:</u> Financial services trade plus inward direct investment.
Loan involves International Capital only	<u>Cell III:</u> International capital flows only.	<u>Cell IV:</u> Financial services trade plus inward direct investment and international capital flows related to the supply of the loan

Note: Refers to the case of a loan provided by a bank that has established a domestic presence in the host country.

Source: Adapted from Kono and Schuknecht (1999).

Cell I on the uppermost left-hand corner refers to the case of financial autarky, i.e. neither financial services trade nor an open capital account. The diametrically opposite case can be found in Cell IV on the bottom right-hand side which denotes the case of “complete” international financial liberalization, i.e. liberal capital account as well as bank internationalization to include provision of cross-border banking services as well as foreign bank presence through right of establishment. The remaining two cells may be broadly classified as “partial

international financial liberalization". Specifically, Cell II involves the case of partial bank internationalization with capital restrictions (i.e. liberalizing Mode 3 commitments to allow foreign bank entry through right of establishment but not commit to Mode 1 which involves provision of services such as cross-border bank lending). Cell III pertains to the case of capital account deregulation though with restrictions on all forms of banking internationalization.

The point to be emphasized here is that while liberalization of FDI in the banking sector would be required to achieve liberalization of financial services trade through commercial presence (Mode 3), it is also possible for countries to liberalize Mode 3 provisions by allowing foreign banks to "set up shops" but restrict cross-border capital movements by limiting their commitments in Mode 1.⁴ Thus the two concepts are inter-related but not equivalent and have very different policy implications, which is why the distinction has to be clear.

In this dissertation we are interested specifically in examining the literature on *one* dimension of international financial liberalization – i.e. foreign bank entry associated with the right of establishment, which is more narrowly measured in terms of number of foreign owned banks (with majority ownership stake) or its share of banking assets in the host country but not necessarily their share of loans as that could be supplied cross-border.⁵ Our focus will be on EMDEs, several of

⁴ That said, in reality the various elements of international financial liberalization could be closely intertwined though the assumption of total separability is useful conceptually.

⁵ For a discussion of Mode 1, i.e. cross-border foreign bank lending, see for instance McGuire and Tarashev (2008) and Herrmann and Mihaljek (2010).

whom have been active over the last two decades in opening up their domestic banking systems to entry of foreign banks.

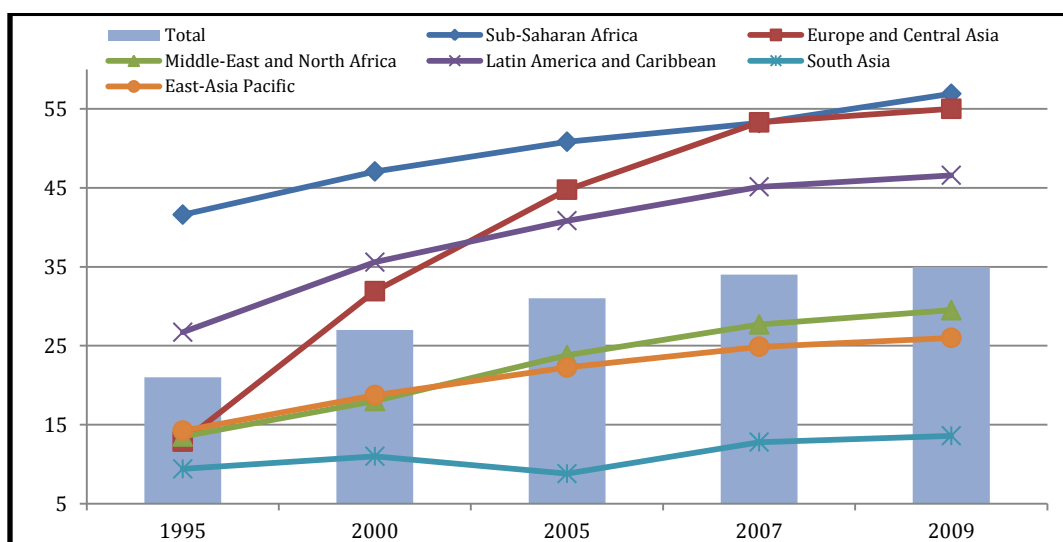
1.2. Trends in Foreign Bank Entry in EMDEs⁶

The series of EMDE crises in the 1990s covering the entire spectrum of countries from Latin America to Asia provided a major impetus to open up the domestic market to foreign banks (Crystal et al., 2001; Tschoegl, 2005). Notwithstanding the variations in the degree and scope of their involvement between regions and countries since then, foreign bank presence has grown significantly across the board in the EMDEs. Measured in terms of the share of foreign banks (in terms of numbers) relative to the total number of banks across EMDEs spanning all regions in the world, this share has increased from 21 per cent in 1995 to 35 percent in 2009. The same is largely true of the EMDEs within every region, though there are notable variations. Three regions - Sub-Saharan Africa, Europe and Central Asia and Latin America and Caribbean - stand out in terms of the numbers.

As Figure 1.2.1 captures, on average, foreign banks constitute more than half the share of the total banks in Sub-Saharan Africa and Europe and Central Asia while it is slightly under 50 percent for Latin America and Caribbean. Over the years, Sub-Saharan Africa has seen this share grow from only from about 41 per cent in 1995 to 57 in 2009 (largely due to its colonial past), Europe and Central Asia has seen a

⁶ The discussion in this section draws on the data employed by Claessens and Van Horen (2011).

dramatic increase from 13 per cent to 55 per cent in the corresponding period. Latin American and the Caribbean closely track Europe and Central Asia with the region, having witnessed a rise in share of foreign banks from about 27 per cent in 1995 to 47 per cent in 2009. The other regions have also experienced a rise in foreign bank representation, though they are much more modest. In the Middle East and Northern Africa, the share of foreign banks relative to the total number of banks rose from 14 per cent to 30 per cent between 1995 and 2009. The EMDEs in Asia have been relatively slow compared to other regions in letting foreign banks in, though the shares are growing. In the East Asia and Pacific region particularly, the percentage of foreign banks rose from 13 to nearly 26 per cent during the same period, while South Asia saw a marginal rise from close to 9 per cent to close to 13 percent between 1995 and 2009.



Note: This figure shows the average number of foreign banks (expressed as percentage of total banks) in each region at each point in time. A bank is considered foreign when it owns at least 50 percent of shares.

Source: Compiled from Claessens et al. (2008) and Claessens and Van Horen (2011).

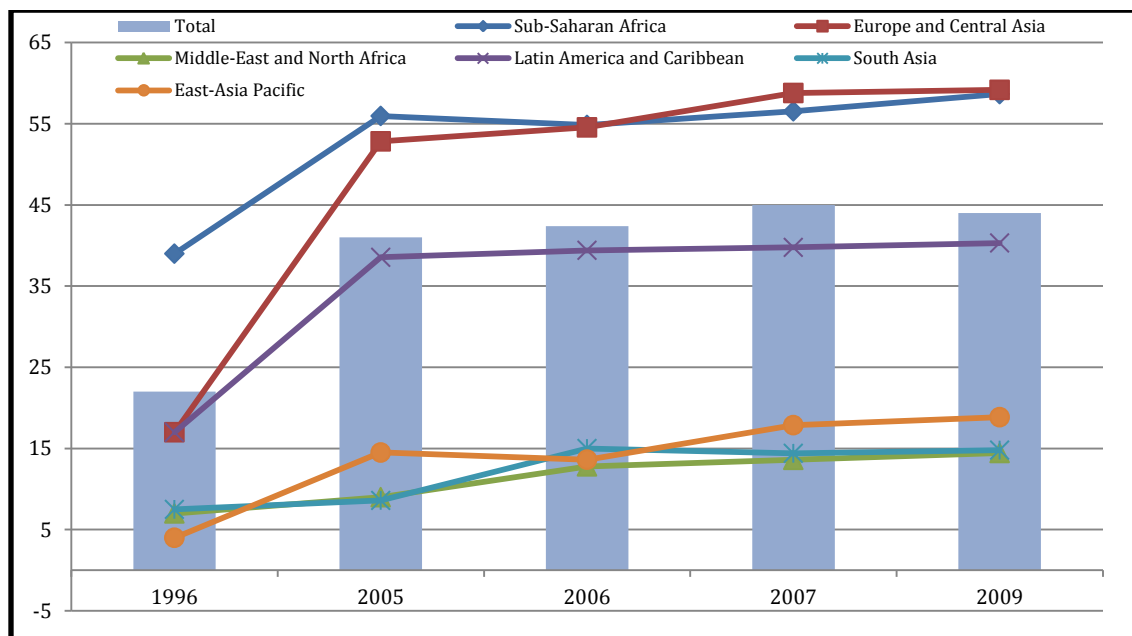
Figure 1.2.1 Share of Number of Foreign Banks Relative to All Banks across EMDEs

The problem with using number of banks is that they do not capture the extent of foreign bank penetration into the domestic banking system as the nature of their operations could depend on the mode of entry. For instance, as Gopalan and Rajan (2010) note, at a disaggregated level, the number of foreign banks in some countries in Asia actually went down between 1997 and 2008 despite the various regulations designed to ease the entry norms for foreign banks, though overall the region saw a rise in the number of foreign banks. This seemingly counter-intuitive result was largely driven by major consolidations and domestic restructurings among local banks. Therefore, a preferable yardstick of the extent of foreign bank presence in a country is to look at the percentage share of their assets in the domestic banking system. Latest available data indicates that foreign banks in terms of their share of assets in the total banking system across EMDEs has doubled from 22 per cent to 44 per cent between 1995 and 2009 (Figure 1.2.2).

The data also suggests that the assets share closely tracks foreign bank presence in terms of their numbers.⁷ As Figure 1.2.3 reveals, on average, the same three regions – Sub-Saharan Africa, Europe and Central Asia and Latin America and Caribbean dominate in terms of the percentage shares of assets owned by foreign

⁷ As Claessens and Van Horen (2011) note, countries with greater number of foreign banks tend to have higher representation in terms of asset shares too because foreign banks play a much larger role in terms of financial intermediation in countries where they are more in numbers. On the other hand, they tend to be niche players in countries where they are less in numbers.

banks. While Sub-Saharan Africa saw its foreign bank assets rise from an average of just under 40 per cent in 1996 to close to 60 per cent in 2009, the corresponding shares in Europe and Central Asia rose from 17 per cent to 60 per cent.



Note: This figure shows the average share of assets held by foreign banks (expressed as percentage of total assets) in each region at each point in time. A bank is considered foreign when it owns at least 50 percent of shares.

Source: Compiled from Claessens et al. (2008) and Claessens and Van Horen (2011).

Figure 1.2.2 Share of Foreign Bank Assets in Total Banking Assets across EMDEs

Latin America also witnessed a remarkable change, with shares growing from 17 per cent to 41 per cent on average between 1996 and 2009. As noted earlier, compared to the other regions, on a relative basis, the degree of foreign bank presence in East Asia and Pacific, South Asia and the Middle East and Northern

Africa has been smaller though the shares are rising in importance. While the average share of foreign bank assets doubled between 1996 and 2009 in Middle East and Northern Africa from 7 to 14 per cent, East Asia experienced a tripling from 4 to 19 percent in the same period and South Asia almost doubled from about 8 percent in 1996 to at 15 percent in 2009.

An obvious point that emerges from the trends discussed above is the notable degree of variability in foreign bank presence (both in terms of numbers and asset shares) among regions. This can also be seen from Table 1.2.1 where we identify the maximum and minimum share of assets held by foreign banks in each region along with the coefficient of variation of assets as of 2009.⁸

Table 1.2.1 Descriptive Statistics for the Share of Foreign Bank Assets across Regions, 2009

Region	Minimum		Median	Maximum		Coefficient of Variation
	%	Country	%	%	Country	
Sub-Saharan Africa	0	Ethiopia	61	100	Burkina Faso	0.6
Europe and Central Asia	3	Azerbaijan	70	99	Estonia	0.6
Middle-East and North Africa	0	Iran, Yemen, Oman and Libya	14	36	Lebanon	1
Latin America and Caribbean	0	Cuba and Haiti	34	100	Argentina	0.8
South Asia	0	Sri Lanka	5	53	Pakistan	1.5
East-Asia and	1	China	18	54	Cambodia	1

⁸ We follow Cull and Martinez Peria (2010) who perform a similar exercise using data for 2005 and reports only coefficient of variations for one year. But we track the changes over time as we find important changes within regions over time in terms of foreign bank presence. The variations we observe within countries in specific regions like South Asia or East Asia and Pacific show that not all countries in the region have allowed foreign banks to enter their economy in a uniform fashion. The degree of foreign bank participation appears more uniform through other regions such as Europe and Central Asia, Latin America and Caribbean and Sub-Saharan Africa.

Pacific						
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Note: This table shows the minimum, median, maximum and coefficient of variation (standard deviation divided by the mean) of the share of assets held by foreign banks in each region. The countries with the minimum and maximum share in each region are also reported.

Source: Computed based on Claessens et al. (2008), Claessens and Van Horen (2011) and Cull and Martinez Peria (2010).

The data shown above brought out the heterogeneous pattern of foreign bank participation in EMDEs across different regions. However, the trends also indicate that the shares of foreign banks in terms of their numbers as well as their assets have been growing in significance.

1.3. Determinants of Foreign Bank Entry in EMDEs

As noted earlier, many EMDEs – especially in Latin America and East Asia -- started allowing foreign banks to enter after they underwent a financial crisis, primarily to use them as a means of recapitalizing their beleaguered domestic banking system. So while EMDEs as a group have an interest in welcoming foreign banks, what motivates a bank to venture overseas in the first instance? The decision pertaining to why foreign banks enter EMDEs goes well beyond the notion of seeking profits. There is a sizeable literature that discusses its motives and connects the decisions of foreign banks to go abroad to the theory of multi-national enterprises (MNEs) in general.

The theoretical literature concerning the question of what influences banks' decisions to go abroad can be treated as a subset of the theory of MNEs. The two

leading paradigms borrowed from the theory of MNEs – the internalization theory and the eclectic paradigm – have been applied to the banking industry to understand the motives for banks to go abroad (Buckley and Casson, 1976; Dunning, 1980). While the debate in the literature about which paradigm is more suitable to the foreign bank literature is unsettled, both the frameworks place considerable emphasis on the theme of internalization (Curry et al., 2003; Williams, 1997). The central idea behind the theory is that the source country firms possess some intangible firm-specific advantages in the domestic market that can be used effectively in the foreign market at a low marginal cost owing to presence of negative externalities in the home market. This has been couched as the broader rationale for banks to expand abroad (for useful overviews, see Buckley and Casson, 2009, Rugman and Verbeke, 2007, and Rugman, 2010).

The empirical literature complements the theoretical literature in the sense that the testable hypotheses have largely flowed out of the theories of multinational banking. The studies suggest that the reasons why banks go abroad may broadly be explained by a set of microeconomic, macroeconomic and institutional factors. Specifically, the micro set of determinants -- borrowing insights from the internalization theory -- primarily relate to the desire of the banks to follow their clientele abroad (defensive expansion)⁹ and the motives to achieve geographical diversification (for instance Soussa, 2004 and Guillen and Tschoegl, 1999). The

⁹ An illustrative set of studies that find evidence of defensive expansion as the motive for banks to go abroad include Goldberg and Saunders (1980; 1981a; 1981b), Grosse and Goldberg (1991), Goldberg and Johnson (1990) and Brealey and Kaplanis (1996).

institutional determinants, on the other hand, mainly relate to the foreign banks exploiting the regulatory arbitrage between the host and home countries as well as taking advantage of the reduction in information costs of doing business in foreign markets.¹⁰

The macroeconomic determinants relate to a set of both pull factors on the host country side as well as push factors from the home country side. More specifically, while the profit and growth opportunities based on risk perceptions constitute the pull factors from the host country's perspective, other specific macroeconomic and financial conditions including market saturation in the home country act as the push factors in affecting a bank's decision to go abroad.¹¹

While a combination of factors appears to be at work in influencing the decision of a bank to go abroad,¹² it is also important to understand the effects of such a decision from a standpoint of the host economy. To that end, what has been the impact of greater banking sector openness to foreign competition in EMDEs? We provide a framework in the next section to examine the various dimensions through which we can assess the impact of foreign banks and also highlight the specific themes that this dissertation explores.

¹⁰ A selected set of papers that focus on institutional determinants of foreign bank entry include Barth et al. (2001; 2013), Focarelli and Pozzolo (2001) and Galindo et al. (2003).

¹¹ Some papers that fall under this strand of literature are Brealey and Kaplanis (1996), Yamori (1998), Buch (2000), Buch and Lipponer (2004), Claessens et al. (2000) and Soussa (2004).

¹² While the literature introduces a variety of motives to enter another economy, it is largely silent as to which motives are more important than the other. Such a ranking could be a useful direction for future research.

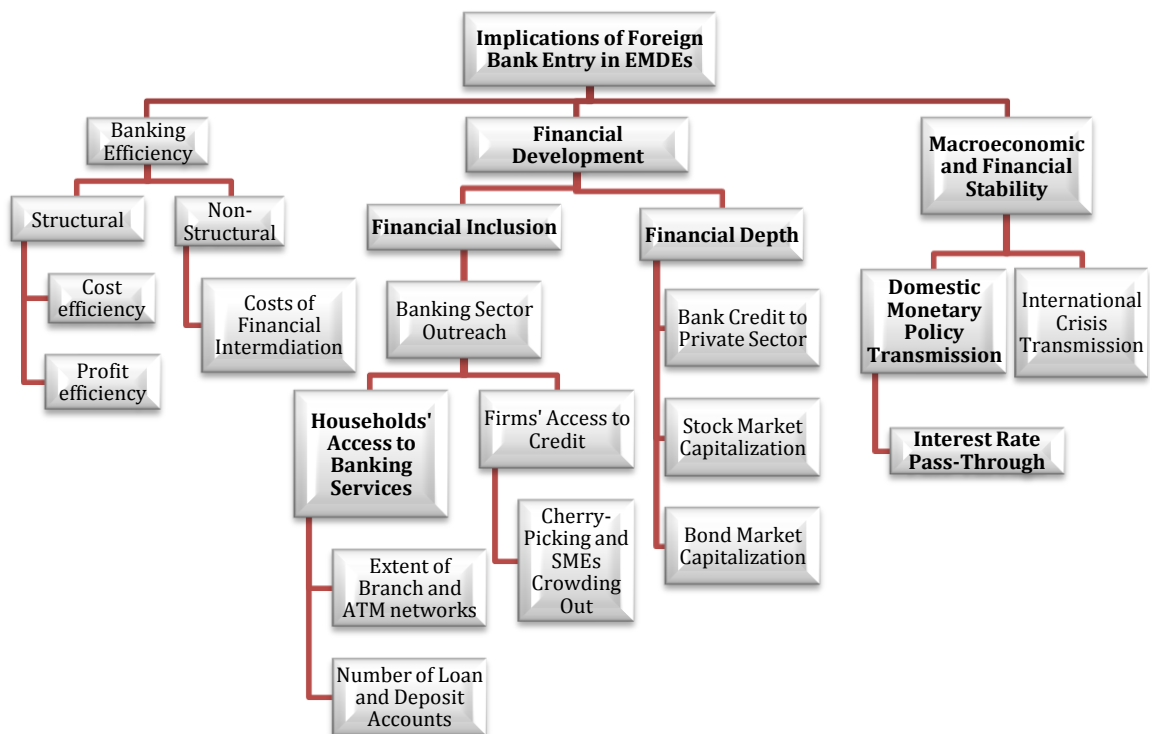
1.4. Impact of Foreign Bank Entry on Host Country

The literature points to a variety of benefits that foreign banks bring in to the host country as summarized in Figure 1.4.1. Several studies document evidence of greater efficiency gains to the domestic banking system in the host countries, particularly in the context of EMDEs. Beyond the promise of efficiency improvements, which remains the most oft-cited rationale for allowing foreign banks, the literature also indicates how foreign bank entry contributes to the development of overall financial and money markets in the host economy eventually leading to favourable economic growth. Broadly, as studies note, foreign banks could contribute to two important dimensions that make up financial development - financial depth and financial inclusion. On the one hand, foreign banks could enhance financial sector deepening (financial depth) by the expansion of banking credit to the private sector, or via enhanced liquidity in the domestic equity market, or contribute to a well-capitalized bond market. On the other hand, they could also facilitate financial inclusion by broadening the accessibility of financial services for households and firms in an economy through expanding the outreach of their services.

The third important dimension of foreign bank entry, as shown in Figure 1.4.1, concerns the impacts of foreign bank lending on macroeconomic volatility and financial stability. Foreign banks could well be seen as a source of stability at times of stress or as a potential channel through which shocks can be transmitted to the domestic economy. Under transmission channels, the literature discusses both

international crisis transmission emanating from global shocks as well as domestic monetary policy transmission as a response to domestic shocks.

In what follows, we will provide a brief overview of each of these strands of literature, identify the specific themes that this dissertation explores, the contributions to the literature on foreign bank entry, and finally offer a preview of the main empirical findings.



Source: Author

Figure 1.4.1 Foreign Bank Entry - A Framework

1.4.1. Implications on Banking Efficiency

As highlighted earlier, a growing body of evidence points out how foreign banks generate efficiency gains by facilitating a reduction in cost structures, improvements in operational efficiency, introduction and application of new technologies and banking products, marketing skills and management and corporate governance structures (Claessens et al., 2001). In relation to this, as some studies note, foreign banks could enhance the quality of human capital in the domestic banking system by importing high-skilled personnel to work in the local host subsidiary as well as via knowledge spillovers to local employees which may in turn benefit the customers in terms of access to new financial services. Foreign banks not only operate with lower overhead costs and charge lower spreads compared to domestic banks but also help promote bank competition by pressuring other banks to lower their costs and their spreads, which have in totality led to improvements in the banking system efficiency.¹³

This is not unlike the age-old literature on FDI dating back to Caves (1974) which points out that the benefits accruing to the host countries through FDI arise mainly from productivity spillovers. This enables the foreign firms to enhance the productivity of the domestic firms in the host countries through transfers of technology and managerial know-how which in turn introduces a series of spillover effects in the form of enhanced human capital and higher wages resulting in higher

¹³ See among others, Levine (1996), Barajas et al. (2000), Claessens and Glaessner (1998), Claessens et al. (2001), Crystal et al. (2001), and Tamirisa and Sorsa (2000).

productivity. Applying it to the banking industry, foreign banks in EMDEs are expected to contribute to improvements in managerial efficiency which will in turn improve the operating efficiency of the domestic banking system. Thus, one of the most important (expected) benefits of foreign bank entry is its enhancement of the efficiency of the domestic banking system, which could also potentially have a positive bearing on economic growth.¹⁴

As pointed out by Figure 1.4.1, the literature on banking efficiency can be broadly divided into two approaches – structural and non-structural (Chen, 2009). Structural approaches typically deal with banking behavior and involve optimization problems such as cost minimization or profit maximization. The most common approach adopted in this literature is to compute and compare the efficiency of banks according to ownership categories, i.e. foreign or domestic banks (private or state-owned) and assessing whether such efficiency has translated into improving the overall efficiency in the banking system. Structural approaches specifically involve the estimation of frontier functions of efficiency *a la* Farrell (1957) and then measuring the difference between the point at which the bank is operating and the optimal efficiency frontier. This, commonly referred to as the X-efficiency, is a measure of the productivity levels of a bank in terms of its usage of

¹⁴ On the one hand while spillover effects raise the profitability and reduce the overhead costs of domestic banks, competitive effects on the other hand could reduce both the profitability and overhead costs of domestic banks. This suggests that the overall impact of banking liberalization could be ambiguous in theory and remains largely an empirical question.

inputs to generate a certain level of output.¹⁵ Measurement of efficiency levels of individual banks is followed by identifying the determinants behind the differences among the efficiency levels of the various banks under consideration.

Nonstructural approaches focus on a host of variables that could possibly possess the explanatory power to account for different performance measures of banking efficiency (Table 1.4.1). Banking efficiency in this strand of literature is often measured in terms of the costs of financial intermediation and the most extensively used variables proxying for financial intermediation costs are interest rate spreads (between lending and deposit rates) or net interest margins (NIMs). In addition to net interest margins, as Table 1.4.1 points out, other commonly used proxies in the literature to measure banking efficiency include lower overhead costs, lower implicit interest payments, lower credit risk as captured by lower non-performing loan ratios and higher asset quality or alternatively lower ratio of loan loss provisions to total interest income.

Table 1.4.1 Non-Structural Indicators of Banking Efficiency

Variable	Definition
<i>Net Interest Margins</i>	Ratio of total interest revenues net of total interest expenses to total assets; or difference between the interest expense paid to depositors and the interest income received from borrowers
<i>Overhead costs</i>	Ratio of total overhead expenses to total assets
<i>Credit risk</i>	Ratio of loan loss provisions to total loans

¹⁵ The two fundamental concepts employed to measure the so-called X-efficiency are cost efficiency and profit efficiency. While cost efficiency measures how close a bank's cost is to the minimal cost for producing a certain level of output given the input prices and a specific technology, profit efficiency measures how close a bank's profit is to the maximum achievable profit with a given level of input and output prices.

<i>Implicit Interest Payments</i>	Ratio of operating expenses net of non-interest revenues to total assets
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Source: Author based on Pogosyan (2012), Claessens et al. (2001) and Chen (2009).

It is pertinent to note that studies on banking efficiency have effectively dominated the foreign bank literature and empirical studies on banking efficiency are abundant. They have been carried out for both individual and a group of countries (cross-section) spanning all levels of development (emerging, transition and advanced economies) covering different regions (Europe, Asia, Latin America and Sub Saharan Africa), using different methodologies (structural and non-structural).¹⁶ Since there is already a voluminous amount of studies measuring efficiency, we do not examine this strand of literature further in this dissertation and instead focus on other dimensions of foreign bank entry in EMDEs as outlined in Figure 1.4.1.

1.4.2. Impact on Financial Development

Beyond efficiency gains, as it was noted earlier, one of the crucial features of foreign bank entry pertain to their impacts on domestic financial and money market development. The additional capital that they bring into the host country not only could facilitate productive resource allocation (Wu et al., 2010) and enhance the efficiency of the domestic banking system, but could also result in increased credit

¹⁶ See Berger (2007) for a review and critique of over 100 empirical studies using structural methods to compare banking efficiencies across nations. For a sample of papers that offer useful literature reviews on the issue of foreign bank entry and banking efficiency, see Berger (2007), Manlagnit (2011), Cull and Martinez Peria (2007), Berger et al. (2007) and Wezel (2010).

availability that facilitates overall financial development in the host country (Claessens et al., 2001).¹⁷ As the literature points out, financial development broadly can be divided into two components – financial depth and financial inclusion.

Foreign banks could contribute to financial sector deepening which could be reflected in either the expansion of banking credit to the private sector or enhanced liquidity in the domestic equity market or well-capitalized bond market. While, in general, studies have found evidence that foreign banks contribute to reduced costs of financial intermediation resulting in increased financial depth in the host country (Claessens et al., 2001), there is also evidence to suggest that this may not necessarily be the case in EMDEs, with some even finding a negative association between foreign bank entry and financial depth (Detragiache et al., 2008 and Rashid, 2011). An important qualification to these results is that there is a need to allow for differences in economic development before concluding that there is a negative relationship between the two.

Considering the importance of financial depth in EMDEs, Chapter 2 of this dissertation examines the nexus between foreign bank presence and financial deepening by specifically focusing on two important inter-related issues that have not been dealt with in the literature thus far. The first pertains to understanding the significance of foreign banks in contributing to financial depth in a panel framework covering 57 EMDEs over the period 1995 to 2009. In addition to studying a longer

¹⁷ Financial (sector) development broadly can be defined as “the factors, policies, and institutions that lead to effective financial intermediation and markets, and deep and broad access to capital and financial services” (World Economic Forum 2011, p.xiii).

time horizon for a large panel of countries, we also depart from the existing literature and examine the role for foreign banks in financial sector deepening using various alternative measures of financial depth. More specifically, while we follow the literature in defining financial depth narrowly using banking credit to the private sector as a proxy, we also go further and use stock market capitalization and bond market capitalization as alternative measures of financial depth.

The second important issue we tackle in this chapter relates to the degree to which this relationship between foreign bank entry and financial depth is affected by different income thresholds of the EMDEs. In other words, does the impact of foreign bank entry on financial depth vary based on level of economic development? While the limited literature on this subject points to the need to factor in such differences, a systematic examination appears to be missing to date, a gap this chapter attempts to fill. To preview the main empirical findings, while we find foreign banks to have a direct positive impact in furthering financial depth, the marginal effects of foreign bank entry diminish as income levels rise. In other words, the impact of foreign bank entry tends to become smaller as the country attains a higher level of economic development. This has important policy implications for several EMDEs that are gradually opening up their banking sectors to foreign competition.

