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Essays in Cross-Border Asset Allocation

A THESIS SUBMITTED TO THE UNIVERSITY OF DUBLIN, TRINITY COLLEGE

IN APPLICATION FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

BY

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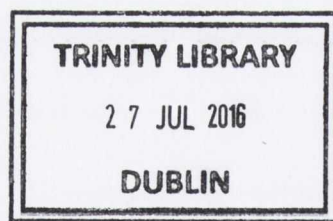


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Summary

The core of this thesis consists of three papers. Although independent, a common theme in each of the papers is the bilateral variation of cross border positions across countries, sectors and banks during the recent boom and bust periods. Each paper emphasises the importance of considering differences in investors to better understand their cross border positions.

The first paper (Chapter 2), provides evidence that bilateral factors such as distance, trade links and colonial history were relevant for the adjustment of bank assets. Using BIS locational and consolidated data, we investigate whether these frictions are important for the adjustment in holdings for the boom (2005-2007) and bust (2007-2009) periods. We find that bilateral factors are significant for the adjustment of bank assets. This finding is consistent with the theory that monitoring costs or informational frictions can help explain the adjustment of bank assets at a bilateral country level. Distance is a particularly relevant friction, and has non-uniform effects for advanced and emerging hosts. The sensitivity of holdings to distance was smaller in relation to advanced hosts than in emerging hosts. The currency denomination of the position is also likely affect these informational frictions. During the boom period, we find that if the assets are denominated in domestic rather than foreign currency, the source countries do not distinguish between equidistant advanced or emerging borrowers. In the bust period, the non-uniform effect of distance is evident, even for assets denominated in domestic currency.

The second paper (Chapter 3) analyses the set of foreign banks and their credit dynamics for the 2006-2009 period. There is a considerable literature on foreign-owned banks and their aggregate

effects on the host economies. Very little research has looked into differences of ownership to better understand foreign bank behaviour. Using host country fixed effects and controlling for bank characteristics at the bank level, we find that the identity of the home country does matter and this varies across periods of calm and crisis. Among the set of foreign-owned banks, we find significant variation in loan growth between banks from advanced than emerging source countries. Further, we provide evidence that the regulatory framework prevailing in the home country is correlated with loan growth in the host economy. We show that foreign-owned banks from source countries with higher capital regulatory requirements were associated with significantly less loan growth pre-crisis but provided a buffer during the crisis.

Informational costs and financial frictions can help explain cross-border portfolio allocation, but it is likely they differ by investor type and through time. In our third paper (Chapter 3), using new data provided by the Coordinated Portfolio Investment Survey (CPIS), we investigate if some portfolio holding sectors are more susceptible to bilateral factors than others. We analyse if institutional sectors such as banks and other financial corporates are less susceptible to bilateral frictions or biases than non-institutional sectors such as households, non-financial corporates and general government. Previous studies suggest at the aggregate institutional levels, sectors with greater information sets concerning cross border assets may rely less on bilateral frictions than households for example. We also consider this question across three distinct global risk periods, the 2005-2007 boom, the 2008-2009 crisis and the 2010-2012 recovery. Our sample consists of fifty-five holding countries and 170 issuing countries across six sectors: household; government; central bank; non-financial corporates; banks and other financial corporates (OFCs) for the period 2001-2013. The results show there are significant differences in the role of bilateral factors across asset-holding sectors, such as distance, colonial ties and legal origins. Interestingly, the role of informational frictions does not decrease in the sophistication level of the investor. Banks invest significantly less than other sectors in portfolio debt from distant countries. Non financial corporates are the most sensitive equity-investors in relation to distance. Euro area households are significantly less affected by the absence of currency risk when it comes to portfolio debt,

and this continued during the recent crises. The banking sector, OFCs and households were significantly more sensitive to distant issuers of debt during the euro area sovereign debt crisis. Households, OFCs and governments were also more averse to holding distant equity during the euro area crisis, while no significant effect was evident for banks or NFCs.

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Chapter 1

Introduction

This thesis focuses on the importance of considering investor differences to explain cross border holdings or positions. In a parallel theme, we consider whether these differences in investor behaviour are stable during crises.

In Chapter 2, we analyse BIS reporting banks and address the question whether informational frictions are important for the adjustment of bank assets. Further, we ask whether these frictions differ for advanced or emerging countries. The currency denomination of the position is also likely to affect these informational frictions and we consider this aspect using the locational data. The paper is consistent with the theory that monitoring costs of loans or informational frictions can help explain the adjustment of bank assets at a bilateral country level. Using BIS locational and consolidated data, we investigate whether these frictions are important for the adjustment in holdings for boom (2005-2007) and bust (2007-2009) periods. Distance is found to be a particularly relevant friction for the adjustment of bank assets. Furthermore, we find distance has non-uniform effects for advanced and emerging hosts. The sensitivity of holdings to distance was smaller in relation to advanced hosts than in emerging hosts. During the boom period, we find that if the assets are denominated in domestic rather than foreign currency, the source countries do not distinguish between equidistant advanced or emerging borrowers. In the bust period, the non-uniform effect of distance is evident even for assets denominated in domestic currency.

In Chapter 3, we consider the identity of foreign-owned banks and loan growth. The landscape of foreign bank ownership is changing and it is likely that this plays a role in credit dynamics. We combine three datasets to build a global picture of foreign bank ownership, the advanced or emerging nature of the home country and the regulatory environment in the home country. The data cover the 2006-2009 period, which provides a suitable testing ground to see whether behaviour differed pre and post crisis. Primarily, we find significant differences of loan growth between advanced than emerging owned banks. Further, we argue that banks originating from countries with different home country regulation might differ in their credit growth. We provide evidence that foreign-owned banks from source countries with higher capital regulatory requirements were associated with significantly less loan growth pre-crisis, but provided a buffer during the crisis.

The idea that investor behaviour may vary by sector is an important piece of the global financial framework puzzle. In Chapter 4, using new data provided by the Coordinated Portfolio Investment Survey (CPIS), we investigate if informational costs and financial frictions can help explain cross border portfolio allocations across sectors. We focus on portfolio debt and equity holdings for the years 2005-2012. We study three pooled cross sections of the data corresponding to global periods of risk: 2005-2007 the boom period, 2008-2009 the bust and 2010-2012 the recovery period. This approach facilitates our study of changing behaviour during crises, in this paper we capture both the 2008-2009 global crisis, and the euro area sovereign debt crisis in 2010-2012. The results show there are significant differences in the role of bilateral factors across asset holding sectors, such as distance, colonial ties and legal origins. Interestingly, the role of informational frictions does not decrease in the sophistication level of the investor. Banks invest significantly less in portfolio debt from distant countries than other sectors. Non financial corporates are the most sensitive equity-investors in relation to distance. Euro area households are significantly less affected by the absence of currency risk when it comes to portfolio debt, and this continued during the recent crises.

Chapter 2

Bilateral Adjustment of Bank Assets: Boom and Bust

2.1 Introduction

The Global Financial Crisis focused attention on the expansion and subsequent contraction of bank balance sheets over the last fifteen years. The world economy experienced a significant increase in gross capital flows during the boom (2005-2007) followed by a sharp tightening during the crisis (2007-2009). Milesi-Ferretti and Tille (2011) document this period in detail and find that banking flows were particularly significant. In light of the variation in the adjustment of bank assets before and during the Great Recession, we use bilateral data from the Bank for International Settlements (BIS) to see which links are important for bilateral patterns. To illustrate the magnitude of these adjustments; BIS reporting countries increased their cross border lending by 50% in the period 2005-2007, this was reversed during the crisis, with cross border assets shrinking by 52% between 2007 and 2009.

Understanding adjustments in bank holdings is central to gauge the stability of a banking system. The recent boom and bust cycle provides a testable situation of bank behaviour. While detailed analysis has been performed with aggregate data, studies at bilateral level are less common. We use bilateral data to further uncover the fragility or stickiness of banking relationships across

borders and whether they differ across country types or risk environments. The literature using country level bilateral data is typically cross sectional and focuses on the ties that are important for the establishment or scale of positions, whereas we are concerned with the importance of bilateral links for the adjustment of bank holdings across time or risk periods.

Increasing understanding of bilateral patterns is important as countries experiencing significant bank inflows can face increased pressure on domestic credit systems leading to credit booms. The reversal or sudden stops of these flows causes issues such as slower growth or currency depreciations. Jordà et al. (2011) and Schularick and Taylor (2009) provide evidence of credit booms preceding recessions, while Lane and Milesi-Ferretti (2012) show how current account deficits in the boom period were associated with significant reductions in domestic demand in the subsequent period. Increased understanding of the fragility of cross border bank loans can assist policymakers in framing their reactions to crises in their lending partners economies, and indeed, global crises or periods of high risk.

We use country level data to get a clearer picture of global banking movements. This aggregation of data is useful for national policymakers as it increases the understanding of the fragility or stickiness of cross border loans. There is also a detailed bilateral literature using data at the bank level, De Haas and Van Horen (2011). The first difference between De Haas and Van Horen (2011) and our own work is the level of data, we use country positions while they consider syndicated loans at the bank level. The use of country level data increases understanding of global movements and patterns of capital allocation. It also facilitates the analysis of the non-linear effect of distance for advanced than emerging economies. While their work focuses on banking relationships that lead to sticky positions we look at the currency the loan was issued in and the advanced or emerging nature of the host economy.

The main theories behind gravity relationships include informational frictions, Okawa and Van Wincoop (2012). A prominent type of informational friction are monitoring costs for bank lending as proposed by Kleinert et al. (2012). The further two countries are geographically,

institutionally and culturally, the higher the cost of monitoring loans. This distance increases the friction to cross border banking relations. The literature highlights geographic distance from source to host country, common legal system, trade ties and colonial links as important factors for the allocation of bank holdings. We include the position held in 2005 to see whether there is evidence of compression of positions by banks across borders during the boom. In the bust period we include the adjustment from the boom to investigate mean reversion effects.

Using Bank for International Settlements (BIS) locational and consolidated data, we investigate whether these frictions are important for the adjustment in holdings for a boom (2005-2007) and bust period (2007-2009). The locational data provide an added layer to the study, facilitating analysis on assets issued in either domestic or foreign currency. For each data type we further analyse whether distance has a non-linear effect for emerging than advanced countries. These two considerations differentiate this paper from the literature on bilateral bank assets for both bank and country level studies.

We estimate the model using fixed effects on both source and host economies facilitating focus on bilateral ties. Applying host fixed effects accounts for factors that are common to investors that attract them to a specific host; macroeconomic conditions, exchange rate effects and valuation effects. Placing fixed effects on the source country means we are controlling for uniform cross border increases or decreases in cross-border positions. For example, consider France and Senegal as a source and host pair. If French banks increase their cross border lending globally this is covered in the source fixed effect, and if Senegal is attracting cross border loans due to a favourable macroeconomic environment this is absorbed in the host fixed effect. In this example, we are analysing whether bilateral ties such as common colonial history or language reduce the frictions to adjustment. We investigate the residual beyond the fixed effects to see if this can be explained by bilateral links. Finally, we want to examine whether that tie was different for emerging than advanced countries.

Specifically, we ask the following questions. Were bilateral factors important for the adjustment of bank assets in the boom and bust periods. Did the sensitivity to bilateral factors differ

between advanced and emerging host economies? Did the role of bilateral factors differ on the currency denomination of the asset?

Primarily, we show that bilateral factors are important not only for the size of asset holdings, but they are relevant in explaining the adjustment of bank assets. The chief result of the paper is robust evidence that distance is more influential for emerging than advanced countries for the adjustment of bank assets. We examine whether bilateral ties differ in importance for the two country groups using both consolidated and locational data. Interestingly, when we account for the currency denomination of the loan in the boom, if the loans are denominated in domestic currency the distance effect is no longer significantly different for advanced than emerging hosts. Thus in the pre-crisis period, banks were not concerned with the friction of advanced or emerging country status of distant borrowers, once the assets were denominated in their domestic currency. In the bust period, we find a different story, non-uniform effects of distance emerge for loans even in domestic currency, source countries are more sensitive to the distance to emerging than advanced borrowers.

The paper proceeds as follows, Section 2.2 details the conceptual framework and reviews the relevant literature. The empirical method is detailed in Section 2.3, while Section 2.4 describes the data. Section 2.5 provides results and discussion, conclusions are offered in Section 2.6.

2.2 Conceptual Framework

The relevance of bilateral ties for the adjustment of bank holdings has yet to be analysed in the literature. This paper provides evidence that bilateral factors matter for asset adjustment in boom and bust periods and are more important for emerging economies. We consider gravity variables and how they can create or ease informational frictions which affect the cost of monitoring and adjusting asset holdings.

2.2.1 Theoretical Motivation

Gravity models are used extensively in the trade literature to explain international trade patterns. Portes and Rey (2005) presented the foundation of applying gravity models to determine international asset portfolio flows. Distance and informational asymmetries account for the gravity findings in their paper, while in trade the main explanations are differing transport and informational costs. Portes and Rey (2005) focus on drivers of bilateral flows while more recent work is aimed at understanding the patterns observed in bilateral portfolio holdings. Okawa and Van Wincoop (2012) note the increase in papers applying gravity type models to portfolio allocation and emphasise the importance of using fixed effects in empirical work. They highlight the need for theoretical foundations to the empirical literature and provide an initial framework to consider gravity models and asset trade. The gravity model Okawa and Van Wincoop (2012) presented is driven by informational or bilateral frictions between the countries. They note that these frictions could be observed such as distance, common language or legal system. A key concept in this area is the interpretation of geographical distance for “weightless”, financial trade. We interpret the negative role of distance as an informational friction.

Following the theoretical model of Kleinert et al. (2012), distance increases the monitoring costs of the bank, thus banks offer loans at a higher price to distant borrowers. Similarly, distance increases the cost to the firm of finding the loan from a faraway bank. Kleinert et al. (2012) use a search model of banks and borrowers for loan allocation. The pairing can be across countries and is formed where loan conditions are most attractive for the borrower. They propose that the cost of monitoring loans increases in geographical distance; as such the banks closest to the borrower can offer the most appealing loans. An alternative explanation for the role of frictions is provided by Niepmann (2011). Differences of countries’ factor endowments and banks’ intermediation capabilities drive the heterogeneous cross border lending behaviour. Although neither model deals explicitly with the adjustment of loans in periods of global exuberance or crisis it is conceivable that these frictions will emerge as significant factors for the adjustment of assets.

2.2.2 Empirical Literature

Papaioannou (2009) discusses the importance of institutions and bank holdings, which provides intuition on the inclusion of the legal origins variable. The paper uses locational BIS data; we also use these data in our paper. Buch (2005) shows the importance of distance in banking and that this relationship has not changed in the fifteen years preceding 2000. The study uses bank level data across five source countries. A recent consideration of financial frictions and the crisis is provided by Buch et al. (2013). Using German bank-level data the authors show that financial frictions were important during the crisis, with distance emerging strongly from their specifications. Using annual stocks, their study focuses on the determinants of the segregated composition of bank assets.

Other papers have found that foreign-owned banks behave differently. De Haas and Van Horen (2011) find that during the crisis foreign banks remain more committed to countries that hold an affiliated subsidiary, that are closer from a geographical measure and those that have developed relations with domestic banks in the market. Their finding of the significance of relationships in banking solidifies the inclusion of the lagged stock of assets as proposed by Galstyan and Lane (2013).

As a basis for time period or boom and bust sample splits we refer to Düwel et al. (2011), who show how banking behaviour of crisis countries differs. The authors find that increased risk aversion (in our case this is representative of the sample split boom and bust) has a negative impact on cross border lending which increases during crisis periods.

When considering informational frictions it is plausible to think that exchange rate risk could play a role. A bank issuing a loan in its domestic currency faces reduced informational frictions relative to issuing a loan in foreign currency. Lending in foreign currency requires increased analysis of exchange rate risk, thus increasing monitoring costs of the bank. In line with the theory proposed by Kleinert et al. (2012), this would increase the price of the loan. We would

thus expect distance to have a larger negative effect on foreign currency loans or assets. The BIS locational data are provided for holdings in all currencies but also provides detail on whether the holding is in the domestic currency of the source country or if it was issued in foreign denominated currency. We make use of this data by running the model specifications on foreign and domestic currency denominated holdings and see if the results hold. Of particular interest here is the non-uniform behaviour of advanced and emerging economies. If source countries issue loans in their domestic currency, does distance still have a more significant effect for emerging than advanced economies?

Galstyan and Lane (2013) provide a starting point for the specification we employ¹. Considering the crisis period, they show that gravity factors are relevant not only for the variation in levels across countries at a given point in time but also for variations in portfolio growth across time periods. The paper focuses on portfolio debt and equity across the Global Financial Crisis and subsequent recovery period. They find financial frictions have differing effects on equities and bonds and for advanced and emerging economies. An important contribution is their consideration of the lagged stock of a bilateral position. We follow this approach and use initial 2005 holdings and the adjustment of holdings during the boom in the bust sample to capture mean reversion effects. Our paper extends the analysis on advanced and emerging behaviour by introducing an interaction term. We investigate whether there are non-uniform effects of gravity variables across advanced and emerging countries.

2.3 Empirical Method

This paper investigates the importance of bilateral relations in the adjustment of bank holdings. We consider whether bilateral links provided stability in times of bust, if they led to increased holdings in times of calm, and crucially if this differed for advanced and emerging economies. The model is applied to two distinct time periods: a boom and a bust phase. The boom period

¹A partial list of bilateral investment papers includes Lane (2006), Aviat and Coeurdacier (2007) and Lane and Milesi-Ferretti (2008), while Coeurdacier and Rey (2013) provide a survey of the main findings to date.

corresponds to the documented increase in cross border financial flows, low interest rates and low perceived risk, while the bust corresponds to the onset of the sub-prime mortgage crisis in the United States. The boom period is analysed as the adjustment in holdings from end of 2005 to end of 2007 and the bust period for end of 2007 to the end of 2009. The model is applied to three types of data: locational (the reporting is in accordance with the Balance of Payments method); consolidated (employs the ultimate risk reporting method); and currency-detailed locational data to analyse whether there are differences between domestic and foreign currency loans. The bilateral findings are robust across locational and consolidated data. As anticipated we find differences between domestic currency and foreign currency loans. The model specification in the boom period is:

$$\begin{aligned} \Delta \ln(A_{ij0507}) = & \alpha_i + \alpha_j + \sigma \ln(A_{ij2005}) + \theta \ln(DIST_{ij}) + \lambda \ln(Trade_{ij}) \\ & + \pi Lang_{ij} + \phi Colonial_{ij} + \gamma Legal_{ij} + \omega EA_{ij} \\ & + \delta EU_{ij} + \kappa ADV_j + \beta (DIST_{ij} * ADV_j) + \varepsilon_{ij} \end{aligned} \quad (2.1)$$

$\Delta \ln(Adj)_{ij0507}$ is the log change in bank holdings for the period between end of 2005 to end of 2007. $\alpha_i + \alpha_j$ are source and host country fixed effects. $\ln(A)_{ij2005}$ is the log of the stock of bilateral holdings in 2005, $\ln(DIST)_{ij}$ is the log of the bilateral distance, the log volume of imports in 2005 is represented by $\ln(Trade)_{ij}$, and the common language dummy is $Lang_{ij}$. The colonial links dummy is $Colonial_{ij}$, common euro area membership is EA_{ij} and common European Union membership is EU_{ij} : these two dummies take a value of 1 if both countries are members of the group and zero otherwise. The interaction term will capture non-uniform effects of the gravity variable DIST. The term ADV is a dummy variable and takes a value of one if the host economy is advanced². A significant coefficient on the interaction term implies that distance affects emerging countries differently than advanced economies.

We include fixed effects for both host and source countries. This enables us to focus on the bilateral links beyond the widely documented global expansion, retrenchment and flight to safety

²The advanced countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States

of capital flows. This method focuses the analysis on bilateral relations. Further, their inclusion means we are effectively controlling for the common to all, and country specific macroeconomic issues at the country level.

The source dummy α_i captures the change in holdings by i in all destination countries. In this instance we aim to account for increased diversification in lending or loan supply during the boom years and possible retrenchment of holdings during the bust phase. Thus, if all countries increased their holdings in emerging markets in the calm period, we can examine whether banks in source countries increased their holdings more in the countries they trade with.

The host effects α_j control for price and exchange rate movements in the destination countries. This also captures common movement by all banks into/from a host for country specific reasons. Here we can consider a country experiencing a change in regulation or policy, we can see if trade or legal system ties acted as a stabiliser on holdings. Equally important, the host fixed effects account for changing demand for loans from international banks.

Precisely, the valuation effects have been dummied out at the country level using host fixed effects. This leaves the differences in adjustments as capital flows. A bank holding in country i recorded in the BIS (in US\$) is composed of the bilateral exchange rate converted to US\$ and the volume of the holding. Fixed effects control for exchange rate or valuation effects at the country level so that the change in position will be accounted for by the bilateral factors or the source and host time varying fixed effects. The following equation illustrates this with $\ln A_{ijt}$ representing the assets, $\Delta \ln H_{jt}$ is the change in price of the asset, $\Delta \ln EX_{jt}^{\$}$ is the bilateral exchange rate converting the currency into dollars, both of these are valuation effects and are controlled for with the fixed effects framework. Thus the remainder $\Delta \ln Q_{ijt}$ yields the change in volume.

$$\Delta \ln A_{ijt} = \underbrace{\Delta \ln H_{jt} + \Delta \ln EX_{jt}^{\$}}_{\text{common to all } i \text{ in } j} + \Delta \ln Q_{ijt}$$

We can focus on the relative adjustments beyond the aggregate level driven by bilateral factors.