Referring again to Figure 1.4.1, the other component of financial sector development pertains to financial inclusion which broadly deals with enabling firms and households to have access to the formal credit market and expanding provision

of financial services to them ‘at affordable costs’,¹⁸ This is also sometimes referred to as banking sector “outreach”, i.e. the degree to which the banking sector is able to meet the needs of a large segment of the population. Since banks play a pivotal role in achieving financial inclusion in EMDEs where bank-based financial systems dominate other forms of providers of financial services, the question of how foreign banks affect financial inclusion assumes policy significance. The related literature relating the entry of foreign banks and financial inclusion can be broadly divided into two strands.

The first strand deals with a micro dimension considering the impact of foreign banks on firms’ and households’ access to credit. The primary focus of this literature is on the lending patterns of foreign banks to various classes of borrowers and whether foreign banks “cherry-pick” financially transparent clients and cater only to a smaller segment of the population. Such behavior arises from the presence of information asymmetry which results in high costs of investing in lending relationships, particularly with small and opaque borrowers, which may eventually lead to a reduction in the credit access for those borrowers. However, it must be noted that much of this literature tends to be theoretical in nature, with the corresponding empirical literature remaining limited (owing largely to demanding data requirements) and ambiguous. To be sure, while a few empirical papers find

¹⁸ While provision of credit is usually channeled through the banking system in a country, it need not be the case always. In several EMDEs, even post offices play a significant role in catering to the needs of smaller households and firms by playing the core role of banks in an economy, by accepting deposits and making loans. For a discussion on the role for postal networks in expanding access to financial services, see World Bank (2005).

support for the view that foreign banks tend to be “fickle lenders” to opaque borrowers (Mian, 2006; Gormley, 2010), an emerging literature challenges this notion of foreign banks shying away from lending to opaque borrowers (particularly the SMEs) and posits that they are actively tapping the SME market even in countries with severe informational problems by resorting to alternative lending technologies (Clarke et al. 2006; De La Torre et al. 2010).

The second strand examines the relationship between foreign bank entry and specific indicators of financial inclusion that capture the provision of physical points of access to financial services as well as indicators reflecting greater use of those services by larger segments of the population (Beck and Martinez Peria, 2010; Beck et al. 2007). Given the growing policy debate in several EMDEs about the controversial role of financial liberalization in promoting financial inclusion as well as the concerns raised by the limited literature in this field that foreign banks could negatively impact banking sector outreach, Chapter 3 of the dissertation focuses on the relationship between foreign bank entry and financial inclusion.

Specifically, Chapter 3 empirically tests for the impact of foreign bank entry on banking sector outreach using broad indicators of financial inclusion in a panel framework for 52 EMDEs over 2004 to 2009. Further, keeping in mind the importance of the implications of banking concentration after financial liberalization in EMDEs, this chapter also tests for the relationship between banking concentration and foreign bank entry and how they jointly influence financial inclusion in EMDEs. To preview the main findings, we find that foreign banks have a

significantly direct positive impact in furthering financial inclusion, though the relationship turns negative when foreign bank entry is followed by greater banking concentration.

1.4.3. Impact on Macroeconomic and Financial Stability

An important theme in the literature dealing with the lending behavior of foreign banks concerns its implications on macroeconomic and financial stability of the host countries. At the heart of this issue is the role played by foreign banks in amplifying or mitigating credit volatility in an economy. Foreign banks, on the one hand, could be a vital source of stability during periods of local stress since in theory they have the ability to raise the required funds from their head offices in their parent country. But on the other hand, they could also serve as a potential transmission mechanism of external shocks which increases the instability in the host country. So the question of whether foreign banks act as a source of financial stability or a propagator of exogenous shocks into the domestic financial system (in the host countries) assumes immense policy significance.

The relevant literature in turn deals with two dimensions of foreign banks lending behavior. The first strand broadly deals with the impact of global/external policy shocks and whether foreign banks act as stabilizing forces or shock transmitters in terms of their credit supply. The second related dimension pertains to domestic monetary policy shocks and how they affect the domestic monetary policy transmission in a country.

The question whether foreign banks amplify or mitigate credit volatility in an economy has attracted a great deal of attention in the literature especially after the global financial crisis. A growing number of studies focus on the question of whether foreign banks act as stabilizing forces or shock transmitters in terms of their credit supply in response to different kinds of exogenous policy shocks – country-specific and external.¹⁹ As noted in this literature, one of the distinguishing variables unique to the process of foreign bank lending is the existence of an active *internal capital market* accessible only to the foreign banks. This significantly changes the way they respond to different types of shocks in the home as well as host country. The changing nature of banking globalization has altered how banks manage their liquidity as well as how they react in the event of liquidity shocks. Foreign banks with affiliates abroad can respond to domestic liquidity shocks by activating a cross-border, internal capital market transfer between the head office of the parent bank and its foreign offices, thus reallocating funds on the basis of relative needs which insulates foreign banks from domestic liquidity shocks (Cetorelli and Goldberg, 2008; 2009).

While the implications in terms of crisis transmission have been the subject of focus in the literature, the flip side of the story pertains to how domestic monetary policy transmission is affected in the event of such liquidity shock management by foreign banks. More generally, there is a consensus in the

¹⁹ See Claessens and Van Horen (2013), De Haas and Lelyveld (2002), De Haas and Van Lelyveld (2006), Detragiache and Gupta (2006) and Galindo et al. (2005), Peek and Rosengren (2000) and Choi et al. (2013).

macroeconomics literature that there are at least four channels through which monetary policy shocks are transmitted to the real economy, viz. the interest rate, the exchange rate, asset prices, and the credit channel, with the credit channel further broken down into the bank lending channel and the balance sheet channel (Mishkin, 1996). Among these channels of domestic monetary transmission, the most traditional channel of transmission of relevance to EMDEs is the interest rate channel. The monetary policy transmission literature has broadly paid more importance to the bank lending channel and the role they play in transmitting shocks to the credit markets through supply-side effects. Nonetheless, for several EMDEs with relatively underdeveloped financial markets, the *interest rate channel* of transmission -- affecting aggregate demand through its impact on the costs of loanable funds -- remains quite important. Further, as several EMDEs have moved towards adopting more flexible exchange rate regimes, interest rates have risen to prominence as the primary instrument for macroeconomic management in these economies.

Considering the importance of interest rate management in EMDEs, the final chapter of this dissertation -- Chapter 4 -- will analyze how foreign bank entry affects degree of interest-rate transmission in EMDEs. Specifically, we estimate the direct interest rate pass-through (from policy to lending rates) for a sample of 57 EMDEs over the period 1995-2009. While there is a considerable literature estimating the degree and pace of interest rate pass-through for various countries, there is almost no study that examines how interest rate transmission changes with

higher foreign bank participation, especially in EMDEs. This question assumes crucial policy significance particularly given the seeming contrasting effects that could be inferred: On the one hand, higher foreign bank presence could strengthen the interest rate transmission because it contributes to the efficiency and development of financial sector. On the other hand, owing to access to a wide variety of sources for funds, foreign banks might be less responsive to domestic monetary policy shocks which may reduce the strength of the monetary transmission.

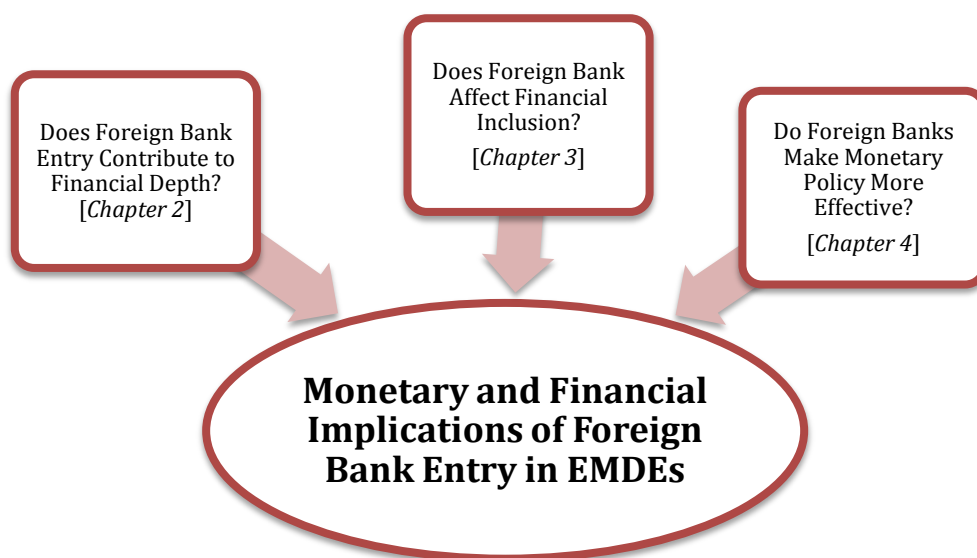
In addition to estimating the degree of interest rate transmission, the chapter also specifically tests for possible identifiable thresholds in foreign bank presence that differentially impact interest rate pass-through. The empirical results suggest that there are strong threshold effects in that foreign bank entry tends to enhance interest-rate pass-through only in countries with greater degree of foreign bank presence compared to those with limited entry. Finally, the chapter also finds that when foreign bank entry leads to greater banking concentration, it significantly lowers the extent of interest rate transmission, a finding that merits policy attention. This result reiterates the need to pay attention to the resulting market structure after introduction of banking competition. If greater foreign bank entry tends to result in higher concentration in the banking sector, then it that may result in a likely weakening of the interest rate transmission, for the market structure would have merely become more oligopolistic.

1.5. Summary and Conclusion

One of the important characteristics of international financial liberalization in several emerging and developing economies (EMDEs) over the last two decades has been the rising prominence of foreign banks in their domestic economies. The literature in this field indicates how entry of foreign banks could prove to be beneficial to the host economy in terms of raising domestic banking efficiency, promoting financial sector development and even providing stable lending during times of crisis due its diversified financial sources. That being said, foreign banks could also prove to be costly to an economy especially if they increase the vulnerability of the host market by transmitting exogenous shocks and result in domestic credit volatility. Alternatively, foreign banks could also target the creditworthy borrowers in an economy, leaving the riskier pool to the domestic banks which may lead to a net reduction in aggregate credit supply in the economy.

As the literature assessing the cost-benefit tradeoffs of foreign bank entry continues to grow, EMDEs with heavy bank-based financial systems need to pay close attention to the policy implications arising from allowing foreign banks to take on greater roles in their domestic economies.

Given this background, this dissertation focuses on three related yet different dimensions of impacts of foreign bank entry in EMDEs, which have immense policy significance (Figure 1.5.1).



Source: Author

Figure 1.5.1 Outline of Chapters

Chapter 2 of the dissertation begins by examining the impact of foreign bank entry on financial depth for a panel of 57 EMDEs over 1995 to 2009. Given the ambiguity in the literature on how foreign banks affect financial depth coupled with the importance of financial market development to EMDEs, this chapter illustrates how greater foreign bank entry affects financial depth. Further, the chapter also empirically examines whether this relationship varies with different income thresholds of EMDEs.

A related dimension of financial development pertains to financial inclusion. Making a country's financial system more accessible to all households and firms in an economy is an important objective of overall financial sector development. Chapter 3 of this dissertation probes how foreign banks in an economy affect financial inclusion. The limited literature dealing with foreign bank entry and

financial inclusion underlines how foreign banks could be negatively associated with banking sector outreach, owing to their tendency to cater to a smaller segment of the population. This appears to be complemented by an active policy debate in several EMDEs about the contentious role of financial liberalization in general in promoting financial inclusion. In the context of these debates and the dearth of empirical studies focusing on an important policy issue, this chapter tries to evaluate the impact of foreign banks on financial inclusion in 52 EMDEs over 2004 to 2009. Furthermore, given that financial liberalization has tended to result in banking concentration in these economies, this chapter also specifically tests for how financial inclusion is influenced by banking concentration and foreign bank entry.

Finally, the last chapter of this dissertation focuses on an important macroeconomic dimension of foreign bank entry – their role in the domestic monetary transmission channel. Among the various channels of monetary transmission, of importance and relevance to EMDEs is the traditional interest rate channel. Considering that there is almost no study in the literature that examines how foreign bank entry impacts interest rate transmission, we examine this issue in Chapter 4 of this dissertation. Focusing on 57 EMDEs covering 1995 to 2009, the chapter estimates the impact of foreign bank entry on interest rate transmission of monetary policy and specifically tests for the presence and impact of foreign bank thresholds in how they impact interest rate pass-through.

Overall, all the three chapters in this dissertation will attempt to advance the empirical literature on foreign bank entry by focusing on some important monetary and financial issues of policy interest to EMDEs.

CHAPTER 2. DOES FOREIGN BANK ENTRY CONTRIBUTE TO FINANCIAL DEPTH? : EXAMINING THE ROLE OF INCOME THRESHOLDS

Abstract

This chapter examines the relationship between foreign bank entry and financial depth in a panel framework covering 57 emerging and developing economies (EMDEs) over 1995 to 2009. Using various measures of financial depth, the chapter also explores the degree to which the relationship between foreign bank entry and financial sector deepening varies by different income thresholds of the EMDEs. The empirical findings suggest that while foreign banks have a direct positive impact in furthering financial depth, the marginal effects of foreign bank entry diminish over time with greater levels of economic development. In other words, the impact of foreign bank entry tends to become smaller as the per capita income of the country rises.

2.1. Introduction

The increasing foreign bank penetration in many emerging and developing economies (EMDEs) over the last two decades has given rise to a body of work dealing with its causes, consequences as well as debates. One such debate in the literature pertains to the contribution of foreign bank presence to overall financial sector development (Van Horen, 2013). Financial sector development is a rather broad term capturing “the factors, policies, and institutions that lead to effective financial intermediation and markets, and deep and broad access to capital and financial services” (World Economic Forum, 2011, p.xiii). The studies relating to

foreign banks specifically focus on two aspects of financial development namely financial depth and financial inclusion. Though the literature has acknowledged the importance of financial inclusion,²⁰ largely due to data limitations, studies in this field have instead focused on financial depth when analyzing the impact of financial development. As the literature points out, foreign banks could contribute to financial sector deepening proxied by the expansion of banking credit to the private sector, or via enhanced liquidity in the domestic equity market, or contribute to a well-capitalized bond market. In this chapter, we will focus on the financial depth dimension of financial development and whether foreign bank entry contributes to financial sector deepening in EMDEs.²¹

We contribute to the literature on foreign bank entry in three important ways: First, we explore the importance of income thresholds between EMDEs in determining the relationship between foreign bank entry and financial depth. In other words, does the impact of foreign bank entry on financial depth vary based on levels of economic development? While the limited literature on this subject points to the need to factor in such income differences while probing the relationship between foreign bank entry and financial depth, a systematic examination appears to be missing to date, a gap this chapter attempts to fill. Second, unlike previous

²⁰ Financial inclusion broadly refers to the provision of financial services to as many households and firms as possible 'at affordable costs' in an economy. We will probe the issue of foreign bank entry and financial inclusion in Chapter 3 of this dissertation.

²¹ While we follow the literature in defining financial depth using banking credit to private sector, we also consider alternative measures like stock market capitalization and private bond market capitalization as indicators reflecting different dimensions of financial depth.

studies, we use various alternative measures of financial depth to examine the said relationship. Finally, we study the issue over a longer time horizon (1995-2009) for a fairly large sample of 57 EMDEs, whereas most studies done on the subject have been cross-sectional in nature.

To preview some significant results, the chapter finds strong evidence in favor of foreign banks having a direct positive impact in furthering financial depth in EMDEs which is important from a policy perspective. Furthermore, one of the other interesting findings of the chapter relates to the importance of factoring in income thresholds in understanding the relationship between foreign bank entry and financial depth. Specifically, we find that the marginal effects of foreign bank entry diminish as income levels of the country rises. In other words, the impact of foreign bank entry tends to become smaller, the richer the country becomes. That foreign bank entry enhances financial depth appears to be distinct departure from the general results found in the literature thus far. Further, the finding that the positive impact of foreign banks in enhancing financial depth tends to be greater in lower and middle income countries could guide policymakers in these economies to draft appropriate strategies promoting foreign bank entry.

The remainder of the chapter proceeds as follows. Section 2.2 motivates the discussion by offering a brief overview of the determinants of financial development in general. Section 2.3 surveys a selected set of empirical studies relevant to the discussion. The data and the empirical model employed in this chapter are discussed in Section 2.4. Section 2.5 elaborates on the empirical findings and

discusses the various robustness checks undertaken. Section 2.6 concludes the chapter with a brief discussion of the policy implications of this empirical study.

2.2. Determinants of Financial Development

A large literature emphasizes that there is a strong and positive nexus between different dimensions of financial development and economic growth, particularly in EMDEs. Most studies relating to this field have primarily focused on understanding the factors that determine the differences in financial development across countries. For instance, La Porta et al. (1998) emphasized the importance of the differences in legal systems to explain the differences in financial development across countries.²² Related to protection of legal rights and contract enforcement is good governance (Kaufmann et al. 1999) which has been noted as another pre-requisite for financial development. Focusing specifically on financial depth, in a survey of cross-country determinants of financial depth for 129 countries, Djankov et al. (2007) finds that a combination of macroeconomic and institutional variables such as GDP per capita, inflation, legal creditor rights, private and public credit registries turn out to be significantly associated with financial depth. They find that while both creditor protection through the legal system and information sharing institutions tend to be associated with higher financial depth, legal rights turn out to

²² The emphasis on legal traditions is largely driven by the observation that there are differences among countries in the degree to which they prioritize protecting the property rights of private investors. These differences in turn determine the efficiency of contract enforcements that are fundamental to financial sector development.

be more important in richer countries relatively. They also reiterate the importance of GDP per capita and the role economic development plays in fostering higher financial depth.²³

Though most of the literature has looked at institutional and macroeconomic variables as determinants of financial depth, a small but growing literature identifies openness to international financial flows as another important determinant of financial depth in EMDEs. One of the central conclusions from this literature is that higher international financial openness is positively associated with domestic financial sector depth, though it is conditional on countries achieving a certain threshold level of institutional development (for instance, see Baltagi et al., 2009; Calderon and Kubota, 2009; Chinn and Ito, 2006 and Kose et al., 2011). As Kose et al. (2011) suggest, financial sector development is one of the primary “collateral benefits” of international financial openness and that the development of domestic financial markets as well as enhanced corporate and public governance indirectly contribute to overall economic growth.

However, this literature fails to sufficiently distinguish between the two broad dimensions of international financial openness (noted in Chapter 1) – capital account openness and financial sector internationalization – and how they impact financial depth. Given that foreign bank entry has been a prominent feature of financial sector internationalization in many EMDEs over the last two decades,

²³ In addition to factors concerning the institutional environment, domestic political economy factors such as rent-seeking behavior of incumbents also determine the extent of financial development (Rajan and Zingales, 2003).

surprisingly, only a handful of studies examine the impact of foreign banks on financial depth and yield mixed results. While one set of studies find that foreign banks contribute to reduced costs of financial intermediation resulting in increased credit availability that in turn facilitates overall financial depth in the host country (Claessens et al., 2001; Martinez Peria and Mody, 2004), another set points out that this may not necessarily be the case in EMDEs. Instead, increased foreign bank presence could lead to lower levels of private sector credit that would in turn result in relatively weaker financial depth (Claessens and Van Horen, 2012; Detragiache et al., 2008). An important caveat to these results is that the negative association between foreign bank entry and financial depth may not hold for all countries and that the levels of economic development matter (Van Horen, 2013).

In this light, this chapter is interested in examining the relationship between foreign bank presence and financial depth in EMDEs by focusing on some important inter-related issues that have not been examined in the literature thus far. Below we survey a selected set of empirical studies relevant to the discussion.

2.3. Selected Empirical Literature

There are two important sets of empirical literature relevant to the discussion. The first strand of literature concerns the impact of international financial openness on financial depth. The second set of studies pertains specifically to the impact of foreign banks on financial depth. We will provide a brief review of selected papers from each of these strands before outlining our empirical model.

2.3.1. International Financial Openness and Financial Development

A number of papers have tested for the relationship between international financial openness (broadly encompassing all types of capital flows) and financial development and have found that openness to international financial flows broadly serves as an important driver of domestic financial market development (Levine, 1996; 2001; Chinn and Ito, 2006; Baltagi et al., 2009; and Calderon and Kubota, 2009). However, as Chinn and Ito (2006) emphasize, the link between financial liberalization and financial development is not “unequivocal” as financial liberalization can have the desired impact on financial development only when the host economies are equipped with some “reasonable” legal and institutional infrastructure. The rationale for the existence of such thresholds stems from the so-called ‘absorptive capacity’ of these economies to internalize the benefits of such financial flows. For instance, Johnston (1998) suggests that before a country’s capital account is opened, the financial intermediaries need to be strengthened in order to guarantee the efficient use of capital inflows. Countries with weak financial systems may need time to develop financial institutions and markets, especially the banking sector, before liberalizing their capital account. Thus the emphasis must be on establishing an effective system of prudential supervision before liberalizing the capital account (Eichengreen, 2001).

Thus the absence of legal protection for creditors and transparency in accounting rules could likely reduce the credibility of the domestic financial system, a point highlighted by the empirical study done by Chinn and Ito (2006). The study

examines the relationship between capital account openness and financial development proxied by stock market capitalization as a proportion of GDP for a panel of 108 countries spanning 1980-2000. The authors find that a higher level of financial openness (measured by *de jure* capital account openness index of Chinn-Ito) spurs equity market development only if a threshold level of legal development has been attained. Furthermore, a country characterized by weak legal infrastructure with ill-defined property rights may lack the capacity to strictly enforce contracts which could reduce the incentive for credit-related activities.

In a related paper, Baltagi et al. (2009) use panel data techniques to investigate whether the pace of financial development can be explained by the joint opening of both trade and financial sector openness. They use two datasets, one for 42 developing countries with banking credit to private sector as the dependent variable (1980-1996) and another for 32 industrial and developing countries with stock market capitalization as the proxy for financial development (1980-2003). They measure financial openness using both the *de jure* Chinn-Ito capital account openness index as well as the *de facto* ratio of foreign assets and liabilities to GDP sourced from Lane and Milesi-Ferreti (2007). The dynamic panel regressions the authors conduct suggest that trade and financial openness are statistically significant determinants of financial sector development.

In a similar study for an expanded sample, Calderon and Kubota (2009) test for the relationship between financial sector openness and domestic financial market development for a 145 economies from 1974-2007 and finds similar results.

Specifically, they find that rising financial openness expands private credit, bank assets, and stock market and private bond market development and also generates overall efficiency gains in the domestic banking system. However, consistent with other studies, the paper finds that the positive impacts are conditional on the level of institutional quality, the extent of investor protection, and the degree of trade openness. The measure of financial openness used is the ratio of foreign assets to GDP, foreign liabilities to GDP, and foreign assets and liabilities to GDP sourced from Lane and Milesi-Ferreti (2007) database.

Finally, testing for threshold conditions in the process of international financial integration and how it affects economic growth, Kose et al. (2011) undertake standard cross-country growth regressions for 84 countries between 1975 and 2004. Their findings suggest that there are “clearly identifiable thresholds” in key variables such as financial depth and institutional quality and that the growth benefits from financial openness significantly improves once countries pass those identified thresholds.²⁴

2.3.2. Foreign Bank Entry and Financial Depth

The relevant literature specifically investigating the relationship between foreign bank entry and financial sector depth is quite limited and ambiguous at best. While Detragiache et al. (2008) find a negative relationship between foreign bank entry and financial depth, Claessens and Van Horen (2012) finds that the negative

²⁴ They also find that the thresholds are lower for foreign direct investment and portfolio equity liabilities compared to those for debt liabilities.

result holds only for a sub-sample of developing countries and it disappears for emerging markets. On the other hand, Claessens et al., (2001) and Martinez Peria and Mody (2004) find that foreign bank entry leads to greater financial depth through lowering costs of financial intermediation. Further, as Cull and Martinez Peria (2011) argue, the possible negative relationship that other papers have found may not indicate any causal relationship between the two, instead this could have been driven by “non-random” entry of foreign banks into markets that were in crisis. Since most of the EMDEs started allowing foreign banks to recapitalize their banking systems, observing a drop in credit levels could have been the result of the efforts to repair the balance-sheets of struggling domestic banks.

Studies in general have found evidence that foreign banks contribute to reduced costs of financial intermediation evident in lowering of bank spreads, spurring credit availability which in turn facilitates overall financial depth in the host country (Claessens et al., 2001 and Martinez Peria and Mody, 2004). However, increased foreign bank presence could also lead to higher interest rate spreads, lower levels of private sector credit that would in turn result in relatively weaker financial depth. Focusing on banking credit to private sector as a proxy for financial depth, Detragiache et al. (2008) use aggregate cross-country data for a sample of 89 lower-income countries to empirically test the association between foreign bank presence on growth in private credit levels. They test this using a standard cross-country regression framework as well as a dynamic panel framework, controlling for host country characteristics such as GDP per capita, inflation rates, credit depth

of information index, time taken to enforce a business contract, as well as a corruption index. For the cross-sectional estimation they average the control variables over 1991-1998 and measure the dependent variable as a 3 year average over 1999-2002 while they use the data in its annual frequency for the dynamic panel estimation. Both their cross-section and panel estimation results suggest that the foreign bank participation is negatively associated with private sector credit.²⁵

As an extension, the authors hypothesize that if greater foreign bank presence is negatively associated with private credit levels then they should observe a negative correlation between foreign presence and subsequent credit growth. Hence they examine the relationship between foreign bank presence and credit growth (as opposed to levels), and for the purposes of this estimation, compute the dependent variable as the log difference of the private credit-to-GDP ratio in 1999 to 2001 and in 1994 to 1996. Their baseline specification similar to what was conducted in the first part of the analysis revealed consistent results in that they found foreign bank presence to have a negative and significant effect on credit growth.

Claessens and Van Horen (2012) perform a similar exercise for a sample of 111 countries representing all levels of development. In essence, they replicate the work of Detragiache et al. (2008), for a larger sample of countries as well as use an updated database on foreign bank ownership which the authors themselves have

²⁵ They also run bank-level panel regressions to test whether foreign banks have a better quality of loan portfolios (proxied by ratio of loan-loss provisions to total assets) than domestic banks within any country and find the results to be consistent with the hypothesis that foreign banks have a higher quality loan portfolio than domestic banks within any given country.

compiled. They also test specifically for the relationship between foreign bank presence and private credit levels conditional on host-country institutional characteristics similar to Detragiache et al. (2008). They average the dependent variable - private credit to GDP ratio - over 2005-2007 along with a similar set of control variables as used by Detragiache et al. (2008), to include GDP per capita, inflation, the availability of information to creditors and the time it takes to enforce contracts.

They find that their results are broadly in line with those of Detragiache et al. (2008) but with one important qualification. Their negative relationship between private credit levels and foreign bank presence holds only in countries characterized by limited foreign bank presence coupled with costly access to information and contract enforcement. They also find that the negative relationship holds only when the distance between the home country of the foreign bank and the host country is relatively “far.” Interestingly, as Claessens and Van Horen (2012) observe, the negative relationship between foreign bank presence and private credit is only apparent for the sub-sample of developing countries though not very obvious for emerging markets. This heterogeneity in the results appears to underline, among other things, the importance of factoring in host country institutional characteristics and levels of development.

While some of the papers discussed above suggest a negative relationship between foreign bank entry and financial depth, they do not necessarily imply a causal relationship. Further, while they hint that the results must be qualified by

accounting for heterogeneous levels of economic development and/or foreign bank entry, the papers do not explore the issue further, a gap that we attempt to fill in this chapter by explicitly accounting for differences in income levels.

As briefly noted earlier, we improve the literature in three important ways: One, we examine the relationship between foreign bank entry and financial depth over a longer time horizon 1995-2009 while most studies hitherto have either employed shorter panels or cross-sectional data; Second, we test our conjectures in a panel spanning 57 emerging and developing economies across different income levels which we believe is important to distinguish in order to understand the role foreign banks play in contributing to financial sector deepening; Finally, we consider other alternative measures of financial depth such as stock and bond market capitalization in addition to banking credit to private sector which has remained the most widely used proxy for financial depth in the literature so far.

2.4. Data and Empirical Model

2.4.1. Baseline Model

The empirics are performed on a panel dataset of 57 emerging and developing economies (EMDEs), spanning all regions of the world, covering the period from 1995 to 2009 (depending on data availability for each economy) (Annex 1.1). As noted by Claessens and Van Horen (2011), the emerging group of countries include those that are in the Standard and Poor's Emerging Market and Frontier Markets indices and that were not high-income countries in the year

2000.²⁶ The developing countries sample includes all other countries based on World Bank's income classification (as of year 2000).

We proceed with our analysis in two steps. First, we specify a baseline panel regression following Detragiache et al. (2008) that helps us investigate the relationship between financial depth – as proxied by banking credit to private sector -- and the share of foreign bank assets over total banking assets in that country, controlling for levels of economic development, other relevant macroeconomic, financial and institutional factors dictated by data availability. Second, we examine how the impact of foreign bank entry on financial depth is affected by possible non-linearities in the relationship between financial depth and income per capita per se.

The basic estimating equation will be as follows:

$$y_{it} = \delta_i + \beta fb_{it} + \gamma X_{it} + \mu_t + u_{it} \quad (1)$$

where: y_{it} is the banking credit to private sector by deposit money banks (as a share of GDP) in country i at time t ;

fb_{it} is the share of bank assets held by foreign banks in country i at time t ;

δ_i is the country fixed effect.

X_{it} is a matrix of control variables measured at time t ;

²⁶ The criteria for Standard and Poor's to classify a stock market as "emerging" includes one of the following several general criteria (Standard and Poor's, 2007): "(i) it is located in a low or middle-income economy as defined by The World Bank, (ii) it does not exhibit financial depth; the ratio of the country's market capitalization to its GDP is low, (iii) there exist broad based discriminatory controls for non-domiciled investors, or (iv) it is characterized by a lack of transparency, depth, market regulation, and operational efficiency" (p.4). This classification of "emerging market economies" was adopted by Claessens and Van Horen (2011) in the construction of their database on foreign bank entry which we utilize through this dissertation. For more details, see Claessens and Van Horen (2011); for a detailed methodological note on the S&P Emerging and Frontier Market Index, see Standard and Poor's (2007).

μ_t is the time fixed effect and

u_{it} is the idiosyncratic error term.

β and γ are the parameters to be estimated. The parameter of interest is β which represents the coefficient of the foreign bank share (fb_{it}). Based on the literature discussed in the foregoing section, a selected set of macroeconomic, financial and institutional variables affecting private credit creation in an economy are employed as controls in our model. The vector of control variables are listed below:

$X_{it} = \text{Macro variables } \{GDP \text{ Per Capita}, Inflation, Exchange \text{ Rate Regime}, Public \text{ Debt}\};$
 $= \text{Financial variables } \{Bank \text{ ZScore}\};$
 $= \text{Institutional variables } \{Creditor \text{ Information}, Legal \text{ Rights}, Corruption\}$

All the sources from where the variables were compiled are summarized in Annex 2.1 Below we offer a brief description of the variables employed in our model along with the priors.

GDP Per Capita: measuring overall levels of economic development in the country. We expect a positive relationship between financial depth and countries with higher levels of development.

Inflation rate: as measured by the Consumer Price Index (CPI) for each country and we expect inflation to have an adverse impact on financial depth as an increase in the rate of inflation tends to decrease the real rates of return for assets in general. This in turn aggravates credit market frictions and leads to credit rationing. As Boyd et al. (2000) find, during periods of higher inflation, “intermediaries lend less and

allocate capital less effectively, and equity markets will be smaller and less liquid” (p.2).

Exchange Rate Regime: exchange rate regime of country i at year t ; We expect greater flexibility in exchange rates to be positively associated with financial depth as it provides incentives for the development of financial market instruments that in turn enables countries to hedge against risks, thus furthering financial depth.

Public Debt: reflecting the gross public debt as a percentage of that country’s GDP. We expect greater public indebtedness to lower financial depth, as greater pressures on authorities to persist with or introduce financial repression will likely hinder financial depth.

Bank Z-Score: capturing the probability of default of a country's banking system, calculated as a weighted average of the z-scores of a country's individual banks (based on the individual banks' total assets). The Z-score compares a bank’s buffers (capitalization and returns) with the volatility of those returns. We would expect a negative relationship between a higher Z-score and financial depth as a higher probability of default of a country’s banking system could likely lead to greater risk aversion that might hinder financial depth.

Credit Depth of Information Index: captures the cost to banks of obtaining information about borrowers and we expect that higher information availability to be positively associated with financial depth in the economy, as it helps ease out information asymmetry. So, higher values in the index should lead to a positive association with financial sector deepening due to better information environment.

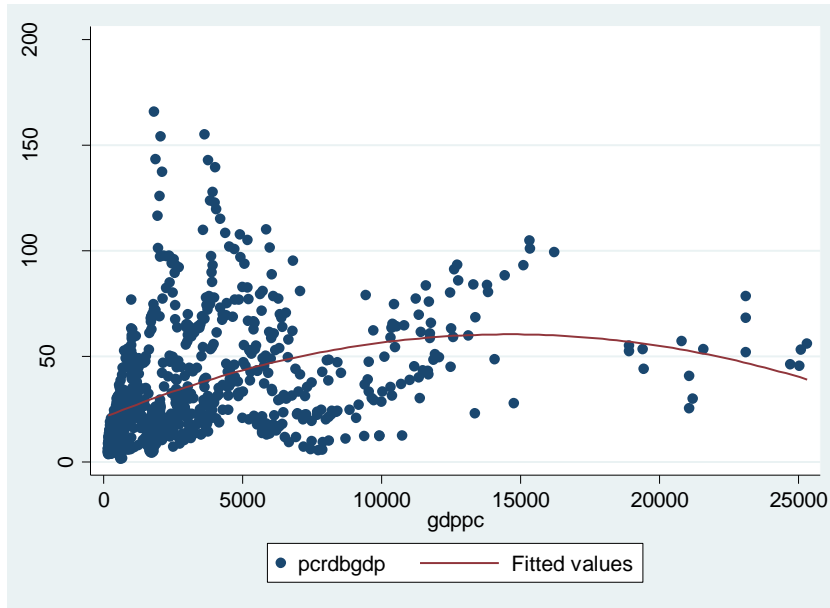
Legal Rights Index: measuring the strength of legal rights in an economy that protect the rights of borrowers and lenders. We expect countries with stronger legal protection of creditors to have deeper credit markets and thus carry a positive sign.

Corruption Index: a measure capturing the perceptions of the extent to which public power is used for private benefits. The index ranges from -2.5 to +2.5, with greater values of the index reflecting better governance outcomes. In other words, a decrease in the index would reveal greater "State capture" by a few interests leading to 'politically connected' lending that may not contribute to financial sector deepening. Hence we expect countries with higher scores on this index to be positively associated with financial depth. That said, the direction of the relationship could go the other way as well if corruption might result in greater connected lending to specific parties, which would be reflected in greater credit creation– one of the indicators of financial depth.

2.4.2. Income Thresholds

Among all these variables listed above, most studies find per capita income to be an important determinant of financial depth. However, the literature assumes a linear relationship between per capita income and financial depth, which may not be necessarily true. A simple graphical illustration shown in Figure 2.4.1 reveals that the relationship between financial depth -- proxied by banking credit to private sector as a percentage of GDP – and income per capita does not appear to be quite

linear. In fact, a quadratic fit can be seen from Figure 2.4.1 specifically which maps private sector credit and GDP per capita.



Note: Proxy for financial depth – Banking Credit to Private Sector

Figure 2.4.1 Relationship between Financial Depth and GDP Per Capita

Figure 2.4.2 provides additional evidence by mapping the augmented component-plus-residual (ACPR) plot, conventionally used in the literature to examine the non-linear relationship between variables of interest. We use locally weighted scatterplot smoothing (LOWESS) to draw the observed pattern in the data to help identify possible nonlinearities.

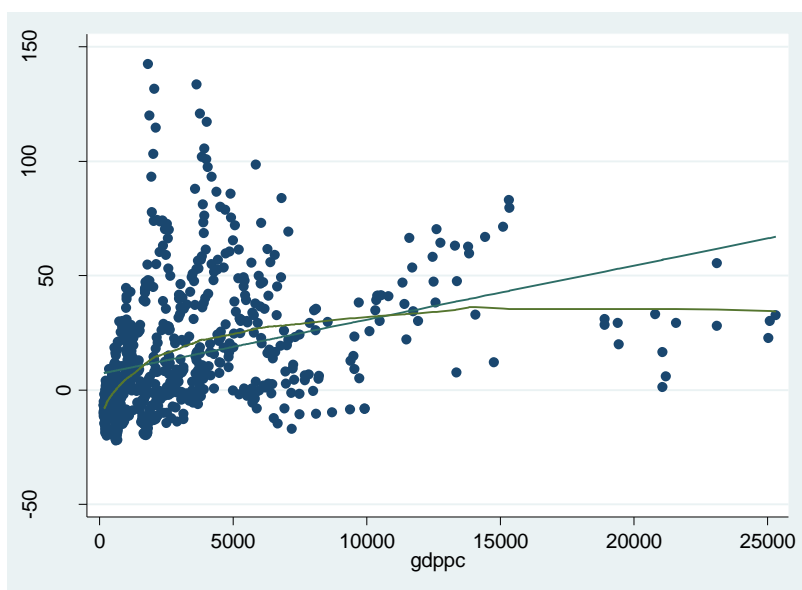


Figure 2.4.2 ACPR Plot: Banking Credit to Private Sector and GDP Per Capita

The above illustrations provide indicative evidence of a certain degree of non-linearity governing the relationship between GDP per capita and financial depth. Motivated by this basic relationship, we conjecture that there are income thresholds that affect levels of financial depth in a country. While, in general, the richer the country the greater might be the financial depth it is also likely that beyond a particular threshold, this relationship may turn negative.²⁷ Thus, in order to understand the relationship between foreign bank entry and financial depth, we must also capture the effect of threshold levels of income per capita, a point that has not been sufficiently appreciated by the available literature.

²⁷ This is not unlike the literature on public debt and economic growth where economic growth appears to be positively impacted by public debt up to a certain threshold beyond which growth turns negative. See Ouyang and Rajan (2014) for a recent application of debt thresholds in debt-growth relationship.

To capture the potential importance of different income thresholds and how it affects the way foreign banks impact financial depth , we re-run our baseline by introducing a quadratic GDP Per Capita term as shown in equation (2) below:

$$y_{it} = \delta_i + \beta_1 GDPPC_{it} + \beta_2 GDPPC_{it}^2 + \beta_3 fb_{it} + \gamma X_{it} + \mu_t + u_{it} \quad (2)$$

By allowing interactions between foreign bank entry and the different income thresholds, we allow for the possibility that, beyond a certain level, the threshold variable becomes more or less important in determining the marginal effect of foreign bank entry on financial depth.

2.4.3. Methodology

It should be noted that the market share of foreign banks may be endogenous, as foreign banks could a priori choose to enter only those countries with a certain threshold of financial depth. A priori, as Detragiache et al. (2008) point out, it is not clear how endogeneity might bias the coefficient β that represents foreign bank share. However using fixed-effects estimation, we can control for unobserved country-specific fixed characteristics that might affect financial depth. A Further point to note is that the estimates of the fixed-effects estimation remain robust only if the potential source of endogeneity arises from the correlation between the time-invariant component of the error term and the regressor of interest, as a fixed-effects model resolves this problem by excluding the unobservable time-invariant effects through a time-demeaning of the data. Hence

we estimate (1) and (2) using a fixed-effects panel data model, incorporating both country and time fixed-effects.

2.5. Empirical Results

2.5.1. Baseline Model

We start with our baseline model as outlined in equation (1) that estimates the relationship between foreign bank entry and financial depth controlling for macroeconomic, institutional and financial variables. The results of our panel estimation using country and time fixed effects with robust standard errors are summarized in Table 2.5.1. Column (1) in Table 2.5.1 reports estimates of our baseline without foreign bank entry. Column (2) reports the estimation results of our baseline model with the foreign bank variable.

As Column (1) shows, GDP per capita and creditor information turn out to be highly statistically significant determinants of financial depth. The significance of GDP per capita is suggestive of the importance of accounting for heterogeneous levels of economic development while creditor information underlines the importance of a better information environment for enhancing financial depth. Bank Z-score and lack of corruption on the other hand appear to be significant at the 5 percent level, with the statistical significance of z-score indicates that an increase in the probability of banking default is negatively associated with financial depth and lack of corruption reflecting better governance also contributing positively to

financial depth. Thus the direction of the relationship for all the significant variables conforms to our priors.

Table 2.5.1 Baseline Fixed Effects Estimates: Full Sample

<i>Dep Var: Private Credit to GDP (%)</i>	<i>Baseline (1)</i>	<i>(1) with Foreign Bank Assets</i>
GDP Per Capita	0.0034*** (0.0020)	0.0039*** (0.0022)
Ln Inflation Rate	0.8321 (0.9162)	2.1759** (1.0353)
Public Debt (%)	0.0054 (0.0547)	-0.0416 (0.0565)
Exchange Rate Regime	-0.7257 (1.0816)	-0.6288 (0.9298)
Bank Z-score	-0.2706** (0.1516)	-0.2199** (0.1174)
Legal Rights	1.6299 (2.182)	1.5739* (1.6732)
Creditor Information	2.8643*** (0.8460)	2.0971*** (0.8414)
Corruption	6.4440** (4.7662)	9.2903** (5.0531)
Foreign Bank Assets (%)		0.0888** (0.0546)
<i>Country Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
Constant	12.9113	12.3388
R-Squared	0.28	0.30
Number of Observations	516	436
Number of Countries	55	54

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors Adjusted for Countries in Parenthesis

In Column (2) we provide the estimates of our baseline specification including the foreign bank variable. As we can see, the model proves to be slightly better with more variables including foreign bank assets becoming statistically significant. GDP per capita and creditor information continue to be highly significant at the 1 percent level reiterating their positive association with greater financial

depth in an economy. In addition to the statistical significance of z-score and lack of corruption, we find inflation to be statistically significant as well at the 5 percent level. The direction of relationships of all the significant variables continues to be consistent with our priors. In particular, our key variable of interest -- foreign bank entry -- is significant at the 5 percent level and shows up with a positive coefficient -- which is a departure from the earlier literature that found a negative relationship. Specifically a 10 percentage point increase in share of foreign bank assets is associated with approximately a 0.9 percentage point increase in financial depth.

2.5.2. Foreign Bank Entry and Financial Depth: Do Income Thresholds Matter?

As noted in Section 2.4.2, the relationship between GDP per capita and financial depth does not appear to be linear. In order to ensure that the effects of this non-linearity are accounted for fully in examining the relationship between foreign bank entry and financial depth, we empirically test for income thresholds by augmenting a quadratic term of GDP per capita to our baseline model. The results of the estimation of equation (2) are produced in Table 2.5.2.

As Table 2.5.2 reveals, there are three relevant issues that need to be scrutinized in the model in order to test the significance of income thresholds. The first step is to check the behavior and consistency of all the variables in the baseline model when we control for quadratic effects of per capita income, which is captured by Column (1) in Table 2.5.2. The next issue of interest to us is to examine the indirect impact of foreign bank entry on financial depth through its interaction with

different thresholds of per capita income. While Column (2) captures the marginal effects of foreign bank entry through its interaction with the linear per capita income term, Column (3) shows the estimation results incorporating the interaction of foreign bank entry with higher thresholds of per capita income captured by the quadratic GDP per capita term.

Table 2.5.2 Fixed Effects Estimates: Income Thresholds (Full Sample)

<i>Dep Var: Private Credit to GDP (%)</i>	<i>Baseline (1)</i>	<i>(1) with FBA and Linear Interaction (2)</i>	<i>(1) with FBA and Quadratic Interaction (3)</i>
GDP Per Capita	0.0100** (0.0049)	0.0107** (0.0053)	0.0116** (0.0052)
GDP Per Capita Squared	-2.15e-07*** (1.19e-07)	-2.26e-07* (1.23e-07)	-2.08e-07* (1.19e-07)
Ln Inflation Rate	2.5402*** (1.0325)	2.5560*** (1.0153)	2.6570*** (0.9763)
Public Debt (%)	-0.0557 (0.0591)	-0.0526 (0.0607)	-0.0491 (0.0609)
Exchange Rate Regime	-0.5473 (0.9521)	-0.5911 (0.9254)	-0.6634 (0.9146)
Bank Z-score	-0.2155** (0.1128)	-0.2132* (0.1125)	-0.2052* (0.1114)
Legal Rights	1.6453 (1.6822)	1.6359 (1.6706)	1.6060 (1.6691)
Creditor Information	1.8566** (0.7892)	1.8255** (0.7851)	1.7766** (0.7942)
Corruption	6.7744** (4.3816)	6.6999** (4.4900)	6.4976** (4.5279)
Foreign Bank Assets (%)	0.0915** (0.0544)	0.1114** (0.0739)	0.1159** (0.0491)
FBA*GDPPC		-7.07e-06* (0.000028)	
FBA*GDPPC ²			-1.88e-09** (2.54e-09)
<i>Country Fixed Effects</i>	Yes	Yes	Yes
<i>Time Fixed Effects</i>	Yes	Yes	Yes
Constant	-1.83	-3.88	-7.05
R-Squared	0.33	0.33	0.33

Number of Observations	436	436	436
Number of Countries	54	54	54

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Robust Standard Errors Adjusted for Countries in Parenthesis

As summarized in Table 2.5.2, we find that the model produces consistent and highly statistically significant results, which appear to be strongly in favor of factoring in levels of economic development. Note that the GDP per capita coefficients – both linear and quadratic – are consistently positive and negative, respectively. These results appear to be consistent with our conjectures on income thresholds suggesting that a country experiences greater financial depth as it grows richer but the positive relationship holds only up to a certain threshold. Beyond that threshold, the impact of GDP per capita will be negatively associated with financial depth.

However, it must be recognized that while the statistical significance of the non-linear income per capita coefficients and their interactions with foreign bank entry appear to support our conjectures, the economic significance of these variables appear to be small, suggesting that the actual measurable impact in terms of the magnitude of the coefficients is fairly modest.²⁸ That being said, the exclusion

²⁸ It must be noted that a logarithmic transformation of the GDP per capita variable or any kind of centering of the variable does not produce consistent results in terms of economic or statistical significance. Further, it also merits attention that a panel stationarity test strongly rejected the hypothesis that the series GDP per capita contained unit roots. The results of a Fisher-type unit root test, using the Augmented Dickey Fuller (ADF) test option for panel is reported in the Annex. We specify a drift option as mean GDP per capita for any country is nonzero and use two lags in the ADF regressions. We also remove cross-sectional means. All the tests strongly reject the null hypothesis that all the panels contain unit roots.

of the quadratic term might lead to misspecification errors because we observe an apparent quadratic relationship between GDP per capita and financial depth as illustrated in Figures 2.4.1 and 2.4.2. Further, we can also note that the economic significance of the linear GDP per capita term is higher when the non-linearity is controlled for. An increase in GDP per capita by 1000 US\$ is associated with a 10 percentage point increase in financial depth as opposed to a 3 percentage point increase in the baseline sample without the non-linear term.

In similar vein, we can also observe that the marginal impact of foreign bank entry on financial depth appears to be weakening as countries move up the income ladder. In other words, while the direct effect of foreign bank entry on financial depth appears to be positive and statistically significant at the 5 percent level, higher levels of per capita income weaken the indirect marginal effects of foreign banks on financial depth. A 10 percentage point increase in share of foreign bank assets is associated with approximately 1.2 percentage point increase in financial depth while higher levels of income per capita tends to weaken the direct impact.

One way of interpreting the above results would be that they offer evidence in favor of our conjecture that income thresholds matter in the way foreign banks affects financial depth. Further, the fundamental results between the variables of interest remain consistent with the inclusion of other conditioning variables pertaining to macroeconomic, institutional and financial structure in these countries. As Columns (1) – (3) indicate, in addition to GDP per capita and foreign

bank entry, we find that creditor information, corruption, z-score and inflation to be statistically significant, consistent with our priors.

2.6. Robustness Checks

The results of our baseline estimation summarized in Tables 2.5.1 and 2.5.2 provide indicative evidence that foreign banks affect financial depth positively and also plausibly vary based on the income thresholds. However the question still remains as to whether there are specifically identifiable income thresholds across which these results will remain robust. To that end, the focus of this section will be to empirically test for such income threshold effects.

In an effort to identify the significance of different income thresholds, in this section we slice our data sample on the basis of different income thresholds and re-estimate our baseline equation. In addition to slicing the sample on the basis of various income based and regional thresholds, we also undertake two other types of robustness checks to verify the consistency of the results we have found so far. The first category of robustness checks involves alternative estimation techniques using dynamic panel estimation as well as instrumental variable methods. The second category of robustness tests involve using alternative measures of financial depth to check if our findings continue to hold. We provide a discussion of the results of the various robustness checks below.

2.6.1. Income Based Slicing

Considering that the impact of foreign bank entry on financial depth could vary across countries with different income levels, we first begin by re-running our baseline model for subsamples classified on the basis of different income levels. Table 2.5.3 reports the baseline estimates for the sub-samples that follow different income-based classifications. Specifically, while Columns (1) and (2) splits the sample into developing and emerging economies, Columns (3) through (5) adopt a finer classification and categorize the 57 EMDEs in our sample into high-income, middle-income and low-income economies, based on World Bank's classification.²⁹

Interestingly, the results are broadly consistent with our full sample results. Notably, the foreign bank variable appears to be statistically significant and positive in the developing economies subsample as well as middle and low income sample. Institutional variables such as creditor information and corruption continue to be statistically significant as well, similar to what we found in the baseline model. However, GDP per capita appears to be a bit inconsistent across the various specifications in terms of its statistical significance, suggesting perhaps the need to examine the relationship between per capita income and financial depth more carefully and account for non-linearities if any. Nevertheless, it is important to note that the direction of all variables of interest is consistent with our priors. In

²⁹ The average income of the countries in our developing economies sample is around US\$1930, while that of emerging market economies is about US\$ 4765.

particular, the foreign bank variable continues to be positively associated with financial depth, underlining its robustness across different specifications.

Table 2.5.3 Baseline Fixed Effects Estimates: Income-Based Sub-Samples

	(1)	(2)	(3)	(4)	(5)
<i>Dep Var: Private Credit to GDP (%)</i>	<i>Developing Economies</i>	<i>Emerging Economies</i>	<i>High Income</i>	<i>Middle Income</i>	<i>Low Income</i>
GDP Per Capita	0.00811*	0.00409*	0.00205	0.00769**	0.0124*
	(0.00485)	(0.00221)	(0.00169)	(0.00592)	(0.00736)
Ln Inflation Rate	0.418	2.621*	1.340	4.078**	0.259
	(0.915)	(1.398)	(2.515)	(1.701)	(0.757)
Public Debt (%)	-0.0810*	0.0169	0.105	0.0147	-0.107***
	(0.0434)	(0.0889)	(0.318)	(0.116)	(0.0366)
Exchange Rate Regime	-1.399	-0.294	-0.925	-0.390	0.194
	(1.042)	(0.965)	(2.084)	(1.241)	(0.699)
Bank Z-score	0.0273	-0.293**	-1.320	-0.169	-0.234
	(0.123)	(0.130)	(1.244)	(0.161)	(0.147)
Legal Rights	0.476	1.006	8.844	0.759	3.890***
	(1.398)	(1.727)	(6.347)	(1.284)	(0.867)
Creditor Information	1.439*	3.964***	-2.828	3.599**	1.228*
	(0.753)	(1.178)	(3.408)	(1.543)	(0.685)
Corruption	4.854*	22.46**	20.02	14.91**	1.041
	(2.503)	(9.378)	(18.65)	(11.75)	(2.808)
Foreign Bank Assets (%)	0.127*	0.0741	-0.178	0.150**	0.109**
	(0.0725)	(0.0690)	(0.214)	(0.0673)	(0.0370)
<i>Country Fixed Effects</i>	Yes	Yes	Yes	Yes	Yes
<i>Time Fixed Effects</i>	Yes	Yes	Yes	Yes	Yes
Constant	34.91	8.269	-2.445	-4.957	1.298
Number of Observations	163	273	67	200	169
R-squared	0.42	0.41	0.64	0.35	0.45
Number of Countries	21	33	9	23	22

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors Adjusted for Countries in Parenthesis

The next step is to estimate equation (2) for our income based sub-samples in order to account for possible non-linearities in the relationship between per capita income and financial depth. We split the sample again into two groups -- emerging and developing. As noted earlier, recall that the emerging group of countries is based on the Standard and Poor's Emerging Market and Frontier Markets index and that were not high-income countries in the year 2000. The developing countries sample includes all other countries based on World Bank's income classification (as of year 2000). Also, it is useful to recall that the average income of the countries in our developing economies sample is around US\$1930, while that of emerging market economies is about US\$ 4765.

Table 2.5.4 summarizes the results for both the emerging and developing country subsample. Our estimation proceeds in similar steps to what we did in the full sample. Columns (1) to (3) provide the estimation results for the developing economies subsample. The estimating equation (2) has been augmented with linear and quadratic interaction terms between foreign bank entry and GDP per capita. The same set of results for the emerging economies subsample is reported in Columns (4) through (6).

The broad conclusion that we can draw from scanning the results is that our full sample results are robust and we find evidence of an income threshold effect when estimating equation (2) using broad income-based subsamples.

Table 2.5.4 Fixed Effects Estimates: Emerging vs. Developing Economies

Dep Var: Private Credit to GDP (%)	Developing Economies			Emerging Economies		
	<i>Baseline (1)</i>	<i>(1) with FBA and Linear Interaction (2)</i>	<i>(1) with FBA and Quadratic Interaction (3)</i>	<i>Baseline (4)</i>	<i>(1) with FBA and Linear Interaction (5)</i>	<i>(1) with FBA and Quadratic Interaction (6)</i>
GDP Per Capita	0.0029 (0.0075)	0.0035 (0.0076)	0.0037 (0.0074)	0.0107** (0.0050)	0.0151*** (0.0060)	0.0143*** (0.0055)
GDP Per Capita Squared	-8.37e-07 (6.65e-07)	-8.67e-07 (6.52e-07)	-7.98e-07 (5.50e-07)	-2.20e-07* (1.19e-07)	-2.86e-07** (1.35e-07)	-2.18e-07* (1.16e-07)
Ln Inflation Rate	0.3620 (0.8270)	0.3501 (0.8229)	0.2841 (0.8143)	3.0523** (1.4246)	3.2176** (1.3500)	3.4371*** (1.2524)
Public Debt (%)	- 0.0891** (0.0425)	-0.0808 (0.0508)	-0.0733 (0.0521)	0.0082 (0.0971)	0.0408 (0.0908)	0.0303 (0.0938)
Exchange Rate Regime	-1.2635 (0.9997)	-1.3831 (1.054)	-1.3285 (1.0334)	-0.1877 (1.0235)	-0.2396 (0.9491)	-0.3860 (0.9408)
Bank Z-score	-0.0115 (0.1349)	-0.0081 (0.1318)	-0.0090 (0.1301)	-0.2668** (0.1295)	-0.2556** (0.1263)	-0.2436* (0.1273)
Legal Rights	0.5793 (1.3326)	0.5584 (1.3045)	0.3108 (1.2611)	1.2238 (1.7858)	1.3222 (1.6057)	1.2617 (1.7137)
Creditor Information	0.9297 (0.8418)	0.9649 (0.8562)	0.8658 (0.8353)	3.5463*** (1.1095)	3.5511*** (1.1300)	3.5040** (1.1356)
Corruption	4.3033 (2.2818)	4.5328* (2.2791)	4.7141** (2.3029)	17.4595** (8.6396)	16.5203* (9.0166)	16.3997* (8.8844)
Foreign Bank Assets (%)	0.1294* (0.0709)	0.1555** (0.0752)	0.1551** (0.0754)	0.0782 (0.0699)	0.2205* (0.1206)	0.1402*** (0.0577)
FBA*GDPPC		-0.00002 (0.00001)			-0.00003 (.00003)	
FBA*GDPPC ²			-5.81e-09 (1.44e-09)***			-3.56e-09 (3.28e-09)
<i>Country Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
Constant	24.89	23.82	23.60	-12.34	-29.75	-10.31
R-Squared	0.45	0.46	0.48	0.45	0.45	0.45
Number of Observations	163	163	163	273	273	273
Number of Countries	21	21	21	33	33	33

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors Adjusted for Countries in Parenthesis

Examining the results closely, as we can observe from Table 2.5.4, for the developing country sub-sample, the model produces insignificant GDP per capita terms (both linear and quadratic) in the first two columns though the quadratic GDP per capita becomes marginally significant when controlled for interaction with foreign bank entry. While the model does not work very well at least with regard to the significance of the GDP per capita variable, interestingly we find that the foreign bank variable registers an improvement in terms of its statistical significance as we control for non-linearities in per capita income. As Column (3) shows, foreign bank presence remains significant at the 5 percent level and is positively associated with financial depth while its interaction with the quadratic GDP per capita terms seems to be extremely significant and negative. One plausible way to interpret this result is that the impact of foreign bank entry on financial depth is stronger and positive at lower thresholds of economic development and tends to turn negligible or even negative at higher levels of economic development beyond a particular point.