The empirical importance of the lagged stock of assets is highlighted in Galstyan and Lane (2013) for portfolio adjustments, while De Haas and Van Horen (2011) provide banking specific evidence of the importance of relationships in banking, thus we include the 2005 holdings in both models.

$$\begin{aligned}\Delta \text{Ln}(A_{ij0709}) = & \alpha_i + \alpha_j + \phi \text{Ln}(A_{ij2005}) + \sigma \text{Ln}(\text{Adj}_{ij0507}) + \theta \text{Ln}(\text{DIST}_{ij}) \\ & + \lambda \text{Ln}(\text{Trade}_{ij}) + \pi \text{Lang}_{ij} + \phi \text{Colonial}_{ij} + \gamma \text{Legal}_{ij} + \omega \text{EA}_{ij} \\ & + \delta \text{EU}_{ij} + \kappa \text{ADV}_j + \beta (\text{DIST}_{ij} * \text{ADV}_j) + \varepsilon_{ij}\end{aligned}\quad (2.2)$$

For the bust period, we add the adjustment during the boom period as a regressor. ϕ and σ might uncover evidence of unwinding of positions that were built up during the boom or a mean reversion effect. On an aggregate level, there is global evidence of capital returning home: here we hope to observe whether boom-acquired positions were reversed more than longer term positions. A negative coefficient would indicate a convergence or compression story, countries are disproportionately moving away from those host economies they had “larger” positions with. This would be in line with the increase in cross border banking experienced during the period, positions or holdings were being built up in new areas or markets. Galstyan and Lane (2013) report a similar story for portfolio bonds and equities.

The gravity literature suggests the inclusion of the following variables; distance, trade, common language, colonial links, common membership of regional blocs and common legal systems between countries. The common membership will be of interest to tease out the importance of a common currency. Including both euro area and European Union controls will capture this aspect. Although the literature has not yet focused on adjusted bank holdings and the importance of gravity factors, we expect that factors affecting levels of bank assets might also be relevant for adjustment of holdings.

OLS is used to estimate the models. Given the use of bilateral data it is reasonable to expect some heteroskedasticity at the country pair level. It is possible that the residual estimating ij

can be related to the residual in estimating ji . In order to account for this robust standard errors are reported.

A central question of this paper is asking whether financial or informational frictions affect countries in a uniform manner. To this end, we introduce an interaction term of distance with an advanced/emerging dummy variable. A significant coefficient implies that distance has a significantly different effect on advanced than emerging countries.

On first sight the independent variables; common language, legal origins and colonial ties raise suspicions of multicollinearity. In view of this we run various tests of multicollinearity and it is not an issue for this sample. Using the VIF command, we test the tolerance ($1/VIF$) and in each case the value is greater than .1. We also test the stability of the coefficients using the Collin command in stata. The condition number does not indicate instability. This is true for both the stock and growth regressions.

2.4 Data

2.4.1 BIS Data Discussion

The paper uses data sourced from the Bank of International Settlements (BIS). They are confidential data provided by 22 reporting countries to the BIS on their bilateral holdings with partner countries³ The respective central banks collect the data at bank level, aggregate them and provide them to the BIS. It is extensive in its list of partners; reaching 168. The data used spans 2005-2009. We examine the adjustment in holdings or positions across two periods, the boom 2005-2007 and the bust 2007-2009. We take the end of period values because we are using stocks. The data report outstanding claims and liabilities of banks that are residing in the BIS source countries. These outstanding values are comprised of cross border loans, and typical bank lending activities; loans, deposits, and inter bank credit lines. Also included in these figures are securities holdings and debt and portfolio investment.

³See Table 2.1

The data are provided using two reporting methods. The locational data are based on the residence principle of the banks, keeping with the balance of payments system. Thus both domestic and foreign owned banks are included in these figures.⁴ The availability of consolidated banking data provides an appropriate testing ground of the bilateral theory. The “Ultimate Risk” based consolidated data captures the claims of banks head-quartered in the source country and their foreign affiliates, but it nets out positions between related offices.⁵ Using this data we overcome one of the main criticisms of locational based information; we avoid the inter office movement which may be happening for intra bank financial incentives and not linked to country level ties or frictions. Further, using the consolidated data as a cross-check overcomes another criticism of locational data, the exposure may not rest with the country listed but where the bank is head-quartered.

The BIS data is a rich source and it enables us to further the analysis by addressing whether the currency denomination of the loans or holdings adjusted by the banks is important. This data are provided on a locational basis,⁶ and the data indicates the amount outstanding between two countries for all currencies and the amounts denominated in domestic and foreign currency.

To get a better insight into the data we present Tables 2.2 and 2.3 detailing summary statistics of the dependant variables. We report regional summary statistics on the asset adjustments for the boom and bust period of locational and consolidated data, and the locational data by reported currency. These figures show the broad global coverage of the data with ties between the BIS reporters and each region. They also reveal the regional variation in asset adjustment by BIS reporting countries. Considering the consolidated regional means, BIS countries increased

⁴The BIS definition is: Statistics designed mainly to capture the financial claims and financial liabilities of internationally active banks (i.e. excluding only resident domestic banks without positions vis--vis non-residents of the reporting country). The statistics cover all on-balance sheet positions and some off-balance sheet positions in the area of trustee business. The basic reporting basis underlying the statistics is the residence of the reporting banking office. This conforms to balance of payments and external debt methodology. These offices report exclusively their own (unconsolidated) business, including their international transactions with any of their own affiliates (branches, subsidiaries, joint ventures), including claims and liabilities vis--vis non-residents in any currency, claims and liabilities vis--vis residents of the reporting country in local currency as well as in foreign currencies.

⁵According to the BIS The statistics capture the consolidated positions of banks worldwide offices, including the positions of banks foreign subsidiaries and branches but excluding inter-office activity.

⁶As our results are similar across locational and consolidated reporting methods we are confident in its use here.

their asset holdings in Eastern Europe and Central Asia by twice the amount than in OECD countries. During the bust or retrenchment period, banks adjusted least in Other High Income economies, only 4% while the South American region experienced the largest adjustment at 32%.

It is interesting to note the differences in the mean adjustments between consolidated and locational data. For the boom period, there was higher growth on average in the consolidated reported data. This implies there was an increase in lending by BIS banks outside their ownership structures during the boom. The consolidated data has a mean retrenchment value of 21% for the whole sample while the locational data value is 70%. The smaller consolidated number indicates that much of the retrenchment in flows for the period was intra-office flows, as the consolidated data nets out these movements.

In Table 2.4 we present summary statistics on the static and varying independent variables. In 2005, BIS reporting countries on average, held the largest amount of assets in OECD countries and the least in sub-Saharan Africa. This is true for both locational and consolidated data. The BIS reporting countries also did the most trade with OECD countries and the least with Sub-Saharan Africa. Finally in Table 2.5, note the differences in average distance to reporting countries. The region of Latin America and the Caribbean is on average the furthest distance from BIS reporters, while Europe and Central Asia is the closest region.

Given the large coverage of host countries in the data there are zeroes indicating no bilateral relation. Our log specification means these are dropped from the sample. We are concerned here with non-trivial holdings and the zero observations mainly relate to minor destinations. As a robustness check we transform the data according to Kleinert et al. (2012) and find similar results⁷.

As with any dataset there are limitations. The data provides in-depth coverage of the advanced bank centres and captures much of the global banking flows. But using this data, we must

⁷They add 1 unit to each observation, then calculate the log of the variable.

bear in mind that the source countries are mostly advanced economies. To this end, we would expect stronger results if the data had a larger reporting base akin to the CPIS with in excess of 70 countries, thus including more emerging source countries. Given our central finding that distance has a significantly different effect for emerging than advanced host countries we would also anticipate differences across the behaviour of source countries.

2.4.2 Other Data

For the gravity variables; distance, colonial ties and common language we use the CEPII database. The trade data are taken from the IMF IFS DOTS database. The European Union and euro area dummy variables were created based on information on their respective websites. The legal origins regressor is sourced from Shleifer et al. (2008).

2.5 Empirical Analysis

We begin by considering the importance and variation of bilateral links in the adjustment of holdings. Figure 2.1 depicts selected residuals from a regression of $\text{Ln}(A_{ij0507})$ on host and source fixed effects. Figure 2.2 depicts selected residuals from a regression of $\text{Ln}(A_{ij0709})$ on host and source fixed effects. The United States is used as the host country for the liabilities and the source country for the assets to portray the concept. The residuals illustrate what is explained by bilateral factors, stripping out the impact of common factors. These graphs illustrate the variation in bilateral factors between countries and across the risk periods.

This paper is mainly concerned with the role of bilateral factors for the adjustment of positions during the boom and bust. However in order to be complete, we regress the stock position in 2005 on our independent variables. These results provide background as to the bilateral factors important for holdings and then we will consider their role in the adjustment of assets. Table 2.6 reports the results. Greater bilateral trade has a significant and positive effect on bilateral asset holdings, so too does common EU membership, common legal origins and a shared colonial

history. A common language is also weakly significant. Greater distance between two countries corresponds to a lower asset position. These findings are in line with what the banking and portfolio asset literature has found. Considering the interaction terms; the distance effect is stronger for emerging than advanced host economies. This is a new finding in the literature, distance has a non-linear effect for emerging than advanced economies. Given the BIS reporting economies are mainly advanced, we interpret that holding assets in an emerging country may increase the informational friction and thus the cost of a loan. When the friction of distance is added to investing in an emerging economy we see this non-linear effect.

2.5.1 The Boom Period 2005-2007

Table 2.7 presents the specification executed on the locational and consolidated data. Table 2.8 details the results for assets or loans issued in foreign and domestic currency.

During the boom period, we find evidence of convergence of bank holdings. Table 2.7 reports the adjustment of holdings are significantly negatively correlated with the level of assets in 2005. This implies large holding positions grew more slowly and hosts with small initial holdings experienced positive adjustments. We interpret this as compression from more traditional banking partners and a movement by banks into more global markets', coinciding with the documented boom in cross border capital flows. This pattern holds for locational and consolidated data and in both domestic and foreign currency.

Looking at the bilateral variables we see that they are significant for the adjustment in the boom. Previous research has found that gravity factors are important for the level of assets: this finding indicates that bilateral factors are also important for adjustment.

Trade links between two countries are significantly and positively associated with greater growth of positions during the boom, see Table 2.7. The finding holds when we look at domestic currency bank assets but is no longer significant when we consider foreign currency assets. Thus, trade

ties are not associated with increased adjustment when the assets are denominated in foreign currency, but if the assets are in domestic currency; stronger trade ties are correlated with higher growth in the position for the period.

Distance emerges throughout this analysis as a significant bilateral variable. Countries further away experienced less growth in holdings than those that were geographically close. This finding fits the concept of monitoring costs of loans; the further the borrower from the lender, the higher the cost to screen hard and soft information. The increased cost in distance affects the suppliers ability to compete in the distant market as effectively as the local competitors. The impact of distance is strongest or greatest in magnitude in the locational data.

These results have quantitative resonance. We can consider France as a source country, the distance between France and Indonesia is twice that of France to India. Column (1) in Table 2.7 reports a coefficient of 0.21, holding all else equal, we would expect 15% lower growth⁸ by French banks of their assets in Indonesia than India during the boom. If we use the consolidated data we estimate 8% less growth of the holdings.

In the boom period, we find no significant relation between countries sharing a common language. We had anticipated a common language to reduce frictions which might have led to a positive adjustment for the period. This implies that, during the boom period or global increase in cross border flows; the adjustment of banking positions were not affected by language ties⁹. When we consider this finding in conjunction with 2.6, common language can explain the stock of a position but not the adjustment.

Colonial links emerge as a strong indicator of adjustment for the locational data. Consider two host countries that are otherwise identical, except one country has a colonial tie with source country i . The coefficient of 0.26 in column (1) in Table 2.7 implies greater growth of bilateral assets of 29% for the pair that share a colonial link. The specification using consolidated data

⁸The calculation is $\Delta \ln stock_{2.distance} - \Delta \ln stock_{distance} = -.21 \ln(2) = -.15$

⁹This variable is important for portfolio adjustment of equities and bonds.

estimates a 26% greater adjustment for countries with common colonial histories. The effect is insignificant in the consolidated data when we control for advanced host countries. The colonial variable emerges positively significant for assets denominated in domestic currency. Papaioannou (2009) reported that colonial ties are important for having branches or subsidiaries of banks across countries, now we show that colonial ties are also important for the adjustment of asset holdings.

We introduce an interaction term between distance and an advanced dummy to investigate whether there is a non-uniform effect of distance between the two types of countries. We report that distance from the source country significantly affects emerging hosts more than advanced host economies. This is a new finding in the literature. The interpretation is, monitoring costs or informational frictions for BIS reporting source countries are more important for emerging than advanced hosts. Quantitatively, consider two advanced economies, one is twice the distance from source country i than the other. Doubling the distance between the source and advanced host is associated with 6% less growth for the distant advanced hosts. If we consider the same scenario but for emerging hosts, the country twice the distance from the source will experience 22% lower growth in asset holdings.

Next we consider Table 2.8, which details the domestic and foreign currency sample split. Of main interest is distance and the interaction term. Column (1) reports that for assets denominated in foreign currency, distant borrowers are associated with lower growth for the full sample. Controlling for advanced hosts, in column (2) distance has a significantly stronger effect for emerging than advanced economies. However, when we look at assets denominated in the domestic currency of the source, the distance effect is no longer significantly different for advanced than emerging hosts. In other words, pre-crisis, banks did not distinguish between equidistant advanced or emerging countries, once the assets were denominated in the banks' domestic currency.

2.5.2 The Bust Period 2007-2009

The bust period specification is similar to that of the boom, but with the inclusion of the adjustment that took place in the boom as an additional regressor. This should capture evidence of mean reversion of boom acquired positions. Did countries unwind positions they had built up in the 2005-2007 period.

In Table 2.9, we consider the initial holdings in 2005. Across the different data specifications, we consistently find evidence of compression or convergence. This is interesting as, although the banking industry was under severe stress for this period, a large position in 2005 is associated with less growth during the crisis. When we look at coefficient on the boom adjustment, we see evidence of mean reversion. Considering the coefficients of $Ln(A_{ij2005}) + Ln(Adj_{ij0507})$, we can think of a situation of source countries unwinding large positions accumulated in the boom.

Trade ties in the boom period were an important factor for growth in assets, in the bust period this link is no longer as strong. It emerges in the locational data but not consolidated data. The difference between the two data types as outlined above is the consolidated removes the inter-office adjustments. Unlike the boom period, when banks have positions in foreign currency, trade is a good predictor for positive adjustment. For banks that issue assets in domestic currency, trade is no longer a significant explanation for asset adjustment. We interpret these findings that when the friction of foreign currency is present, trade ties can ease or reduce the friction.

Colonial links provide stability during the bust period: banks grew their holdings more in countries with a shared colonial history. Quantitatively, using locational data, a shared colonial history is associated with 22% higher growth in asset holdings. The magnitude increases to 27% when we consider assets denominated in foreign currency. In addition, sharing a language emerges as a positive link in the crisis when banks issue in their domestic currency. Thus a common language between countries reduced the informational friction, and we see greater growth in assets to host economies that share a language.

The distance variable emerges as an important factor in the adjustment of bank holdings in the crisis period. Given the time frame and global risk environment it is particularly informative to look at the interaction effects. Consider a scenario where two advanced countries are identical except one is twice the distance from source country i . In Table 2.9 column (2), we estimate that the more distant country is associated with 2% more growth than the near country. This is a somewhat surprising result, distance in this case appears to reduce the friction. On closer examination, this finding reflects BIS reporting countries located further from the euro area increasing their assets in euro area countries or decreasing it less than in non-euro area countries. We investigate this by using an interaction term comprising a dummy EA host and the distance to the host. Further this result holds, indeed it is stronger if we exclude the US or UK as source countries. Thus we interpret this that during the 2007-2009 crisis, BIS reporters increased their positions (or reduced them less) in distant euro area countries. What is most interesting is that it is the opposite of what would be expected. Thus during the global crisis there was a movement by BIS banks into euro area countries. This movement proceeded the euro area crisis.

If we analyse two emerging host economies that are otherwise identical, doubling the distance leads to 15% less growth in assets for the more distant economy. If we consider the consolidated data, the corresponding figures are 1% and 17% respectively. In other words, in a high risk environment distant advanced host countries benefited from positive adjustments in assets, the opposite is true for emerging host countries.

Next we consider Table 2.10 and the differences between domestic or foreign currency denominated assets. In column (1) we see no significant association of distance and growth of assets denominated in foreign currency. The regression in column (2) including the interaction term depicts a very different story; highlighting the importance of looking at differences of adjustment in advanced and emerging host economies. The results in column (2) estimate that an emerging host that is twice as distant from the source had 9% lower growth over the period. But an advanced host that was twice the distance from the source economy actually experienced higher growth of 4%. We interpret this positive effect of distance on assets denominated in foreign

currency to advanced hosts as a movement by banks to hedge or move away from European markets. Given the large sample of European countries reporting to the BIS, this can reflect a movement away from assets in Europe, denominated in euros.

Finally, we look at the specification estimated on assets denominated in the domestic currency of the source country. Without differentiating between advanced or emerging host countries, a country that is twice the distance from the source would have had 15% lower growth than the nearer host. Now we look at column (4) and consider the advanced and emerging differences. An advanced host country that is the same distance from the source is estimated to have a 5% greater reduction in assets during the crisis, for an emerging host it is estimated to be 27%. In comparison to the boom period, where source countries did not differentiate between distant emerging than advanced countries when the assets were denominated in domestic currency, here we see that during the crisis banks were more sensitive to distant emerging than advanced hosts.

2.5.3 Summary

Overall, the finding of non-uniform distance effects is a new contribution to the literature and is important for policy makers in emerging economies. In particular, that this finding is robust across both locational and consolidated data, it is not distorted by netting out affiliates or other accounting and reporting details. We have shown that gravity factors are important for the adjustment of holdings in the boom and bust period; trade, distance and colonial origins emerge as particularly important ties.

The analysis of the domestic and foreign currency provides a further friction to consider in cross-border banking. We find that host countries that take loans in the domestic currency of the lender are less affected by bilateral distance during the pre-crisis years. BIS source countries do not distinguish between distant advanced or emerging countries if the loan is in their domestic currency. Host countries that are twice the distance from the source than an otherwise identical country, are associated with 20% less growth in assets if denominated in foreign currency but

only 7% less if the loan is denominated in domestic currency. These figures illustrate that the friction of distance is intensified when loans are issued in foreign currency during the boom.

When we look at the analysis between boom and bust periods, comparing the marginal R^2 , it is clear that the specification fits the boom better than the bust. This finding suggests that when source banks were moving further into cross-border positions bilateral factors are important; however, in periods of crisis, these ties provide less explanatory power.

Throughout the specification a common legal system has not been associated with the adjustment of assets. This result is somewhat surprising, as it is found to be important in the establishment of positions by Papaioannou (2009). This leads us to believe that similar institutional factors are important in the initial stages of establishing cross border flows or holdings, such as reducing the start up cost, but are not seen as a day to day cost or benefit to cross border banking.

2.5.4 Robustness Analysis

To be confident in our findings, we run a number of robustness checks. Primarily, we look at different time periods for the boom episode. Changing the boom to the period 2002-2007 does not affect our results. We use the 2005-2007 period so we can directly compare the locational and consolidated data, since the latter only becomes available in 2005. Similarly, we have data until 2009 which provides a natural end to our bust period, but changing the bust specification to end 2008 from end 2009 does not alter the findings.

In selecting the model specification, we considered other bilateral ties suggested by the literature and find that they are not significantly relevant in the case of adjustment of positions. The following were estimated: growth of imports and sharing a common border.

Following our main finding of non-uniform effects of distance across advanced and emerging economies, we investigated whether these were evident for debtor or creditor countries, crisis

and non-crisis economies and for varying intensity of foreign bank presence in the host markets. Using both sample splits and interaction effects there is evidence of non-uniform relations but the results are sensitive to specification changes and thus not sufficiently robust.

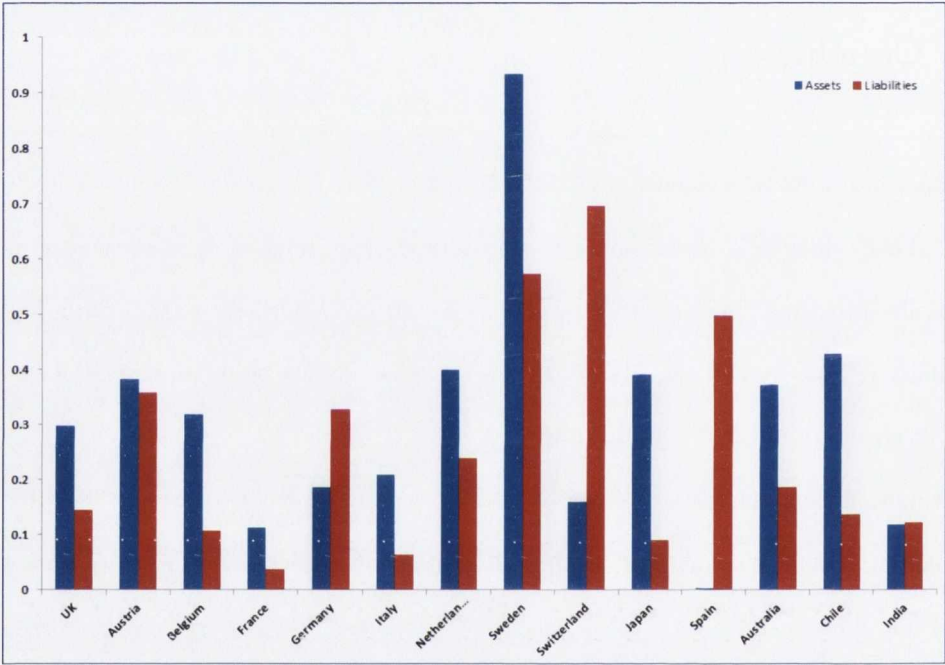
Finally, we checked for advanced dummy interaction terms between the advanced country dummy and the other strong bilateral indicators, none of which were robust across the different data specifications.