In contrast, as Columns (4) to (6) show, the results for the emerging market subsample are more consistent with the findings of the full-sample. We find the direction and statistical significance of the relevant coefficients to be identical to that of what we found in the full sample. Foreign banks are consistent in having a positive association with financial depth and this effect is stronger when controlled

for income threshold effects. However, the interaction term with quadratic income per capita while carrying the right sign, is not statistically significant.³⁰

2.6.2. Region Based Slicing

While the income based splitting appeared to indicate that a sample splitting is appropriate, we try to slice the sample on the basis of different regions, as classified by the World Bank. It is useful to note at the outset that we have an asymmetry in terms of representation of countries from different regions, with more countries coming from the Europe and Central Asia (ECA) and the Latin America and Caribbean (LAC) regions relative to Asia or Sub-Saharan Africa or Middle East and North Africa. Further, most of the institutional variables drop out of the estimation because of a large number of missing observations.

Keeping these in mind, we estimate a baseline with just the macroeconomic variables to get a sense of whether the expected relationships hold in terms of income thresholds. As the results in Table 2.5.5 show, the basic relationship of interest involving foreign bank assets and the quadratic term of GDP per capita follows the priors in ECA and LAC region subsamples, where we have lesser missing data concerns relative to the rest of the regions.

³⁰ As an extension, we also used the finer income classification reported by the World Bank by splitting the developing and emerging economies into High Income, Low Income and Middle Income categories and tested for the significance of quadratic per capita income. As the results summarized in Annex 2.3 show, in addition to finding the foreign bank variable positive and statistically significant, the quadratic per capita term is also significant across different income categories conforming to our conjectures, though the interaction terms (not reported) were not significant.

Table 2.5.5 Fixed Effects Estimates: Regional Sub-Samples

<i>Dep Var: Private Credit to GDP (%)</i>	<i>MENA (1)</i>	<i>LAC (2)</i>	<i>ECA (3)</i>	<i>Asia (4)</i>	<i>SSA (5)</i>
GDP Per Capita	0.0045 (0.0077)	0.0036 (0.0091)	0.0344*** (0.0090)	0.0792*** (0.0246)	0.0051 (0.0213)
GDP Per Capita Squared	8.49e-08 (1.82e-07)	-2.70e-07 (3.92e-07)	-5.81e-07 (3.59e-07)	2.74e-06*** (6.95e-07)	1.94e-06 (2.68e-06)
Ln Inflation Rate	-1.8476** (0.7626)	0.3477 (1.5337)	2.7113* (1.4611)	3.7693 (2.5141)	-0.4616 (0.6437)
Public Debt (%)	0.3589** (0.1297)	-0.0074 (0.0865)	-0.1417 (0.0851)	-0.1760 (0.1938)	-0.00068 (0.0257)
Exchange Rate Regime	0.0664 (0.8616)	-1.5476 (1.3052)	0.1736 (2.1263)	2.8002 (1.9387)	0.1648 (0.5241)
Bank Z-score	0.0235 (0.1946)	0.2014 (0.2078)	-0.5852 (0.3594)	0.5634 (0.4414)	0.0882* (0.0475)
Foreign Bank Assets (%)	0.3397 (0.4208)	0.1911* (0.0966)	0.1235 (0.0790)	-0.1926 (0.2348)	0.0275 (0.0282)
FBA*GDPPC ²	-1.38e-09 (1.16e-09)	-4.85e-09* (2.55e-09)	-1.42e-08*** (2.69e-09)	-1.96e-08** (6.87e-09)	-5.62e-09 (5.76e-09)
<i>Country Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>	<i>Yes</i>
R-Squared	0.81	0.37	0.81	0.67	0.72
Number of Observations	47	137	156	86	91
Number of Countries	7	13	16	8	11

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Robust Standard Errors Adjusted for Countries in Parenthesis

2.6.3. Other Estimation Procedures

Applying fixed effects estimation to dynamic panels could potentially lead to significantly biased OLS coefficients and that the size of the bias is larger the shorter the time dimension of the panel. Given the potential endogeneity bias among the independent variables, there could be further estimation problems. To overcome these econometric issues, we re-estimate our baseline model using the system GMM estimator developed by Arellano and Bover (1995), which uses lagged levels of the series as instruments for the endogenous variables in the equations in first differences and lagged differences of the dependent variable as instruments for

equations in levels. As noted by Detragiache et al., (2008, p.2142), the rationale for doing so would be that lagged foreign bank market share would affect present levels of financial depth only through the current foreign bank market share.

We employ a two-step system GMM with finite sample correction to the covariance matrix (Windmeijer (2005)), specifying up to two lags for instruments. A test of serial correlations for the error terms of the differenced equation is also used to check the validity of the instruments. Table 2.5.6 provides the results of the dynamic panel estimation, using Arellano-Bond estimation.

Table 2.5.6 Arellano-Bond Two-Step GMM Estimates

	(1)
<i>Dep Var: Private Credit to GDP (%)</i>	Arellano-Bond Two-Step GMM
L. Private Credit to GDP (%)	0.649***
	(0.125)
L. Foreign Bank Assets (%)	0.173**
	(0.0835)
LD.GDPPC	0.0170**
	(0.00815)
D.GDPPC ²	-2.05e-07***
	(4.76e-08)
LD. Ln Inflation Rate	0.790
	(1.200)
D. Public Debt (%)	0.0979***
	(0.0361)
D. Exchange Rate Regime	2.4415
	(0.782)
LD. Bank Z Score	0.181*
	(0.112)
D. Legal Rights	0.657
	(2.005)
D. Creditor Information	1.438**
	(0.7487)
D. Corruption	0.2883
	(8.232)
Observations	189
Number of Countries	49

<i>Instruments for Differenced Equation:</i>	
GMM-Type	Lags (2): Private Credit to GDP Lags (1): Foreign Bank Asset
Standard Instruments	First Difference of all exogenous variables
<i>Arellano-Bond Test for Zero Autocorrelation in First-Differenced Errors (P values)</i>	
Order 1	0.9487
Order 2	0.7783

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Note: Windmeijer Bias-Corrected Robust Standard Errors in Parenthesis
D – First Difference; LD – Lagged Difference; L - Lagged

We can see that our lagged dependent variable turns out to be extremely significant and the coefficient is closer to 1 which provides evidence of serial correlation and hence justifies the use of dynamic system GMM. Most variables remain consistent after instrumentation and foreign bank variable continues to be positively and significantly associated with financial depth. The output also presents no significant evidence of serial correlation in the first-differenced errors at orders 1 and 2.

Further, following the convention in the literature, we also re-run the baseline dynamic specific using an instrumental variables estimation procedure to address potential endogeneity issues as well as check for consistency of our baseline fixed effects estimation. Choosing instruments tend to be tricky and there is no convincing evidence in favor of any particular instrument. However, the ideal instrument should explain foreign bank presence but have no other direct effects on financial depth after controlling for other standard determinants.

We use two forms of instruments and the first set follows the standard practice in literature (See for instance Calderon and Kubota, 2009) in using the lagged version of all the control variables including that of foreign bank entry. The second follows Detragiache et al. (2007), and we instrument foreign bank entry with a measure of potential market size captured by population density. As explained by Detragiache et al. (2007), foreign banks operating in multiple markets have the advantage of diversifying country-specific risk than domestic banks. In countries where markets are small, foreign banks would be in a position to capture a significant market position with relatively smaller scale of investments. These reasons make the size of a market captured by population density a potential instrument. Further, the validity of the instrument cannot be challenged only if population does not affect financial depth through other channels. Table 2.5.7 reports the second-stage results of the instrumental variable estimation, done using two-stage least squares (TSLS). The key variables of interest continue to conform to our priors and also remain statistically significant.

Table 2.5.7 Instrumental Variable TSLS Estimation

<i>Dep Var: Private Credit to GDP (%)</i>	(1)	(2)
	IV Model 1	IV Model 2
L. Foreign Bank Assets (%)	0.129**	0.158***
	(0.0515)	(0.0506)
L. GDPPC	0.0131***	0.0131***
	(0.00178)	(0.00178)
L. GDPPC ²	-2.66e-07***	-2.67e-07***
	(5.33e-08)	(5.35e-08)
L. Ln Inflation Rate	2.415***	2.415***
	(0.678)	(0.681)

L. Public Debt (%)	-0.105***	-0.106***
	(0.0331)	(0.0332)
L. Exchange Rate Regime	-0.467	-0.438
	(0.603)	(0.606)
L. Bank Z-Score	-0.247**	-0.250**
	(0.0998)	(0.100)
L. Legal Rights	2.154**	2.188**
	(0.938)	(0.942)
L. Creditor Information	1.036	0.957
	(0.649)	(0.651)
L. Corruption	7.297**	7.053**
	(2.960)	(2.971)
Constant	-8.663	-9.631
	(7.369)	(7.391)
Observations	388	388
Number of Countries	54	54
Primary Instrument	L. Foreign Bank	Population Density

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Thus the various alternative estimation techniques appear to deliver consistent results in terms of significance and the direction of coefficients of interests relative to our baseline fixed effects estimation, serving as useful robustness checks.

2.7. Alternative Measures of Financial Depth

The final set of robustness checks we undertake is to try alternative measures of financial depth. Based on the discussion in Chapter 1 and Section 2.3 of this chapter, we know that the literature indicates that financial depth is not just about banking sector depth through credit creation but also involves the depth of stock and bond markets. To that end, stock market capitalization (as a percentage of GDP) and private bond market capitalization (as a percentage of GDP) are two accepted measures in the literature capturing different dimensions of financial

depth. We illustrate the results of using these variables as the dependent variables, and re-running our baseline estimation.

Before we examine the results, it is worth highlighting some data limitations. While the data we have for stock market capitalization spans 44 countries, there are still lots of missing observations for several years which reduces the total number of observations to 342 -- substantially smaller than the data on private credit creation in the full sample. The data for private bond market capitalization is even more limited, with the total number of observations significantly dropping by more than a half, with the final count of countries in our sample being 14 corresponding to 126 observations.

Table 2.5.8 Alternative Measures of Financial Depth (Full Sample)

	<i>Dep Var: Stock Market Capitalization (1)</i>	<i>Dep Var: Private Bond Market Capitalization (2)</i>
GDP Per Capita	0.0079 (0.0061)	0.0081* (0.0046)
GDP Per Capita Squared	6.03e ⁻⁰⁸ (1.30e ⁻⁰⁷)	-2.16e ⁻⁰⁷ (1.51e ⁻⁰⁷)
Ln Inflation Rate	6.7448 (4.3187)	0.1887 (0.4187)
Public Debt (%)	-0.2978 (0.3249)	0.1063*** (0.0376)
Exchange Rate Regime	-3.3012 (5.4817)	0.5313 (0.9091)
Bank Z-score	0.3534 (0.9788)	-0.0441 (0.0417)
Legal Rights	7.0522*** (2.1761)	0.2166 (0.4119)
Creditor Information	0.2714 (2.1194)	0.1374 (0.3942)
Corruption	-16.8731 (12.4630)	-2.6126 (1.9541)
Foreign Bank Assets (%)	0.3105**	0.1361*

	(.1487)	(0.0690)
FBA*GDPPC ²	-5.50e ^{-09**} (2.68e ⁻⁰⁹)	-2.32e ⁻⁰⁹ (2.04e ⁻⁰⁹)
<i>Country Fixed Effects</i>	<i>Yes</i>	<i>Yes</i>
<i>Time Fixed Effects</i>	<i>No</i>	<i>No</i>
Within R-Squared	0.17	0.33
Number of Observations	342	126
Number of Countries	44	14

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors Adjusted for Countries in Parenthesis

Column (1) in Table 2.5.8 summarizes the results of the empirical model for the full sample using stock market capitalization as the dependent variable. The results indicate that the per capita income – both in its linear and quadratic forms turn out to be statistically significant in explaining financial depth. In addition, we also find that foreign bank entry is not only positively and significantly associated with fostering financial depth, but the marginal effects on financial depth decrease with greater incomes. This is robust and consistent with earlier findings and our priors that the marginal effects of foreign banks on financial depth diminish as per capita incomes increase over time. It is also evident from the regression results that two other institutional variables that are statistically significant are legal rights and corruption, with the former being highly significant at the 1 percent level and the latter at the margins (10 percent level). Countries with stronger legal protection of creditors are expected to have deeper credit markets and thus are positively associated with fostering financial depth, a result that is also consistent with the findings from the literature.

Column (2) in Table 2.5.8 reports the results of the empirical model for the full sample using private bond market capitalization as the dependent variable. The

results conform to the larger income threshold story as per capita income – both in its linear and quadratic forms turn out to be statistically significant though only at the margins. They are consistent with our priors, carrying the expected signs. Interestingly the model shows foreign bank entry is not only positively and significantly associated with enhancing financial depth, but the marginal effects on financial depth decrease with greater incomes.

2.8. Conclusion and Policy Implications

Rising foreign bank participation in many emerging and developing economies (EMDEs) has given rise to a large body of work exploring its multifaceted impacts. One of the unsettled debates in the literature on foreign bank entry pertains to the contribution of foreign bank presence to financial sector depth in the host economy. Foreign banks are expected to positively enhance financial sector depth through their impact on credit creation and lowered cost of financial intermediation. They are also expected to contribute to greater equity and bond market liquidity thus enhancing financial depth in an economy. However there is a small but growing literature that appears to suggest that foreign bank entry results in raising interest rate spreads, lowering credit creation and negatively affecting financial depth. In this context, this chapter has examined the relationship between foreign bank presence and financial depth in 57 EMDEs. Specifically, we have investigated the significance of foreign banks in contributing to alternative measures of financial depth in a panel of 57 EMDEs between 1995 and 2009 and

also empirically tested if this relationship is affected by different income thresholds of countries.

The findings of the study appear to run counter to the existing literature in this field where our fixed-effects panel data estimation suggests that foreign bank entry is significantly and positively associated with financial depth and is robust across different subsamples based on income classification. However, the variations in the significance of foreign bank entry in fostering financial depth across different income groups confirms the importance of accounting for the heterogeneous levels of economic development across countries, a finding that is also consistent with the previous literature.

In order to explore further the non-linear relationship between per capita income and different measures of financial depth, this chapter tested the significance of income thresholds for countries in determining the relationship between foreign bank entry and financial depth. The empirical analysis strongly suggests the existence of income threshold effects. The results show that while foreign banks have a direct positive impact in furthering financial depth, the marginal effects of foreign bank entry diminishes as income levels rise. In other words, the impact of foreign bank entry tends to become smaller the richer the country becomes over time.

Probing this point further, we slice our data sample into different subsamples based on per capita income thresholds in order to ascertain the significance of income thresholds on how foreign banks affect financial depth and find that the

results are robust and consistent. We also run a variety of other robustness tests, using different estimation procedures and alternative indicators of financial depth as well as slicing the sample on the basis of regions. Across the board, the results remain largely consistent and reiterate the importance of explicitly factoring in the heterogeneous levels of economic development when examining the relationship between foreign bank entry and financial depth.

The empirical findings of the chapter have some important policy implications as well. There is a widespread recognition in the finance-growth literature that both bank-based and financial-markets based intermediation are positively linked to output growth. The deepening of bank-based financial sector in particular has been found to be particularly valuable for countries at their earlier stages of development (Gambacorta et al. 2014). The significant and positive association that our empirical results show between foreign bank entry and financial depth – especially for low and middle income countries -- provides a strong case for policy makers in these economies to design policies to promote foreign bank entry. Such policies, if implemented in a calibrated manner, will likely help them achieve higher financial development, thereby leading to positive growth outcomes. However, the chapter's findings also underline the importance of factoring in the levels of economic development of countries in understanding the relationship between foreign bank entry and financial depth. The results find an inverse U-shape relationship in the way foreign banks affect financial depth, i.e. the marginal effects of foreign bank entry tend to reduce as countries grow richer,

implying that a one-size-fits-all approach to financial liberalization is likely to be counter-productive.

The empirical results also reiterate the importance of sound institutions that would provide an enabling environment for foreign banks to enhance financial depth. In particular, the depth of information about creditors emerges as a highly significant variable consistently across different specifications. This is in line with the findings of the broader literature on international financial openness and financial development which emphasized the need for host economies to be equipped with sound institutional infrastructure in order to benefit from international financial openness (Chinn and Ito, 2006). To a large extent, the freedom from corruption variable also appears significant in most specifications, which speaks to the positive impact of better governance in enhancing financial depth in an economy.

Finally, the findings of the chapter also underline the importance of banking and prudential regulation for EMDEs. The significance of Bank Z-score – which captures the probability of default of a banking system in a country -- as a key determinant of financial depth in our model reiterates the need to establish an effective system of prudential regulations. For instance, Mishkin (2001) argues that in order for financial liberalization to work and to reduce the likelihood of financial crises, institutional and governance prerequisites such as adequate prudential supervision as well as accounting and disclosure standards must be in place. Our results appear to be consistent with such observations from the literature.

CHAPTER 3. DOES FOREIGN BANK ENTRY AFFECT FINANCIAL INCLUSION?

Abstract

An important dimension of the effects of foreign bank entry on financial sector development relates to that of financial inclusion, i.e. making finance more accessible for all households and firms in an economy. This chapter examines the relationship between foreign bank entry and financial inclusion in a panel framework covering 52 emerging and developing economies (EMDEs) over the period 2004-2009. The empirical findings suggest that foreign banks have a significantly direct positive impact in furthering financial inclusion, though the relationship turns negative when foreign bank entry is followed by greater banking concentration.

3.1. Introduction

Does foreign bank entry contribute to financial inclusion in emerging and developing economies (EMDEs)? The impact of foreign banks on financial sector development in general has tended to focus on financial sector deepening relating to the liquidity and development of the banking sector as well as bond and equity markets (see Chapter 2). However, as noted in the previous chapters, the other crucial dimension of financial sector development, especially from the perspective of EMDEs, involves making finance more inclusive for all households and firms in an economy. Financial inclusion can be said to encompass the process of broadening the accessibility of financial services for households and firms. In other words, it

relates to the issue of providing and enabling the firms and households in an economy with access to the formal credit market.³¹ This is also sometimes referred to as banking sector “outreach”, i.e. the degree to which the banking sector is able to meet the needs of a large segment of the population.

Since banks play an important role in achieving financial inclusion in EMDEs where bank-based financial systems dominate other forms of providers of financial services, the question of how foreign banks affect financial inclusion assumes policy significance. The limited literature on this subject has thus far focused on whether foreign banks promote provision of physical points of access to financial services or facilitate greater use of those services by larger segments of the population. These studies also point out concerns that the entry of foreign banks could be negatively associated with banking sector outreach owing to the tendency of foreign banks to cater to a smaller segment of the population (Beck and Martinez Peria, 2010 and references cited within).

Complementing the rather limited empirical literature is also an active policy debate in several EMDEs about the controversial role of financial liberalization in promoting financial inclusion. It is argued that the entry of foreign and private banks has deterred the objectives of financial inclusion as it is fundamentally at

³¹ While provision of credit is usually channeled through the banking system in a country, it need not be the case always. In several EMDEs, even post offices play a significant role in catering to the needs of smaller households and firms by playing the core role of banks in an economy, by accepting deposits and making loans. For a discussion on the role for postal networks in expanding access to financial services, see World Bank (2005).

odds with their profit incentives.³² Further, it has also been noted that weak competition policy in some countries has resulted in a concentrated financial sector which has blunted the incentives for foreign banks to promote financial inclusion (Ellis, 2007).

While the foregoing discussion points out that the policy debate about the role of foreign bank entry and financial inclusion is controversial, there is very little systematic empirical analysis of the concerned issues. The existing set of empirical studies neither appears to factor in various determinants of financial inclusion nor permit an analysis of the issue over time owing to their cross-sectional nature of data.

In this light, the aim of this chapter is to advance the literature on financial inclusion by empirically testing the impact of foreign bank entry on banking sector outreach. We use broad indicators of financial inclusion in a panel framework for 52 EMDEs over 2004 to 2009. Additionally, considering the importance of the implications of banking concentration after financial liberalization in EMDEs, this chapter is also specifically interested in testing how banking concentration and foreign bank entry jointly influence financial inclusion in EMDEs.

The remainder of the chapter is structured as follows. Section 3.2 begins by examining the literature on financial inclusion. Section 3.3 details some of the definitional and measurement issues relating to financial inclusion. The data and

³² For instance, see Chandrasekhar and Ghosh (2013) who make this argument about the specific case of India.

model for the empirics in this chapter are outlined in Section 3.4. The results are discussed in Section 3.5, along with robustness checks. Section 3.6 concludes this chapter with a brief discussion of policy implications of the empirical findings.

3.2. Overview of Literature

An inclusive financial system is considered to be desirable for several reasons, including enhancing both economic efficiency and welfare by providing opportunities for large segments of the population to adopt safe and secure saving practices, as well as facilitating the use of a range of financial services (Sarma and Pais, 2008). Ensuring broad financial services outreach is also important to ensure that the relatively poorer households or small entrepreneurs and small and medium-sized enterprises (SMEs) with inadequate collateral and insufficient credit histories are not left out of the formal credit market. Such financial exclusion could occur because of financial market imperfections such as information asymmetry or high transaction costs or lack of inadequate legal infrastructure to enforce contracts. The credit constraints that arise as a result make it difficult for those poorer households or small entrepreneurs to finance high-return investments, reducing the efficiency of resource allocation in an economy and eventually negatively impacting economic growth and poverty alleviation (Beck et al. 2007).

The literature on foreign bank entry and financial inclusion can be broadly divided into two strands, though the number of studies in each strand as well as their scope is rather limited. The first strand focuses on financial inclusion as

measured by indicators of banking sector outreach. Detragiache et al. (2006) and Beck et al. (2007) use cross-sectional data for 2003-04 for a sample of countries involving 18 low income countries and 99 countries respectively to find a general negative correlation between different measures of banking sector outreach and foreign bank participation. In a related paper and a fairly recent case study on Mexico, Beck and Martinez Peria (2010) use more detailed disaggregated data on the behavior of the number or share of municipalities where foreign banks are present. They find that greater foreign bank presence is associated with a decline in the number of branches, loans, and deposit accounts.

The other strand deals with the micro dimension considering the ‘real’ impact of foreign banks on firms’ and households’ access to credit by focusing on the lending patterns of foreign banks to different classes of borrowers. One of the long-standing debates in the literature on foreign bank entry concerns the so-called “cherry-picking” behavior of foreign banks by which they have the tendency to attract the financially transparent clients – firms or households – catering only to a smaller relatively risk-free segment of the population. This behavior arises from the existence of information asymmetry in the lender-borrower relationship. The resultant high costs of investing in lending relationships, particularly with small and opaque borrowers, may in turn lead to a reduction in the credit access for those borrowers (firms or households) (Clarke et al. 2006; Beck and Brown, 2014; Gormley, 2010).

While there has been a great deal of theoretical literature modelling the “cherry-picking” behavior of foreign banks, the corresponding empirical literature is limited (owing largely to demanding data requirements) and ambiguous at best. On the one hand, a few empirical papers find support for the view that foreign banks tend to be “fickle lenders” to opaque borrowers, though much of this evidence is limited to a few country-cases.³³ On the other hand, a recent emerging literature seems to be challenging this notion of foreign banks shying away from lending to opaque borrowers (particularly the SMEs) and posits that they are actively tapping the SME market even in countries with severe informational problems by resorting to alternative lending technologies (see De la Torre et al., 2010).³⁴

Interestingly, as Ellis (2007) notes, while there is some evidence of improved access to credit for SMEs as a result of foreign bank entry, this does not appear to extend to households, and large segments of the population often still appear to have very limited access to formal financial services, which will be the focus of this chapter.

3.3. Definitions and Measurement Issues

This section highlights some of the definitions and measurement related issues that arise from the literature.

³³ For example, see Mian (2006) for the case of Pakistan and Gormley (2010) for the case of India.

³⁴ This literature emphasizes the need to move beyond relationship lending based assessments in order to understand the lending behavior of foreign banks to such borrowers

3.3.1 Definitions

How does one define financial inclusion? One of the simplest working definitions of financial inclusion – as defined by Amidzic et al. (2014) is that financial inclusion refers to – “an economic state where individuals and firms are not denied access to basic financial services based on motivations other than efficiency criteria” (p.5).³⁵ Interestingly, as the World Bank Global Financial Development Report (2014) notes, such a definition of financial inclusion is paradoxically defined in terms of financial exclusion. Financial exclusion is broadly classified into two categories -- voluntary and involuntary exclusion. This in turn underlines the need to bring out the importance of distinguishing between two concepts of financial inclusion: (a) access to financial services which provide the enabling environment to use financial services; and (b) the actual use of financial services (World Bank, 2014).

On the one hand, voluntary exclusion, as the name suggests, refers to the segment of the population that chooses not to use financial services on a voluntary basis either because they do not need those services or because their culture or religion does not permit them to utilize such services.³⁶ On the other hand, economic agents could be involuntarily excluded from use of financial services, which is referred to as “involuntary exclusion.” Involuntary exclusion consists of the

³⁵ This definition is based on World Bank (2014).

³⁶ This type of exclusion is not a direct consequence of market failure though and not very interesting from a macroeconomic perspective (Amidzic et al. 2014 and World Bank, 2014).

individuals and firms who are denied financial services as a result of government failures or market imperfections, which necessitate corrective policy action.

While the above taxonomy is useful to understand the various conceptual intricacies in defining financial inclusion, from a measurement standpoint that will be helpful for policy purposes, the concept of financial inclusion can be understood through its multiple dimensions. As the literature points out, financial inclusion comprises three main dimensions, namely the outreach, usage, and quality of financial services and these different dimensions can be in turn be examined from the demand/user-end or supply/provider-side perspective (Amidzic et al. 2014; Beck and Martinez Peria, 2007).

The outreach dimension refers to the (physical) ability to easily reach a point of service. For instance, data from the World Bank's Global Financial Inclusion Index ('Findex') survey³⁷ reveals that of the 2.5 billion individuals excluded from financial systems globally, about 20 percent cite the distance to a point of financial service as the prime reason for not having an account with a formal financial institution, which is considered one of the indicators of financial inclusion. Thus, the shortage of physical points of financial services emerges as a significant factor in excluding a segment of population from accessing financial services, which in turn points to the need for policies to enhance accessibility of financial services through greater provision of physical points of access.

³⁷ The Global Financial Inclusion (Global Findex) Database, built by the World Bank, measures how adults in about 148 economies manage their finances. The indicators use survey data from household interviews globally for the year 2011 and include over 40 indicators related to ownership of accounts, information about payments, savings and borrowings etc.

3.3.2 Measurement

The literature suggests four proxies that effectively capture the outreach dimension of financial inclusion. The first two relate to Automatic Teller Machines (ATMs), scaled either by demography (adjusted for population) or geography (adjusted for geographic size) and the other two relate to the number of bank branches scaled in a similar fashion. Specifically, demographic ATM penetration (ATMs per capita) is defined as number of bank ATMs per 100,000 people, while geographic ATM penetration (ATM density) is defined as number of bank ATMs per 1,000 km². Similarly, geographic branch penetration, defined as number of bank branches per 1,000km² and demographic branch penetration, is defined as number of bank branches per 100,000 people. The literature interprets higher branch and ATM intensity in demographic and geographic terms as indicative of greater access to financial services by households and enterprises. The measurement of financial inclusion around the world can thus be understood using density indicators, such as bank branches or ATMs.³⁸

The second dimension concerns the usage dimension of financial inclusion. Some of the proxies suggested in the literature that capture the usage dimension include: Loan accounts per capita defined as number of loans per 1,000 people; Loan-income ratio defined as average size of loans to GDP per capita; Deposit accounts per capita defined as number of deposits per 1,000 people; and Deposit-

³⁸ Relevant data is compiled by surveying financial service providers and much of this provider side information on financial inclusion is now collected as part of the IMF's Financial Access Survey.

income ratio defined as average size of deposits to GDP per capita. Of these four proxies, consistent data appears to be available on a panel basis for the number of deposit accounts, defined as the reported number of deposit account holders at commercial banks and other resident banks functioning as commercial banks.

As Demirguc-Kunt and Klapper (2012) note, supply-side indicators do not necessarily provide the full picture about financial inclusion. This is because information concerning the actual use of those financial services from the user-side, in addition to measuring the degree of financial exclusion among women etc., are also important measures of financial inclusion. It is useful to note that the Global Financial Inclusion (Global Findex) Database has compiled several user-side indicators, which complement existing provider-side data on financial inclusion. Most of them are cross-sectional in nature and available only for the year 2011, limiting the usefulness of the data for our analysis in this chapter.

Figures 3.2.1 to 3.2.3 provide a snapshot view of the relationship between the various proxies of financial inclusion. While Figure 3.2.1 maps the relationship between two provider-side indicators of financial inclusion -- ATMs and bank branches, Figures 3.2.2 and 3.2.3 show the relationship between different measures of “access” and an indicator measuring “use of” financial services (number of depositor bank accounts). As Figure 3.2.1 suggests, there is a very close degree of correspondence between the two indicators, which is not necessarily the case when we compare “access to” and “use of” indicators as shown in Figures 3.2.2 and 3.2.3. While they appear correlated, their correspondence seems imperfect, as

emphasized by World Bank (2014) too, to drive home the point that there could be differences between the access to and use of financial services.

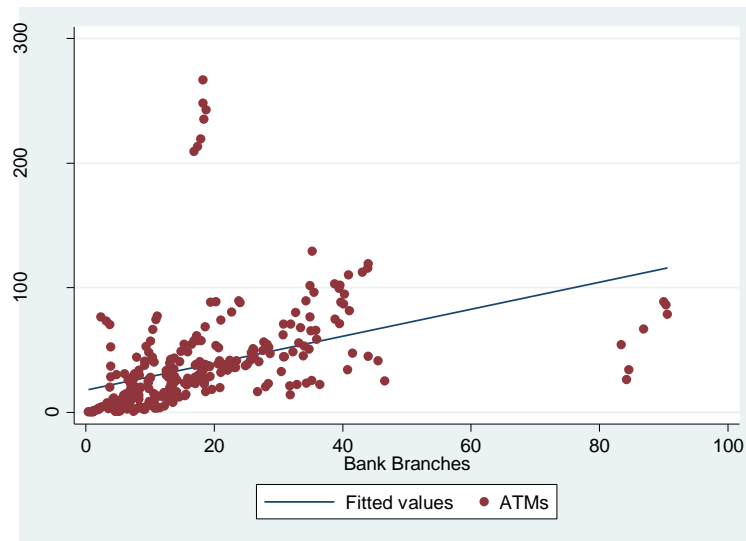


Figure 3.2.1 ATMs Per Capita and Bank Branches Per Capita

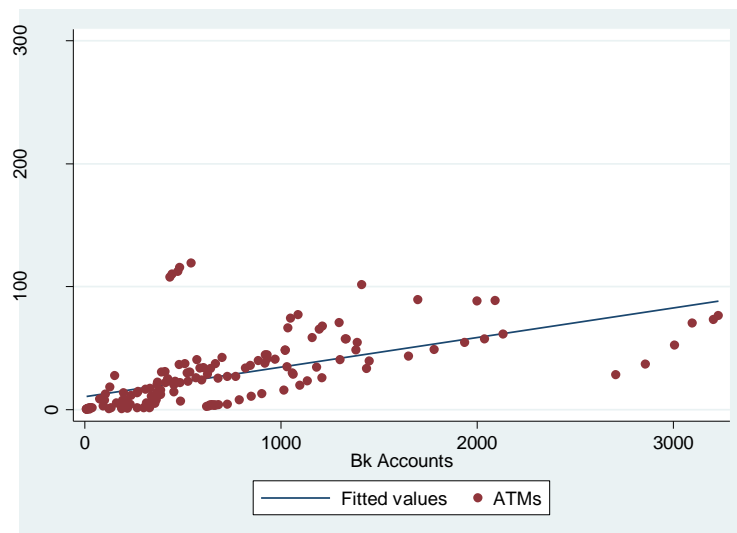


Figure 3.2.2 ATMs Per Capita and Bank Accounts Per Capita

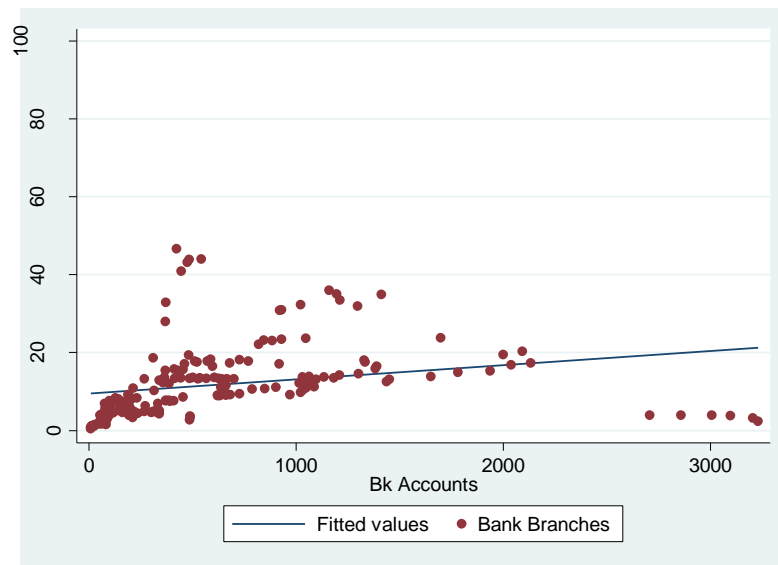


Figure 3.2.3 Bank Branches Per Capita and Bank Accounts Per Capita

The third dimension – quality dimension – measures the extent to which financial services address the needs of the consumers. As Amidzic et al. (2014) note, indicators capturing the quality dimension of financial inclusion are in turn implicit in sub-categories that include institutional variables such as financial literacy, legal requirements, the cost of usage of financial services and the like. As the general literature on financial inclusion shows, addressing these supply-side issues of access to and use of financial services for larger segments of the population could go a long way in promoting financial inclusion in EMDEs.

For instance, a couple of important policy measures that would help address financial exclusion in EMDEs are (a) addressing lack of physical access to the point of financial service by establishing ATMs in rural areas; and (b) easing availability of formal credit by providing the requisite legal, contractual and informational

environment that would reduce the degree of dependence on informal sources of credit.

To summarize the foregoing discussion, the literature indicates that financial inclusion can be understood and defined using three main dimensions, namely the outreach, usage, and quality of financial services. In this light, the commonly used proxies measuring these various dimensions of financial inclusion as discussed above, as well as the host of institutional and geographical determinants of financial inclusion form the basis for our empirical analysis in the chapter.

3.4. Data and Empirical Model

The discussion in the previous section brought out the various dimensions of financial inclusion that need to be factored in when assessing financial inclusion in EMDEs. Despite the policy significance of the issue, the empirical literature has rather little to offer in terms of evidence on the impact of bank competition in general or foreign bank entry in particular on financial inclusion. The large body of work examining the impact of international financial openness more broadly on financial development has focused more on financial sector deepening as opposed to financial inclusion. While lack of sufficient data has been a major impediment till recently, the development of cross-country data over time, despite its limitations, permits a more careful examination of this issue. To that end, in the remaining part of the chapter we will be interested in examining the impact of bank competition in

general and foreign bank entry in particular on financial inclusion in a selected sample of EMDEs, dictated by data availability.

3.4.1. Data

As described previously, financial inclusion can be typically measured using demand/user-side or supply/provider-side indicators. Demand-side indicators available from the global financial inclusion index database are cross-sectional in nature and given that we are interested also in the time-series dimension, for our panel estimation the focus of our empirics will mainly be on supply/provider-side indicators of financial inclusion. We also find that consistent data for a reasonably large sample of 52 EMDEs spanning a six year time period is available for the set of supply-side indicators.

To that end, we use the demographic penetration indicator -- proxied by ATMs per capita as the main variable measuring the physical outreach dimension, Physical distance to points of financial service tends to be an important barrier to financial inclusion (World Bank, 2014; Amidzic et al., 2014). ATMs are rescaled by adult population per 100,000 adults capturing demographic penetration.³⁹ Data is compiled from both the IMF's Financial Access Survey (FAS) as well as World Bank's World Development Indicators (WDI) dataset. See Annex 3.1 for details.

Before we proceed for a more formal analysis, it must be emphasized here that we prefer using ATMs as the preferred proxy to measure financial inclusion

³⁹ We also use ATM density - the number of ATMs rescaled by land mass, i.e. number of ATMs per 1,000 km² as an alternative dependent variable.

over other measure. As the discussion in the previous section noted, supply-side constraints such as inability to provide physical access points for delivery of financial services reveals important information about the accessibility of large segments of population to financial services. Viewed from the perspective of foreign banks, ATMs are much more cost effective and require the least amount of investment commitment relative to establishing bank branches or allowing deposit-taking functions. Hence using ATMs instead of bank branches as the preferred proxy would appear more intuitive to examine the role of foreign bank presence on financial inclusion. However, we test for the impact of foreign bank entry on all other alternative indicators for which data is available as part of robustness checks in Section 3.5.2.

Figures 3.4.1 to 3.4.3 map the relationship between the financial inclusion indicators and foreign bank entry in our sample. A simple visual inspection appears to show no evidence of any discernible relationship though Figure 3.4.3 tends to show a negative relationship between foreign bank entry and financial inclusion as proxied by number of deposit accounts per capita, corresponding with the findings for Mexico by Beck and Martinz Peria (2010). In similar vein, Figure 3.4.2 appears to show a slight positive relationship between bank branches and foreign bank entry with ATMs (Figure 3.4.1) appearing to exhibit no meaningful relationship. Overall, simple visual plots do not seem to offer adequate evidence about the precise nature of the relationship between foreign bank entry and various measures of financial inclusion. We undertake a more formal empirical analysis in the next section.

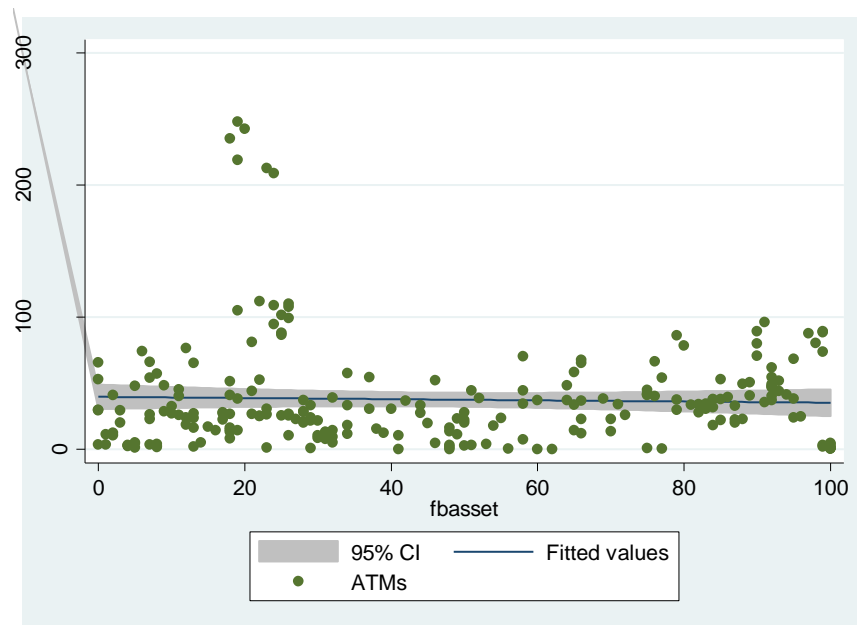


Figure 3.4.1 ATMs Per Capita and Foreign Bank Entry

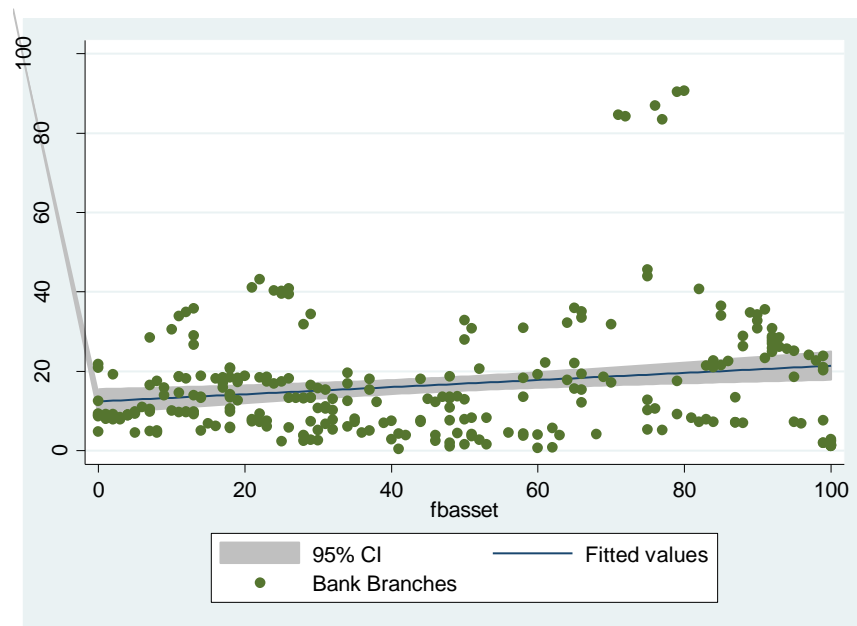


Figure 3.4.2 Bank Branches Per Capita and Foreign Bank Entry

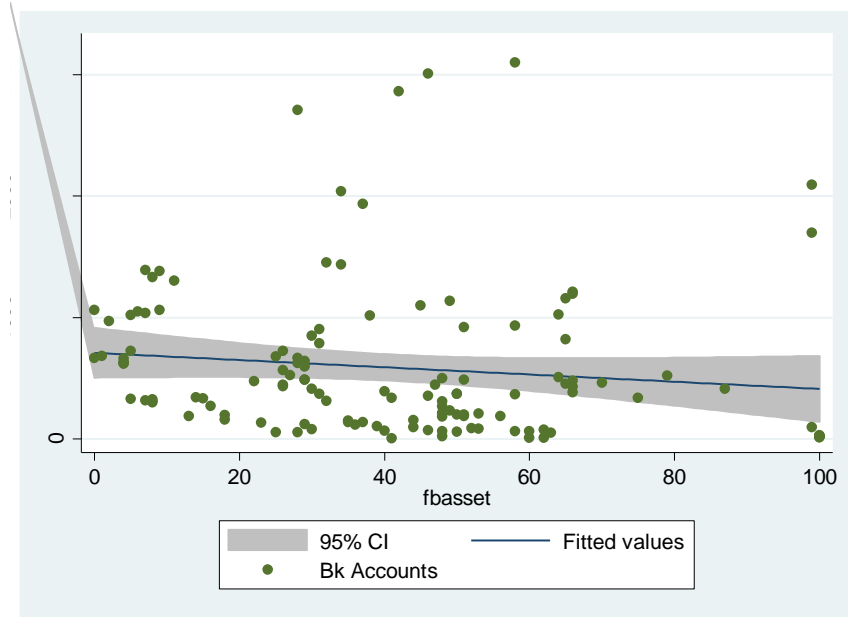


Figure 3.4.3 Bank Accounts Per Capita and Foreign Bank Entry

3.4.2. Empirical Model

The basic estimating equation will be as follows:

$$y_{it} = \delta_{it} + \beta fb_{it} + \gamma X_{it} + u_{it} \quad (1)$$

where: y_{it} is the number of ATMs per capita (per 100,000 people) in country i at time t

fb_{it} is the share of bank assets held by foreign banks in country i at time t ;

X_{it} is a matrix of control variables measured at time t ;

u_{it} is the idiosyncratic error term.

β and γ are the parameters to be estimated.

The parameter of interest is β which represents the coefficient of the foreign bank share. Based on the literature discussed in the foregoing section, a selected set of macroeconomic, geographic, financial, social and institutional variables affecting

financial inclusion in an economy are employed as controls in our model. The vector of control variables are listed below:

$$X_{it} = \left\{ \begin{array}{l} \text{GDP Per Capita, Surface area;} \\ \text{Overhead costs, Credit to Stateowned enterprises, Bank Concentration;} \\ \text{Creditor Information, Legal Rights;} \\ \text{Share of women employed in non – agricultural sector} \end{array} \right\}$$

All the data sources are summarized in Annex 3.1. Below we offer a brief description of the variables employed in our model along with the priors.

GDP Per Capita: measuring overall levels of economic development in the country. We expect a positive relationship between financial inclusion and countries with higher levels of development.

Surface Area: This is a proxy capturing a country's geographic size, which is a likely important determinant of financial inclusion. Greater the surface area, the greater the spread of the population and higher are the costs of providing financial services. So a large surface area might lower the financial inclusion in an economy and we expect a negative relationship.

Overhead Costs: These costs are defined as operating expenses of a bank, expressed as a share of the value of all held assets. Greater the overhead costs, the less likely the bank would be interested in greater outreach as it would increase its costs and hence it is likely to impede financial inclusion.

Credit to State-Owned Enterprises: Measured as the ratio between credit by domestic money banks to the government and state-owned enterprises and GDP, this variable will positively influence financial inclusion, as a greater government control of the banking system implies that it has the potential to direct credit to specific areas prioritizing banking outreach. This is likely to result in a higher degree of financial repression which may be beneficial to financial inclusion.

Lerner Index: The *Lerner Index* measures market power in the banking industry by comparing output pricing and the marginal costs (markup). An increase in the Lerner index is associated with a decline in bank competition and we expect greater banking concentration in an economy to be a deterrent to financial inclusion as an oligopolistic type market structure is unlikely to have an incentive to promote banking sector outreach unless they are government owned and have a mandate to do so.

Credit Depth of Information Index: This variable captures the cost to banks of obtaining information about borrowers and we expect that higher information availability to be positively associated with financial inclusion in the economy, as it helps ease out information asymmetry in the lending-borrowing process, which in turn may reduce the costs for banks in promoting greater outreach.

Legal Rights Index: measuring the strength of legal rights in an economy that protect the rights of borrowers and lenders. We expect countries with stronger legal protection of creditors to have deeper credit markets because a reliable legal institutional backing is suggestive of transparency and credibility of any contract

enforcement mechanism which reduces the risks involved. Thus a sound legal system to enforce and honor contracts would encourage the banks to opt for greater outreach and would carry a positive sign.

Share of Women Employed in Non-Agricultural Sector: A greater representation of women employed in the non-agricultural sector should enhance financial inclusion, as greater use of financial services is expected in more densely populated urban areas with a much higher density in retail access points and a higher degree of literacy among the female workforce.

We employ a generalized least squares (GLS) random effects specification for our panel regressions. In addition to conforming to the results of the Hausman test, which suggests that the assumption of absence of any correlation between the time invariant error term and the regressors is not unreasonable, a comparison of the near similar coefficients of random and fixed effects estimates also supports the choice of random effects specification. Further, considering that there is not a significant degree of within-group variation in our key variables of interest within each group, especially dealing with short time span over 6 years, it is likely that differences across groups and countries have more influence on the dependent variable.

3.5. Empirical Results

3.5.1. Baseline Model

We start with our baseline model as outlined in equation (1) that estimates the relationship between foreign bank entry and financial inclusion controlling for macroeconomic, institutional and financial variables. The results of our panel estimation using GLS random effects with robust standard errors are summarized in Table 3.5.1. Column (1) in Table 3.5.1 reports estimates of our baseline without foreign bank entry. Column (2) reports the estimation results of our baseline model with the foreign bank variable.

Table 3.5.1 Determinants of Financial Inclusion

	(1)	(2)	(3)
<i>Dep Var: ATMs Per Capita</i>	Baseline	(1) With Foreign Bank Entry	(2) With Foreign Bank Entry*Concentration
GDP Per Capita	0.00956*** (0.00233)	0.00894*** (0.00213)	0.00915*** (0.00209)
Creditor Information Index	5.339*** (1.100)	3.919*** (0.901)	4.069*** (0.892)
Legal Rights	2.651** (1.243)	2.490** (1.122)	2.311** (1.062)
Surface area	2.10e-06*** (7.13e-07)	2.18e-06** (9.34e-07)	2.30e-06** (9.69e-07)
Overhead Cost	0.859 (1.509)	-1.321*** (0.508)	-1.303*** (0.476)
Credit to Govt. Enterprises	1.037*** (0.266)	0.718*** (0.268)	0.651** (0.261)
Women Employed in Non-Agriculture	0.429 (0.434)	0.311 (0.454)	0.240 (0.457)
Concentration Index	-17.77 (12.21)	-20.30** (11.23)	-25.87* (15.62)
Foreign Bank Entry		0.131** (0.0892)	0.366*** (0.109)
Foreign Bank			-0.930***

Entry*Concentration			
			(0.256)
Observations	230	181	181
Number of Countries	40	38	38

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors Adjusted for Countries in Parenthesis

The model produces several significant variables and broadly all of them conform to our priors. While GDP per capita is variables are highly significant at the 1 percent level, inflation is weakly statistically significant and negative at the 10 percent level, consistent with our priors. Both the institutional variables appear to be highly statistically significant in explaining financial inclusion. The credit to government owned enterprises is also significant, carrying a positive impact on financial inclusion as we noted earlier. It is interesting that surface area is also highly significant but appears to have the wrong sign. We would expect to see a negative relationship between surface area and financial inclusion the greater the geographical size. However, it must be emphasized that though this variable is statistically significant, its economic significance is quite marginal.⁴⁰

As the next step, we add the foreign bank entry variable to examine its relationship with financial inclusion. The results are shown in Column (2) and they bring out the consistency of the model. While most of the variables continue to be significant from our baseline without foreign bank entry, foreign bank entry per se

⁴⁰ Alternatively we used population density as an alternative control and we did not find it to be significant. Since both the variables were highly correlated, we did not use the two together in the regressions.

appears to be positive and statistically significant at the 5 percent level although only marginally economically significant. However, it must be noted that controlling for foreign bank entry turns the overhead costs of the banks highly significant at the 1 percent level. While this could point to some joint endogeneity issues because entry of foreign banks themselves could contribute to decreased overhead costs which may not have anything to do with financial inclusion per se, it is nevertheless a useful result to highlight.

Controlling for foreign bank presence also appears to reduce the measure of financial repression proxied by credit to government owned enterprises, indicating the positive competitive effects they bring in to the economy. At the same time, note that the measure of concentration becomes statistically significant at the 5 percent level when accounting for foreign bank entry. While the variable is consistent in terms of our priors and impedes financial inclusion, the economic and statistical significance appears to go up in the presence of foreign banks. Overall, most variables appear to be consistent from our previous model though foreign bank entry seems to affect some of the key financial variables in the way they affect financial inclusion, which warrants a closer examination.

In order to probe the relationship between foreign bank entry and concentration and how they jointly affect financial inclusion, we re-run our baseline model with an interaction term between the two concerned variables. The results, as shown in Column (3) yield interesting results, once again consistent with our priors. While foreign bank entry continues to carry a statistically significant and

positive impact on financial inclusion, and banking concentration continues to affect it negatively, the joint interaction between the two also possesses significant explanatory power. Both individually as well as jointly, the influence of foreign bank entry and bank concentration remains highly statistically and economically significant. In addition, the interaction between the two variables is significant at the 1 percent level and affects financial inclusion negatively. This result strongly suggests that foreign bank entry by itself could bring in a host of economic benefits, including the enhancement of financial inclusion. However, if the post entry of foreign banks is followed by greater banking concentration that may be detrimental to the goals of achieving enhanced financial inclusion, as it merely transforms the market structure from a government-dominated banking system to an oligopolistic structure controlled by foreign private banks.

3.5.2. Robustness Checks

We test the relationship between foreign bank entry and financial inclusion by using alternative indicators of financial inclusion as robustness checks. The problem with most of these indicators is the data availability and the final sample of countries reduces significantly when using our baseline specification in equation (1) for other indicators. However, the idea behind this exercise is to verify at some level the robustness of our priors to alternative indicators of financial inclusion.

There are two sets of indicators of financial inclusion that cover both dimensions in terms of “access to” and “use of” financial services, which we employ

in our model as dependent variables. The first pertains to bank branches scaled by either population or square kilometer which measure access to financial services, similar to ATMs by providing physical points of access to a large segment of the population.⁴¹ The second indicator – use of formal bank accounts -- falls under the other category of financial inclusion indicators facilitating the “use of” such services. The indicator that we use from the financial access survey is the number of deposit accounts/loan account per capita (per 1,000 adults).

Table 3.5.2 presents the results of the model that uses bank branches per capita (per 100,000 adults) as the proxy for financial inclusion and uses the benchmark model given in equation (1). The results are available for 41 countries with 197 observations. Interestingly, as columns (1) and (2) show, almost all the variables that were significant in model 1 with ATMs as a proxy continue to be significant in this model as well, consistent with our priors. Both the benchmark specification without foreign bank variable (Column 1) and including it (Column 2) appear to produce consistent results although the statistical and economic significance is relatively weak compared to the benchmark model.⁴²

⁴¹ We also use ATM density as our dependent variable and find that the results largely correspond to our benchmark model with ATM per capita as the dependent variable. Thus our results are consistent across both the demographic as well as geographic indicator of financial inclusion.

⁴² Note however that the interaction term between foreign bank entry and concentration is not statistically significant, though the economic significance of banking concentration becomes more important when controlled for foreign bank entry, suggesting that there is a relationship between banking concentration and foreign bank entry that needs to be factored in while assessing the impact on financial inclusion.

Table 3.5.2 Alternative Indicators of Financial Inclusion: Bank Branches

	(1)	(2)	(3)
<i>Dep Var: Bank Branches Per Capita</i>	Baseline	(1) With Foreign Bank Entry	(2) With Foreign Bank Entry * Concentration
GDP Per Capita	0.0013** (0.001)	0.0013*** (0.000)	0.0013*** (0.000)
Creditor Information Index	0.7251** (0.306)	0.7598*** (0.271)	0.7639*** (0.282)
Legal Rights	2.4558* (1.314)	2.2747** (1.159)	2.2667* (1.173)
Surface area	0.0000*** (0.000)	0.0000*** (0.000)	0.0000*** (0.000)
Overhead Cost	-0.2574* (0.142)	-0.3734** (0.187)	-0.3739** (0.188)
Credit to Govt Enterprises	0.0653 (0.068)	0.0839 (0.053)	0.0826 (0.055)
Women Employed in Non-Agriculture	0.2808 (0.214)	0.2696 (0.178)	0.2656 (0.181)
Concentration Index	-1.7588 (5.549)	-3.5411 (5.973)	-1.5888 (3.497)
Foreign Bank Entry		0.0391* (0.025)	0.0485* (0.034)
Foreign Bank*Concentration			-0.0392 (0.133)
Observations	248	197	197
Number of Countries	42	41	41

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Robust Standard Errors Adjusted for Countries in Parenthesis

The other robustness test we employ involves using the reported number of deposit account holders at commercial banks as an indicator of financial inclusion that measures the actual use of deposit and credit services. Table 3.5.3 presents the results of the baseline model in equation (1) with number of deposit accounts as the

dependent variable. The number of observations drops drastically to 112 in total with data available only for 23 countries for the sample period. This model does not work very well, though the variables that are significant are consistent with the priors. With the exception of income per capita and depth of creditor information, the rest of the variables are insignificant. The inclusion of foreign bank entry does further reduce the sample size to 85 representing only 21 countries. While foreign bank entry continues to produce a positive and significant impact on financial inclusion, the significance of the model per se is overshadowed by the limited number of observations.

Table 3.5.3 Alternative Indicators of Financial Inclusion: Deposit Accounts

	(1)	(2)	(3)
<i>Dep Var: Deposit Accounts Per Capita</i>	Baseline	(1) With Foreign Bank Entry	(2) With Foreign Bank Entry * Concentration
GDP Per Capita	0.1096*** (0.039)	0.1121** (0.045)	0.1082** (0.043)
Creditor Information Index	34.4196** (15.893)	9.0876 (18.244)	10.1816 (19.425)
Legal Rights	17.1006 (23.179)	12.2734 (23.891)	16.7023 (26.452)
Surface area	-0.0001** (0.000)	-0.0001** (0.000)	-0.0001** (0.000)
Overhead Cost	-14.9512 (13.195)	-13.7147 (11.437)	-14.8804 (11.595)
Credit to Govt Enterprises	10.8029* (5.954)	5.6579 (4.522)	5.0584 (4.397)
Women Employed in Non-Agriculture	15.0245 (10.707)	9.8250 (11.020)	8.9782 (9.696)
Concentration Index	-137.9157 (188.904)	-209.8440 (252.129)	134.1707 (441.856)

Foreign Bank Entry		3.0206*	4.9672*
		(1.761)	(3.620)
Foreign Bank*Concentration			-8.3088
			(12.379)
Observations	112	85	85
Number of Countries	23	21	21

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Robust Standard Errors Adjusted for Countries in Parenthesis

3.6. Conclusion and Policy Implications

One of the important dimensions of the effect of foreign bank entry on financial sector development relates to that of financial inclusion. Specific indicators of financial inclusion capture the provision of physical points of access to financial services as well as indicators reflecting greater use of those services by larger segments of the population. The limited literature on this subject appears to suggest that entry of foreign banks could be negatively associated with banking sector outreach owing to the tendency of foreign banks to cater to a smaller segment of the population. However, the vast majority of the literature has tended to be cross-sectional in nature and has spanned limited number of countries.