2.6 Conclusion

This paper has provided evidence that bilateral factors are relevant for the adjustment of bank assets. This evidence is consistent with the theory that monitoring costs or informational frictions assist in explaining the adjustment of bank assets at a bilateral country level. Distance is particularly relevant, and has non-uniform effects across advanced and emerging hosts. Distant emerging hosts are affected significantly more than advanced host countries, *ceteris paribus*. Interestingly, during the pre-crisis period, in the absence of currency risk reflected in assets denominated in domestic currency, distance did not significantly affect emerging countries more than advanced hosts. However, in the crisis phase even if assets were issued in domestic currency, BIS source countries distinguished between distant advanced than emerging hosts.

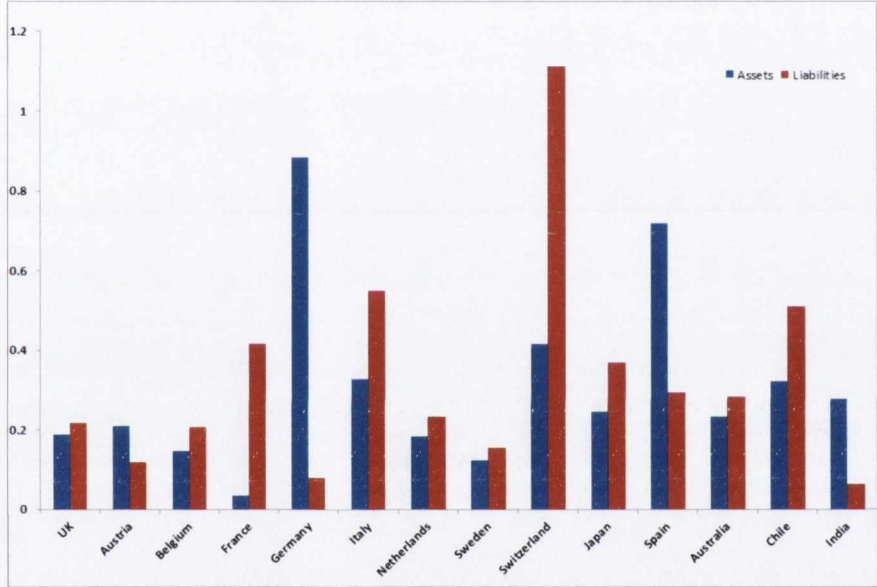
We also find that trade, colonial ties and the history of a position are important for the bilateral adjustment of bank assets. So too, but in lesser instances are common languages and regional group membership.

Figure 2.1: Bilateral Residuals: Boom Period



Note: The graph depicts residuals for a regression of $\text{Ln}(A_{ij0507})$ on source and host country fixed effects only. The countries reported in the graph are BIS reporting countries vis a vis the United States. The blue bar represents the bilateral component of US adjusted assets, the red bar refers to the bilateral component of US liabilities.

Figure 2.2: Bilateral Residuals: Bust Period



Note: The graph depicts residuals for a regression of $\text{Ln}(A_{ij0709})$ on source and host country fixed effects only. The countries reported in the graph are BIS reporting countries vis a vis the United States. The blue bar represents the bilateral component of US adjusted assets during the bust, the red bar refers to the bilateral component of US liabilities.

Table 2.1: BIS Reporting Countries

BIS Reporting Source Countries

Australia
Austria
Belgium
Brazil
Chile
Denmark
Finland
France
Germany
Hong Kong
India
Ireland
Italy
Japan
Luxembourg
Netherlands
Panama
Spain
Sweden
Switzerland
United Kingdom
United States

Table 2.2: Dependant Variable Summary Statistics

	REGION	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
Locational Boom	EAP	119	0.54	0.96	-1.35	0	0.33	0.85	6.21
	ECA	231	0.69	0.96	-3.04	0.13	0.67	1.17	4.64
	LAC	249	0.27	0.9	-2.46	-0.15	0.27	0.63	5.67
	MENA	155	0.27	0.82	-1.9	-0.17	0.23	0.72	2.83
	OECD	313	0.48	0.63	-4.42	0.25	0.44	0.66	4.77
	OHI	100	0.73	0.85	-0.94	0.27	0.63	1.12	5.89
	SA	54	0.57	1.01	-1.3	-0.01	0.34	0.91	4.48
	SSA	226	0.23	1	-4.41	-0.2	0.23	0.69	3.36
	TOTAL	1447	0.44	0.89	-4.42	0.01	0.39	0.81	6.21
Locational Bust	EAP	120	-0.78	0.78	-3.91	-1.1	-0.74	-0.51	3.11
	ECA	238	-0.61	0.81	-4.55	-0.89	-0.56	-0.22	3.14
	LAC	260	-0.8	0.88	-4.43	-1.16	-0.73	-0.38	2.9
	MENA	158	-0.67	1.08	-4.64	-1.1	-0.72	-0.35	4
	OECD	314	-0.73	0.54	-4.08	-0.97	-0.74	-0.48	2.74
	OHI	100	-0.52	0.73	-3.12	-0.89	-0.6	-0.22	2.07
	SA	54	-0.56	0.64	-2.05	-0.92	-0.56	-0.2	1.08
	SSA	233	-0.74	0.74	-3.37	-1.15	-0.69	-0.35	1.39
	TOTAL	1477	-0.7	0.79	-4.64	-1.02	-0.69	-0.36	4
Consolidated Boom	EAP	108	0.59	0.8	-2.77	0.27	0.56	1.01	3.23
	ECA	205	1.06	1.13	-1.87	0.51	0.9	1.49	4.91
	LAC	224	0.46	1	-2.81	0	0.38	0.91	5.21
	MENA	132	0.44	0.98	-3.02	-0.05	0.4	0.92	4.41
	OECD	310	0.53	0.54	-1.46	0.27	0.48	0.73	3.64
	OHI	95	0.84	0.84	-2.45	0.34	0.8	1.33	3.56
	SA	46	0.84	0.99	-0.46	0.23	0.64	1.17	4.23
	SSA	167	0.43	1.13	-3.14	0	0.41	0.88	3.97
	TOTAL	1287	0.62	0.95	-3.14	0.19	0.53	0.98	5.21
Consolidated Bust	EAP	107	-0.14	0.83	-3.73	-0.33	-0.05	0.33	1.85
	ECA	205	-0.2	0.92	-3.47	-0.47	-0.05	0.19	3.95
	LAC	228	-0.26	1.03	-5.74	-0.66	-0.11	0.25	2.3
	MENA	136	-0.23	1.17	-4.64	-0.67	-0.09	0.27	4.65
	OECD	309	-0.22	0.7	-3.47	-0.47	-0.15	0.11	2.19
	OHI	93	-0.04	0.81	-2.79	-0.4	0.04	0.38	2.37
	SA	48	-0.32	1.08	-4.16	-0.82	-0.04	0.23	1.5
	SSA	164	-0.26	1.03	-3.37	-0.88	-0.08	0.23	3.23
	TOTAL	1290	-0.21	0.93	-5.74	-0.54	-0.09	0.22	4.65

Note: Distance, Common Language and Colonial Link data are sourced from CEPIL. EU and EA membership sourced from respective websites. The Legal Origins data is sourced from La Porta et al.

Table 2.3: Dependant Variable Summary Statistics

Locational Data	REGION	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
Foreign Currency Boom	EAP	119	0.54	0.96	-1.35	0	0.33	0.85	6.21
	ECA	231	0.69	0.96	-3.04	0.13	0.67	1.17	4.64
	LAC	249	0.27	0.9	-2.46	-0.15	0.27	0.63	5.67
	MENA	155	0.27	0.82	-1.9	-0.17	0.23	0.72	2.83
	OECD	313	0.48	0.63	-4.42	0.25	0.44	0.66	4.77
	OHI	100	0.73	0.85	-0.94	0.27	0.63	1.12	5.89
	SA	54	0.57	1.01	-1.3	-0.01	0.34	0.91	4.48
	SSA	226	0.23	1	-4.41	-0.2	0.23	0.69	3.36
	TOTAL	1447	0.44	0.89	-4.42	0.01	0.39	0.81	6.21
Foreign Currency Bust	EAP	120	-0.78	0.78	-3.91	-1.1	-0.74	-0.51	3.11
	ECA	238	-0.61	0.81	-4.55	-0.89	-0.56	-0.22	3.14
	LAC	260	-0.8	0.88	-4.43	-1.16	-0.73	-0.38	2.9
	MENA	158	-0.67	1.08	-4.64	-1.1	-0.72	-0.35	4
	OECD	314	-0.73	0.54	-4.08	-0.97	-0.74	-0.48	2.74
	OHI	100	-0.52	0.73	-3.12	-0.89	-0.6	-0.22	2.07
	SA	54	-0.56	0.64	-2.05	-0.92	-0.56	-0.2	1.08
	SSA	233	-0.74	0.74	-3.37	-1.15	-0.69	-0.35	1.39
	TOTAL	1477	-0.7	0.79	-4.64	-1.02	-0.69	-0.36	4
Domestic Currency Boom	EAP	90	0.22	0.81	-1.91	-0.12	0.11	0.57	3.64
	ECA	172	0.72	0.99	-3.35	0.13	0.61	1.26	4.19
	LAC	158	0.2	1.11	-4.2	-0.22	0.23	0.68	5.05
	MENA	131	0.23	0.99	-3.55	-0.18	0.18	0.68	4.1
	OECD	294	0.48	0.69	-7.09	0.24	0.46	0.74	3.18
	OHI	91	0.58	0.82	-2.79	0.13	0.63	1.1	2.65
	SA	47	0.47	0.69	-1.59	0.13	0.27	0.77	2.2
	SSA	160	0.33	1.08	-4.77	-0.05	0.21	0.7	4.55
	TOTAL	1143	0.41	0.93	-7.09	0	0.38	0.79	5.05
Domestic Currency Bust	EAP	92	-0.82	0.78	-4.08	-1.21	-0.75	-0.33	1.13
	ECA	179	-0.59	0.68	-4.18	-0.85	-0.55	-0.18	1.52
	LAC	169	-0.81	0.86	-4.27	-1.22	-0.76	-0.45	3.88
	MENA	133	-0.76	1.24	-5.27	-1.33	-0.86	-0.4	3.94
	OECD	295	-0.74	0.62	-2.84	-1.03	-0.77	-0.42	2.13
	OHI	92	-0.63	1.05	-3.13	-1.1	-0.74	-0.31	3.99
	SA	47	-0.68	0.72	-1.79	-1.11	-0.77	-0.23	1.58
	SSA	166	-0.74	0.69	-3.37	-1.1	-0.74	-0.37	2.61
	TOTAL	1173	-0.72	0.82	-5.27	-1.09	-0.72	-0.36	3.99

Note: Distance, Common Language and Colonial Link data are sourced from CEPII. EU and EA membership sourced from respective websites. The Legal Origins data is sourced from La Porta et al.

Table 2.4: Static Independent Variable Summary Statistics

Region	Variable	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
TOTAL	Colonial Links	1477	0.08	0.27	0	0	0	0	1
EAP		120	0.11	0.31	0	0	0	0	1
ECA		238	0.02	0.14	0	0	0	0	1
LAC		260	0.1	0.31	0	0	0	0	1
MENA		158	0.07	0.26	0	0	0	0	1
OECD		314	0.05	0.22	0	0	0	0	1
OHI		100	0.08	0.27	0	0	0	0	1
SA		54	0.07	0.26	0	0	0	0	1
SSA		233	0.14	0.34	0	0	0	0	1
TOTAL	Legal Origins	1477	0.27	0.44	0	0	0	1	1
EAP		120	0.24	0.43	0	0	0	0	1
ECA		238	0.03	0.16	0	0	0	0	1
LAC		260	0.38	0.49	0	0	0	1	1
MENA		158	0.37	0.49	0	0	0	1	1
OECD		314	0.25	0.43	0	0	0	1	1
OHI		100	0.25	0.44	0	0	0	0.5	1
SA		54	0.24	0.43	0	0	0	0	1
SSA		233	0.39	0.49	0	0	0	1	1
TOTAL	Euro area	1477	0.06	0.23	0	0	0	0	1
EAP		120	0	0	0	0	0	0	0
ECA		238	0	0	0	0	0	0	0
LAC		260	0	0	0	0	0	0	0
MENA		158	0.04	0.21	0	0	0	0	1
OECD		314	0.25	0.43	0	0	0	0	1
OHI		100	0	0	0	0	0	0	0
SA		54	0	0	0	0	0	0	0
SSA		233	0	0	0	0	0	0	0
TOTAL	European Union	1477	0.16	0.36	0	0	0	0	1
EAP		120	0	0	0	0	0	0	0
ECA		238	0.34	0.47	0	0	0	1	1
LAC		260	0	0	0	0	0	0	0
MENA		158	0.06	0.23	0	0	0	0	1
OECD		314	0.4	0.49	0	0	0	1	1
OHI		100	0.18	0.39	0	0	0	0	1
SA		54	0	0	0	0	0	0	0
SSA		233	0	0	0	0	0	0	0
TOTAL	Common Language	1477	0.14	0.35	0	0	0	0	1
EAP		120	0.07	0.25	0	0	0	0	1
ECA		238	0	0	0	0	0	0	0
LAC		260	0.17	0.37	0	0	0	0	1
MENA		158	0.09	0.29	0	0	0	0	1
OECD		314	0.16	0.37	0	0	0	0	1
OHI		100	0.11	0.31	0	0	0	0	1
SA		54	0.11	0.32	0	0	0	0	1
SSA		233	0.33	0.47	0	0	0	1	1
TOTAL	Distance	1477	8.37	0.92	4.09	7.74	8.62	9.08	9.88
EAP		120	9.03	0.43	7.05	8.97	9.13	9.26	9.86
ECA		238	7.6	0.82	4.09	7.12	7.5	8.25	9.5
LAC		260	9.05	0.41	7.03	8.92	9.1	9.26	9.83
MENA		158	8.11	0.62	6.39	7.67	8.14	8.51	9.54
OECD		314	7.95	1.22	5.15	7.01	7.74	9.07	9.88
OHI		100	8.37	0.76	5.63	7.99	8.39	9.02	9.84
SA		54	8.71	0.54	6.53	8.63	8.8	8.97	9.74
SSA		233	8.72	0.31	7.92	8.46	8.68	8.98	9.55

Note: Distance, Common Language and Colonial Link data are sourced from CEPIL. EU and EA membership sourced from respective websites. The Legal Origins data is sourced from La Porta et al.

Table 2.5: Independent Variable Summary Statistics

Region	Variable	N	Mean	S.D.	Min	0.25	Mdn	0.75	Max
TOTAL		1447	6.7	3.01	0	4.38	6.52	8.83	15.1
EAP		119	6.29	2.59	0.69	4.25	6.55	8.36	11.2
ECA		231	6.21	2.54	0	4.3	6.29	8.47	11.6
LAC		249	5.95	2.36	0	4.37	5.94	7.52	12.9
MENA	Ln (Locat) Stk 2005	155	5.99	2.28	0	4.32	6.06	7.85	11.13
OECD		313	9.8	2.72	0	8.32	10.13	11.81	15.1
OHI		100	7.39	2.35	1.39	5.86	7.45	9.15	12.43
SA		54	5.45	2.37	0	3.69	5.34	6.96	10.56
SSA		226	4.41	2	0	2.94	4.3	5.82	10.71
TOTAL		1477	7.07	3.08	0	4.81	6.92	9.36	15.59
EAP		120	6.79	2.56	0.69	5.2	6.91	8.66	11.62
ECA		238	6.78	2.66	1.1	4.8	6.76	9.14	12.44
LAC		260	6.22	2.36	0	4.7	5.98	7.82	13.25
MENA	Ln (Locat) Stk 2007	158	6.19	2.4	0	4.99	6.29	7.87	11.44
OECD		314	10.25	2.63	2.3	8.63	10.67	12.12	15.59
OHI		100	8.12	2.26	2.3	6.54	8.51	9.85	12.64
SA		54	6.01	2.34	1.79	4.33	5.93	7.48	11.34
SSA		233	4.56	2.11	0	3.04	4.22	6.12	11.2
TOTAL		1332	5.9	3.02	0	3.56	5.94	8.09	13.78
EAP		114	5.88	2.54	0	4.03	6.02	7.79	11.13
ECA		212	5.34	2.8	0	2.99	5.42	7.78	10.21
LAC		228	5.17	2.36	0	3.35	5.27	6.72	11.65
MENA	Ln (Cons) Stk 2005	136	4.86	2.09	0	3.56	4.96	6.31	9.25
OECD		312	8.78	2.49	0	7.54	9.17	10.53	13.78
OHI		95	6.51	2.12	0	4.87	6.84	7.98	11.81
SA		48	4.85	2.62	0	2.56	4.86	6.75	9.93
SSA		187	3.35	2.29	0	1.39	3.09	5.01	10.9
TOTAL		1329	6.5	3.07	0	4.09	6.61	8.81	14.02
EAP		109	6.67	2.52	0	4.75	7.23	8.47	11.38
ECA		209	6.41	2.8	0	3.97	6.73	8.81	10.81
LAC		237	5.46	2.49	0	3.76	5.46	7.17	11.89
MENA	Ln (Cons) Stk 2007	138	5.19	2.16	0	3.71	5.27	6.71	9.52
OECD		311	9.33	2.41	1.61	8.15	9.65	10.98	14.02
OHI		95	7.35	2.06	1.95	6.18	7.69	8.82	11.93
SA		49	5.58	2.74	0	3.5	5.28	7.65	10.88
SSA		181	3.77	2.48	0	1.79	3.4	5.77	11.29
TOTAL		1477	5.5	2.89	-5.72	3.7	5.75	7.66	12.58
EAP		120	6.72	2.61	-2.12	5.3	7.19	8.33	12.47
ECA		238	5.44	2.37	-1.31	3.81	5.73	7.3	10.2
LAC		260	4.31	2.79	-5.72	2.8	4.39	6.21	12.06
MENA	Ln Imports 2005	158	4.72	2.54	-3	3.12	4.69	6.46	10.26
OECD		314	7.93	1.98	1.42	6.78	8.22	9.28	12.58
OHI		100	5.95	2.16	-0.72	4.75	6.07	7.43	10.13
SA		54	5.54	1.98	-0.85	4.49	5.8	6.78	9.9
SSA		233	3.33	2.68	-4.67	1.88	3.63	5.05	8.81
TOTAL		1477	5.78	2.93	-6.91	4.03	6.08	7.93	12.74
EAP		120	6.97	2.6	-1.1	5.48	7.48	8.62	12.74
ECA		238	5.8	2.44	-2.41	4.3	6.16	7.68	10.55
LAC		260	4.59	2.82	-5.3	3.06	4.7	6.6	12.27
MENA	Ln Imports 2007	158	5.15	2.57	-3.06	3.47	5.57	7.05	10.48
OECD		314	8.17	1.96	1.33	7.16	8.37	9.54	12.67
OHI		100	6.2	2.19	-0.99	4.8	6.39	7.67	10.39
SA		54	5.87	1.92	0.86	4.8	6.03	6.94	10.13
SSA		233	3.51	2.82	-6.91	1.91	4.02	5.33	9.14

Note: Distance, Common Language and Colonial Link data are sourced from CEPII. EU and EA membership sourced from respective websites. The Legal Origins data is sourced from La Porta et al.

Table 2.6: Stock 2005 Positions

Variables	(1) Locational	(2) Consolidated	(3) Foreign Currency	(4) Domestic Currency
Imports	0.13*** (0.03)	0.14*** (0.03)	0.11*** (0.03)	0.19*** (0.04)
Distance	-1.27*** (0.10)	-0.95*** (0.11)	-1.24*** (0.10)	-1.24*** (0.14)
Common Language	0.27* (0.14)	0.27* (0.16)	0.28* (0.15)	-0.05 (0.18)
EA	0.36 (0.24)	0.08 (0.26)	-1.29*** (0.25)	1.04*** (0.29)
EU	0.95*** (0.22)	0.55** (0.24)	0.58** (0.23)	1.33*** (0.28)
Colonial Links	1.06*** (0.16)	1.66*** (0.17)	0.75*** (0.17)	1.33*** (0.19)
Common Legal System	0.21** (0.10)	0.23** (0.12)	0.24** (0.11)	0.24* (0.13)
Advanced	2.42 (1.68)	5.49*** (1.81)	1.17 (1.72)	2.12 (2.01)
Adv* Distance	0.70*** (0.12)	0.36*** (0.13)	0.63*** (0.13)	0.58*** (0.16)
Observations	1,447	1,332	1,287	1,143
R-squared	0.86	0.84	0.82	0.83

Note: The dependant variable is $\ln(A_{ij05})$. All regressions include host and source country fixed effects. Estimated by OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ refer to significance at the 1,5,10 % respectively.