In this light, this chapter investigated the relationship between foreign bank presence and financial inclusion by using multiple indicators for 52 emerging and developing economies spanning 2004-2009. The empirical results using both a measure of demographic penetration (number of automatic teller machines (ATMs) rescaled by population) as well as geographical penetration (captured by ATMs rescaled by area of the country) produce consistent and significant results in favor

of a positive impact of foreign bank presence on financial inclusion. This appears robust across all other indicators of financial inclusion as well. These results also have significant policy implications for the emerging and developing economies, several of which are undertaking active initiatives to put in place measures to promote financial inclusion as well as liberalize their domestic banking sectors.

The findings highlight that foreign bank entry likely contributes to easing of supply-side constraints such as the inability to provide physical access points for delivery of financial services which will in turn help promote financial inclusion. Specifically, since ATMs are much more cost effective and require the least amount of investment commitment, designing appropriate policies to facilitate the setting up of such physical points of access would likely enhance financial inclusion in EMDEs. In fact, since many basic banking transactions occur through ATMs in the advanced economies -- obviating the need to go a teller to a certain degree -- policy makers in EMDEs could facilitate setting up of physical points of access through foreign bank entry.

Another aspect of the empirical findings pertains to the significance of information asymmetry and how a better information environment promotes financial inclusion. In fact one of the primary reasons cited by the literature as to why foreign banks could hamper financial inclusion in EMDEs has to do with problems of information asymmetry. Asymmetric information and high transaction costs are two important obstacles to financial inclusion, preventing the expansion of financial services to certain segments of the population (de la Torre et al. 2007). As

the World Bank (2014) points out, there is an important role for the government in this context to provide an enabling environment in terms of easing out problems of information asymmetry that would in turn enhance financial inclusion.

Finally, an important qualification to the empirical findings in this chapter comes from the result on banking concentration and how the positive impact of foreign bank entry on financial inclusion tends to reverse when it is followed by greater banking concentration in an economy. This is important from a policy standpoint because greater foreign bank entry can result in greater banking concentration, as has been the case in several Central and Eastern European or Latin American countries (World Bank, 2008). Such an outcome is likely to be detrimental to the goals of achieving financial inclusion, as it merely transforms the market structure from a government-dominated banking system to an oligopolistic structure controlled by foreign private banks.

Furthermore, recent evidence by Bruhn et al. (2012) points out how increased banking concentration in an economy can result in generating monopoly rents by the few large players in the market by holding on to information endowments and aggravating problems of information asymmetry that in turn deter new entry into the market. Hence, the role of the policy makers in EMDEs is not just to provide better information environment that would solidify the welfare gains to be had from foreign bank entry, but also to ensure that the domestic market is not dominated by a few large banks that would lead to greater banking concentration.

CHAPTER 4. DOES FOREIGN BANK ENTRY MAKE MONETARY POLICY MORE EFFECTIVE? : EXPLORING THE INTEREST RATE PASS-THROUGH CHANNEL

Abstract

This chapter explores the impact of foreign bank entry on interest rate pass-through for a panel of 57 emerging and developing economies over the period 1995-2009. The chapter specifically tests for possible identifiable thresholds in foreign bank presence that differentially impact interest rate pass-through. The empirical results suggest that there are strong threshold effects in that foreign bank entry tends to enhance interest-rate pass-through only in countries with greater degree of foreign bank presence compared to those with limited entry. The chapter also finds that when foreign bank entry tends to be followed by greater banking concentration, it significantly lowers the extent of interest rate transmission.

4.1. Introduction

As elaborated in detail in Chapter 1, the focus of the literature on foreign bank entry has largely been on how foreign banks have brought greater efficiency gains to the domestic banking system in the host economies. But beyond the efficiency-related gains, there is also a growing recognition in the literature about how foreign banks contribute to the development of overall financial and money markets by fostering financial sector depth as well as financial inclusion – the two prime components of financial sector development (Chapters 2 and 3). An emerging literature appears to be more concerned with the role foreign banks play in transmitting different kinds of shocks (external and domestic) to the host

economies they operate in. This specifically relates to how foreign bank entry affects domestic monetary policy transmission as well as international crisis transmission in EMDEs.

The impact of greater foreign bank presence on domestic monetary policy transmission has become a subject of importance for EMDEs also because several of these economies have gravitated towards more market determined exchange rate regimes. This has in turn resulted in the growing prominence of interest rates as the primary instrument for macroeconomic management in these economies.⁴³ While the monetary policy transmission literature has broadly paid more importance to the bank lending channel and the role they play in transmitting shocks to the credit markets through supply-side effects, for several EMDEs with relatively underdeveloped financial markets, the *interest rate channel* of transmission -- affecting aggregate demand through its impact on the costs of loanable funds -- remains quite important⁴⁴ (Mishra and Montiel, 2012).

In this light, an interesting question of relevance to the discussion here is how foreign banks affect interest rate transmission of monetary policy, especially in

⁴³ There is a general consensus in the literature that there are at least four channels via which monetary policy changes are transmitted to the real economy -- interest rates, exchange rates, asset prices, and the credit channel, with the credit channel further broken down into the bank lending channel and the balance sheet channel. The bank lending channel affects the real economy through the supply of loans while the balance sheet channel operates through the demand for loans. For an overview of the lending channel, see Bernanke and Gertler (1995). In contrast, as noted by Alpanda and Aysun (2012), research on the balance sheet channel has been relatively scarce, mainly because of the difficulty in isolating the independent effects of this channel.

⁴⁴ The policy rate also works through its impact on the flow of funds to other assets, such as equities, which causes a rise in the price of the assets stimulating consumption in the economy through the wealth effect and through the impact on investment demand (Islam and Rajan, 2011).

EMDEs. As World Bank (2008) notes, there are two conflicting views. First, higher foreign bank participation could strengthen the interest rate transmission indirectly because it contributes to the efficiency and development of the financial sector. On the other hand, the presence of *internal capital markets* -- one of the distinguishing variables unique to the process of foreign bank lending -- along with the access to external buffer of funds, allows foreign banks to be less responsive to domestic monetary policy shocks which may reduce the strength of the monetary transmission.⁴⁵ The net impact is a priori unclear and remains an empirical question.

These contrasting views notwithstanding, there are two key relevant factors at work. The first pertains to the structure of the domestic financial system in which foreign banks operate, while the second relates to the degree to which they are present in these economies, which in totality could determine the strength of the interest rate pass-through in EMDEs. While the relevant literature seems to focus on estimating both the degree and determinants of interest rate pass-through in many countries, almost no paper to our knowledge explores the impacts of foreign bank

⁴⁵ An active *internal capital market* is accessible only to the foreign banks which significantly changes the way they respond to different types of shocks in the home as well as host country. The changing nature of banking globalization has altered how banks manage their liquidity as well as how they react in the event of liquidity shocks. As Cetorelli and Goldberg (2008; 2009) posit, foreign banks with affiliates abroad can respond to domestic liquidity shocks by activating a cross-border, internal capital market transfer between the head office of the parent bank and its foreign offices, thus reallocating funds on the basis of relative needs which insulates foreign banks from domestic liquidity shocks. This chapter will specifically focus on an important channel of domestic monetary policy transmission – the interest rate channel – and how foreign banks impact this transmission channel.

entry on interest rate transmission, which will be the focus of this chapter of the dissertation.

The remainder of the chapter is organized as follows. Section 4.2 outlines the analytical framework to understand interest rate pass-through and discusses the relationship between foreign bank entry and interest rate transmission by specifying some hypotheses of interest. Section 4.3 surveys briefly the relevant empirical literature. The data sources and the empirical model are specified in Section 4.4. This section undertakes an empirical investigation of the significance of foreign bank entry to the interest rate transmission with a specific objective of testing for possible identifiable thresholds in terms foreign bank presence that differentially impact pass-through. Section 4.5 details the empirical findings while Section 4.6 concludes this chapter.

4.2. Analytical Framework

As noted earlier, the literature on monetary policy transmission has focused on the bank lending channel and the role banks play in transmitting shocks to the credit markets through supply-side effects. During phases of monetary policy tightening, should banks experience a contraction in their deposits they are assumed to substitute those deposits with other forms of financing in a costless way, i.e. deposits and other liabilities are perfect substitutes. This assumption minimizes the role played by banks in the other transmission channels and hence do not appear significant (Wu et al., 2007).

However, in a seminal paper, Bernanke and Blinder (1988) relaxed the assumption of perfect substitutability of bank deposits and their ability to substitute it with other forms of finance, and highlighted the importance of the bank lending channel in transmitting monetary policy shocks. Thus when the central bank tightens the money supply and draws out banks' reserves which consequently reduce their deposits, the banks are constrained by their inability to perfectly substitute deposits with other liabilities. This eventually leads to a contraction in the supply of credit in the economy, which affects the overall output in the economy through reduced investments from firms (Kashyap and Stein, 1995; Bhaduri and Toto, 2012).

So the key point as set out by Bernanke and Blinder (1988) in understanding the bank lending channel relates to the notion of "imperfect substitutability" of deposits with other liabilities, which eventually leads to a contraction in the supply of credit. The idea is that such liquidity shocks are transmitted to the asset side of the banks' balance sheets when the banks are not endowed with adequate liquidity buffers as they end up absorbing the shock in their lending activities. This completes the transmission to the real economy as it generates supply-side shocks in the credit markets, amplifying economic fluctuations.⁴⁶

Kashyap and Stein (2000) -- considered one of the seminal papers in this literature -- showed that in practice, the lending channel works only through the

⁴⁶ See Cetorelli and Goldberg (2008; 2009; 2010; 2012); Bernanke and Blinder (1988); Bernanke and Gertler (1995); and Kashyap and Stein (1995).

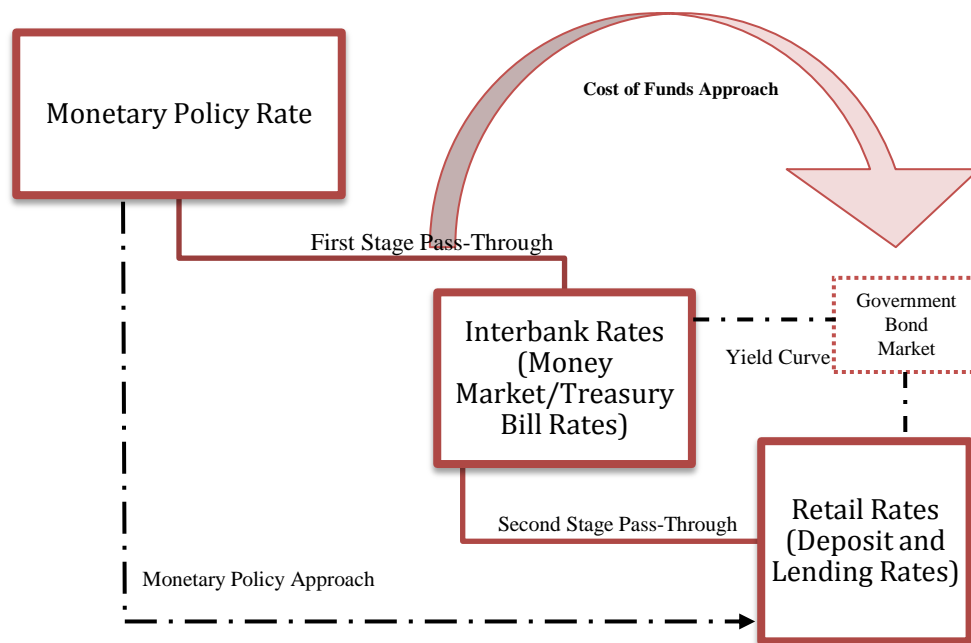
balance sheet of small banks, i.e. size matters. Large banks do not have any difficulty accessing external capital markets and hence any funding shock is absorbed with a potential liability substitution. Campello (2002) shows that, in fact, even among the smaller banks, only the ones that are stand-alone entities are the worst affected, that is, small banks affiliated with large banks as parts of the same bank holding company are insulated from this problem. Though this logic can be extended to foreign banks operating in EMDEs too, the relevant literature is quite inconclusive.

While the bank lending channel of monetary transmission focuses on quantity of funds, the related literature notes that the traditional interest rate channel of monetary transmission -- the pass-through from policy rates to retail (lending/deposit) rates -- can occur in two ways. The first direct channel of transmission is known as the monetary policy approach where a change in the monetary policy rate is directly reflected in the long-term lending (and/or deposit) rates. The other indirect channel of transmission - known as the cost of funds approach (de Bondt, 2005) - can be decomposed into two stages broadly (Figure 4.2.1).

The first stage measures how changes in policy rates are first transmitted to interbank rates -- which are the short-term money market rates -- and then in turn how changes in interbank rates are passed through to the longer-term lending or deposit rates. It is useful to note that since interbank rates usually happen to be the target rates for the monetary policy, the pass-through from the policy to interbank rates has been observed in the literature to usually be complete and instantaneous.

An incomplete pass-through between policy and interbank rates usually reflect stresses in the money market (Gigineishvili, 2011).

The second stage pass-through in turn operates in two steps as shown in Figure 4.2.1 -- from the interbank rates to government bond markets and subsequently from the government bond markets to the retail rates. In other words, changes in short-term market rates (money market, treasury bills), usually are transmitted to longer-term interest rates through the yield curve. The final phase of monetary transmission completes the transmission to the real sector of the economy by affecting aggregate demand. Thus the essence of the two stage pass-through is that the spread between the policy and lending (or deposit) rate depends on the spread between the policy rate and money market rate, the money market and government bond rate and finally the government bond rate and the lending rate (Illes and Lombardi, 2013). This underlines the importance of structure of the financial markets for a smooth and efficient transmission process (Mishra et al., 2010).



Source: Based on Coricelli et al. (2006).

Figure 4.2.1 Decomposing Interest Rate Pass-Through

However, the two-stage pass-through may not work effectively for some countries, particularly the EMDEs. When economies have relatively underdeveloped financial and bond markets, the yield curve may not be fully developed, i.e. changes in short-term market rates do not get transmitted to the long-term market rates. In such circumstances, the direct pass-through from the policy rate to the lending and deposit rates would prove to be much more effective (Sander and Kleimer, 2004). This is especially true for a government dominated banking sector where the

banking system is susceptible to moral suasion from the central bank (Gigineishvili, 2011).

Why do we expect pass-through to vary based on the degree of foreign bank presence, i.e. is there a reason to believe that there are threshold levels of foreign bank presence for the pass-through to be effective and complete? At the one end of the spectrum, when there is a high degree of government control of the domestic banking system, implying very limited competition, 'moral suasion' could ensure a high pass-through from policy rates to lending rates through the direct channel as governments have full control over the banking system.

At the other end of the spectrum, an economy characterized by a very high degree of competition with significant foreign bank presence may experience greater banking efficiency and contribute to financial sector development which in turn strengthens the second-stage pass-through.⁴⁷ This occurs primarily through the development and integration of the government and corporate bond markets which will help in the formation of a well-developed and stable yield curve, thereby facilitating the pass-through.

However, for countries in the intermediate stages of liberalization, on the one hand, their financial sector is characterized by weak competition which may not be sufficient to contribute to financial market development. On the other hand, the process of liberalization would imply a gradual reduction in the power of moral

⁴⁷ Greater competition in itself need not necessarily imply greater degree of foreign bank presence as competition can also be enhanced through private domestic banks but foreign banks contribute to the enhanced functioning of the money market in addition to transferring technology and best practices which is likely to strengthen the pass-through.

suasion by the government to influence the pass-through. A combination of these factors would result in weakening the transmission of interest rates from the interbank market to the lending or deposit rates. Thus while greater competition in the banking sector in general could possibly contribute to a tighter pass-through between policy rates and lending rates, there needs to be a certain thresholds in terms of foreign bank presence in order for it to strengthen the interest rate transmission. In other words, at lower levels of foreign bank penetration, the second stage pass-through is likely to be weak due to insufficient impact in terms of financial sector development.

That said, from a policy perspective, it is also important to note that if greater foreign bank entry tends to result in higher levels of banking concentration, the positive effect on interest rate transmission could be negated. Higher levels of banking concentration would merely imply that the ownership patterns of the banking industry have changed from being a government run monopoly to an oligopolistic-type market structure dominated by a few foreign banks. Such a market structure may lead to weakening the interest rate transmission as foreign banks could refrain from passing on changes in interbank rates to lending/deposit rates with a view to benefit from profiteering.

4.3. Selected Empirical Literature

There are two sets of related literature that are relevant for our purposes. The first pertains to a small set of studies that examine the impact of foreign banks

on monetary policy transmission which have largely focused on the bank lending channel. The second set of papers, even more limited in number, focuses on the determinants of interest rate transmission. While there are two disparate strands of literature, there are no studies to our knowledge that examine the impact of foreign bank presence on interest rate pass-through in a systematic manner, which we attempt to do in this chapter.

From the literature on bank lending channel of monetary transmission, the question that is of interest to us is whether banks with different characteristics -- not just size but also ownership -- respond in a heterogeneous way to monetary policy shocks. Given that foreign banks are equipped with different tools and abilities to shield themselves from monetary policy shocks, how do they impact the monetary transmission through the bank lending channel? While there is a voluminous literature on the bank lending channel in general, there are only a handful of studies that examine the role of foreign banks specifically.

In an analysis of 1,565 banks in 20 Asian and Latin American countries during 1989-2001, Arena et al., (2006) compare the response of the volume of loans, deposits, and bank-specific interest rates on loans and deposits, to various measures of monetary conditions, across domestic and foreign banks. They also look for systematic differences in the behavior of domestic and foreign banks during periods of financial distress and normal times and conclude that there is weak evidence to prove the existence of supply-side effects in credit markets and suggest that foreign bank entry in EMDEs did not contribute to instability in credit markets.

Along similar lines, with an expanded dataset, Jeon and Wu (2012) examine the impact of increased foreign bank penetration on the monetary policy transmission mechanism in emerging Asian economies during the period from 2000 to 2009, with a specific focus on the recent global financial crisis. Examining the bank lending channel, they find on the whole that an increase in foreign bank penetration weakened the effectiveness of the monetary policy transmission mechanism in the host emerging Asian countries during the crisis period.

In a related paper, Wu et al. (2007) study the existence of a bank lending channel in emerging markets, by comparing responses of domestic and foreign banks to host country monetary shocks. Using a sample of more than 1200 banks spread across emerging economies in Eastern and Central Europe, Latin America and Asia over the period 1996 – 2003, they find evidence that foreign banks are less responsive to domestic monetary policy shocks and that they adjust their loan and deposit growth rates less than their domestic counterparts.

While a limited set of papers that exist in the literature have dealt with only how foreign banks affect the bank lending channel of monetary policy transmission, there are virtually no studies that explicitly test for the impact of foreign banks on direct interest-rate pass through from policy rates to lending rates. However, as already noted earlier, there is a growing literature that seeks to explain the heterogeneity of interest rate pass-through in various countries by examining the significance of various determinants of the strength of interest rate transmission.

Scanning the existing literature on the possible determinants of interest rate pass-through across EMDEs particularly, Gigineishvili (2011) studies 70 countries across all levels of development for the period 2006-09 and observes that a variety of macroeconomic, institutional and regulatory as well as financial structure related factors appear to be significant. In one of the earlier influential papers on this subject of determinants of interest-rate pass through, for a sample of 31 developed as well as emerging economies for the period 1980-93, Cottarelli and Kourelis (1994) find that a higher inflationary environment, capital mobility, and money market development - proxied by volatility of money market rates or by the size of the market for short-term securities - result in a stronger interest rate transmission. These variables have emerged as important and statistically significant determinants of interest rate transmission in other studies such as Mojon (2000) and Sander and Kleimeir (2004) as well, who undertake similar analysis for a variety of European countries.

Sander and Kleimeir (2004) for instance, investigate the transmission of monetary policy onto retail bank interest rates in eight Central and Eastern European countries (CEECs) that joined the European Union in 2004, focusing on the period from 1993 to 2003 and find that market concentration, bank health, foreign bank participation and monetary policy regime are important determinants of interest-rate pass-through.

In a study to assess the importance of financial market developments in influencing the interest rate pass-through, Singh et al. (2008) estimate differences in

the nature of interest rate pass-through between 10 developed industrial countries and developing Asian countries between 1987 and 2006 and compare the estimates with various measures of financial market developments. They find that financial market developments, in general, lead to stronger interest rate pass-through in terms of both higher immediate and long-run pass-through and also facilitate faster speed of adjustments.⁴⁸

The studies on this subject have unanimously found that banking sector competition strengthens the interest rate transmission in the domestic economy. However, it is interesting to note that the proxies used to measure banking sector competition range from concentration of banking sector to a measure of private ownership of banks (Cottarelli and Kourelis, 1994; Sorensen and Werner, 2006) to an index capturing the degree of banking deregulation in Europe (Mojon, 2000) and have been consistent in their finding that greater banking sector competition tends to improve interest rate pass-through domestically. To our knowledge, the only paper to have used a measure of foreign bank presence -- proxied by the number of foreign banks as a percentage of total number of banks in the economy -- is Sander and Kleimeir (2004), who find a negative and significant relationship with interest-rate pass through. While this seemingly counter-intuitive result could have been

⁴⁸ There is a wide variety of banking sector specific variables that are used in various studies which have also been reported to be significant determinants of interest rate pass-through. For instance while improvement in credit risk as captured by loan loss provisioning and portfolio diversification proxied by share of non-interest income to total income appear to strengthen the interest rate transmission, a negative relationship has been found with variables such as banks' excess liquidity, rigidity of bank funding costs as captured by share of deposits in total liabilities, and interest rate risk measured by maturity mismatches (Sorensen and Warner, 2006) and high operating costs captured by personnel costs to gross income (Mojon, 2000).

driven by the use of the number of foreign banks as opposed to their assets share (which has been acknowledged as a better proxy for foreign bank penetration in the literature), it could also suggest the likely existence of thresholds, a conjecture we attempt to test in this chapter.⁴⁹

Overall, the literature seems to be largely silent on the impact of foreign bank presence on interest rate pass-through. None of the studies have tested if foreign bank presence is a plausible determinant of interest rate transmission, something that we propose to do in this chapter.

4.4. Data and Empirical Model

The empirics are performed on a panel dataset of 57 emerging and developing economies, spanning all regions of the world, covering the period from 1995 to 2010 (depending on data availability for each economy) (Annex 4.3).

As pointed out earlier, interbank rates usually happen to be the target rates for the monetary policy and the pass-through from the policy to interbank rates has been observed in the literature to be usually complete and instantaneous. Hence, our starting point will be to examine the pass-through between the interbank rates and lending rates for our panel of EMDEs and our basic estimating equation is given as follows:

$$LR_{it} = \alpha + \beta_1 MMR_{it} + \beta_2 fb_{it} + \beta_3 fb_{it} * MMR_{it} + \beta_4 Z_{it} + \beta_5 Z_{it} * MMR_{it} + \varepsilon_{it} \quad (1)$$

⁴⁹ Other regulatory and institutional variables such as central bank independence appear to possess significant explanatory power for interest rate transmission with a higher degree of independence positively affecting the pass-through (Gigineishvili, 2011).

where LR_{it} is (retail) lending rate and MMR_{it} is the short-term money market rate and β_1 is the pass-through coefficient, with β equaling 1 implying a complete or perfect pass-through and less than 1 signaling an incomplete pass through; We augment this basic pass-through relationship with a proxy for foreign bank entry to test our key conjectures about the influence of foreign bank presence on interest rate pass-through. fb_{it} measures the share of foreign bank assets in the total domestic banking system in country i at time t and its influence on lending rates is captured by its interaction with money market rates.

In addition, we control for a set of macroeconomic determinants captured by the vector \mathbf{Z}_{it} and their influence on lending rates through its interaction with the money market rates. Based on the literature on possible macroeconomic determinants of interest rate transmission, the three key variables we use in our baseline specification are growth, inflation and exchange rate regimes (Sander and Kleimeir, 2004; Gigineishvili, 2011).

$$\mathbf{Z}_{it} = \{GDP \text{ Per Capita Growth}, Inflation \text{ and Exchange Rate Regime}\}$$

Growth: Since periods of faster growth allows banks greater flexibility to transmit changes in the policy rate to the lending rates, we include changes in Gross Domestic Product (GDP) per capita as one of our controls.

Inflation: Considering that higher inflation rates could drive banks to adjust their lending rates more in order to safeguard their profit margins, which in turn could imply that there could be greater pass-through, we control for prevailing inflation rates. It is also intuitive to think that the uncertainty associated with a high

inflation environment could lead banks to pass on the risks to the consumers in order to insulate themselves from potential losses. So we use the average change in Consumer Price Index for each country over the respective year as a regressor.

Exchange Rate Regimes: One of the other macroeconomic determinants of interest rate transmission relates to the exchange rate regimes. A greater degree of exchange rate flexibility is associated with a greater degree of interest rate transmission as it generally enables countries to send credible policy signals to markets that their policy rates have been set with the primary purpose of managing interest rates in their countries. This would ensure that policy rate changes are perceived as credible signals of the policy stance of the central bank.

As pointed out earlier, apart from macro variables, the literature also suggests that there are a variety of financial sector variables that could influence the degree of interest rate pass-through. However, most of the bank-specific variables could not be used in our estimation owing to lack of consistent data for the sample employed in this study though we use a measure of banking concentration in our analysis as given by the Lerner index. The *Lerner Index* measures market power in the banking industry by comparing output pricing and the marginal costs (markup). An increase in the Lerner index is associated with a decline in bank competition and as we had stated earlier, we are interested in examining if the extent of interest rate transmission decreases when greater foreign bank entry tends to be followed by greater banking concentration.

The second part of our estimation strategy is an attempt to explicitly capture the potential nonlinear effects of foreign bank entry on interest rate pass-through. To that end, we augment our baseline specification by introducing a quadratic term of foreign bank presence as shown in equation (2).

$$LR_{it} = \alpha + \beta_1 MMR_{it} + \beta_2 fb_{it} + \beta_3 fb_{it} * MMR_{it} + \beta_4 fb_{it}^2 + \beta_5 fb_{it}^2 * MMR_{it} + \beta_6 Z_{it} + \beta_7 Z_{it} * MMR_{it} + \varepsilon_{it} \quad (2)$$

fb_{it}^2 is our quadratic version of foreign bank variable accounting for the non-linear effects and the interaction term capturing its influence on lending rate. Based on the foregoing discussion, controlling for possible non-linearities of the degree of foreign bank entry, we expect β_3 to be positive and significant. Conditional on β_3 being significant, our empirical strategy will involve testing for the influence of foreign bank entry at different threshold levels on the degree of interest rate pass-through. This will involve slicing the panel of EMDEs into sub-samples on the basis of specified exogenous thresholds of foreign bank presence.

We employ a generalized least squares (GLS) random effects specification for all our panel regressions as the first step. There are several reasons why a random effects specification is preferred to a fixed effects model. One, the results of the Hausman test suggest that the assumption of absence of any correlation between the time invariant error term and the regressors is not unreasonable; Two, a comparison of the near similar coefficients of random and fixed effects estimates support the choice of random effects specification; Finally, the data appears to have

more cross-sectional heterogeneity as opposed to time-series variations and we have reasons to believe that differences across countries have some influence on the dependent variable. Furthermore, a random effects model using a GLS is considered to produce more efficient estimates than a fixed effects model, when there is no reason to suspect that the time invariant part of the error term and the regressors are correlated. Further, the properties of GLS are such that they are unbiased and more efficient than the OLS when random effects assumptions hold.

As a second step, in order to ensure that our estimating procedure fully accounts for non-normally distributed error terms, we also employ a Maximum Likelihood Estimation (MLE) method in a random effects setup. Maximum Likelihood Estimation method is an iterative approach to fitting data to an underlying relationship. In the case of linear relationships where the error term is normally distributed, OLS estimates are in fact maximum likelihood estimators. But in more complex functions when errors are non-normally distributed, maximum likelihood estimators are required to produce the best estimates. All the macroeconomic controls estimated enter the regression as a differenced logarithmic series. All the sources from where the variables were gleaned are summarized in Annex 4.3.