Table 2.7: Boom: Locational & Consolidated Data

Variables	(1) Locational	(2) Locational	(3) Consolidated	(4) Consolidated
2005 Holdings	-0.23*** (0.02)	-0.23*** (0.02)	-0.20*** (0.02)	-0.21*** (0.02)
Imports 2005	0.05*** (0.02)	0.05** (0.02)	0.06*** (0.02)	0.06*** (0.02)
Distance	-0.21*** (0.05)	-0.32*** (0.07)	-0.11* (0.06)	-0.27*** (0.07)
Common Language	-0.01 (0.09)	0.02 (0.09)	0.04 (0.10)	0.10 (0.10)
EA	0.20 (0.15)	0.30* (0.16)	-0.13 (0.16)	0.02 (0.16)
EU	-0.03 (0.14)	0.03 (0.14)	0.44*** (0.15)	0.50*** (0.15)
Colonial Links	0.26** (0.10)	0.24** (0.10)	0.23** (0.12)	0.19 (0.11)
Common Legal System	-0.01 (0.07)	-0.02 (0.07)	-0.05 (0.07)	-0.06 (0.07)
Advanced		-0.08 (1.08)		-1.78 (1.12)
Adv * Distance		0.23*** (0.08)		0.33*** (0.08)
Observations	1,447	1,447	1,287	1,287
R-squared	0.32	0.33	0.37	0.38
Marg R-squared	0.09	0.10	0.07	0.08

Note: The dependant variable is $\Delta \ln(A_{ij0507})$. All regressions include host and source country fixed effects. The marginal R^2 provides the explanatory power of the bilateral variables in the specification that is not explained by the host and source dummy variables. Estimated by OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ refer to significance at the 1,5,10 % respectively.

Table 2.8: Boom: Foreign & Domestic Currency Data

Variables	(1) Foreign Curr	(2) Foreign Curr	(3) Domestic Curr	(4) Domestic Curr
2005 Holdings	-0.23*** (0.02)	-0.23*** (0.03)	-0.19*** (0.02)	-0.19*** (0.02)
Imports 2005	-0.00 (0.02)	-0.00 (0.03)	0.08*** (0.03)	0.07*** (0.03)
Distance	-0.29*** (0.06)	-0.37*** (0.08)	-0.11* (0.06)	-0.18** (0.09)
Common Language	-0.05 (0.11)	-0.02 (0.10)	-0.13 (0.11)	-0.10 (0.11)
EA	-0.11 (0.17)	-0.05 (0.14)	-0.02 (0.17)	0.02 (0.17)
EU	-0.12 (0.16)	-0.09 (0.15)	0.56*** (0.17)	0.60*** (0.17)
Colonial Links	0.13 (0.12)	0.11 (0.10)	0.37*** (0.12)	0.35*** (0.12)
Common Legal System	-0.01 (0.08)	-0.01 (0.07)	0.06 (0.08)	0.06 (0.08)
Adv * Distance		0.16* (0.08)		0.13 (0.10)
Observations	1,287	1,287	1,143	1,143
R-squared	0.32	0.32	0.34	0.34
Marg R-squared	0.08	0.08	0.07	0.07

Note: The dependant variable is $\Delta \ln(A_{ij0507})$. All regressions include host and source country fixed effects. The marginal R^2 provides the explanatory power of the bilateral variables in the specification that is not explained by the host and source dummy variables. Estimated by OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ refer to significance at the 1,5,10 % respectively.

Table 2.9: Bust: Locational & Consolidated Data

Variables	(1) Locational	(2) Locational	(3) Consolidated	(4) Consolidated
2005 Holdings	-0.13*** (0.02)	-0.14*** (0.02)	-0.10*** (0.02)	-0.11*** (0.02)
Adj 05-07	-0.13*** (0.03)	-0.13*** (0.03)	-0.20*** (0.03)	-0.20*** (0.03)
Imports 2007	0.04** (0.02)	0.04** (0.02)	0.00 (0.02)	0.00 (0.02)
Distance	-0.10** (0.05)	-0.22*** (0.06)	-0.08 (0.05)	-0.17** (0.07)
Common Language	-0.01 (0.08)	0.03 (0.08)	0.13 (0.09)	0.16* (0.10)
EA	-0.14 (0.14)	-0.03 (0.14)	-0.10 (0.15)	-0.02 (0.15)
EU	0.11 (0.13)	0.18 (0.13)	0.36*** (0.14)	0.40*** (0.14)
Colonial Links	0.20** (0.10)	0.18* (0.10)	0.24** (0.11)	0.22** (0.11)
Common Legal System	-0.02 (0.06)	-0.03 (0.06)	-0.05 (0.07)	-0.06 (0.07)
Advanced		-1.54 (1.00)		-1.27 (1.07)
Adv * Distance		0.25*** (0.07)		0.18** (0.08)
Observations	1,447	1,447	1,257	1,257
R-squared	0.23	0.24	0.42	0.42
Marg R-squared	0.03	0.04	0.04	0.04

Note: The dependant variable is $\Delta \ln(A_{ij0709})$. All regressions include host and source country fixed effects. The marginal R^2 provides the explanatory power of the bilateral variables in the specification that is not explained by the host and source dummy variables. Estimated by OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ refer to significance at the 1,5,10 % respectively.

Table 2.10: Bust: Foreign & Domestic Currency Data

Variables	(1) Foreign Curr	(2) For Interaction	(3) Dom Curr	(4) Dom Interaction
Adj 05-07	-0.18*** (0.03)	-0.19*** (0.03)	-0.20*** (0.03)	-0.21*** (0.03)
2005 Holdings	-0.13*** (0.02)	-0.14*** (0.02)	-0.15*** (0.02)	-0.16*** (0.02)
Imports 2007	0.05** (0.02)	0.05** (0.02)	0.00 (0.02)	-0.00 (0.02)
Distance	-0.03 (0.06)	-0.13* (0.07)	-0.21*** (0.06)	-0.40*** (0.08)
Common Language	0.00 (0.10)	0.03 (0.10)	0.16* (0.10)	0.22** (0.10)
EA	-0.35** (0.16)	-0.27 (0.16)	-0.11 (0.16)	-0.00 (0.16)
EU	0.01 (0.15)	0.06 (0.15)	0.05 (0.16)	0.14 (0.16)
Colonial Links	0.25** (0.11)	0.23** (0.11)	0.24** (0.11)	0.19* (0.11)
Common Legal System	0.00 (0.07)	-0.01 (0.07)	0.07 (0.07)	0.06 (0.07)
Adv * Distance		0.19** (0.08)		0.33*** (0.09)
Observations	1,287	1,287	1,143	1,143
R-squared	0.28	0.28	0.27	0.28
Marg R-squared	0.05	0.05	0.08	0.09

Note: The dependant variable is $\Delta \ln(A_{ij0709})$. All regressions include host and source country fixed effects. The marginal R^2 provides the explanatory power of the bilateral variables in the specification that is not explained by the host and source dummy variables. Estimated by OLS, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ refer to significance at the 1,5,10 % respectively.

Chapter 3

Foreign bank Identity: Does it Matter for Credit Growth?

3.1 Introduction

In the context of changing international bank ownership, we ask if the home country identity of foreign-owned banks is relevant for loan growth in the host country. Claessens and Van Horen (2014b) document the increasing share of foreign owned banks globally. In 1995 foreign owned banks accounted for 20% of the global sample, by 2009 that figure had increased to 34%. In 2009 only 12 countries had no foreign bank presence. The increased participation of foreign owned banks in global credit supply is an important motivation to better understand their behaviour.

A second motivation arises from the composition of the set of foreign banks, it is becoming increasingly heterogenous. Claessens and Van Horen (2014b) describe the shedding of subsidiaries by Western Europe and North American banks during the crisis, which were picked up by emerging and developing economy owners. To cite a few examples; Russian banks bought Eastern European banks from Austrian owners, while a Colombian bank purchased subsidiaries in Costa Rica, El Salvador and Honduras. Sub Saharan African banks also increased their ownership of overseas banks. In the wake of the financial crisis, Claessens and Van Horen (2014b) show that the crisis has not led to a retrenchment in foreign bank ownership. Rather a structural transformation is under way. The shifting identity of ownership raises questions about credit dynamics.

It is likely that the heterogeneity of foreign bank owners is reflected in heterogeneous lending growth by foreign-owned banks. This paper investigates if the identity of the home country is relevant for loan growth in the host economy in the 2006-2009 period. Figure 3.1 highlights the significant differences in credit growth between banks with emerging and advanced country owners.

This paper addresses two main questions. Do the credit dynamics of foreign banks differ if they are owned by an emerging or advanced country? Is the regulatory environment in the home country associated with credit growth in the host? To address these questions empirically, we combine three sources of data: bank-level data from Bankscope, bank ownership data from Claessens and Van Horen (2014a) and home country regulation data from Barth et al. (2013). Following the literature, we control for bank characteristics of: size, profitability, capitalization, deposit funding and liquidity. We apply host country fixed effects so we can focus on differences in credit dynamics arising from source country variation. This accounts for the locational choices of banks and conditions in the host economy that would affect credit demand.

We find significant differences in lending behaviour by foreign-owned banks, with different types of home countries. During the pre-crisis period, we report that foreign-owned banks from emerging home countries were associated with significantly lower loan growth than advanced home countries. The opposite is the case for the 2008-2009 crisis years. This finding implies that comparing the loan growth of domestic banks and the set of foreign banks can be misleading. Variation in credit dynamics are concealed when we treat foreign banks as one group.

We extend the analysis to consider whether the regulatory environment in the home country is associated with credit growth in the host. Using the Barth et al. (2008) regulatory data, we explore whether there is evidence of regulation pass-through via foreign-owned banks from source to host economies. Given the rich data we analyse three types of regulation: initial capital stringency, restrictions on non-core banking activity and the supervisory power of the

regulators. Using principal component analysis we create a factor variable to get an overview of regulation pass through from home country to host.

The results suggest that foreign banks from home countries with higher capital stringency regulatory requirements were associated with significantly less loan growth pre-crisis. During the 2008-2009 period, they were correlated with significantly higher growth than those from home countries with looser capital regulation. This finding is not driven by differences of advanced and emerging home countries. The results are consistent when we control for emerging country ownership.

The literature has focused on host country differences to explain credit variation by foreign-owned banks. Detragiache et al. (2008), Cull and Martínez Pería (2013) and Claessens and Van Horen (2014a) look at income and regional variation in the host economy. Home country characteristics have yet to be explored in this context. If the type of foreign-owned bank is relevant for credit growth, host policy-makers should be aware of financial stability implications associated with different groups of foreign-owned banks. Given that foreign-owned banks are accountable to host regulation, a priori, it is not clear that we will find any association between home regulation and credit dynamics in the host economy. However, recent work presented in Ongena et al. (2013) links home country regulation and foreign bank behaviour. They focus on the type of loans (risk profile) offered in the host economy with an Eastern European sample of hosts and Western European source countries. In our global sample of home and host economies, we find evidence of regulation pass through for credit growth.

The paper proceeds as follows. Section 3.2 details the conceptual framework and reviews the relevant literature. The empirical method is detailed in Section 3.3, while Section 3.4 details the data. Section 3.5 provides the results and discussion and conclusions are offered in Section 3.6.

3.2 Conceptual Framework

There is a considerable literature on foreign-owned banks and their effects on the host economies. Host country characteristics are often used to explain the variation in credit behaviour of foreign-owned banks. The relevance of the home country identity of the foreign-owned bank for loan growth in the host economy has yet to be analysed. We propose that the identity of the source country is likely to assist in explaining loan growth variation. We investigate whether foreign-owned banks from advanced or emerging home countries differ in their loan growth. We extend the concept to ask whether the regulatory environment of the home country can help explain the differences in loan growth of emerging than advanced home countries.

Primarily, the paper contributes to the growing literature on foreign-owned banks. We focus on the importance of home country identity for credit dynamics. The differences in loan growth have implications for financial stability. Our findings show that it is not enough to know foreign banks are operating in a host economy, it is also important to consider the regulatory environment in the home country of the bank. We find that regulation in the home country has interesting implications for credit growth on the host economy.

3.2.1 Home Country Identity

The literature on foreign-owned banks highlights positive effects on the banking system where they operate. They can increase competition, lower overall costs, increase access to funds and increase financial intermediation in an economy. Claessens et al. (2001), Claessens (2006) and Lehner and Schnitzer (2008) provide such evidence. This literature has explored variation in the host country to explain differences in foreign bank behaviour. However, less focus has been placed on the home country identity.

Exceptions are Van Horen (2007) and Claessens and Van Horen (2014b). Van Horen (2007) provides a starting point for our analysis. The paper focuses on foreign banks and their entry

into and performance in (efficiency and profitability) emerging economies. The author proposes banks from developing home countries might be more familiar or have a competitive advantage working in a weak investment climate explaining their presence in developing countries. Using bilateral data, the paper looks at home country diversity that may explain locational choices of banks. But unlike her study, in this paper we are concerned with how banks behave once they are in the host economy.

Claessens and Van Horen (2014b) provide further guidance in this area. The paper shows that some bilateral factors are important for the entry and exit of foreign banks but that home and host factors can help explain asset growth between 2007 and 2012. The authors find that home country GDP per capita is significant in explaining asset growth as a home country characteristic. Similarly, they run a cross-country regression on asset growth between 2007 and 2012 for OECD and non-OECD home countries. The results suggest that differences in the home identity should be considered in further detail. We provide evidence of variation in loan growth across advanced and emerging home countries. Further, we uncover that regulation in the home country can help explain these differences.

3.2.2 Loan Growth and Domestic Credit

Claessens and Van Horen (2014a) find that increased foreign bank participation increases the domestic credit in an economy. The main channel is increased participation. Stiffer competition results in pressure on both lending rates and the volume of credit. However, in low income countries or where there are barriers to entry, foreign banks have been found to “cherry pick” or “cream skim” their clients. This process can lead to lower overall credit in an economy, as found by Detragiache et al. (2008). Essentially, foreign-owned banks can offer more competitive rates and attract the “best” firms in an economy, or “cherry pick” their clients. The domestic banks are then left with a weaker pool of borrowers. To account for these lower quality or higher risk loans, the domestic banks may charge higher rates or issue less loans. This process can lead to an overall reduction in credit in the economy.

Cull and Martínez Pería (2013) find that the behaviour of loan growth by foreign banks differed across regions in the Global Financial Crisis. Their study considered host economies in Eastern Europe and Latin America. They find that foreign banks in Eastern Europe increased lending more than domestic banks pre-crisis, and during the crisis, their lending fell by more than domestic banks. Interestingly, the foreign-owned banks operating in Eastern Europe are mostly subsidiaries of banks with Western European owners. The paper finds different results in Latin America; foreign banks neither increased lending more than domestic banks in the pre-crisis phase nor reduced lending faster in the crisis period. The ownership of foreign banks in Latin America is more varied than that of Eastern Europe. This result leads us to investigate if it is the type of foreign-owned bank that matters. Chen and Wu (2014) extend the above analysis to include Asia. They introduce the concept of regulation at the host country level to explain variation in loan growth. They find that tighter host country regulation was positively associated with credit growth during the crisis. We are concerned with the regulatory environment in the home country of the foreign-owned bank.

In Chapter 2 of the Global Financial Stability Report Fund (2015), the IMF considered the role of different cross-border banking linkages and domestic credit growth. The report considers home country characteristics and credit growth at the country level. Rather, we are concerned with the bank level pass through of ownership characteristics. Furthermore, we are concerned with differences of credit growth within the heterogeneous foreign bank set. The IMF report is focused on the different types of links, such as: cross-border claims, international claims and the local claims of banks.

The literature provides comparisons across domestic, foreign-owned, private or public-owned banks in relation to credit or loan growth. In other cases, the variation in host country characteristics or regional diversity is examined. To the best of our knowledge, no paper has looked at the identity of foreign banks and loan growth. We propose that not only is host identity relevant for credit growth by foreign banks, but so too is the home country identity. Primarily, we analyse if banks from emerging home countries exhibit different loan behaviour than

banks from advanced source countries. We extend the analysis and ask whether the regulation environment in the home country is relevant for loan growth in the host. These findings can facilitate policy-makers' understanding of the credit dynamics in their economy.

3.2.3 Financial Stability

Credit dynamics have an important role in financial stability. We relate our work to the literature on foreign banks and financial stability. We provide evidence that home country characteristics are relevant for loan growth in the host. We show that a foreign-owned bank from a tighter regulated home country is associated with more credit growth than a bank with looser home regulation during the Global Financial Crisis.

De Haas and Van Lelyveld (2006) and Goldberg (2009) show that foreign-owned banks can provide stability when a banking system is hit by a systemic shock. However foreign-owned banks can also expose an economy to instability if there is trouble in the home country or globally, as shown by Peek and Rosengren (1997), Peek and Rosengren (2000), Cetorelli and Goldberg (2011) and Schnabl (2012).

The funding structure of the foreign bank is important for crisis behaviour. Foreign-owned banks that are deposit funded are more stable. De Haas and Van Lelyveld (2010) find that funding cuts were less likely in banks financed by deposits. The extent of foreign bank presence in the host country is important for behaviour of foreign-owned banks during a crisis. Claessens and Van Horen (2014a) find that foreign banks reduced credit more than domestic banks during the crisis but not when dominant in the host country.

In the context of these studies; our findings show that treating foreign banks as one group can be misleading.

3.2.4 Regulation

We propose regulation in the home country to be associated with loan growth in the host. We adopt the question posed by Ongena et al. (2013): “when the cat’s away, the mice will play”. Given the opportunity, do subsidiaries participate in more risky behaviour in the host country? Contrastingly, if a home country is tightly regulated, do banks export their conservative behaviour to their foreign subsidiaries? This would be in line with a habit persistence type relation. These two alternatives are plausible. They are likely to differ between crisis and calm periods. Equally, given that subsidiaries are subject to host regulation, there might be no pass through of home regulation on bank behaviour in the host.

Using detailed firm and bank level loan analysis, Ongena et al. (2013) provide evidence that banks from home markets with higher barriers to entry are associated with lower lending standards in the host economy. Similarly, banks from home countries with higher restrictions on non-core bank activity are associated with lower lending standards. Ongena et al. (2013) focus on Western European foreign-owned banks operating in Eastern European countries, while our sample has global coverage. We look at loan growth in the host and regulation in the home country, while their focus is on the lending standards of the foreign subsidiaries. As a complementary step in our analysis we test our model on their sample and compare findings.¹

The Barth et al. (2013) indices on banking regulation provide data for the analysis. We consider three types of regulation and supervision: restrictions on non-core banking activity, capital stringency and supervisory power. We are particularly interested in capital stringency in the home country, if it is associated with credit growth. Furlong (1992) and Peek and Rosengren (1995) examined the link between capital regulation and loan growth within a banking system. We examine the supervisory power in the home country in light of the increased popularity of macro-prudential policy in recent years. In order to get an overall view of these three regulation types, we also use principal component analysis to create an aggregate factor variable.

¹It would be interesting to compare the results of the two studies: i.e. does regulatory pass through differ for lending standards than for credit growth?

3.3 Empirical Method

The literature has provided evidence that differences at the host country level can result in variation of loan growth by foreign banks. Using global coverage of bank level data for the period 2006-2009, we investigate whether the home country identity also has a role in understanding credit growth. We employ a panel framework similar to Cull and Martínez Pería (2013) and consider three home identity specifications using interaction terms.

$$Growth_{ijkt} = \alpha_0 + \alpha_j + \alpha_t + EM_k + Crisis_t + Crisis_t * EM_k + X_{ijt-1} + \varepsilon_{ijt} \quad (3.1)$$

We use the interaction term as opposed to a sample split framework to estimate the model for a number of reasons. Primarily, the bank controls are not static. Allowing these vary with the dependent variable is more important here than in the first chapter where the controls were time invariant. Although the main variable of interest is indeed static, the controls are time varying and as such a panel model is more suited. Using a boom-bust adjustment set up as in Paper One reduces the sample size. The combination of bank level data and the need to include host country fixed effects means a panel set up using each year of the data provides more data enabling more accurate estimates. The panel is unbalanced and facilitates the inclusion and estimation of the model on all foreign banks operating during the period. Executing the sample on a balanced panel means only healthy banks are included or those that were foreign owned for the duration. (The main results hold on the balanced panel which constitutes 79% of the sample.) Using the balanced panel could be misleading as banks that lend aggressively in the boom may have been shut down, gone bust etc. We are not only concerned with successful or healthy foreign banks but all foreign-owned banks for the boom and bust period. This panel framework also allows direct comparison of the type of foreign bank for credit growth before and during the crisis, especially given the unbalanced nature of the panel. Furthermore the main results are consistent if the model is tested on cross sections of a boom and bust setup, akin to the framework employed in Paper 1.

In the basic model set-up we consider the difference of credit growth by advanced and emerging

home countries. $Growth_{ijkt}$ is the annual growth of loans by bank $_i$ from home country $_k$ in host country $_j$ in year $_t$, we use credit in U.S. dollars following the literature. We apply host country fixed effects in the model α_j to control for host specific factors. This removes exchange rate fluctuation at the host level and accounts for a host being in crisis effects as found in De Haas and Van Lelyveld (2006) on credit growth. The host fixed effects also control for factors that attracted the subsidiary to locate in that country initially, highlighted by Van Horen (2007). We also apply time fixed effects to the model, α_t . The inclusion of time fixed effects controls for common to all shocks or global effects. Given the time period under consideration, these control positive credit growth in the run up to the crisis and the likely reduction of credit growth during the crisis. The specifications are estimated using pooled OLS.

The emerging variable is a dummy at the home country level that takes a value of one if the home country is an emerging economy and zero if it is advanced.² The coefficient on this dummy variable can be interpreted as the difference in credit growth by emerging than advanced home country banks for the pre-crisis period. The crisis variable has a value of one for the years 2008 and 2009.³ The interaction term coefficient assists in understanding the role of identity during the crisis. To see the different credit behaviour of an emerging bank than an advanced during the crisis we sum the coefficients of the interaction term and the emerging dummy variable.

X_{ijt-1} is a vector of bank specific characteristics common to the literature on credit growth. We use the lagged values of these variables to reduce potential endogeneity issues. Common to both Chen and Wu (2014) and Cull and Martínez Pería (2013) we control for: bank size; the profitability of the bank; the capitalization of the bank; funding stability; and the liquidity of the bank. Table 3.1 presents bank level summary statistics.

Chen and Wu (2014) pointed to the relevance of regulation at the host country level for credit growth. Although the foreign owned banks are not subject to home country regulation it is

²The advanced countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States, all other economies are coded as emerging.

³Excluding time fixed effects and running separate 2008 and 2009 crisis dummy variables yields similar results.

plausible that there is persistence in bank behaviour across borders as outlined in Ongena et al. (2013). In order to get a clearer idea of potential regulatory pass through, we run a specification using three indices created by Barth et al. (2013). A higher index value indicates more restrictive regulation.

$$Growth_{ijkt} = \alpha_0 + \alpha_j + \alpha_t + REG_k + Crisis_t + Crisis_t * REG_k + X_{ijt-1} + \varepsilon_{ijt} \quad (3.2)$$

We run these regressions separately due to correlation among the regulatory measures. First, we consider the index for restrictions on non-core banking activities as an explanatory variable (values can range from (3-14)). Second, we use the initial capital stringency regulation index. Finally, we use the index for official supervisory power, indicating whether the supervisors have power to take specific actions to prevent and correct problems, the values range (1-14). In order to get an aggregate interpretation, we construct a factor variable from the three indices using principal component analysis. The principal component analysis reduces the regulation data into their basic components, removing unnecessary parts.⁴

Our final specification helps to uncover which type of variation; (regulation or advanced and emerging differences at the home country level) is relevant for loan growth. We estimate the model with the regulation variables and control for emerging home country ownership.

$$LoanGrowth_{ijkt} = \alpha_0 + \alpha_j + REG_k + EM_k + Crisis_t + Crisis_t * REG_k + Crisis_t * EM_k + X_{ijt-1} + \varepsilon_{ijt} \quad (3.3)$$

What is of most interest in this specification is whether the regulatory environment in the home country can drive out the significance of the emerging/advanced home country split.

As a final step in the analysis, we run our model on the samples used by Ongena et al. (2013). We run the specification three times, once with their European source countries and global host sample, then with a global source sample and the Ongena et al. (2013) host sample, and finally with the same sample as in their analysis. To be clear, their paper addresses whether the type

⁴The Kaiser criterion suggests to retain factors with eigenvalues greater than or equal to one. In this paper, following this specification we retain Factor 1, with an eigenvalue of 1.66. Factor 1 corresponds to 55% of the total variance.

of loans issued by foreign banks is associated with the level of bank regulation in the source country, they also consider the risk profile of the borrowers, whether banks that lend to riskier borrowers abroad face tighter restrictions at home. We are concerned with the loan growth of foreign banks. In our global sample we find that banks facing tighter capital regulation at home export this more conservative behaviour, in their European sample they find that banks take on more risk once they are able to. If using the same samples we find consistent results as theirs, it would appear that European banks behave differently to the global sample of foreign banks. If instead we don't find consistent evidence in the loan growth of European banks, we can conclude that foreign owned banks from Europe, pursue riskier lending overseas but in quality, there isn't a quantity effect which is what our model captures.

3.4 Data

3.4.1 Foreign Ownership

The data on foreign bank ownership are provided by Claessens and Van Horen (2014a). The coverage of banking systems is broad, detailing 137 countries for the period 1995-2009. The data accounts for 90 per cent or more of a countries banking assets. The authors define a bank as foreign owned if 50 percent or more of its shares are held by foreigners. This cut-off is typical of the literature on foreign banking. The ownership is applied on a direct basis.⁵

We present summary statistics on a regional basis for source and host country loan growth in Table 3.3. At a regional level, we see that the main source countries of foreign banks are OECD economies for both the pre-crisis and crisis periods. Also evident is the increased participation of regions between the two periods, for example Sub-Saharan African banks had 79 links with overseas banks for 2005-2007 but this had increased to 100 for the 2007-2009 period. Banks from the Middle East and North Africa also increased their presence abroad from 23 to 31 links in 2009. Table 3.3 also reports the number of foreign bank links for the crisis and pre-crisis

⁵For a detailed discussion of foreign ownership refer to Claessens and Van Horen (2014a)

periods and the mean loan growth on a host country basis. This table gives a clear indication of the country coverage of the data. It also highlights the negative loan growth experienced by many host countries during the crisis. In our sample we analyse banks from 78 different source countries. This table indicates the variation in loan growth by source country and across the periods of interest for this paper.

3.4.2 Bank Level Data

We restrict our analysis to the period 2006-2009, corresponding to the significant improvement (since 2005) in coverage for asset and loan data provided by Bankscope. Our analysis requires a one year lag, thus we use the 2005 data. The purpose of the paper is to uncover if the home country identity of a foreign bank is relevant in explaining credit growth in the host economy. We look at all foreign-owned banks as defined by Claessens and Van Horen (2014a). However, if we restrict our sample to only those banks that are present in each year 2005-2009, the main findings hold. Evidence is provided by Claessens and Van Horen (2014a) of significant entry and exit of banks during the period, executing the specification on a “healthy” bank sample may be misleading.

Bankscope provides data on domestic banks and foreign owned subsidiaries. Banks do not typically report branch balance sheets, so our sample consists of foreign-owned subsidiaries. The bank-level variables are all sourced from Bankscope, produced by Bureau van Dijk. The variable we use for loan growth is gross loans. It is the growth in local lending provided by foreign-owned banks from home country k in host country j . The bank specific controls are bank size, log of total assets; profitability, return on assets; capitalization, equity to loan ratio; liquidity condition, liquid assets to total assets ratio; funding stability, retail deposits to total liability ratio. Table 3.1 provides summary statistics. Broadly; emerging banks are smaller in terms of asset size, rely more on deposits, are higher capitalized and are more liquid than advanced banks. Tables 3.4 and 3.5 provides a regional breakdown of source economies of bank

level summary statistics. For the pre-crisis period foreign banks with OECD or MENA owners were the most capitalized on average. Banks with South Asian or Sub Saharan African owners had the highest levels of deposit funding, while Europe and Central Asian owned banks relied least on deposit funding. There is less variety by regional ownership for liquidity, although Latin American owned foreign banks had lowest liquidity ratios. Banks with owners from the Europe and Central Asia were the most profitable or had the highest return on assets, while Latin American banks were the least profitable. Finally banks from OECD source countries were the largest in terms of asset size and those with owners from Eastern Asia and the Pacific were the smallest on average.

3.4.3 Regulation data

The regulation and supervision data are sourced from the Barth et al. (2013) database. We use the indices resulting from the 2005 survey round, corresponding to Barth et al. (2008). The data are collected from detailed surveys co-ordinated by the World Bank (almost three hundred questions) completed by central bank officials in each country. The questions span the supervision and regulation of banks in 142 countries. The authors then compile the survey responses into indices that can be used in empirical research. It is important to note that we use the static values of 2005 regulation indices for our analyses. We have chosen the 2005 value as these values are exogenous to loan growth in the later years. If instead later values of regulation were used there would be causality issue. For example, did the source countries that changed their capital adequacy ratios do so because banks had issued too much credit or vice versa. We use indices measuring regulation on bank activities, capital regulation and official supervisory power. The index of restrictions on non-core banking activities is based on the following questions: (1) The extent to which banks may engage in underwriting, brokering and dealing in securities and all aspects of the mutual fund industry; (2) the extent to which banks may engage in insurance underwriting and selling; and (3) the extent to which banks may engage in real estate investment, development and management.

The official supervisory power index is constructed from 14 questions. The index is designed to see whether the supervisory authorities have the authority to take specific actions to prevent and correct problems. The questions range from the power to replace bank directors to supervisors meeting with external auditors.

The capital stringency index only covers 68 countries, or half the countries in our sample. As a result we use the initial capital stringency index which provides full coverage. The initial capital stringency index is created from the following questions: (1) are the sources of funds classified as capital verified by the regulatory or supervisory authorities?; (2) can the initial disbursement and subsequent injections of capital be executed with assets other than cash or government securities?; (3) can the initial disbursement of capital be executed with borrowed funds? In Table 3.6 we report summary statistics for the regulation variables from the source country perspective. We see that OECD countries had the loosest capital stringency regulation on average, while Southern Asia and the MENA region had the most stringent rules. Latin America has the tightest restrictions on non-core banking activity. Banks originating from Other High Income countries gave the highest level of supervisory power to their Central Banks. In order to get an overall view of home country regulation, we use principal component analysis to create a factor variable. We combine the three indices outlined above to do so.

In summary, we use the foreign ownership data from Claessens and Van Horen (2014a), match them to bank level data from Bankscope, and merge with home country characteristics using Barth et al. (2013). This provides a globally representative database we can use to investigate whether the home country of a foreign bank matters for credit dynamics in the host country.

3.5 Empirical Analysis

We begin by considering the variation in the loan growth of foreign-owned banks from emerging countries versus advanced source countries. Figure 3.1 illustrates the median loan growth of foreign banks split by advanced or emerging home countries. Interestingly, credit growth was

increasing for 2006-2007 for the median foreign-owned bank of either advanced or emerging origin. The variation is striking for the crisis period. The median bank in our sample from an advanced country had substantially lower loan growth in 2008 and close to zero growth in 2009.

Figure 3.2 depicts the median loan growth of foreign banks split by advanced or emerging home countries in advanced host countries, while Figure 3.3 does the same for emerging host economies. In both charts, there appear to be significant differences in loan growth by foreign banks from emerging than advanced home countries for the crisis. Emerging-owned banks increased credit more in advanced hosts throughout the period. Credit growth in 2008 is particularly divergent across advanced and emerging country owned foreign banks.

The annual median values of the banking variables are provided in Table 3.1. The figures show that the median emerging foreign-owned bank was more profitable, had a greater dependence on deposit funding and was better capitalized than the median advanced bank for the period. It is clear that the median advanced bank was significantly larger than an emerging source bank in this sample. Table 3.2 provides summary statistics on the regulation data created by Barth et al. (2008). For each regulatory measure, the average source emerging economy had tighter regulation than the average advanced country.

3.5.1 Loan Growth and Asset Growth

In Table 3.7, we report the results from estimating equation (1). In the first column, we report the specification applied to annual loan growth, column (2) refers to asset growth. We include asset growth here as a robustness check. The two series are correlated, but in this paper we are concerned with credit growth so primarily use the loan series.

In both specifications, we see that a foreign-owned bank from an emerging home country is associated with significantly lower loan growth pre-crisis. In the years preceding the crisis, an emerging foreign-owned bank had 6.6 percentage points less credit growth than an advanced

home country. The crisis years 2008-2009 have a significant negative effect on loan growth. During the crisis however foreign-owned banks from emerging countries had significantly higher relative credit growth than banks from advanced home economies. Summing the coefficient of the “Emerging Owner” and the “Emerging Owner” interacted with “Crisis”, emerging owned banks had almost 5 percentage points more loan growth than foreign banks with advanced owners during the crisis.

The control variables throughout the specifications are consistent with the literature. Larger banks are associated with less annual loan growth, so too are more profitable banks. Banks with higher capital and liquidity are correlated with higher credit growth. The funding stability variable, which considers the extent of deposits as a source of funding is not consistently significant across the specifications. This control is important in the literature when comparing loan growth between domestic and foreign owned banks De Haas and Van Lelyveld (2006). It would appear it is not so relevant for explaining differences among foreign-owned subsidiaries. Before we consider the role of source country regulation for loan growth, we consider the above regression on a regional basis.

3.5.2 Loan Growth and Home Country Regulation

In Table 3.8 we present the results of the estimation of equation (2). Each column corresponds to the different measure of regulation used in the specification. In order to get an overall view, we used principal component analysis of the three measures of regulation to obtain an aggregate regulatory index. The results are presented in column (1). The regulation coefficient is significant and negative, implying countries with tighter regulation are associated with less credit growth in the pre-crisis period. The coefficient on the interaction term suggests banks with tighter regulation in the home country had higher credit growth during the crisis.

In column (2), we consider the restriction of non-core activity in the home country on loan growth by the bank in the host economy. The measure is insignificant included alone, implying

that pre-crisis, there was no association with non-core regulation at home and loan growth abroad. During the crisis period it gains significance. This result suggests that during the crisis, foreign owned banks from home countries with higher restrictions on non-core activity were associated with higher credit growth in the host.

The results using the index of initial capital stringency are reported in column (3). Banks of home countries with more stringent capital requirements are correlated with lower credit growth before the crisis. This result is significant at the 1 percent level. During the crisis the opposite is found, banks from home countries with stricter initial capital requirements provided a 4 percent buffer during the crisis.

Finally in column (4), we report the results of the specification including the supervisory power of the home country regulator. We find home country supervisory powers are associated with credit growth in the host. More supervisory powers have a negative relation with credit growth prior to the crisis but, they have a positive effect during the crisis period.

Overall the regulation on bank capital in the source country has the strongest association with credit growth in the host economy. Foreign-owned banks with tighter capital regulation are associated with less loan growth pre-crisis, so too for banks from countries with high supervisory power. However during 2008-2009, foreign banks that faced tighter regulation at home had significantly greater credit growth in the host economy. These findings provide evidence of regulation pass through from home to host economies via foreign banks. This is relevant for policy-makers: the type or identity of foreign banks is important to better understand the credit dynamics in domestic markets.

3.5.3 Loan Growth and Home Country Regulation, Controlling for Emerging Country Variation

Next, we consider Table 3.9. This specification includes the regulation variables while controlling for an emerging home country dummy. We are interested whether the regulation variables can drive out the significance of the emerging country dummy.

The first column presents the results for the overall regulatory environment in the source economy. Outlined in the empirical method, we compute this variable using principal component analysis. Our main interest is whether controlling for emerging ownership, regulation differences in the source country are still significant. The regulation variable drives out the significance of the emerging dummy. This implies that for the pre-crisis period, banks from home countries with more stringent regulation were associated with less credit growth. For the 2008-2009 period, foreign banks increased credit relatively more when their home economy was tightly regulated controlling for emerging country ownership. The insignificance of the emerging owner variable emphasises that the relevant identity is the regulatory regime in the home country.

Column (2) reports the results for regulation of non-core activity in the home country. Neither emerging country ownership nor restrictions on non-core bank activity are associated with loan growth pre-crisis. During the crisis, however, banks from home countries with more regulation of non-core activities are correlated with relatively higher growth. The same is true for banks with owners from emerging countries. These results suggest both regulation of non-core activities and emerging bank ownership at the home country level can both explain the differences in loan growth during the crisis.

In column (3), we consider if the stringency of capital requirements at home are associated with loan growth in the host countries, controlling for emerging country ownership. Again the results show that regulation in the home country is not just picking up differences between advanced and emerging countries. More stringent regulation in the home country is associated with less loan growth in the host pre-crisis, controlling for an emerging home country. In the 2008-2009 period, we see that foreign owned banks with stricter initial capital regulation are associated with higher credit growth.

In the final column, we investigate if the supervisory power of the home country is associated with loan growth in the host country when we control for emerging home countries. In this instance, we see that the supervisory environment is not significantly associated with credit

growth in the host before or during the crisis. The fact that a bank has an emerging country owner explains the variation rather than the power of regulators in the home country.

In summary, we have shown that the identity of the home country of a foreign-owned bank is important. We find evidence that there is pass-through of behaviour by foreign banks from home to host markets. This pass through of higher regulation is not explained by advanced or emerging country differences in the case of capital regulation.

Ongena et al. (2013) found higher regulation at home led to riskier lending behaviour overseas. Their sample was based on Eastern European banks with Western European owners. In a global sample, we show that tighter capital regulation at home appears to follow through to the host country. Subsidiaries from tightly regulated home markets were associated with relatively less loan growth in the pre-crisis period, and relatively more growth during the crisis.

The contrast in the results of the two papers warrants further examination. In order to do this we create a sub sample of the Ongena et al. (2013) host and source countries. We run our model on their sample to better understand the result. First we look and see is it the banks from Western Europe that are driving the result, then if the result is coming from the sample of host countries. Finally we run the model on the same sample as Ongena et al. (2013).

To be consistent with their analysis we use two forms of regulation, restrictions on non-core banking activities and capital stringency. Primarily we analyse the restrictions of non-core banking activity. In column (1) of Table 3.10 the results for the sample of Western European source countries are presented. We find that they increased lending significantly more if they had tighter restrictions on bank behaviour during the boom period, to all hosts. This finding is consistent with the Ongena et al. (2013), and in contrast to our findings. This suggests foreign banks from this Western European sample behave differently to the global sample. When we run the model on foreign banks in the Eastern European host sample, we find smaller, insignificant coefficients however their signs are consistent with the Ongena et al. (2013). Finally when we

run the same sample as used by Ongena et al. (2013) at both host and source level we find insignificant results.

We interpret these results that this Western European sample of foreign owned banks appear to play when the cats away during the boom period. However that the finding doesn't hold in the precise Ongena et al. (2013) sample implies that loan growth and the types of loans offered or risk profiles have different relationships with home country regulation. Our paper is concerned with loan growth and it finds that banks from countries with tighter capital regulation increase the volume of loans less than those facing looser capital regulation at home. The Ongena et al. (2013) on a restricted European sample finds that banks take risk when they can if they are tightly regulated at home. The comparison of the results suggests that they do this really along the quality of loans by issuing riskier types; rather than the quantity.

3.5.4 Robustness

Importantly, our findings hold when conditioning on a number of robustness checks. As outlined in Table 3.7, our results are robust to using the asset growth of foreign owned banks and are not only relevant for loan growth. We use narrow and broad measures of advanced country samples and the results are not sensitive to different definitions. In the analysis we use a narrow advanced country sample.

We winsorize the dependent variables, and all continuous variables at the 1st and 99th percentile to account for outliers. Further the findings hold if we exclude the top 1% and 5% of loan growth observations; so that our findings are not driven by outliers. We also run the specifications on the sample of banks that are in every year of the sample, obtaining similar results.

For robustness, we look into subsets of the data. Analysing the set of foreign-owned banks with only advanced country owners provides consistent results. We find that foreign-owned banks with tighter capital regulation are associated with less credit growth pre-crisis, and more growth in 2008-2009. This adds further weight to the regulation pass through hypothesis.

The role of foreign-owned banks and crisis transmission is widely debated. In the context of this paper, we run additional specifications and control for banking crises in the home country.⁶ The findings of regulation pass through holds in these settings.

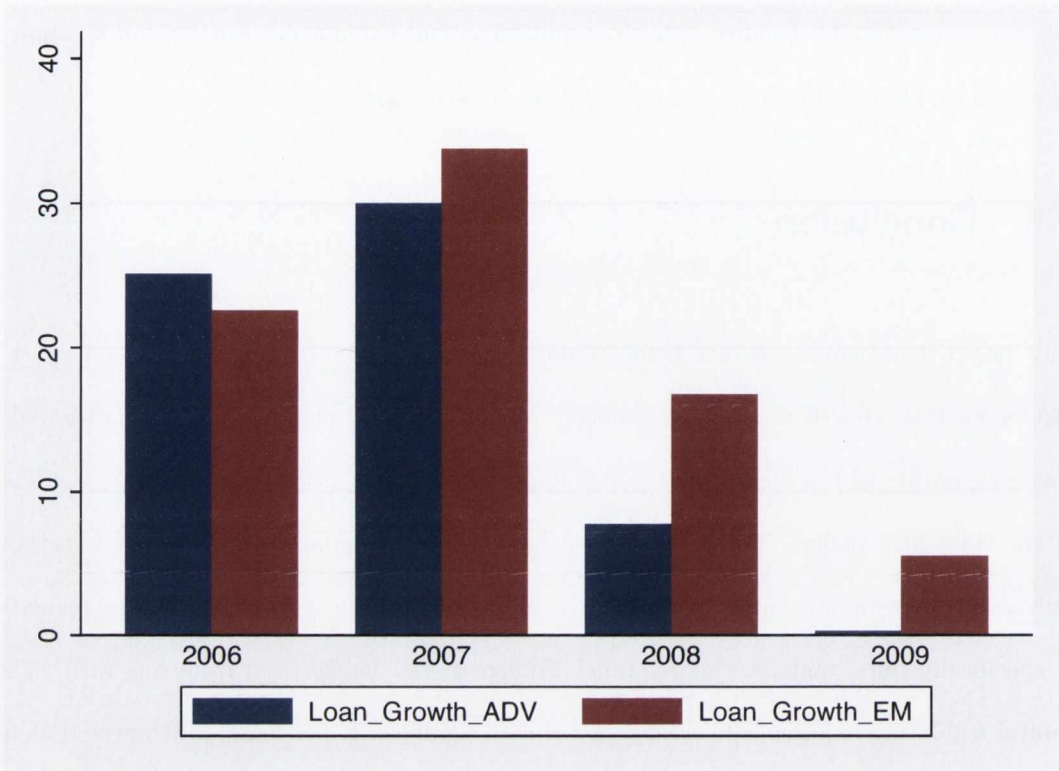
3.6 Conclusion

This paper investigates whether home country characteristics of foreign banks can assist in explaining loan growth in the host country. We provide new evidence that the advanced or emerging nature of the home country was important for loan growth of foreign-owned banks in the 2006-2009 period. Furthermore, we show that the regulatory framework of the home (advanced or emerging) country is related to loan growth in the host economy. Capital regulation is specifically important for this relation. Foreign-owned banks from countries with tighter capital regulatory requirements are associated with significantly less loan growth pre-crisis, and provided a buffer during the crisis. These findings are important for banking sector stability. In the changing landscape of foreign ownership of banks, these results highlight the importance of considering the type of foreign bank for credit dynamics of an economy.