4.5. Empirical Results

4.5.1. Baseline Model

We start with our baseline model as given by equation (1) that essentially estimates the interest rate pass-through controlling for a set of macroeconomic factors. As the results summarized by Table 4.5.1 (Column 1) show, the direct pass-through coefficient turns out to be highly significant with the size of the pass-through from money market rates to lending rates being closer to 1 (reflecting complete pass-through). However, the key interaction term of interest involving foreign banks and the money market rates -- which allows us to test the impact of foreign bank entry on pass-through-- appears to be insignificant. With the exception of the interaction between changes in inflation rate and money market rates, none of the other macroeconomic variables turn out to be significant determinants of pass-through. Even the change in inflation rate appears to be significant only at the 10 percent level. In column (2), we add a financial sector variable -- banking credit to private sector -- to the baseline in column (1) and find that the interaction coefficient with money market rate is not significant either.⁵⁰

Among the various reasons as to why the baseline results have not produced significant results could be a misspecification of the model particularly arising from the failure to account for non-linearities in equation (1). Non-normal errors and nonlinear functional forms could reflect problems of misspecification of the model.

⁵⁰ Another financial sector variable (*Lerner Index*) to capture the extent of banking concentration was also used but it did not turn out to be significant either.

An examination of Kernel density plots and quintile-normal plots of residuals for the full sample as well as the foreign bank asset variable suggests possible nonlinearities.⁵¹ Furthermore, based on the foregoing discussion in Section 4.1, considering that we have an economic rationale to believe that there is a possible case of non-linearity to be explored with respect to foreign bank presence as to how it affects interest rate transmission, we re-run our baseline model along with a quadratic term of foreign bank entry and its interaction with the policy rates as given in equation (2).

Column (3) in Table 4.5.1 provides these results. As is evident, the pass-through coefficient continues to be closer to 1 implying full pass-through like before. In addition to the significance of the money market rates, the interaction terms of both the quadratic term of foreign bank assets as well as its linear counterpart turn out to be statistically significant at the 10 percent level. This appears to be robust to the inclusion and exclusion of banking credit to private sector as reflected in the high significance of both the linear and quadratic interaction term of foreign bank assets with money market rates (Columns 2 and 4).⁵² This seems to suggest that there is some non-linear effect of foreign bank presence indicating a likely threshold effect in terms of its implications on interest rate transmission.

⁵¹ See Annex 4.1 for more details.

⁵² Despite the interaction coefficient of banking credit with money market rate being significant, as noted earlier, we exclude it from the rest of our analysis owing to endogeneity concerns between foreign bank entry and private sector credit.

Beyond the statistical significance at the margins, the fact that the interaction term between foreign bank variable and money market rate is positive and significant implies that foreign bank presence increases the sensitivity of lending rates to money market rates, i.e. increases the interest rate transmission of policy interest rates.

Given the high degree of regional variations in foreign bank presence (as discussed in Chapter 1) and possible differential effects of exogenous shocks such as the global financial crisis, we rerun our equation (2) with the inclusion of indicator variables representing different regions as well as the global financial crisis phase (2008 and 2009).⁵³ As column (5) in Table 4.5.1 shows, there are no fundamental changes to the baseline results, with the linear interaction term of foreign bank entry and money market rates still being significant and carrying the right sign. The pass-through appears to have declined slightly and in addition, the interaction term consisting global financial crisis dummy and foreign bank entry shows a statistically significant relationship (at the 10 percent level). But the bottom line results remain unchanged with the inclusion of these additional indicator variables. As a robustness check, we also tried running separate regressions for available countries in each region. Despite evidence of differential pass-through coefficients, none of the variables yielded anything significant.

⁵³ As a robustness check, we also add the Public Debt to GDP ratio in our model but it was not significant in any of the concerned regressions.

Table 4.5.1 Random Effects GLS Estimates – Full Sample

Dep Var: Lending Rate (%)	Linear Baseline (1)	(1) with Financial Variable(s) (2)	(1) with Quadratic Interaction (3)	(3) with Financial Variable(s) (4)	(3) with Regional and Temporal Effects (5)
Money Market Rate (%)	0.9847*** (0.3026)	0.9141*** (0.3084)	0.8925*** (0.3731)	0.7792** (0.3948)	0.8153*** (0.3705)
Foreign Bank Assets (%)	0.0153 (0.0332)	0.0157 (0.0329)	-0.0418 (0.0952)	-0.0502 (0.1089)	-0.1184 (0.1149)
Δ Ln Inflation Rate	1.2513 (1.2952)	1.4551 (1.3870)	1.1228 (1.2384)	1.2940 (1.3510)	1.1438 (1.2544)
Δ Ln GDPPC Growth	12.5662 (20.3665)	17.6203 (25.4951)	9.4602 (17.3801)	12.9670 (21.8297)	13.6814 (22.8631)
Exchange Rate Regime	-0.9894 (1.1967)	-1.1203 (1.2271)	-1.0198 (1.2605)	-1.1550 (1.2756)	-1.1036
Foreign Bank Assets Squared			0.0006 (0.0010)	0.0008 (0.0011)	0.0014 (0.0010)
Private Credit to GDP		-0.0561* (0.0316)		-0.0728** (0.0323)	
<i>Policy Rate Interacting with:</i>					
Foreign Bank Assets	0.0018 (0.0029)	0.0015 (0.0033)	0.0117* (0.0064)	0.0137* (0.0074)	0.0136** (0.0064)
Δ Ln Inflation Rate	-0.3152* (0.1795)	-0.3288* (0.1839)	-0.2939* (0.1699)	-0.3077* (0.1781)	-0.2923* (0.1713)
Δ Ln GDPPC Growth	-1.1776 (1.6606)	-1.3330 (1.7966)	-0.9067 (1.3777)	-0.8883 (1.5122)	-1.0730 (1.4367)
Exchange Rate Regime	0.0486 (0.1126)	0.0586 (0.1155)	-1.0198 (1.2605)	0.0533 (0.1211)	0.0562 (0.1240)
Foreign Bank Assets Squared			-0.0001* (0.0001)	-0.0001* (0.0001)	-0.0001* (0.0001)
Private Credit to GDP		0.0023 (0.0034)		0.0043 (0.0041)	
<i>Temporal and Regional Controls</i>					
Global Financial Crisis					-2.3129 (1.8310)
MENA					-5.3863 (2.7748)
LAC					4.7941 (4.8203)
ECA					-2.4561 (3.9267)
Asia					-7.4283* (2.3536)
<i>Foreign Bank Assets Interacting with:</i>					
Global Financial Crisis					0.0509* (0.0305)
MENA					0.1024 (0.0955)
LAC					-0.0306 (0.0613)

ECA					-0.0264 (0.0591)
Asia					0.1825 (0.0891)
Constant	8.49	10.64	9.34	11.91	12.07
Overall R-Squared	0.68	0.70	0.68	0.69	0.71
Number of Observations	524	515	524	515	524
Number of Countries	49	49	49	49	49

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors in parenthesis

As stated earlier, considering that we are dealing with potential non-linear effects, we re-estimate our model employing the MLE estimation technique, which is considered to be superior to a conventional GLS.⁵⁴ The results are shown in Table 4.5.2. Overall we find better results in terms of statistical significance of the key interaction terms. In contrast to the GLS results where all the interaction terms of foreign bank entry and the other explanatory variables were weakly significant at the 10 percent level, the MLE estimation technique generates better estimates, with all foreign bank interactions with policy rates emerging highly statistically significant at the 1 percent level.

Table 4.5.2 Random Effects MLE Estimates – Full Sample

Dep Var: Lending Rate (%)	Linear Baseline (1)	(1) with Financial Variable(s) (2)	(1) with Quadratic Interaction (3)	(3) with Financial Variable(s) (4)	(3) with Regional and Temporal
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⁵⁴ The standard random-effects regression estimator is a GMM estimator that is just a matrix-weighted average of the between and within estimators. The ML random-effects regression estimator is an MLE that fully maximizes the likelihood of the random-effects model. It is observed that in several cases, the maximum likelihood is more efficient than an iterated feasible GLS (FGLS) used by a conventional random effects specification as the ML estimate converges to the maximum likelihood estimate. This is especially the case when dealing with potential non-linearities in the data.

					Effects (5)
Money Market Rate (%)	0.9833*** (0.1498)	0.9156*** (0.1537)	0.8876*** (0.1560)	0.7785*** (0.1607)	0.8154*** (0.1630)
Foreign Bank Assets (%)	0.0152 (0.0257)	0.0160 (0.0266)	-0.0504 (0.0909)	-0.0580 (0.0925)	-0.1157 (0.1108)
Δ Ln Inflation Rate	1.2507** (0.5653)	1.4570* (0.5814)	1.1222** (0.5621)	1.2959** (0.5767)	1.1449** (0.5610)
Δ Ln GDPPC Growth	12.7773 (11.0179)	18.2264 (12.4808)	9.7478 (10.9795)	13.5832 (12.4217)	13.6196 (11.8968)
Exchange Rate Regime	-1.0353* (0.5985)	-1.1826* (0.6089)	-1.0198 (0.5939)	-1.2077** (0.6016)	-1.0884* (0.5925)
Foreign Bank Assets Squared			0.0007 (0.0010)	0.0009 (0.0009)	0.0014 (0.0009)
Private Credit to GDP		-0.0549* (0.0327)		-0.0716** (0.0328)	
Policy Rate Interacting with:					
Foreign Bank Assets	0.0018 (0.0013)	0.0015 (0.0015)	0.0119*** (0.0042)	0.0139*** (0.0043)	0.0136*** (0.0043)
Δ Ln Inflation Rate	-0.3151*** (0.0341)	-0.3284*** (0.0363)	-0.2935*** (0.0347)	-0.3072*** (0.0365)	-0.2925*** (0.0345)
Δ Ln GDPPC Growth	-1.1775** (0.5606)	-1.3331** (0.5766)	-0.9067* (0.5638)	-0.8880 (1.5845)	-1.0761** (0.5711)
Exchange Rate Regime	0.0491 (0.0393)	0.0590 (0.0407)	0.0455 (0.0390)	0.0535 (0.0402)	0.0562 (0.0394)
Foreign Bank Assets Squared			-0.0001** (0.0001)	-0.0001** (0.0001)	-0.0001** (0.0001)
Private Credit to GDP		0.0027 (0.0019)		0.0042** (0.0020)	
Temporal and Regional Controls					
Global Financial Crisis					-2.3096 (2.0290)
MENA					-5.2932 (5.4475)
LAC					4.8382 (4.6308)
ECA					-2.3743 (4.7215)
Asia					-7.3685 (5.0148)
Foreign Bank Assets Interacting with:					
Global Financial Crisis					0.0509 (0.0347)
MENA					0.0993 (0.1503)
LAC					-0.0314 (0.0658)
ECA					-0.0279 (0.0637)
Asia					0.1807 (0.1542)

Constant	8.62	10.74	9.61	12.10	11.96
Number of Observations	524	515	524	515	524
Number of Countries	49	49	49	49	49

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level; Standard Errors in parenthesis

4.5.2. Do Foreign Bank Thresholds Matter?

The results of our baseline estimation, as summarized in Tables 4.5.1 and 4.5.2, appear to suggest that there is a possible non-linearity in the foreign bank presence. To that end, the focus of this section will be to empirically test for threshold effects of foreign bank presence on interest rate pass-through. In an effort to identify the significance of different thresholds, in this section, we slice our data sample and re-estimate our baseline equation. As the Annex 4.1 shows, Kernel density plots and quintile-normal plots of residuals for the full sample suggests that a sample-splitting is appropriate to deal with possible nonlinearities in the dataset. Accordingly, we slice the data into two categories – high thresholds and low thresholds – with the basis of thresholds being 35 percent of foreign bank assets (as a share of domestic assets) which is the mean of foreign bank assets in our entire sample.⁵⁵ So we slice the sample into two groups with countries with foreign bank assets more than 35 percent of the domestic assets, and those with less than 35 percent⁵⁶ and rerun our baseline equation (1).

⁵⁵ The median is close to 30 percent and so using the median instead of the mean produces similar results.

⁵⁶ We understand that taking the average shares for every country over the sample period could be misleading if the variation within each country is disproportionate over time. However an

The results of the high threshold sample are summarized in Table 4.5.3 while results for the low threshold sample are given in Table 4.5.4. Both report the results of the MLE estimation.⁵⁷ We are specifically interested in the direction, magnitude and statistical significance of β_1 , β_2 and β_3 from equation (1) - the pass-through coefficient, the direct impact of foreign bank entry on lending rates and the interaction term between foreign bank entry and money market rates. As is evident, the results of the high threshold sample are consistent with our priors stated earlier, while for the low threshold sample, the coefficients carry the right signs though are either weakly statistically significant or insignificant.

As Table 4.5.3 shows, the high threshold sample produces highly significant results for the variables of interest. As column (1) illustrates, we find that pass-through from policy rate to lending rate is more than complete with $\beta_1 > 1$ and is highly statistically significant. Further, we observe that an increase in foreign bank assets is associated with a reduction in lending rates (capturing the direct effects). Finally, we can see that the impact of foreign bank entry on pass-through captured by the interaction term is also highly significant. Also, changes in inflation and GDP growth rate appear to be statistically significant and reduce lending rates, though only changes in GDP growth significantly impact the pass-through. Column (3) of

examination of the within standard deviation of foreign bank assets for the sample reveal no such disproportionately large discrete jumps that would raise concerns. Furthermore, as a robustness check, we split the sample based on time with different break points and do not find anything significant that would fundamentally challenge our results generated from mean based sample-splitting.

⁵⁷ See Annex 4.2 for GLS estimation results using random effects.

Table 4.5.3 re-estimates the linear baseline along with temporal and regional dummies and finds that the results are largely unchanged, with the global financial crisis appearing to have significantly negatively affected lending rates as well as pass-through.

Based on our discussion of priors earlier in the chapter, our next step is to examine the relationship between banking concentration (*Lerner index*) and foreign bank entry on interest rate pass-through. If countries with a significant degree of foreign bank presence also appear to have greater concentration in their banking industry, how does the interest rate transmission get affected? Column (2) in Table 4.5.3 produces the results. Interestingly, as we can see, adding a measure of banking concentration to the baseline reduces the pass-through, which is consistent with the idea that the direct impact of changes in policy rates to the lending rates is lowered when changes in market conduct lead to greater banking concentration (lower banking competition). The pass-through coefficient drops by approximately 25 percentage points, with the direct effect of banking concentration on pass-through captured by the interaction term between banking concentration and policy rate which is both negative and statistically significant.⁵⁸ Column (4) presents the output of the same regression but with additional temporal and regional controls and produces consistent results. An important implication of these results is that if foreign bank entry tends to be followed by greater banking concentration, it

⁵⁸ A triple interaction term between foreign bank entry, banking concentration and money market rates included in estimating the model (not shown) for the high threshold sample of countries carries a negative sign in line with our argument, though remains statistically insignificant.

significantly lowers the interest rate transmission in EMDEs, especially if the level of foreign bank presence in the country is above the mean threshold.

Table 4.5.3 Random Effects MLE Estimates - High Threshold Sample

Dep Var: Lending Rate (%)	Linear Baseline (1)	(1) with Banking Concentration (2)	(1) with Regional and Temporal Effects (3)	(3) with Banking Concentration (4)
Money Market Rate (%)	1.0617*** (0.1757)	0.7540*** (0.1932)	1.1515*** (0.1771)	0.8893*** (0.1878)
Foreign Bank Assets (%)	-0.0482* (0.0235)	-0.0681*** (0.0242)	-0.0214 (0.0635)	-0.0564 (0.0792)
Δ Ln Inflation Rate	-1.1197** (0.5608)	-0.5541 (0.5564)	-1.4152** (0.5646)	-0.8617 (0.5528)
Δ Ln GDPPC Growth	-23.7437** (10.3255)	-23.9472** (10.7287)	-30.3622*** (11.2830)	-37.6858*** (11.8089)
Exchange Rate Regime	-0.7280 (0.7736)	-0.9773 (0.7981)	-0.7426 (0.7469)	-0.8908 (0.7525)
Banking Concentration		3.2666 (6.1018)		4.9429 (5.8277)
Policy Rate Interacting with:				
Foreign Bank Assets	0.0026*** (0.0010)	0.0046*** (0.0011)	0.0025*** (0.0010)	0.0041*** (0.0010)
Δ Ln Inflation Rate	0.0279 (0.0311)	0.0052 (0.0362)	0.0387 (0.0303)	0.0162 (.0347)
Δ Ln GDPPC Growth	2.6266*** (0.6548)	2.2825*** (0.7254)	2.8555*** (0.6453)	2.7102*** (0.7025)
Exchange Rate Regime	-0.07314 (0.0492)	0.0381 (0.0524)	-0.1001** (0.0494)	0.0019 (0.0509)
Banking Concentration		-1.0003*** (0.3097)		-1.0593*** (0.2957)
Temporal and Regional Controls				
Global Financial Crisis			-15.1972*** (4.0339)	-13.4997*** (4.3029)
MENA			-20.5859 (37.7498)	-9.9566 (35.1817)
LAC			6.5275 (6.9060)	9.1781 (7.7448)
ECA			-3.9034 (6.5741)	-4.6228 (7.3561)
Foreign Bank Assets Interacting with:				
Global Financial Crisis			0.1767*** (0.0525)	0.1297** (0.0563)
MENA			0.2128 (0.5835)	0.0571 (0.5453)
LAC			-0.0693	-0.0587

			(0.0687)	(0.0853)
ECA			-0.0077 (0.0673)	0.0187 (0.0813)
Constant	14.01	15.81	14.85	16.40
Number of Observations	258	214	258	214
Number of Countries	24	20	24	20

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level; Standard Errors in parenthesis

We estimate a model similar to the one above for the low threshold sample of countries. As column (1) in Table 4.5.4 clearly shows, the pass-through coefficient is incomplete and we can also observe a negligible impact of foreign bank presence on the pass-through. The direct impact of foreign bank entry on pass-through should be to increase the lending rate, which is consistent with our priors, but the variable is statistically insignificant. Inclusion of concentration measure renders even the pass-through coefficient insignificant. In all, the results indicate that none of the key variables of interest are significant in the low threshold sample though it must be noted that the direction of the coefficients are consistent with our priors. One could also make a case that these results are suggestive of a weak direct pass-through as foreign banks strengthen the interest rate transmission only indirectly through financial sector development (in countries where they are limited in presence).

Table 4.5.4 Random Effects MLE Estimates – Low Threshold Sample

Dep Var: Lending Rate (%)	Linear Baseline (1)	(1) with Banking Concentration (2)	(1) with Regional and Temporal Effects (3)	(3) with Banking Concentration (4)
Money Market Rate (%)	0.6471** (0.3148)	0.5994 (0.5790)	0.5717*** (0.1983)	0.5535 (0.4464)
Foreign Bank Assets (%)	0.0237 (0.0894)	0.0601 (0.1131)	0.0011 (0.0847)	0.0605 (0.1062)
Δ Ln Inflation Rate	4.6361***	3.4009**	4.7511***	3.5099***

	(1.3842)	(1.7446)	(0.6576)	(0.6093)
Δ Ln GDPPC Growth	34.4406* (19.0300)	22.8525 (24.0967)	31.5944** (15.4745)	16.2427 (15.5726)
Exchange Rate Regime	-1.6674*** (0.5852)	-0.9867 (1.2878)	-2.0361*** (0.6128)	-1.1420 (0.8106)
Banking Concentration		-5.1345 (9.3399)		-6.0872 (7.1890)
<i>Policy Rate Interacting with:</i>				
Foreign Bank Assets	0.0076* (0.0095)	0.0036 (.0089)	0.0098** (0.0106)	0.0083 (0.0060)
Δ Ln Inflation Rate	-0.7429*** (0.1398)	-0.5937*** (0.2253)	-0.7395*** (0.0451)	-0.5906*** (0.0495)
Δ Ln GDPPC Growth	-3.503*** (1.1162)	-3.6664 (2.5400)	-3.6234*** (0.6761)	-3.9785*** (1.0136)
Exchange Rate Regime	0.1752*** (0.0354)	0.0995 (0.2295)	0.1868*** (0.0396)	0.0813 (0.1096)
Banking Concentration		1.2581 (1.2498)		1.0464 (0.6784)
<i>Temporal and Regional Controls</i>				
Global Financial Crisis			1.7606 (2.5337)	0.5848 (2.3840)
MENA			-0.3981 (3.9228)	-0.0591 (4.2308)
LAC			12.5996*** (4.0120)	19.0932*** (4.9238)
ECA			8.2577 (4.8814)	8.5913* (5.2067)
<i>Foreign Bank Assets Interacting with:</i>				
Global Financial Crisis			-0.06424 (0.1077)	-0.0856 (0.1164)
MENA			0.1849 (0.2054)	0.1403 (0.2001)
LAC			-0.2861* (0.1606)	-0.4204*** (0.1678)
ECA			-0.1423 (0.1307)	-0.1664 (0.1395)
Constant	10.06	8.67	7.36	7.34
Number of Observations	252	222	252	222
Number of Countries	24	20	24	20

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.
Robust Standard Errors in parenthesis

4.5.3. Robustness Checks for Thresholds

The empirical findings reported in the previous section were that the sample splitting was done on the basis of the mean of foreign bank asset shares as the

identified thresholds. It is important to verify if the results that we have found so far remain consistent and robust to alternative thresholds. Since we observe that the distribution of foreign bank asset shares is skewed, we undertake two different robustness checks to ensure consistency of results. First, we slice the aggregate sample based on countries with greater than 50 percent foreign bank shares and those with less than 50 percent, instead of the 35 percent mean threshold. So we split the aggregate sample into two and re-run our regressions for the specific set of countries that fall on either side of the 50 percent threshold.

Based on our priors, we are more interested in verifying if the high-threshold sample is robust because concentration tends to be more of an issue only in countries with significant foreign bank presence, as opposed to in countries with limited entry. So we decompose the high threshold sub-sample originally defined on the basis of the mean and sub-divide it further. Based again on the visual Kernel density plot (reported in Annex 4.1), we group countries with foreign bank asset shares less than 35 percent in one group, those between 35 and 65 percent in another and the rest with asset shares above 65 percent as the third group. This also helps us isolate the effects of the outliers in the sample in terms of the countries that have extremely high degree of foreign bank entry.

A summary of these two cases as robustness checks is presented in Table 4.5.5. It is useful to recall here that the empirical results in the previous section were based on slicing the sample into high and low thresholds with the mean of 35 percent being the threshold and the key coefficients of interest were β_1 , β_2 and β_3

from our baseline equation (1) which pertain to the pass-through coefficient, the direct effect of foreign bank assets on lending rate, and the interaction term between foreign bank entry and policy rate. This baseline was subsequently augmented with a banking concentration measure. As the results in Table 4.5.3 showed, for the high threshold sample, all the coefficients of interest are significant in both the baseline specification and the augmented baseline with banking concentration. For the low threshold sample however, we found that only β_1 and β_3 to be significant in the baseline. None of the coefficients of interest (includes the coefficient of concentration) were significant in the augmented baseline for the low threshold sample.

So what we are looking for in the robustness tests are similar results in terms of statistical significance and whether the coefficients are consistent across the different checks for the high threshold sample of countries.

Table 4.5.5 Significance of Model under Alternative Thresholds

Threshold s	Model	Pass- through coefficient (β_1)	Foreign Bank Asset (β_2)	Interaction FB Asset*Policy Rate (β_3)	Interaction Policy Rate * Concentration
Case-I:					
FBA > 50%	Baseline (1)	Significant	Significant	Significant	-
	(1) Augmented with banking concentrati on (2)	Significant	Significant	Significant	Significant
FBA < 50%	Baseline (1)	Significant	Insignificant	Significant	-
	(1) Augmented	Significant	Insignificant	Insignificant	Insignificant

	with banking concentrati on (2)				
Case-II:					
FBA < 35%	Baseline (1)	Significant	Insignificant	Insignificant	-
	(1) Augmented with banking concentrati on (2)	Significant	Insignificant	Insignificant	Insignificant
35 < FBA < 65%	Baseline (1)	Significant	Significant	Significant	-
	(1) Augmented with banking concentrati on (2)	Significant	Significant	Significant	Significant
FBA > 65%	Baseline (1)	Insignificant	Insignificant	Insignificant	-
	(1) Augmented with banking concentrati on (2)	Insignificant	Insignificant	Insignificant	Insignificant

The results given in Table 4.5.5 show two important points: One, the behavior of coefficients of interest pertaining to the high threshold sample is consistent and robust across different benchmarks. Specifically, after establishing in our first case that the coefficients of all concerned variables carry the expected signs and are statistically significant when we split the sample into half with 50 percent being the threshold, we decided to focus more on the high-threshold sample to see if there is a sub-clustering that we can find.⁵⁹ Accordingly, in our second case where we had split the high-threshold sample, we find that our results are consistent only for countries with average foreign bank assets within the 35 to 65 percent range and

⁵⁹ We also move the threshold to 60 percent instead of 50 percent, i.e. countries above 60 percent grouped as the high threshold sample and those with less than 60 percent as the other and find that the results are broadly consistent with what we find in the 50 percent case.

not for the extreme case of those above 65 percent. This suggests that the effect of banking concentration is negligible when there is extremely high entry or low entry of foreign banks.

Two, the coefficients continue to underperform in terms of statistical significance for all the lower-threshold cases though they follow our priors in terms of signs.⁶⁰

Overall, the key point that emerges from these results is that they are broadly in favor of our original benchmark case of sample splitting based on the mean of foreign bank assets in the full sample. Further, the robustness checks also take us a step further by identifying a sub-cluster within the high-threshold case where countries within the 35 to 65 percent range experience the impacts of banking concentration on interest rate transmission relatively greater than the other categories.

4.6 Conclusion and Policy Implications

The impact of foreign bank entry on domestic monetary policy transmission has become a subject of importance for EMDEs as several of these economies have moved towards flexible exchange rate regimes, with interest rates assuming a larger and more important role in their macroeconomic management. While the monetary policy transmission literature has generally paid more importance to the

⁶⁰ We also perform this exercise for the low threshold sample by clustering those countries that have foreign bank asset shares less than 17 percent and those between 17 and 35 percent as another category but did not find the results to be significant, i.e. the model continues to produce insignificant results for all low-threshold categories.

bank lending channel and role they play in transmitting shocks to the credit markets through supply-side effects, for several EMDEs with relatively underdeveloped financial markets, the *interest rate channel* affecting aggregate demand through its impact on the costs of loanable funds remains quite important.

In this context, this chapter has explored the impact of foreign bank entry on interest rate pass-through for a panel of 57 emerging and developing economies over the period 1995-2009. The chapter has undertaken an empirical investigation of the significance of foreign bank entry to the interest rate transmission with a specific objective of testing for possible identifiable thresholds in terms of foreign bank presence that differentially impact pass-through (on the basis of thresholds). In other words, does the strength of interest rate transmission vary on the basis of different thresholds of foreign bank presence?

The empirical results suggest that there are strong threshold effects in how foreign banks affect interest rate transmission. On the one hand, we find that foreign bank entry tends to reduce lending rates and enhance interest-rate pass-through in countries that have a relatively high degree of foreign bank presence defined as countries with average asset share of over 35 percent. On the other hand, we find only weak support for the foreign banks increasing the lending rates and consequently reducing the interest rate transmission in low threshold economies that have foreign banks represent less than 35 percent of banking assets on average. While the high and low thresholds were defined on the basis of the

means of foreign bank assets, the findings appear to be robust to alternative thresholds as well.

While greater foreign bank entry could contribute to a tighter pass-through between policy rates and lending rates, an important point to underline from a policy perspective is that this relationship could be negated if higher foreign bank entry tends to be followed by higher levels of banking concentration. Higher levels of banking concentration would merely imply a change in the ownership pattern of the banking industry from a State-owned monopoly to a private sector oligopoly dominated by foreign banks. The resulting market structure may lead to weakening the interest rate transmission as foreign banks may not pass on changes in interbank rates to lending/deposit rates in order to engage in profiteering.

To that end, this chapter formally tested this relationship between banking concentration and foreign bank entry on interest rate pass-through for the high threshold sample and found that the results are in line with the priors, i.e. when foreign bank entry leads to greater banking concentration it significantly lowers the interest rate transmission. The fact that the pass-through coefficient reduces when we control for concentration, appears to reiterate our hypothesis that higher foreign bank entry may not be necessarily beneficial in terms of enhanced pass-through if it is followed by higher banking concentration in the country.

This result has significant policy implications for EMDEs which are in the process of liberalizing their banking sectors and opening them up to foreign competition. As shown by World Bank (2008), in a number of EMDEs that

experienced significant foreign bank entry, ownership of banking assets eventually became concentrated in a few large foreign banks. Several Central and Eastern European countries like Albania, Lithuania, Slovak Republic and Latin American countries such as Mexico and El Salvador experienced significantly high banking concentration post entry of foreign banks.⁶¹ Strikingly, the report by World Bank (2008) also finds that some countries like Slovak Republic (with high degree of foreign bank penetration) experienced a decline in interest-rate transmission through the period it allowed greater foreign bank entry.⁶² Without loss of generality, it can be safely said that such country cases broadly correspond to the empirical findings of the chapter.