In the context of previous literature, the paper compares and complements Ongena et al. (2013). We find that banks facing tighter capital regulation at home do not increase the volume of loans through loan growth, while Ongena et al. (2013) report that tighter regulation is associated with the issuing of riskier profile of loans. Thus it appears to be a quantity and quality relationship between regulation at home and foreign bank behaviour.

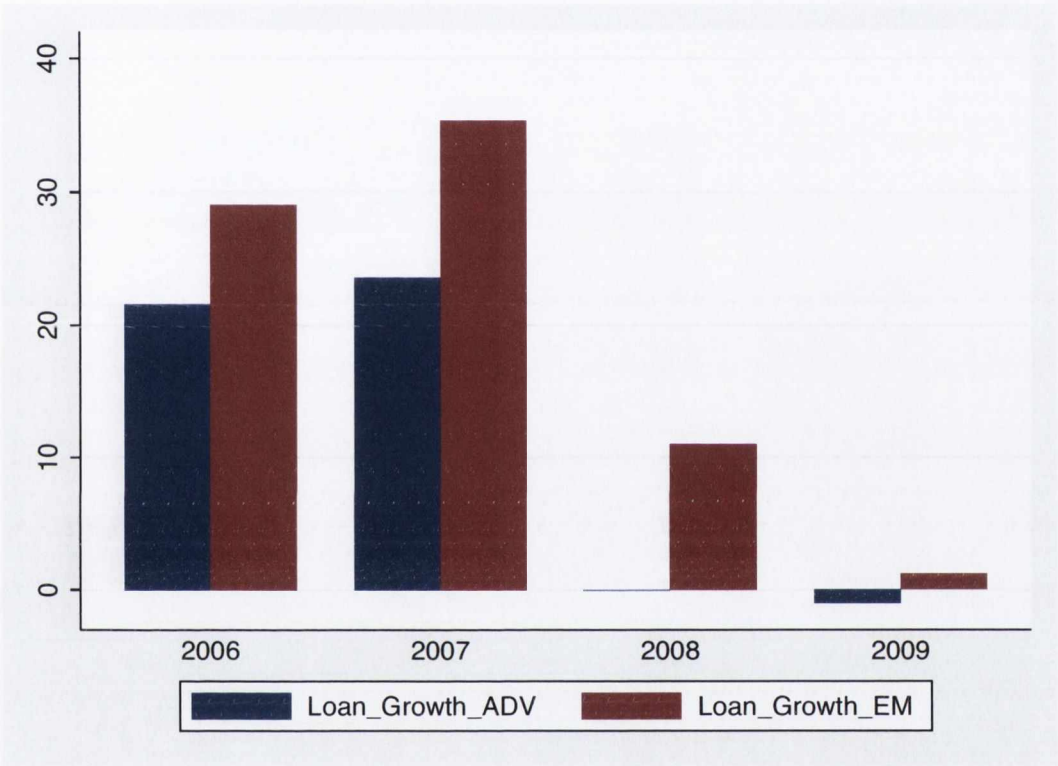
⁶We follow Valencia and Laeven (2012) to define banking crises.

Figure 3.1: All Foreign-Owned Banks



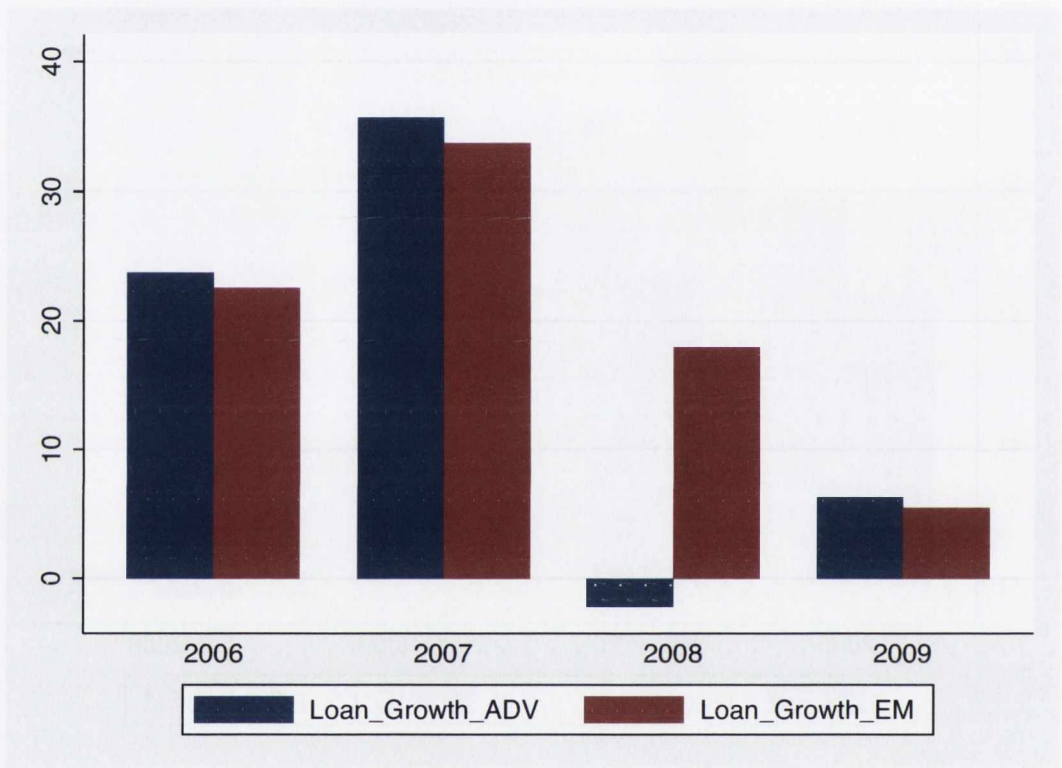
Note: The graph depicts differences in loan growth by foreign banks between emerging and advanced home countries. The data are annual growth in loans sourced from Bankscope. The home country ownership data are taken from Claessens and Van Horen (2014a)

Figure 3.2: Foreign-Owned Banks in Advanced Host Countries



Note: The graph depicts differences in loan growth by advanced country owned foreign banks between emerging and advanced host countries. The data are annual growth in loans sourced from Bankscope. The home country ownership data are taken from Claessens and Van Horen (2014a)

Figure 3.3: Foreign-Owned Banks in Emerging Host Countries



Note: The graph depicts differences in loan growth by emerging owned foreign banks between emerging and advanced host countries. The data are annual growth in loans sourced from Bankscope. The home country ownership data are taken from Claessens and Van Horen (2014a)

Table 3.1: Bank Level Summary Statistics

MEDIAN VALUES		EMERGING	ADVANCED
LOAN GROWTH	2006	22.58	25.12
	2007	33.77	29.97
	2008	16.76	7.75
	2009	5.54	0.30
TOTAL ASSETS (\$ MILLIONS)	2006	244.66	1239.94
	2007	337.39	1788.34
	2008	375.86	1906.58
	2009	430.14	1814.28
PROFITABILITY (RETURN ON ASSETS)	2006	1.43	1.10
	2007	1.41	1.06
	2008	1.19	0.82
	2009	0.97	0.57
CAPITALIZATION (RATIO EQUITY:LOANS)	2006	11.49	9.45
	2007	11.74	9.41
	2008	12.04	9.58
	2009	12.37	10.65
LIQUIDITY (LIQUID ASSETS/ TOTAL ASSETS)	2006	41.23	39.34
	2007	39.55	39.24
	2008	34.39	33.51
	2009	34.68	32.45
FUNDING STABILITY (RETAIL DEPOSITS/ TOTAL LIABILITIES)	2006	0.69	0.58
	2007	0.69	0.55
	2008	0.67	0.51
	2009	0.70	0.57

Note: Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a).

Table 3.2: Regulation Summary Statistics

	Non-Core Bank Activity			Supervisory Power			Initial Capital Stringency		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Emerging	3	12	8.5	5	16	11.4	0	3	2.3
Advanced	3	9	6.6	6	14.5	10.1	0	3	1.7

Note: Data are calculated using Barth et al. (2008).

Table 3.3: Regional Summary Statistics for Loan Growth

Region		n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EAP		21	22	27	-66	11	22	46	56
ECA		29	64	46	-7	26	58	107	152
LAC	PRE-CRISIS	69	19	45	-218	10	18	31	219
MENA	Source	23	33	56	-134	15	34	62	156
OECD	Loan Growth	611	35	60	-207	12	28	51	575
OHI		22	28	26	-43	22	30	42	69
SA		16	36	29	-6	19	27	53	92
SSA		79	32	32	-51	12	28	49	199
EAP		25	11	29	-47	-7	11	24	99
ECA	CRISIS	37	22	55	-48	-11	2	37	243
LAC	Source	70	5	58	-282	-7	4	24	128
MENA	Loan Growth	31	20	23	-25	8	16	30	85
OECD		721	5	58	-387	-12	4	22	483
OHI		30	9	18	-22	-1	3	15	60
SA		19	18	18	-18	5	19	28	54
SSA		100	23	33	-72	5	26	37	160
EAP		36	29	32	-43	12	25	45	140
ECA		222	46	48	-199	24	42	65	364
LAC	Pre-Crisis	161	31	69	-218	10	22	36	575
MENA	Host	24	41	29	-26	22	39	56	110
OECD	Loan Growth	225	23	59	-207	3	21	39	326
OHI		27	49	43	-7	20	36	61	189
SA		11	94	142	3	24	34	57	388
SSA		164	29	33	-134	13	24	45	199
EAP		59	5	44	-232	-12	7	24	110
ECA	Crisis	279	11	50	-387	-6	9	29	243
LAC	Source	191	13	67	-282	-7	5	31	483
MENA	Loan Growth	28	16	19	-21	3	15	26	62
OECD		246	-9	63	-319	-26	-1	13	239
OHI		29	12	39	-47	-2	6	16	181
SA		14	-1	17	-31	-15	-3	13	30
SSA		187	19	33	-62	2	16	31	235

Note: Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a). The regions are defined as EAC; Europe and Central Asia, EAP; East Asia Pacific, LAC; Latin America and Caribbean, MENA; Middle East and Northern Africa, OECD, OHI; Other High income countries, SA; South Asia, SSA; Sub Saharan Africa.

Table 3.4: Regional Summary Statistics Bank Controls for Pre-Crisis Source Countries

REGION	VARIABLE	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EAC	Capitalization	29	0.05	0.04	0.01	0.02	0.04	0.06	0.18
EAP		21	0.14	0.17	0.01	0.04	0.08	0.13	0.69
LAC		69	0.21	0.41	0.01	0.02	0.03	0.08	1.58
MENA		23	0.42	1.06	0.02	0.04	0.08	0.19	4.77
OECD		611	0.58	3.24	0	0.03	0.07	0.18	46.34
OHI		22	0.07	0.05	0.01	0.04	0.06	0.09	0.24
SA		16	0.13	0.1	0.01	0.05	0.09	0.21	0.32
SSA		79	0.09	0.08	0.01	0.03	0.06	0.13	0.4
EAC	Deposit Funding	29	0.38	0.27	0.01	0.16	0.32	0.61	0.89
EAP		21	0.55	0.28	0.07	0.39	0.61	0.8	0.91
LAC		69	0.63	0.3	0.02	0.51	0.73	0.81	1.58
MENA		23	0.47	0.21	0.03	0.34	0.47	0.6	0.86
OECD		611	0.5	0.28	0	0.26	0.56	0.75	0.96
OHI		22	0.61	0.18	0.17	0.53	0.68	0.73	0.85
SA		16	0.75	0.12	0.46	0.71	0.76	0.86	0.91
SSA		79	0.72	0.14	0.2	0.66	0.75	0.81	0.94
EAC	Liquidity	29	0.24	0.12	0.05	0.18	0.24	0.29	0.58
EAP		21	0.39	0.21	0.09	0.22	0.4	0.49	0.76
LAC		69	0.27	0.23	0.05	0.13	0.19	0.3	0.92
MENA		23	0.38	0.21	0.15	0.23	0.32	0.47	0.97
OECD		611	0.36	0.25	0	0.16	0.31	0.5	0.97
OHI		22	0.36	0.13	0.04	0.27	0.35	0.47	0.57
SA		16	0.37	0.23	0.05	0.2	0.31	0.58	0.75
SSA		79	0.36	0.18	0.07	0.22	0.32	0.49	0.72
EAC	Profitability	29	1.12	1.77	-2.7	0.04	1.08	2.29	4.2
EAP		21	2	1.82	-1.67	1.24	1.58	3.29	5.41
LAC		69	0.48	6.92	-45.15	0.71	1.77	2.26	6.41
MENA		23	1.84	3.67	-9.18	0.48	2.25	3.73	11.68
OECD		611	1.18	3.03	-32.41	0.35	1.01	2.19	21.84
OHI		22	0.85	2.29	-6.29	0.43	1.25	2.13	3.7
SA		16	1.8	0.78	0.56	1.14	1.84	2.53	3.1
SSA		79	1.48	2.65	-14.5	0.96	1.84	3.23	5.04
EAC	Size	29	5.63	1.33	3.61	4.43	5.72	6.92	7.95
EAP		21	5.25	0.62	3.93	4.84	5.39	5.71	6.05
LAC		69	5.39	1.42	2.69	4.39	5.6	6.52	8.35
MENA		23	5.98	1.64	2.73	5.09	5.51	6.87	9.01
OECD		611	7.18	1.89	2.85	5.83	6.96	8.42	13.41
OHI		22	6.21	1.33	3.27	5.58	6.06	7.53	8.66
SA		16	5.53	1.43	3.85	4.83	5.25	5.54	9.09
SSA		79	5.27	1.22	2.91	4.32	5.33	6.09	8.18

Note: The regions are defined as EAC; Europe and Central Asia, EAP; East Asia Pacific, LAC; Latin America and Caribbean, MENA; Middle East and Northern Africa, OECD, OHI; Other High income countries, SA; South Asia, SSA; Sub Saharan Africa.

Table 3.5: Regional Summary Statistics: Bank Controls for Crisis Period Source Countries

REGION	VARIABLE	n	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EAC	Capitalization	37	0.04	0.03	0.01	0.02	0.03	0.06	0.13
EAP		25	0.1	0.1	0.02	0.03	0.06	0.1	0.47
LAC		70	0.24	0.45	0.01	0.02	0.04	0.21	2.03
MENA		31	0.08	0.08	0.02	0.03	0.05	0.09	0.36
OECD		721	0.35	1.23	0	0.02	0.05	0.17	22.75
OHI		30	0.05	0.05	0	0.03	0.04	0.07	0.24
SA		19	0.07	0.07	0.01	0.03	0.03	0.13	0.24
SSA		100	0.08	0.09	0.01	0.03	0.05	0.09	0.8
EAC	Deposit Funding	37	0.45	0.23	0.03	0.24	0.42	0.63	0.86
EAP		25	0.52	0.27	0.03	0.3	0.63	0.68	0.9
LAC		70	0.58	0.29	0	0.35	0.71	0.8	0.93
MENA		31	0.52	0.21	0.04	0.35	0.55	0.66	0.89
OECD		718	0.5	0.27	0	0.27	0.54	0.73	0.94
OHI		30	0.6	0.19	0.16	0.44	0.62	0.78	0.9
SA		19	0.8	0.12	0.61	0.74	0.78	0.87	1.16
SSA		100	0.72	0.14	0.04	0.65	0.74	0.81	0.93
EAC	Liquidity	37	0.24	0.12	0.06	0.13	0.23	0.36	0.48
EAP		25	0.35	0.17	0.1	0.22	0.34	0.41	0.71
LAC		70	0.32	0.22	0.03	0.16	0.25	0.42	0.93
MENA		31	0.31	0.15	0.13	0.23	0.27	0.36	0.75
OECD		721	0.33	0.24	0	0.14	0.26	0.47	1.33
OHI		30	0.28	0.17	0.04	0.17	0.24	0.37	0.86
SA		19	0.28	0.2	0.09	0.14	0.21	0.5	0.7
SSA		100	0.31	0.15	0.06	0.2	0.26	0.39	0.8
EAC	Profitability	37	-0.48	3.03	-7.77	-2.27	0.29	1.32	3.89
EAP		25	1.72	1.4	-1.18	0.75	1.43	2.55	4.19
LAC		70	1.5	2.53	-6.52	0.5	1.54	2.46	6.59
MENA		31	2.41	3.14	-4	0.7	1.83	3.97	10.34
OECD		720	0.46	4.58	-82.26	0.01	0.66	1.71	14.57
OHI		30	-0.07	2.7	-10.76	0.07	0.5	1.05	2.89
SA		19	3.2	4.36	0.08	1.52	2.29	2.81	20.21
SSA		100	1.28	2.96	-12.95	0.64	1.61	2.47	8.16
EAC	Size	37	5.98	1.6	2.41	4.74	5.7	7.3	8.8
EAP		25	5.86	0.93	4.15	5.19	5.82	6.08	7.5
LAC		70	5.44	1.74	0.77	4.02	5.7	6.99	8.49
MENA		31	6.08	1.47	3.2	5.3	6.07	7.21	9
OECD		721	7.32	1.89	1.88	5.95	7.18	8.57	13.53
OHI		30	6.75	1.28	4.18	6.13	6.78	7.78	8.6
SA		19	5.53	1.44	3.96	4.7	5.11	5.94	8.91
SSA		100	5.54	1.08	3.67	4.64	5.43	6.4	8.07

Note: The regions are defined as EAC; Europe and Central Asia, EAP; East Asia Pacific, LAC; Latin America and Caribbean, MENA; Middle East and Northern Africa, OECD, OHI; Other High income countries, SA; South Asia, SSA; Sub Saharan Africa.

Table 3.6: Regional Summary Statistics for Regulation Variables

Region	Variable	N.	Mean	S.D.	Min	0.25	Mdn	0.75	Max
EAP	Initial Capital Stringency	21	2.1	0.3	2	2	2	2	3
ECA		29	2.17	0.38	2	2	2	2	3
LAC		69	2.38	0.55	1	2	2	3	3
MENA		23	2.7	0.47	2	2	3	3	3
OECD		611	1.91	0.68	0	1	2	2	3
OHI		22	2.36	0.95	1	1	3	3	3
SA		16	3	0	3	3	3	3	3
SSA		79	2.46	0.5	2	2	2	3	3
EAP	Non-Core Banking Activity	21	7.62	0.92	7	7	7	8	10
ECA		29	6.93	1.41	6	6	6	9	9
LAC		69	8.81	1.18	7	8	9	10	11
MENA		23	8.43	0.51	8	8	8	9	9
OECD		611	6.27	1.74	3	5	6	8	9
OHI		22	7.68	0.48	7	7	8	8	8
SA		16	8.13	0.5	8	8	8	8	10
SSA		79	8.41	0.98	8	8	8	8	11
EAP	Supervisory Power of Regulators	21	12.4	2.26	10	11	11	15.5	15.5
ECA		29	8.95	2.01	8	8	8	9	14.5
LAC		69	12.63	1.42	10	12	12	14	14.5
MENA		23	12.02	1.12	10	12	12.5	12.5	13
OECD		611	10.13	2.81	6	8	8.5	14	14.5
OHI		22	13.11	1.39	10	13.5	13.5	14	14
SA		16	10.25	1	10	10	10	10	14
SSA		79	11.04	1.85	5	10	12	12	14

Note: Data are calculated using Barth et al. (2008).

Table 3.7: Loan and Asset Growth

	(1) Loan Growth	(2) Asset Growth
Emerging Owner	-6.66** (3.01)	-10.43*** (2.57)
Crisis	-27.93*** (2.68)	-27.03*** (2.19)
Size	-3.97*** (0.84)	-5.60*** (0.69)
Capitalization	8.82*** (2.86)	-2.80** (1.15)
Profitability	-2.17*** (0.58)	-0.52 (0.50)
Deposit Funding	-0.12 (4.74)	3.84 (3.70)
Liquidity	0.99 (6.70)	-11.06** (4.37)
Emerging * Crisis	12.56*** (3.51)	16.92*** (2.84)
Host Country F.E.	Yes	Yes
Year F.E.	Yes	Yes
Observations	2,288	2,294
R-squared	0.22	0.25

Note: The models are estimated using ordinary least squares. The crisis variable is a dummy for the years 2008-2009. The dependant variable and all continuous variables are winsorized at the 1st and 99th percentile. Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a). Bank regulation data are sourced from Barth et al. (2013). Robust standard errors are in parentheses. *** Significant at 1%, ** Significant at 5%, *Significant at 10%.

Table 3.8: Loan Growth and Home Country Regulation

	Overall Reg (PCA)	Non-Core Banking Activity	Initial Capital Stringency	Supervisory Power
Regulation	-4.15** (1.80)	-0.95 (0.83)	-5.59*** (1.94)	-1.14* (0.62)
Crisis	-24.76*** (2.48)	-44.06*** (7.17)	-43.43*** (5.40)	-39.99*** (8.59)
Size	-4.88*** (0.94)	-3.62*** (0.83)	-4.11*** (0.84)	-4.98*** (0.91)
Capitalization	10.28*** (2.79)	9.22*** (2.76)	9.37*** (2.72)	10.66*** (2.73)
Profitability	-2.07*** (0.63)	-2.28*** (0.59)	-2.14*** (0.58)	-2.06*** (0.62)
Deposit Funding	4.93 (5.34)	0.55 (4.79)	-0.26 (4.80)	4.63 (5.34)
Liquidity	-7.40 (6.97)	-3.86 (6.56)	-1.38 (6.66)	-5.41 (6.99)
Regulation * Crisis	7.13*** (2.03)	2.80*** (0.97)	9.61*** (2.35)	1.56** (0.77)
Host Country F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Observations	1,903	2,187	2,211	1,943
R-squared	0.24	0.22	0.22	0.24

Note: The dependant variable is annual loan growth. The models are estimated using ordinary least squares. The crisis variable is a dummy for the years 2008-2009. The dependant variable and all continuous variables are winsorized at the 1st and 99th percentile. Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a). Bank regulation data are sourced from Barth et al. (2013). Robust standard errors are in parentheses. *** Significant at 1%, ** Significant at 5%, *Significant at 10%.