However, our empirical results also suggests that within the high-threshold sample, the negative effects of concentration are consistent only for a sub-cluster of countries with average foreign bank assets within the 35 to 65 percent range and

⁶¹ In 2005-06, the shares of assets held by the foreign banks in their domestic banking system was about 45 percent in Albania, 34 percent in Lithuania, 22 percent in Slovak Republic, 25 percent in El Salvador and Mexico (World Bank, 2008, p. 108).

⁶² A relevant point to note is that Slovak Republic adopted an inflation targeting regime in 2005 and has significantly high degree of foreign bank presence which also resulted in high banking concentration. The results of World Bank (2008) show that the country experienced a weakening of its interest-rate transmission channel during the period that coincided with greater foreign bank entry, which also resulted in higher banking concentration. Though the study does not have sufficient sample periods post its adoption of inflation targeting, it is interesting to note that our findings on banking concentration for high-threshold countries like Slovak Republic tend to fit the country's experience with interest rate transmission well. As a contrasting example, World Bank (2008) points out that Brazil, another inflation targeter since 1999 (which falls in our low-threshold sample) has had higher interest rate pass-through. Our low threshold sample results appeared to find weak support for foreign banks lowering interest rate transmission.

not for the extreme cases.⁶³ This suggests that the effect of banking concentration is negligible when there is extremely high entry or low entry of foreign banks.

⁶³ As a case in point, Slovak Republic on average has about 60 percent foreign bank assets over the sample period considered in the study.

ANNEX

Annex 1.1: Full Sample - List of Countries and Regions

Region	Country
East Asia and Pacific (EAP)	Indonesia, Korea, Malaysia, Philippines, Thailand
Europe and Central Asia (ECA)	Armenia, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Kyrgyz Republic, Latvia, Lithuania, Moldova, Romania, Russia, Serbia, Slovak Republic, Slovenia, Ukraine.
Latin America and Caribbean (LAC)	Antigua, Argentina, Bolivia, Brazil, Chile, Colombia, Dominican Republic, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Uruguay, Venezuela
Middle East and North Africa (MENA)	Algeria, Bahrain, Jordan, Kuwait, Libya, Morocco and Oman
South Asia (SA)	India, Pakistan and Sri Lanka
Sub Saharan Africa (SSA)	Madagascar, Mali, Mauritius, Mozambique, Namibia, Niger, Rwanda, Senegal, South Africa, Togo, Zimbabwe

Annex 2.1: Sources and Definitions

Variable	Definition	Source
Foreign Bank Assets (%)	Share of foreign bank assets in total banking assets	Claessens and Neeltje van Horen (2011); Claessens, et al. (2008)
Inflation (Average CPI: 2005=100)	Average Inflation measured by Consumer Price Index in 2005 prices	Global Financial Development Database - World Bank
GDP Per Capita (Constant 2000 USD)	GDP Per Capita measured in 2000 US dollars	Global Financial Development Database - World Bank
Public Debt	General Gross Government debt as a Percentage of GDP	IMF Historic Public Debt Database
Exchange Rate Regime	1 – no separate legal tender/ pre-announced pegs 2- crawling pegs narrower than or equal to +/-2% 3-managed floating 4-freely floating 5-freely falling 6-dual market in which parallel market data is missing	Ilzetzki, Reinhart and Rogoff (2008)
Private Credit to GDP	The financial resources provided to the private sector by deposit money banks as a share of GDP. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. (International Monetary Fund, International Financial Statistics, and World Bank GDP estimates)	Global Financial Development Database - World Bank
Bank Z-Score	Capturing the probability of default of a country's banking system, calculated as a weighted average of the z-scores of a country's individual banks (based on the individual banks' total assets). The Z-score compares a	Global Financial Development Database - World Bank

	bank's buffers (capitalization and returns) with the volatility of those returns.	
Creditor Information	This index measures rules and practices affecting the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau. (0=low to 6=high)	Doing Business Database - World Bank
Corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	World Governance Indicators - World Bank
Legal Rights	This index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending.	World Development Indicators - World Bank
Stock Market Capitalization	Total value of all listed shares in a stock market as a percentage of GDP. (Standard & Poor's, Global Stock Markets Factbook and supplemental S&P data)	Global Financial Development Database - World Bank
Private Bond Market Capitalization	Total amount of domestic private debt securities (amounts outstanding) issued in domestic markets as a share of GDP. It covers data on long-term bonds and notes, commercial paper and other short-term notes. (Bank for International Settlements)	Global Financial Development Database - World Bank

Annex 2.2. Fisher-type Unit-Root Test for GDP Per Capita

Based on Augmented Dickey-Fuller Tests		
Ho: All panels contain unit roots	Number of panels = 57	
Ha: At least one panel is stationary	Avg. number of periods = 15.91	
AR parameter: Panel-specific		
Panel means: Included		
Time trend: Not included	Cross-sectional means removed	
Drift term: Included	ADF regressions: 2 lags	
	Statistic	p-value
Inverse chi-squared(114) P	215.8287	0.0000
Inverse normal Z	-6.3592	0.0000
Inverse logit t(289) L	-6.2182	0.0000
Modified inv. chi-squared Pm	6.7438	0.0000

Annex 2.3 Fixed Effects Estimates: Income-Based Sub-Samples

	(1)	(2)	(3)	(4)	(5)
<i>Dep Var: Private Credit to GDP (%)</i>	Emerging Economies	Developing Economies	High Income	Middle Income	Low Income
GDP Per Capita	0.00291 (0.00519)	0.0107*** (0.00221)	0.0108* (0.00552)	0.0318*** (0.00530)	0.0773*** (0.0181)
GDP Per Capita Squared	-8.37e-07** (3.51e-07)	-2.20e-07*** (6.37e-08)	-2.19e-07* (1.27e-07)	-1.81e-06*** (3.63e-07)	-3.18e-05*** (8.17e-06)
Ln Inflation Rate	0.362 (0.662)	3.052*** (0.995)	1.560 (2.059)	3.956*** (1.119)	0.446 (0.720)
Public Debt (%)	-0.0892*** (0.0318)	0.00828 (0.0557)	-0.0969 (0.289)	-0.0249 (0.0600)	-0.0736** (0.0358)
Exchange Rate Regime	-1.264* (0.752)	-0.188 (0.809)	-0.930 (1.858)	-0.387 (1.093)	0.499 (0.668)
Bank Z-score	-0.0115 (0.168)	-0.267** (0.124)	-1.289 (0.802)	-0.166 (0.133)	-0.282** (0.140)
Legal Rights	0.579 (1.293)	1.224 (1.087)	8.083* (4.296)	-0.654 (1.648)	3.890*** (0.823)
Creditor Information	0.930 (0.661)	3.546*** (0.886)	-3.346 (3.517)	1.934* (1.068)	0.891 (0.656)
Corruption	4.303 (2.632)	17.46*** (4.776)	9.414 (12.64)	14.12*** (5.405)	-0.273 (2.687)
Foreign Bank Assets (%)	0.129*** (0.0371)	0.0782* (0.0454)	-0.189 (0.150)	0.147*** (0.0501)	0.101*** (0.0352)
<i>Country Fixed Effects</i>	Yes	Yes	Yes	Yes	Yes
<i>Time Fixed Effects</i>	Yes	Yes	Yes	Yes	Yes
Constant	34.91	8.269	-2.445	-4.957	1.298

Annex 3.1: Sources and Definitions

Variable	Definition	Source
Foreign Bank Assets (%)	Share of foreign bank assets in total banking assets	Claessens and Neeltje van Horen (2011); Claessens, et al. (2008)
GDP Per Capita (Constant 2000 USD)	GDP Per Capita measured in 2000 US dollars	Global Financial Development Database - World Bank
Creditor Information	This index measures rules and practices affecting the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau. (0=low to 6=high)	Doing Business Database - World Bank
Legal Rights	This index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending.	World Development Indicators - World Bank
Automated Teller Machines (ATMs) (per 100,000 adults)	Automated teller machines are computerized telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place.	Financial Access Survey - International Monetary Fund
ATM Density	ATMs per 1,000 km ²	Financial Access Survey - International Monetary Fund
Bank Accounts per 1000 adults (commercial banks-bank survey)	Number of depositors with commercial banks per 1,000 adults.	Financial Access Survey - International Monetary Fund
Bank Branches per 100,000 adults (commercial banks)	Number of commercial bank branches per 100,000 adults.	Financial Access Survey - International Monetary Fund

Banking Concentration (Lerner Index)	A measure of market power in the banking market. It compares output pricing and marginal costs (that is, markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries. (Bankscope)	Global Financial Development Database - World Bank
Surface Area (sq. km)	Surface area is a country's total area, including areas under inland bodies of water and some coastal waterways.	World Development Indicators Database - World Bank
Overhead Costs to Total Assets (%)	Operating expenses of a bank as a share of the value of all held assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax, discontinued operations and other assets. (Bankscope)	Global Financial Development Database - World Bank
Credit to Government and State-Owned Enterprises to GDP (%)	Ratio between credit by domestic money banks to the government and state-owned enterprises and GDP. (International Monetary Fund, International Financial Statistics)	Global Financial Development Database - World Bank
Share of Women Employed in the Nonagricultural Sector (% of Total Nonagricultural Employment)	Share of women employed in the nonagricultural sector is the share of female workers in the nonagricultural sector (industry and services), expressed as a percentage of total employment in the nonagricultural sector. Industry includes mining and quarrying (including oil production), manufacturing, construction, electricity, gas, and water, corresponding to divisions 2-5 (ISIC revision 2) or tabulation categories C-F (ISIC revision 3). Services include wholesale and retail trade and restaurants and hotels; transport, storage, and communications;	World Development Indicators Database - World Bank

	financing, insurance, real estate, and business services; and community, social, and personal services-corresponding to divisions 6-9 (ISIC revision 2) or tabulation categories G-P (ISIC revision 3).	
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Annex 4.1: Non-Normality and Non-Linearity

We report Kernel Density, the Probability and Quintile Plot of Residuals of our full sample to check for normality of residuals.

- Quintile-normal plots check for non-normality in the extremes of the data (tails). It plots quintiles of residuals versus quintiles of a normal distribution. Tails are a bit off the normal.

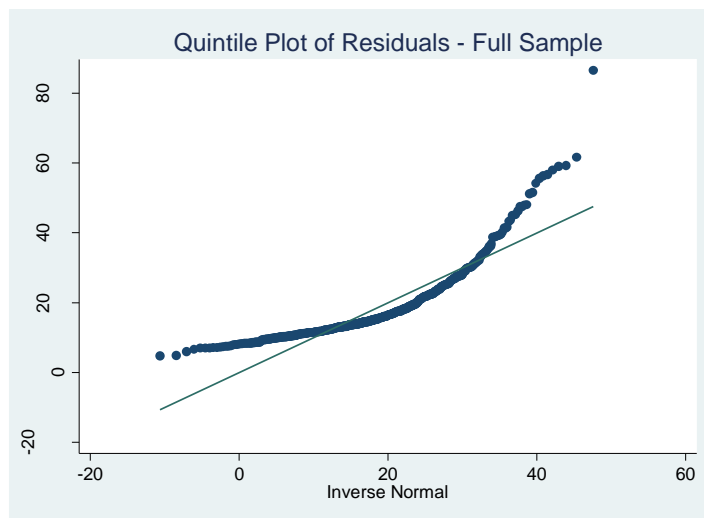


Figure 4.6.1 Quintile Plot of Residuals – Full Sample

- Standardized normal probability plot checks for non-normality in the middle range of residuals.

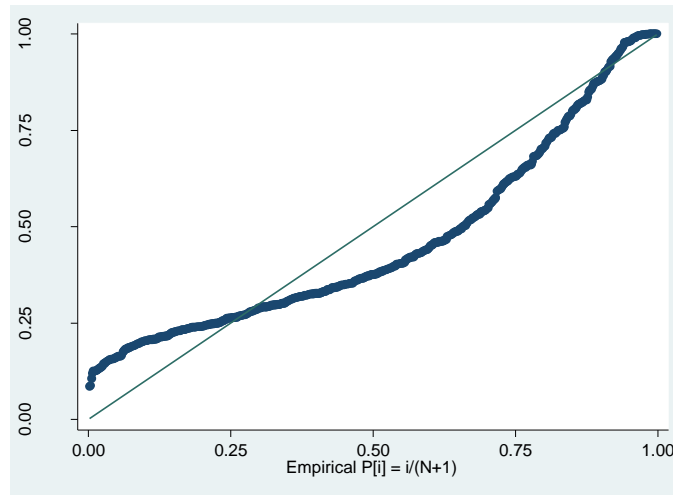


Figure 4.6.2 Normal Probability Plots of Residuals – Full Sample

- A kernel density plot produces a kind of histogram for the residuals

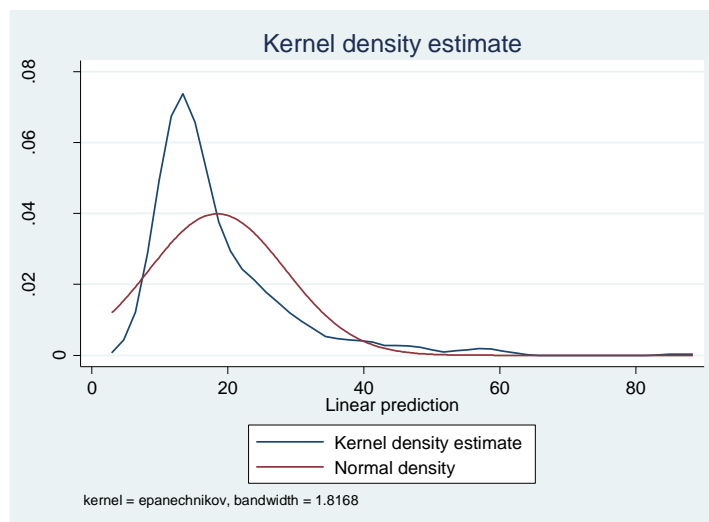


Figure 4.6.3 Kernel Density Plot of Residuals – Full Sample

We can see that a visual inspection of residual plots using different methods reveals that they do not follow a ‘normal’ pattern which implies that we should check for omitted variables or linearity issues in our model specification.

Annex 4.1.1. Kernel and Normal Density of Foreign Bank Assets

Since the basis of our sample splitting thresholds is the existence of possible non-linearities in foreign bank assets, we plot Kernel and Normal density plots of foreign bank assets at the specified high and low thresholds divided on the basis of the means.

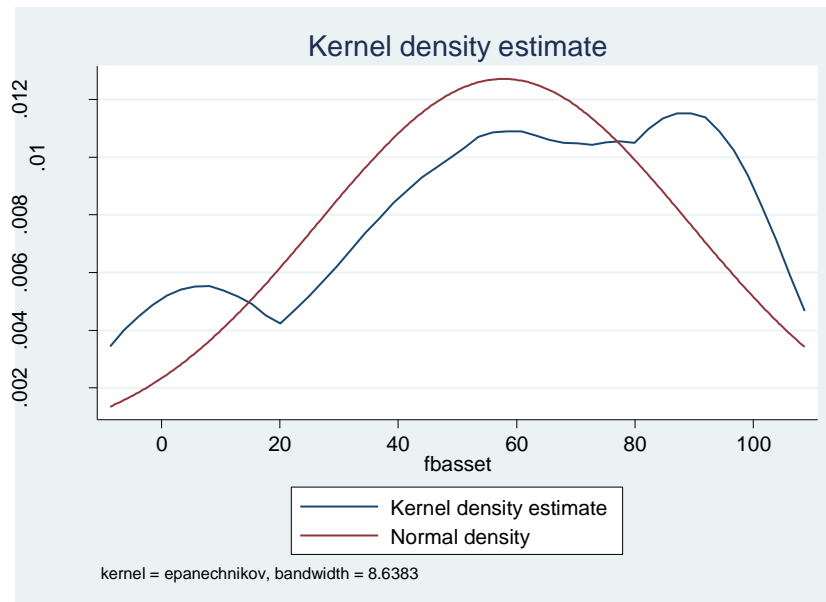


Figure 4.6.4 Kernel and Normal Density of Foreign Bank Asset – High Threshold

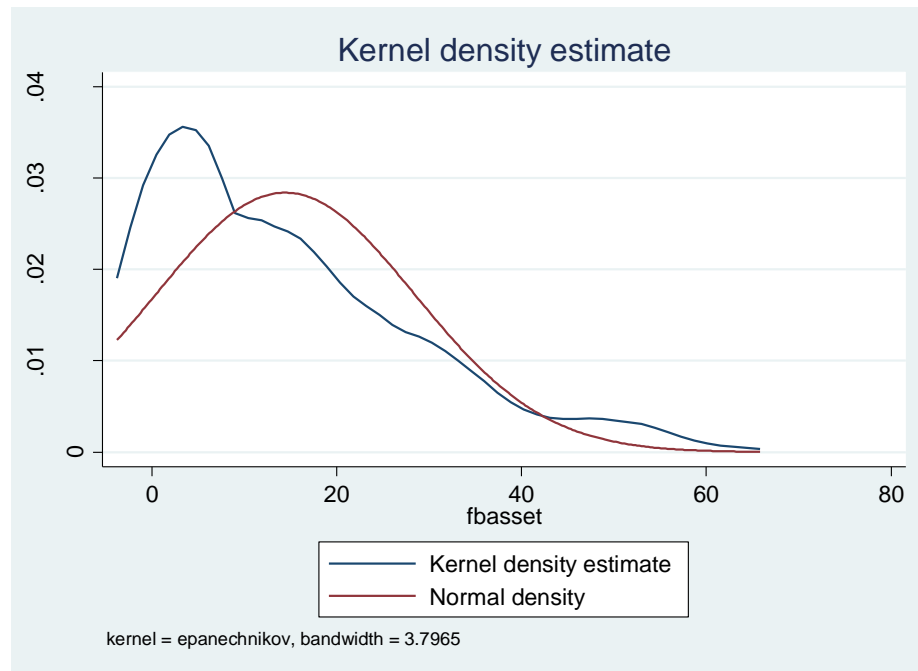


Figure 4.6.5 Kernel and Normal Density of Foreign Bank Asset – Low Threshold

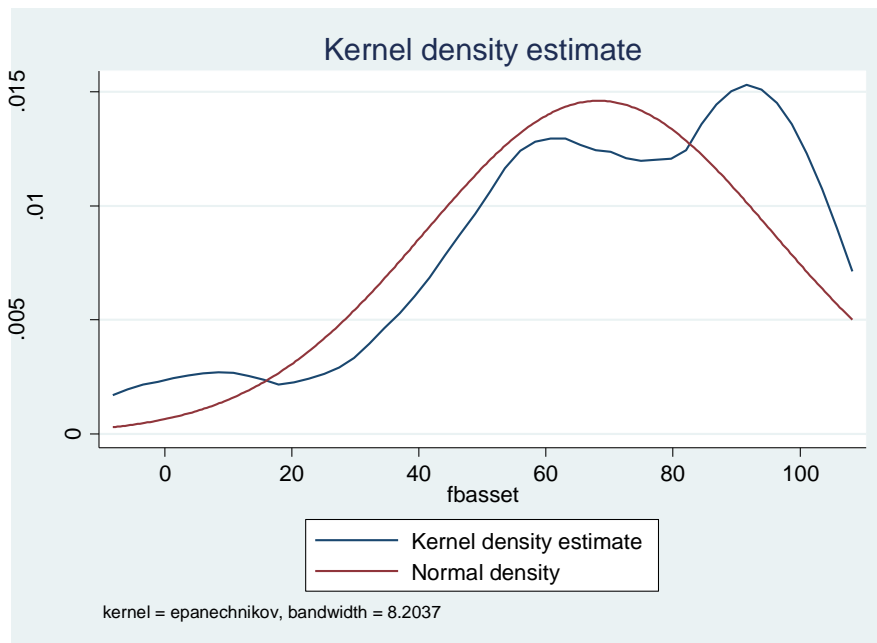


Figure 4.6.6 Kernel and Normal Density of Foreign Bank Assets: > 50%

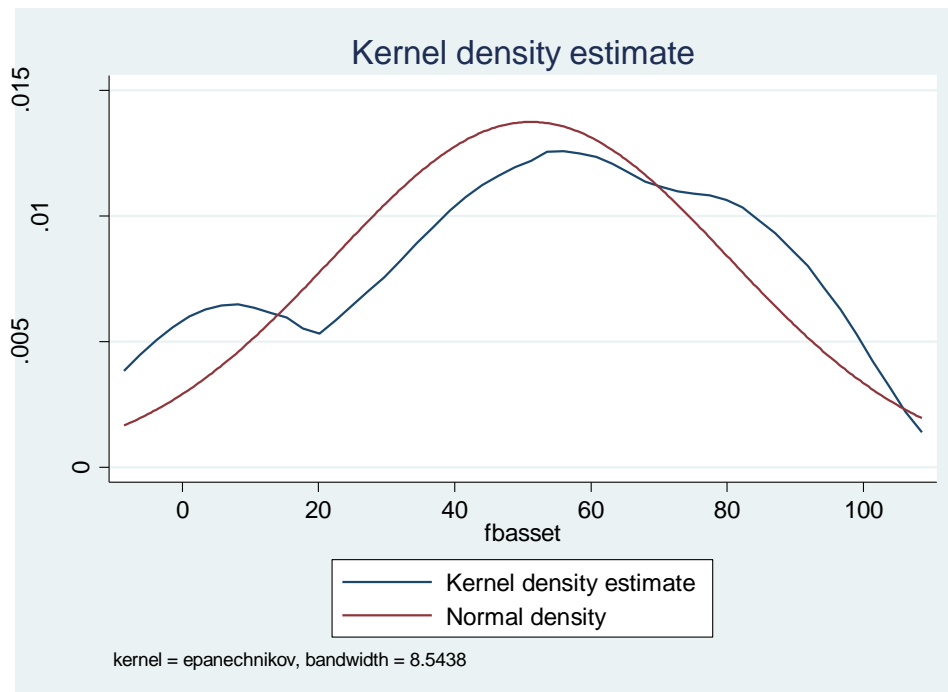


Figure 4.6.7 Kernel and Normal Density of Foreign Bank Assets – Between 35 and 65%

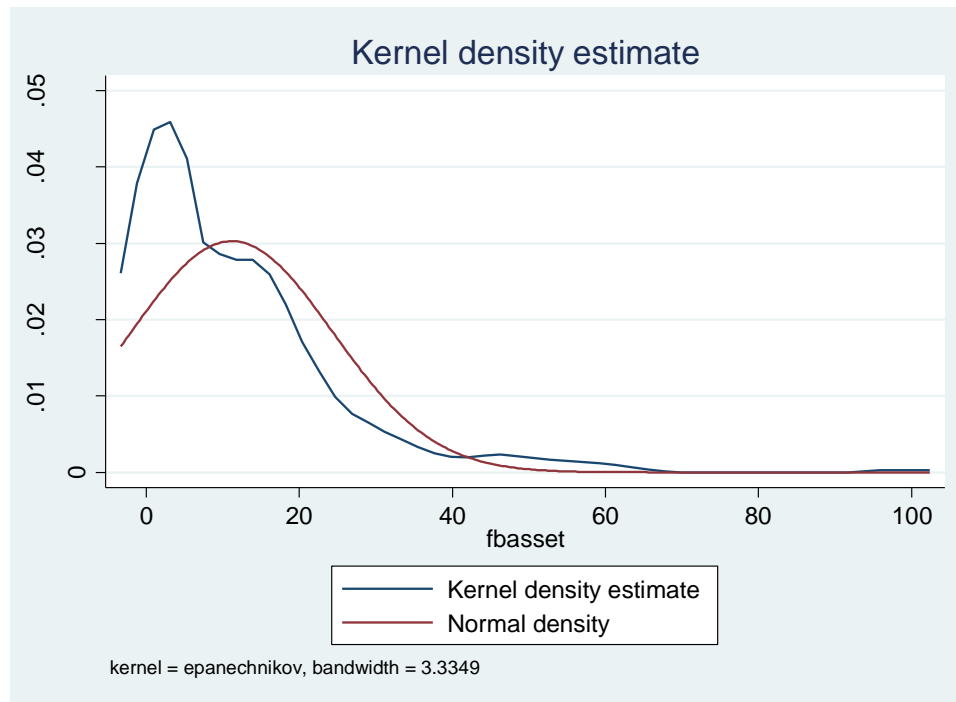


Figure 4.6.8 Kernel and Normal Density of Foreign Bank Assets: < 25%

Annex 4.2. Random Effects GLS Estimates - High Threshold Sample

Dep Var: Lending Rate (%)	Linear Baseline (1)	(1) with Banking Concentration (2)	(1) with Regional and Temporal Effects (3)	(3) with Banking Concentration (4)
Money Market Rate (%)	1.0637*** (0.2654)	0.7473*** (0.1974)	1.1521*** (0.3118)	0.8173*** (0.2620)
Foreign Bank Assets (%)	-0.0482* (0.0258)	-0.0835*** (0.0258)	-0.0226 (0.0181)	-0.0989*** (0.0414)
Δ Ln Inflation Rate	-1.1145** (0.5203)	-0.4092 (0.4035)	-1.4178** (0.6176)	-0.8984** (0.3855)
Δ Ln GDPPC Growth	-23.7977** (10.6486)	-24.2153* (13.3750)	-30.3777** (15.0586)	-32.0296** (15.4748)
Exchange Rate Regime	-0.6814 (1.1628)	0.0476 (0.9015)	-0.8401 (1.2187)	0.0340 (0.8018)
Banking Concentration		1.2693 (8.9661)		2.7334 (8.3771)
<i>Policy Rate Interacting with:</i>				
Foreign Bank Assets	0.0027** (0.0012)	0.0053*** (.0009)	0.0024*** (0.0009)	0.0049*** (0.0010)
Δ Ln Inflation Rate	0.0276 (0.0488)	-0.0022 (0.04330)	0.0391 (0.0494)	0.0146 (0.0354)
Δ Ln GDPPC Growth	2.6249*** (0.7825)	2.0752 (1.4659)	2.8658*** (0.9291)	2.3864* (1.4433)
Exchange Rate Regime	-0.07414 (0.0701)	0.0248 (0.0549)	-0.0992 (0.0796)	0.0074 (0.0636)
Banking Concentration		-1.0291 (0.7027)		-1.0215 (0.6554)
<i>Temporal and Regional Controls</i>				
Global Financial Crisis			-15.3167** (7.3110)	-10.8011 (8.1442)
MENA			-20.7219* (12.1636)	-15.8691 (11.1639)
LAC			6.4780 (6.7881)	6.3644 (8.2239)

ECA			-4.1089 (3.8465)	-6.2536* (3.6839)
<i>Foreign Bank Assets Interacting with:</i>				
Global Financial Crisis			0.1783** (0.0943)	0.1008 (0.0919)
MENA			0.2124 (0.1913)	0.1656 (0.1780)
LAC			-0.0687 (0.0546)	-0.0202 (0.0917)
ECA			-0.0054 (0.0363)	0.0408 (0.0586)
Constant	13.91	15.10	15.20	17.57
Overall R-Squared	0.61	0.70	0.65	0.78
Number of Observations	258	214	258	214
Number of Countries	24	20	24	20

*** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level; Robust Standard Errors in parenthesis

Annex 4.3 –Definitions and Sources

Variable	Definition	Source
Lending Rate (%)	Lending Rate is the domestic rate at which banks lend to meet the short- and medium-term financing needs of the private sector. This rate is for the domestic economy.	IMF International Financial Statistics
Money Market Rate (%)	Short-term money market rates	IMF International Financial Statistics
Foreign Bank Assets (%)	Share of foreign bank assets in total banking assets	Claessens and Neeltje van Horen (2011)
Inflation (Average CPI: 2005=100)	Average Inflation measured by Consumer Price Index in 2005 prices	Global Financial Development Database - World Bank
GDP Per Capita (Constant 2000 USD)	GDP Per Capita measured in 2000 US dollars	Global Financial Development Database - World Bank
Exchange Rate Regime	1 – no separate legal tender/ pre-announced pegs 2- crawling pegs narrower than or equal to +/-2% 3-managed floating 4-freely floating 5-freely falling 6-dual market in which parallel market data is missing	Ilzetzki, Reinhart and Rogoff (2008)
Private Credit to GDP	The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. (International Monetary Fund, International Financial Statistics, and World Bank GDP estimates)	Global Financial Development Database - World Bank

Banking Concentration (Lerner Index)	A measure of market power in the banking market. It compares output pricing and marginal costs (that is, markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries. (Bankscope)	Global Financial Development Database - World Bank
Global Financial Crisis	Dummy for Global Financial Crisis taking the value 1 for 2008 and 2009.	Author

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