Table 3.9: Loan Growth, Home Country Regulation Controlling for Emerging Ownership

	Overall Reg (PCA)	Non-Core Banking Activity	Initial Capital Stringency	Supervisory Power
Regulation	-3.37* (2.03)	-0.32 (0.91)	-4.50** (1.96)	-0.83 (0.64)
Emerging Owner	-3.26 (3.84)	-5.65 (3.48)	-4.87 (3.24)	-6.87** (3.48)
Crisis	-26.63*** (2.92)	-40.21*** (7.47)	-42.44*** (5.37)	-37.48*** (8.68)
Size	-4.88*** (0.96)	-3.68*** (0.85)	-4.08*** (0.87)	-4.96*** (0.94)
Capitalization	10.26*** (2.79)	9.16*** (2.77)	9.28*** (2.71)	10.56*** (2.72)
Profitability	-2.07*** (0.63)	-2.29*** (0.59)	-2.15*** (0.58)	-2.07*** (0.62)
Deposit Funding	4.88 (5.33)	0.49 (4.78)	-0.30 (4.80)	4.62 (5.32)
Liquidity	-7.23 (6.98)	-3.61 (6.56)	-1.13 (6.65)	-5.19 (6.97)
Regulation * Crisis	5.71** (2.41)	1.89* (1.10)	7.61*** (2.44)	0.94 (0.81)
Emerging * Crisis	6.21 (4.75)	7.99* (4.15)	9.85** (3.86)	12.79*** (4.18)
Host Country F.E.	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes
Observations	1,903	2,187	2,211	1,943
R-squared	0.24	0.22	0.22	0.24

Note: The dependant variable is annual loan growth. The models are estimated using ordinary least squares. The crisis variable is a dummy for the years 2008-2009. The dependant variable and all continuous variables are winsorized at the 1st and 99th percentile. Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a). Bank regulation data are sourced from Barth et al. (2013). Robust standard errors are in parentheses. *** Significant at 1%, ** Significant at 5%, *Significant at 10%.

Table 3.10: Sensitivity Testing with Ongena et al Samples. Non-core Banking Activity Regulation

	(1) Western European Ongena et al Sample Source	(2) Eastern European Ongena et al Sample Host	(3) Ongena et al. Sample Source and Host
Non-Core Banking Res	6.85** (2.94)	-1.37 (1.58)	-2.79 (4.93)
Crisis	-35.60 (22.39)	-69.85*** (18.40)	-88.44** (34.79)
Size	-2.95 (1.90)	-0.53 (1.63)	-2.36 (3.13)
Capitalization	3.15* (1.81)	39.62*** (11.15)	42.02*** (11.08)
Profitability	-6.10*** (1.16)	-4.43*** (0.76)	-5.16*** (1.07)
Deposit Funding	3.30 (10.07)	3.81 (7.29)	2.72 (9.57)
Liquidity	10.55 (13.63)	-68.00*** (20.17)	-81.08*** (27.04)
Non-Core Res*Crisis	-0.72 (3.59)	3.03 (2.12)	6.81 (5.32)
Host Country F.E.	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Observations	743	370	229
R-squared	0.28	0.49	0.50

Note: The dependant variable is annual loan growth. The models are estimated using ordinary least squares. The crisis variable is a dummy for the years 2008-2009. The dependant variable and all continuous variables are winsorized at the 1st and 99th percentile. Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a). Bank regulation data are sourced from Barth et al. (2013). Robust standard errors are in parentheses. *** Significant at 1%, ** Significant at 5%, *Significant at 10%.

Table 3.11: Sensitivity Testing with Ongena et al Samples- Initial Capital Stringency Regulation.

	(1) Western European Ongena et al Sample Source	(2) Eastern European Ongena et al Sample Host	(3) Ongena et al. Sample Source and Host
Initial Capital Stringency	-2.27 (3.38)	-5.61 (3.62)	-7.00 (5.65)
Crisis	-56.01*** (9.51)	-59.40*** (9.05)	-62.29*** (10.18)
Size	-3.54* (1.91)	-1.05 (1.59)	-2.52 (3.15)
Capitalization	3.02* (1.78)	39.47*** (11.46)	42.03*** (11.44)
Profitability	-5.85*** (1.16)	-4.39*** (0.76)	-5.07*** (1.07)
Deposit Funding	6.84 (10.02)	4.66 (7.28)	1.40 (9.28)
Liquidity	7.81 (13.74)	-66.65*** (20.27)	-79.57*** (27.51)
Init Cap Strin* Crisis	8.48** (4.03)	5.85 (4.07)	7.83 (6.60)
Host Country F.E.	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes
Observations	743	371	229
R-squared	0.28	0.49	0.51

Note: The dependant variable is annual loan growth. The models are estimated using ordinary least squares. The crisis variable is a dummy for the years 2008-2009. The dependant variable and all continuous variables are winsorized at the 1st and 99th percentile. Bank level data are sourced from Bankscope, home country ownership data are taken from Claessens and Van Horen (2014a). Bank regulation data are sourced from Barth et al. (2013). Robust standard errors are in parentheses. *** Significant at 1%, ** Significant at 5%, *Significant at 10%

Chapter 4

Informational Frictions and Portfolio Assets: Differences Across Investors and Through Time?

4.1 Introduction

Informational or financial frictions can be thought of as barriers or biases between countries that affect their bilateral asset holdings. This paper is motivated by the idea that financial frictions likely differ for portfolio assets across holding sectors, asset type and through time. We consider whether these frictions matter more for sectors that are less sophisticated or non-institutional investors than institutional investors. Using new data published by the Coordinated Portfolio Investment Survey (CPIS), we investigate whether different asset holding sectors such as households or non-financial corporates are more sensitive to bilateral factors than perhaps banks or other financial corporates.

The last fifteen years have exhibited unprecedented levels of financial globalisation. Cross border capital flows can be measured by the International Financial Integration (IFI) ratio of a country; the sum of an economies foreign assets and liabilities scaled by GDP. Lane and Milesi-Ferretti (2001) proposed this de facto measure and in more recent work Lane (2013) note that in 2007,

the IFI of advanced economies was 438%. The Global Financial Crisis highlighted what can happen when these cross border flows stop, reverse and retrench. Economies suffered current account reversals, currency depreciations and in cases, recessions. Increased understanding of the stability of these cross border capital flows can aid policy-makers in times of global market stress. The Global Financial Crisis highlighted that in particular, sectoral exposures and shocks can have widespread effects. A call for sectoral data followed in the literature Milesi-Ferretti et al. (2010) and Lane (2015). The IMF has recently developed a more detailed version of the Co-ordinated Portfolio Investment Survey encouraging countries to report the sector holding the portfolio asset. In Figures 4.1 and 4.2, we plot the sectoral composition of portfolio debt and equity assets for 2001-2013. We note the reduced magnitude of the bank sector post crisis in portfolio debt, which is in line with Milesi-Ferretti and Tille (2011). The differences of sector participation across asset classes is notable. Banks play a much smaller role in holdings of portfolio equity, where OFCs and households are important. In this paper, we analyse the role of bilateral ties across sectors of the holding country. This level of detail greatly facilitates analysis to understand more about the patterns of globalization and cross-border capital movements.

There is a detailed literature relating bilateral links and cross border financial trade. The main concept is that increased geographical, institutional or cultural distance is associated with informational frictions. Higher financial frictions reduces cross border asset trade Okawa and Van Wincoop (2012). We propose that informational frictions are likely to affect the portfolio choices of sectors differently. Public investors may differ to the private sector, or sensitivity to frictions may vary in the level of sophistication of investors. In this vein consider differences in the information sets available to households than OFCs. The institutional investors of OFCs are likely to be better informed on cross border asset markets and as such may rely less on bilateral frictions or biases than households. If households have access to a smaller information set for cross border investment may rely more on bilateral frictions or biases.

In this paper we address two main questions. Firstly; Do bilateral links vary across sectors for portfolio allocation of debt and equity? To consider this question we look at an aggregate

split of the data between sophisticated and unsophisticated investors. We classify the former group as banks and other financial corporations (OFCs), for the unsophisticated we group households, non-financial corporations and general government together. To provide a more granular approach we also look at each sector independently and investigate whether there are differences within these groups. Secondly, we ask did investors change their portfolio holdings along gravity lines in three different times of global market pressure. We analyse the 2005-2007 boom period, the Global Financial Crisis (GFC) 2007-2009 the recovery or euro area crisis (EAC) 2010-2012. We propose that sectors are likely to react differently in periods of market stress. In times of crises information can be more opaque resulting in increasing reliance on bilateral links. It is plausible that informational frictions affect some sectors more than others during global or regional crises.

To answer these questions we consider three pooled cross-sections of data, a pooled 2005-2007 boom sample, a crisis 2007-2009 sample and a EAC 2010-2012 pooled sample. We use fixed effects for both the source and host countries. Placing fixed effects on the holding country means that we are controlling for uniform cross-border increases or decreases in cross-border positions. Applying issuer fixed effects accounts for factors that are common to investors that attract them to a specific country: macroeconomic conditions; exchange rate effects; and valuation effects. For example, consider Portugal and Brazil as a portfolio holder and issuing pair. If Portuguese investors increase their cross-border portfolio globally this is covered in the holding fixed effect, and if Brazil is attracting cross border investment due to a favourable macroeconomic environment this is absorbed in the issuing fixed effect. The Portuguese involvement in the euro area crisis highlights the need to consider different time periods with splits of the data. Portuguese investors likely changed their behaviour during the 2005-2012 period. Importantly, with the CPIS sectoral data, we can see which sectors of Portuguese investors are more susceptible to bilateral frictions or biases, i.e. did banks reduce their holdings in Brazil more than households and NFCs?

Following the literature on aggregate portfolio allocation, we use the geographic distance from

issuing to holding country, common legal system, trade ties and colonial links as explanatory bilateral factors. We also consider the role of joint membership of NAFTA, ASEAN, the EEA and the euro area. The gravity type variables approximate informational frictions. When considering cross-border portfolio trade, we can think of these variables as proxies for financial frictions.

Our results show that bilateral factors differ in their importance across asset holding sectors. The role of financial frictions does not decrease in the sophistication of the investor either. We report that banks are significantly more sensitive to the friction of distance than OFCs and households for portfolio debt. The public sector is significantly less sensitive to distance, with central banks displaying a positive relationship with holdings in distant debt issuers during the crisis. Equity investors behave differently than debt holders; banks no longer differ to OFCs in their responsiveness to distance, while non financial corporates invest significantly less in distant equity issuers. The absence of currency risk in the form of euro area membership also highlights differences across portfolio holders. Households buying debt are significantly less affected by the common currency than other investors during the bust and recovery periods. While for equity, euro area membership is least important for OFCs. During periods of market stress, common language links emerged as a stronger link. Banks held significantly less debt from distant issuers during the 2008-2009 crisis. For the euro area crisis, households and OFCs also held significantly less debt from faraway issuers. The common currency did not lead to significant intra euro area investment during the Global Financial Crisis. However during the euro area crisis, the role of the common currency varied across equity investors. Banks and households reduced their holdings in fellow euro area countries.

The paper proceeds as follows, Section 4.2 details the conceptual framework and reviews the relevant literature. The empirical method is presented in Section 4.3, while Section 4.4 describes the data. Section 4.5 provides results and discussion, conclusions are offered in Section 4.6.

4.2 Conceptual Framework

There is a detailed literature relating bilateral factors and cross-border financial trade. Much less explored is the extent that these ties vary across sectors. In this paper, we use the recently released CPIS data which provides data on the assets held across different sectors of the economy. We analyse the differences across institutional and non-institutional investors and then consider the sub components of these groups; six sectors: banks; other financial corporates; households; non financial corporates; general government and central banks.

This paper contributes to the literature in three main areas. Primarily, it provides an insight into the heterogeneous role bilateral factors play across asset holders. These findings can assist in building a greater understanding of the global financial system. Second, we present results that differ for portfolio debt than equity. Third, we explore whether these factors differed in their importance for the Global Financial Crisis and the euro area crisis. This increases our understanding of the flighty or sticky nature across sectors during periods of market pressure.

4.2.1 Theoretical Motivation

Gravity models are used extensively in the trade literature to explain international trade patterns. Portes and Rey (2005) presented the foundation of applying gravity models to determine international asset portfolio flows. Distance and informational asymmetries account for the gravity findings in their paper, while in trade the main explanations are differing transport and informational costs. Portes and Rey (2005) focus on drivers of bilateral flows while more recent work is aimed at understanding the patterns observed in bilateral portfolio holdings.

Okawa and Van Wincoop (2012) note the increase in papers applying gravity type models to portfolio allocation and emphasise the importance of using fixed effects in empirical work. They highlight the need for theoretical foundations to the empirical literature and provide an initial framework to consider gravity models and asset trade. The gravity model Okawa

and Van Wincoop (2012) present is driven by informational or bilateral frictions between two countries. They note that these frictions could be observed such as distance, common language or legal system. A key concept in this area is the interpretation of geographical distance for “weightless” financial trade.

Coeurdacier (2009) provides guidance on the link between trade in assets and goods. The author proposes a theoretical argument for the positive covariation of trade and equity holdings between country pairs. We find consistent results in our specifications.

Although these models relate to aggregate portfolio holdings, it is likely that these effects vary across sectors. An increased level of sophistication of investors could lead to less reliance on informational frictions for portfolio allocation. Thus households and non-financial corporates may hold larger portions of their portfolios in countries they feel closer to: such as countries with a shared language or common legal system. In this vein, central banks or general government may hold different portfolios than private sector investors.

4.2.2 Bilateral Empirical Literature

The availability of aggregate-level CPIS data resulted in a substantial literature detailing bilateral investment patterns. A partial list includes Lane (2006), Lane and Milesi-Ferretti (2008), and Aviat and Coeurdacier (2007). Coeurdacier and Rey (2013) provide a survey of the main findings to date. These papers find that portfolio holdings increase in trade, common language, colonial history, legal system and regional-bloc membership. Investors hold smaller positions in countries that are geographically distant.

Galstyan and Lane (2013) motivate our consideration of informational frictions across sectors during crises. They analysed portfolio adjustment of both debt and equity during the Global Financial Crisis. Galstyan and Lane (2013) provide evidence that informational frictions are important considerations for investors during crises. In a similar vein, Mehigan (2015) show

that bilateral ties are relevant for bank asset adjustment, and that these vary in times of boom and bust.

The different role of financial frictions for debt than equity investors emerges in Galstyan and Lane (2013). They show that equity investors are more susceptible to gravity factors than holders of debt. Our findings are consistent with this result.

We employ a similar empirical approach as in Buch et al. (2013). The authors use a bank-level panel of German banks. Buch et al. (2013) make two points of particular note to our paper: (1) the crisis led to an increased role of informational frictions for banks; and (2) the importance of using fixed effects and that these should vary with time. We heed both points. The use of pooled cross sections for the three periods; boom, GFC and the recovery enables us account for the changing global risk environment.

4.2.3 Sectoral Empirical Literature

To the best of our knowledge there is but one paper that analyses cross sectoral portfolio asset holdings and bilateral links. Roque and Cortez (2014) use a preliminary release of the CPIS equity data for the 2001-2009 period (our coverage is for 2001-2013). Similar to our analysis, Roque and Cortez (2014) propose differences in informational costs depending on the level of sophistication of investors.

Our empirical specifications are quite different. To capture the multilateral resistance term highlighted by Buch et al. (2013), we include holding and issuing country fixed effects and analyse three different time periods to allow the effects vary. Instead, Roque and Cortez (2014) include controls for holding and issuing country characteristics. However without controlling for time fixed effects, and thus common to all shocks (particularly given the period under consideration), we propose our results are more appropriate and reflective of the actual role of bilateral factors in this setting.

The papers also diverge on the sectors considered. Roque and Cortez (2014) cover two sectors institutional (banks and OFCs) and non-institutional investors (households and non financial corporates). In our analysis we look at this restrictive split and then a more detailed split of six different investor types. This more detailed split shows that in cases there are significant differences between banks and OFCs. Further, we include the central bank and general government sector in our analysis. The two papers also differ in country coverage. We study a more globally representative sample of 50 holding countries corresponding to 170 issuers, while they analyse a more restrictive, OECD only sample.

In terms of the results of the two papers, we find that distance has a significant negative association with portfolio allocation for all investors except the central bank. However, Roque and Cortez (2014) do not find a significant relationship for the institutional sector. We argue that the choice of econometric specification explains the divergence of results. Our results are in line with the approach outlined by Buch et al. (2013).

4.2.4 Gap in the literature

The era of increased financial globalisation has seen demands for analysis using sectoral level data. In a post crisis evaluation, Milesi-Ferretti et al. (2010) call for increased sectoral information. More recently, Lane (2015) makes a similar point. Both papers emphasise the need to better understand the global financial system, and how sectoral data can help identify vulnerabilities and exposures.

Given the recent availability of the sectoral level data, this is the first paper to consider whether informational frictions differ across asset holding sectors at such a detailed level. Further, we consider the frictions in the context of portfolio debt and equity holdings. In this work, we extend the literature by providing insights into the role of bilateral factors across sectoral asset holders.

4.3 Empirical Method

This paper investigates whether bilateral factors or informational frictions differ across asset holding sectors or risk period. We use three pooled cross sections of data corresponding to different global risk phases to address the question.

Firstly we consider an aggregate split of the data between sophisticated and unsophisticated investors. We classify the former group as banks and other financial institutions (OFIs), for the unsophisticated, we aggregate households, non-financial corporations and general government holdings together. This split is in line with previous papers and at first glance suggests a reasonable split of the data. It is likely that banks and OFIs face similar information sets and incentives and so may respond to financial frictions in a similar way. The institutional or sophisticated investors may thus rely less on informational frictions than the non-institutional investors. To provide a more granular approach we also look at each sector independently and investigate whether there are differences within these groups. This analysis has not been done in the literature and as we argue in the results section; yields very interesting findings.

Crucially, we consider the specification for three distinct time periods. It is likely that countries will have had different macroeconomic responses to the shocks for the last decade. This technique accounts for this variation. The importance of employing this method is highlighted in Buch et al. (2013). A parallel aim of this paper is to uncover whether informational frictions vary across sectors during periods of market pressure. It is likely that during the Global Financial Crisis, sectoral portfolios may have responded differently to distant issuers. A high risk global environment might increase perceived informational frictions. We know that banks retrenched their asset positions along gravity lines during the crisis; did households and NFCs follow a similar pattern?

The following equation is used to estimate the regression coefficients:

$$\begin{aligned}
Ln(Asset_{kijt}) = & \alpha_0 + \alpha_i + \alpha_j + \alpha_t \theta Ln(DIST_{ij}) + \lambda Ln(Trade_{ijt-1}) \pi Lang_{ij} + \phi Colonial_{ij} + \\
& \gamma Legal_{ij} + \omega EA_{ij} + \delta EEA_{ij} + \kappa ASEAN_{ij} + \phi NAFTA_{ij} + \varepsilon_{ijt}
\end{aligned}
\tag{4.1}$$

$Ln(Asset_{kijt})$ is the log of the stock of assets held by sector k in country i from issuing country j in year t . α_i , α_j and α_t are the holding and issuing country and year fixed effects respectively. $Ln(DIST)_{ij}$ is the log of the bilateral distance between the two countries. The common language dummy is $Lang_{ij}$ and $Colonial_{ij}$ takes a value of one if countries share a colonial past. The binary variable $Legal_{ij}$ takes a value of one if the countries have common legal origins. The regional trade groups are represented by $NAFTA_{ij}$, $ASEAN_{ij}$ and EEA_{ij} . The common currency dummy is depicted by EA_{ij} . These dummies take a value of 1 if both countries are members of the group and zero otherwise. $Ln(Trade_{ijt-1})$ represents the trade control. It is the logged value of bilateral imports between the countries. We use the lag to reduce potential endogeneity issues.

As discussed above, we estimate the model on three distinct time periods 2005-2007, 2008-2009 and 2010-2012. These three pooled cross sections of data are consistent with global risk environments.

The use of fixed effects on both holding and portfolio issuing countries focuses the analysis on bilateral relations. Their inclusion means we are effectively controlling for the common to all, and country specific macroeconomic issues at the country level. We can think of the issuing country fixed effect as controlling for why some countries are more attractive to cross border investors. Conversely, the holding country fixed effect accounts for why some countries hold larger cross border portfolios than others. Furthermore, the issuing country fixed effect will capture valuation effects such as asset price and exchange rate movements.

Following the literature, we include standard gravity-type variables. These are proposed to proxy for informational or financial frictions. We include bilateral distance, common language,

colonial link, and common legal origins. These variables are typically found to be more important for equity than debt. We also include regional-bloc variables: Association of Southeast Asian Nations (ASEAN), North American Free Trade Agreement (NAFTA) and the European Economic Area (EEA). These memberships may play a role through two channels. On one hand, they may reduce perceived informational frictions, leading to increased intra-group investment. They may also play a political economy role; the idea is that investors may be placed under pressure to build up or maintain portfolios with politically connected countries. This will be particularly interesting as we can look at the sectoral holders. Do public sectors hold significantly greater intra-group portfolios compared to private investors? Finally, we include a euro area dummy to capture the effect of a common currency. It is plausible that the absence of currency risk will have different implications for portfolio allocation across sectors.

OLS is used to estimate the models. Given the use of bilateral data, it is reasonable to expect some heteroskedasticity at the country pair level. It is possible that the residual estimating ijt can be related to the residual in estimating jit . In order to account for this, robust standard errors are reported.

The issue of collinearity between the independent variables is important to address. On first sight the combination of common language, colonial history and legal origins might suggest collinear links. We investigate using statistical tests and find the hypothesis of multi-collinearity to be rejected in the data.

4.4 Data Discussion

In this paper, we use the recently released Coordinated Portfolio Investment Survey (CPIS), which reports portfolio investment assets by sector of holder. The data are available annually for the period 2001-2013. The survey collects year-end data on the bilateral holders of both debt and equity assets for 55 reporting countries vis-a-vis 170 issuing countries. The positions are recorded

in accordance with the residence principle consistent with the Balance of Payments method.¹ The CPIS have provided data on bilateral portfolio holdings since 2001 at the aggregate level; the recent availability of sectoral data facilitates our study. For a detailed discussion of the CPIS data see CPIS Guide Second Edition, Section 3.

To get a sense of the institutional and non-institutional composition of asset holdings, we report summary statistics at a regional level in Tables 4.2 and 4.3 for debt and equity respectively. We report the regional average share of the aggregate sectors for four years, 2005, 2008, 2010 and 2012. The choice of these years give an indication of changing sectoral composition for the period 2005-2012. We report the data from the holding country perspective, the 55 countries that report the breakdown are mainly concentrated in East Asia and the Pacific (EAP), Europe and Central Asia (ECA), Latin America and the Caribbean (LAC), OECD and Other High Income countries (OHI).

First consider Table 4.2. Apart from Latin America and the Caribbean, each regions institutional investors held a greater share of portfolio debt assets than the non-institutional sector. The figures also point to a changing composition over the period for each region except OECD countries. Institutional investors in EAP played a larger role in 2008, so too for Other High Income Countries, these larger share reverted to previous levels after the crisis period. The figures for equity assets are reported in Table 4.3. There is less volatility in the sectoral shares for equity than debt assets over the period. A few changes of note, LAC institutional investors greatly reduced their share after 2005, and this trend has continued until 2012. Institutional investors in EAP increased their share in 2008 and 2010 but returned to pre-crisis levels in 2012.

Throughout the paper we look at the aggregate institutional and non-institutional sectors but also at the more granular level of individual sectors, these summary statistics are reported in Tables 4.4 and 4.5. From Table 4.4 it is evident that the more detailed sectoral shares vary in time and across sectors. Broadly, banks and OFCs are most important for holding portfolio debt

¹For a discussion of the limitations of the CPIS data, see Lane and Milesi-Ferretti (2008).

assets. However in the OHI group; NFCs also play a significant role. In the case of LAC; the general government hold relatively substantial portfolio debt assets. Households play a minor in holding debt, so too for general government except the LAC region. Table 4.5 reports the equivalent statistics for portfolio equity. Banks and NFCs are the main sectoral asset holders of portfolio equity across the different regions. General government sector is relevant for OECD members and the EAP region.

In summary, these Tables have shown that the concentration of sectoral holders varies by region, across the time or risk periods considered and; across debt and equity. Most importantly, these figures have shown that there are differences within the institutional and non-institutional groups, this encourages our granular approach to investigate the role of informational frictions across sectors.

Next, examining Figures 4.1 and 4.2, the graphs depict the evolution of the sectoral positions for the period 2001-2013. The different sectoral roles across the two portfolio assets are striking. As observed above, banks play a much smaller role in the equity market than that of debt; households are the opposite. The role of OFCs has increased throughout the period, particularly in the equity market. Central banks have increased participation in the portfolio debt market since 2005, while they have a negligible role in equity assets throughout the period.

For both debt and equity, we see evidence of dips in cross border holdings during the Global Financial Crisis and the subsequent euro area crisis. These vary in their severity across the asset classes. This observation further motivates our use of crisis interaction terms to analyse whether the role of bilateral ties differs during periods of increased risk.

To prevent our results being distorted by offshore financial centers, we exclude these from our sample. We follow the classification of Lane and Milesi-Ferretti (2010). Further we exclude both Ireland and Luxembourg, given the disproportionate size of their financial sectors to gross domestic product. Both holding and issuing offshore financial centres are removed.

Given the large coverage of issuing countries in the data there are zeroes indicating no bilateral holdings for sectors. It is important to construct the samples so that observations where sectors don't invest are not dropped from the sample but recorded as zeros. In order to be consistent across the samples and so we can compare between sectors we employ the following approach. For any country pair that the bilateral position is zero for the asset class (debt or equity) we drop the observation. Once there is a bilateral position at the aggregate asset holding, we then add the value of one unit to each sectoral observation. We take the natural log of the values, as such the observations of unity are in the regression sample as zeroes. This technique means that the sectoral samples are consistent and that different samples are not driving different results across sectors.

For the gravity variables; distance, colonial ties and common language we use the CEPII database. The trade data are taken from the IMF IFS DOTS database. The regional group memberships dummy variables are created based on information provided on their respective websites. The legal origins regressor is sourced from Shleifer et al. (2008).

Combining the gravity variables with data from the CPIS, we create a dataset that spans 50 asset holding countries and 180 corresponding issuers, for debt and equity, across eight sectors, for a total of fourteen years. Using this highly detailed data, we investigate whether bilateral links, or informational frictions differ in their importance across sectors. Further, we analyse whether these effects varied during the Global Financial Crisis and the euro area crisis.

4.5 Empirical Analysis

The aim of the paper is to explore whether the role of bilateral links for portfolio allocation varies across sectors and during periods of market crisis. We consider debt and equity portfolio assets.

4.5.1 Preliminary Analysis

As a first step in the analysis, we report the coefficients of distance for annual cross section estimations of equation (1). Figures 4.3 and 4.4 illustrate the varying role of distance both through time and across sectors. In Figure 4.3, it is evident that distance differs both through time and across sectors for portfolio debt. The coefficients on distance for the general government sector differ strikingly from the other portfolio holders. Interestingly, debt portfolios of NFCs have become less sensitive to distance since the crisis. The coefficients for equity in Figure 4.4 display greater variation and are larger in magnitude than for debt. This is in line with Galstyan and Lane (2013): equity holdings are more sensitive to gravity factors than debt. We see the informational friction of distance declined until 2010 for the banking sector, when it then increased. The OFC series also exhibits increased sensitivity to distance since 2009.

This graphical analysis has illustrated variation in the coefficients of the informational friction of distance. There is evidence of variety, both across sectors and through time. These findings enhance confidence in our regression approach, the importance to consider the three separate periods reflecting differences in the global economy.

4.5.2 Sectoral Regressions: Portfolio Debt Assets

Portfolio Debt 2005-2007

The results from estimating equation (1) on portfolio debt holdings are reported in Table 4.6. The results in column (1) are for the institutional sectors, with column (2) reporting for the non-institutional sector. What is most striking is the larger coefficient on distance in column(1) than (2). We test whether these coefficients are statistically different and conclude they are. This result means the institutional sector is more sensitive to distance in allocating their debt portfolios. A priori, we would have expected the opposite, that given the greater informational set available to institutional investors, they might rely less on financial frictions than non-institutional investors. When we look at the disaggregated sectoral level data, we see it is the

banking sector driving this result. From Paper 1, and other literature we know that banks are particularly sensitive to distance when issuing loans. That this behaviour carries over to the portfolio debt assets is a remarkable finding. This result emphasises the importance of sectoral data. Roque and Cortez (2014) treat banks and OFCs the same, while we show the need to look at a detailed sectoral split. A priori, we might have considered banks and OFCs to behave more similarly than households, given the level of sophistication of the investors.

Continuing to compare columns (1) and (2), we see a colonial link is a relevant explanatory variable for the institutional group; driven by OFCs. Again this is surprising, the non-institutional sectors are not significantly relying on financial frictions for cross border asset allocation during the boom period. The legal origins variable is relevant for both groups, as is EEA and euro area membership. These findings are broadly in line with the literature. Bilateral debt holdings are positively associated with colonial links, common legal origins, imports and membership of regional blocs. The common currency is also a positive tie, while debt holdings decrease in distance.

Now consider the sectoral detail results in columns (3)-(7), we analyse the role of distance across the asset holding sectors. Perhaps most striking, is the significant positive association of distance for the central bank sector, implying that central banks hold more debt of distant issuers. This result is unusual in the literature, suggesting that central banks behave differently as asset holders. The general government coefficient is also positive albeit insignificant. These results hint at divergence of public and private asset holding behaviour of distant issuers.

Common language only emerges as a significant bilateral link for the general government sector, and the result is somewhat surprising. We find a negative association of bilateral debt holdings in countries that share a language. The theory predicts a common language reduces perceived financial frictions leading to increased holdings. Surprisingly, we find that the government sector holds significantly less debt of countries with a shared language. When we think of this result in

conjunction with the central bank positive relation with distance, an unusual pattern of public sector debt (anti-gravity) holdings emerge.

The importance of colonial links is apparent for the banking and general government sectors. Again, in contrast central banks holdings decrease in countries with a shared colonial history. A common legal system is positively associated with bilateral debt holdings across all sectors. The effect is significantly stronger for households and central banks than banks and OFCs. Trade is an important link for asset holdings of all sectors except that of central banks.

Interestingly, we see variation in the effect of regional-bloc membership. NFCs in ASEAN positively invest in other member countries, while the reverse is found for NAFTA members. Meanwhile ASEAN membership significantly reduces OFCs intra-regional holdings. This likely reflects the less developed financial sector in member countries. In line with a political economy story, we find a positive relationship with debt holdings for general government in ASEAN members. Membership of the EEA is consistently positive and significant across sectors. It is significantly stronger for the central bank sector than the others, also supporting a political economy view.

Finally, the removal of currency risk in the form of euro area participation yields the largest coefficients for most of the sectors. Least affected is the household sector. This result is somewhat intriguing; households might be the least sophisticated investors of the sectors, yet the absence of currency risk is least important for them.

Portfolio Debt 2008-2009

There are some striking findings when we consider the results for the bust period in Table 4.7. Distance continues to have a negative effect for holding portfolio debt assets. We continue to find a strong and, after testing, significant difference for the importance of distance between institutional and non-institutional investors. Thus during the crisis period, institutional or

sophisticated investors relied significantly more on the friction of distance than non-institutional sectors.

When we consider the granular sectoral regressions the findings are particularly interesting. Central banks are seen to hold more portfolio debt assets from distant borrowers. Given the uniqueness of this result compared to all other sectors, we investigate further by dropping large countries that may be driving the result. It is not driven by countries holding US or UK assets, nor is it driven by economies holding assets issued by China. It appears that Central banks increased their holdings of portfolio debt in distant countries during the crisis and that distance did not act as a financial friction but in fact central banks looked to hold portfolios of distant issuers. A second interesting point, is the lower coefficient on general government holdings in comparison to households or NFCs. The coefficient on GG in column (8) is statistically different from that on households. The difference behaviour of central banks and general government compared to all other sectors points to divergence of public and private sector investors. If we look at the other gravity variables; a common language is only significantly important for the household sector. This is in-line with our hypothesis, less sophisticated investors might rely increasingly on informational frictions to allocate portfolio holdings than institutional investors.

A colonial link between host and source economies is important for the banking sector, indeed it is the only asset holding sector that is susceptible to this friction. The legal origins variable provides another interesting consideration of frictions and sectors. A common legal origin is important for banks and OFCs, and to a lesser extent, households, NFCs and general government. But as with the friction of distance, central banks hold more assets in countries with whom they do not share a legal origin.

When we think of informational frictions we can imagine it as an extension of the home bias puzzle across borders. Within a domestic economy, the home bias puzzle is that agents don't diversify their asset portfolio as much as they should, i.e. invest overseas. They believe they have better knowledge of what is domestic or close or near. When we consider cross border

investment, informational frictions contribute to this sentiment of investing in what is known, or better understood. Agents invest in countries they feel closer to, whether it is culturally, geographically or institutionally.

The findings of central banks and general government relying the least on financial frictions (distance and legal origins) for asset allocation, suggest they diversify their portfolios the most. Given the data available we cannot investigate this finding further at the moment, but in future work we hope to consider the differences of public and private investors, and whether it is an incentive issue. During the crisis we find little role for trade ties and the holdings of portfolio debt assets. In this instance central banks invest positively in countries they trade with. We interpret this as hedging type story and the need to be able to provide foreign currency to traders.

Finally, we consider the role of regional groups during the crisis period. NAFTA membership has conflicting effects depending on the holding sector. Banks in the region held significantly more of fellow members *ceteris paribus*, while the unsophisticated members moved away from fellow members. More interesting perhaps is the role of ASEAN, institutional investors held less in other member countries, while the central bank in these economies held larger positions of fellow ASEAN members. This breakdown enables us to see the possible political economy motives at play. Central banks in the region invest in member economies perhaps due to political pressure or mutual agreement. For the European Economic Area, the effect is positive across all sectors, with the greatest magnitude emerging for the OFC sectors. The absence of currency risk, evident in the coefficient on euro area membership is significantly important for each sector, and in this case more important for non-institutional than institutional investors.

In summary, bilateral factors were important for bilateral asset allocation in 2008 and 2009. There are differences across sectors and evidence that shows sectors do not rely less on informational frictions the more sophisticated they are. Banks were the most sensitive to distance, while central banks actually invested in distant issuers of portfolio debt. The most important friction in terms of magnitude is the removal of currency risk in the form of euro area membership.

Portfolio Debt Assets 2010-2012

Next we consider the role of bilateral factors during the years 2010-2012. This period corresponds to the recovery or euro area crisis depending on your perspective. The results are presented in Table 4.8. Considering first the role of distance, increased distance from the debt issuer is associated with significantly lower holdings. This is now also true for the central banks. When we consider these results with those from Table 4.7, it suggests that central banks diversified their portfolios during the global crisis but, in subsequent years the friction of distance regained importance. As in previous periods, distance is strongest for the banking sector. This suggests that the asset allocation of banks is similar to their lending patterns.

Households are placing increasing reliance on the reduced friction of a common language when holding portfolio debt assets. During the boom period, they did not significantly differentiate asset issuers on language. Language is also important for NFCs and OFCs for this period. These results suggest an increasing reliance on informational frictions in the post crisis years. A shared colonial history continues to be important for the banking sector. Consistent with the 2008-2009 period, legal origins are a strong bilateral link for all sectors except for central banks where there is a negative relationship.

When we look at the regional partners, NAFTA membership is associated with significant reduced asset holdings across banks, NFCs, households and general government. On closer inspection this is driven by Mexico diversifying their portfolio away from the US and Canada. Membership of ASEAN provides an interesting comparison between NFCs and OFCs, the former see the regional grouping as a positive investment link while OFCs invest less in fellow ASEAN members. This result is consistent with the hypothesis of non-institutional investors allocating their portfolios with countries they feel closer too.

Finally, for the period of the euro area crisis, the public sector investors of euro area members placed the most emphasis on investing in euro area countries. This likely reflects a political

economy motive, members were seen as investing in each other. Each sector invested positively in fellow euro area countries, but households were the least susceptible to this bias. Membership of the European Union is also associated with positive holdings, albeit the coefficients are smaller than in previous risk periods.

Throughout the analysis we have seen variation in the roles of bilateral factors across sectors and through risk periods. Importantly, we have shown that simply splitting sectors into institutional and non-institutional does not typically fit the behaviour of investors when we look at sectors individually. At times, sophisticated investors rely more on informational frictions than non-institutional asset holders, i.e. banks and distance or bank and colonial links. Banks are the most sensitive sector to distant issuers of liabilities; this sensitivity has fluctuated through time, with it becoming increasingly important during crisis times when information is more opaque. Somewhat surprisingly, central banks had a positive relationship between distance and asset holdings during the crisis. We consider this a move to diversify their portfolios at times of heightened global volatility. More in line with a priori expectations, we see when market pressure is high, households and NFCs relied on language links.

4.5.3 Sectoral Regressions: Portfolio Equity Assets

Portfolio Equity Assets 2005-2007

Now we consider the situation for portfolio equity assets for the boom period in Table 4.9. First we examine columns (1) and (2) which report results for the institutional and non-institutional sectors respectively. The first observation is the similar coefficients for distance across both types of investors. There were significant differences for portfolio debt, this is not the case for equity. When we look at the sectoral breakdown, banks, households and NFCs are similarly sensitive to distance. Consistent with the portfolio debt data, the public sector is less sensitive to distance than the private investors, with central banks not affected at all.

Sharing common legal origins has a positive bias for holding equity from a partner country across all sectors. Trade links also are associated for more equity holdings for a number of sectors. A colonial link is important for households but acts as a friction for the central bank sector. The central bank sector behaves different to what theory predicts, holding assets in countries with informational frictions and not in places where there may be bilateral bias. This likely reflects different incentive motives of central banks. They may look to hold a more diversified portfolio than other sectors.

When we consider the regional groups, ASEAN membership is not associated with any positive bias or frictions for any sector. However NAFTA membership, again driven by Mexico has a negative association for the non-institutional sector. But the OFCs hold more equities of fellow NAFTA members. It appears there is a political economy story for EEA membership, the general government holds significant holdings in fellow EEA countries during the boom years. The main link in Europe for this period however was the common currency. Euro area members held significantly more equities of fellow members than non-members. This was particularly strong for households, with the removal of currency risk, we could expect to see the least sophisticated investors holding equities along this bias.

Portfolio Equity Assets 2008-2009

Next we consider the results in Table 4.10, which reflect the Global Financial Crisis period, 2008-2009. Distance remains significantly important for all sectors except the central bank. As in the boom years, general government are the least sensitive to distance. The bias of sharing a common language with a country emerges during the crisis years. Consistent with the theory that non-institutional investors may rely on bilateral frictions in place of information, households and NFCs both positively and significantly held equities of countries with whom they share a language. Central banks continue to hold equities contrary to what informational frictions would predict. They held less equities in countries with whom they share a colonial link, nor did they have positive holdings in countries with similar legal origins.

The removal of currency risk in the form of euro area membership is strong across all sectors. In columns (1) and (2), we see that there are significant differences in the coefficients for euro area membership. This result is in line with theory that less sophisticated investors rely more on bilateral frictions or biases to allocate portfolio assets.

Portfolio Equity Assets 2010-2012

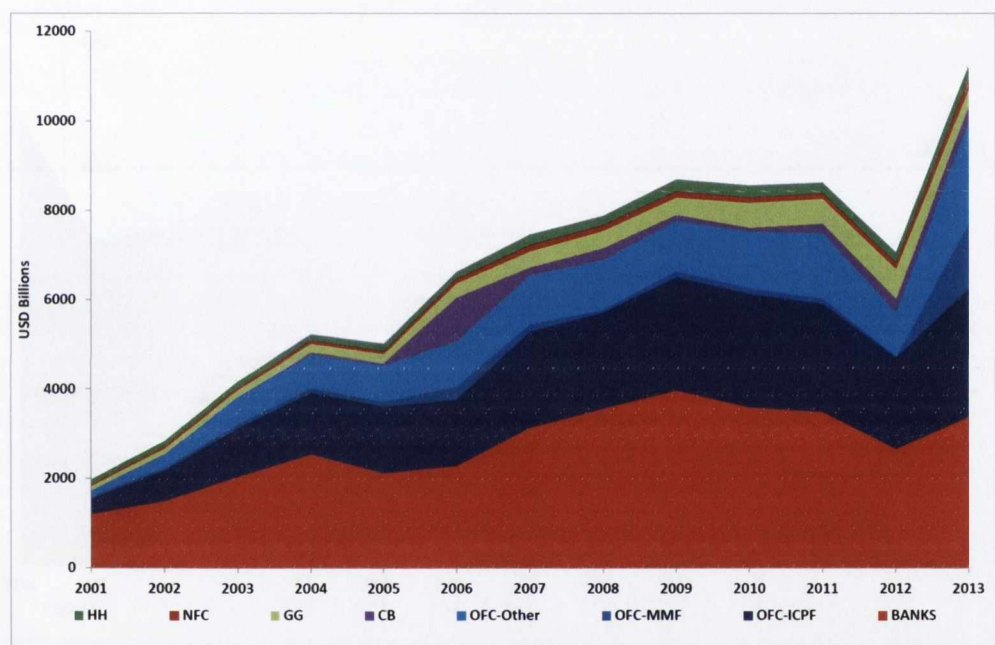
Finally we examine Table 4.11, which report regression results for the 2010-2012 period. The results for distance are consistent with what we have seen in the previous equity results. The public sector is least sensitive to the friction of distance. In contrast to the portfolio debt results, banks are not significantly more sensitive to distance than other sectors.

The non-institutional sectors of households and NFCs, hold significantly more equities from countries they have common colonial histories and in the case of NFCs; common languages. These findings are in line with the hypothesis that non-institutional sectors may rely on bilateral ties in the place of information. Legal origins are relevant for all sectors except central banks. The euro area crisis took place during these years, and interestingly we continue to see positive holdings of all sectors in fellow member countries. The removal of foreign currency risk is again significantly more important for non-sophisticated than institutional investors. This result is striking given the time period in question; the non-institutional sectors did not flee the euro area during this period of uncertainty.

4.6 Conclusion

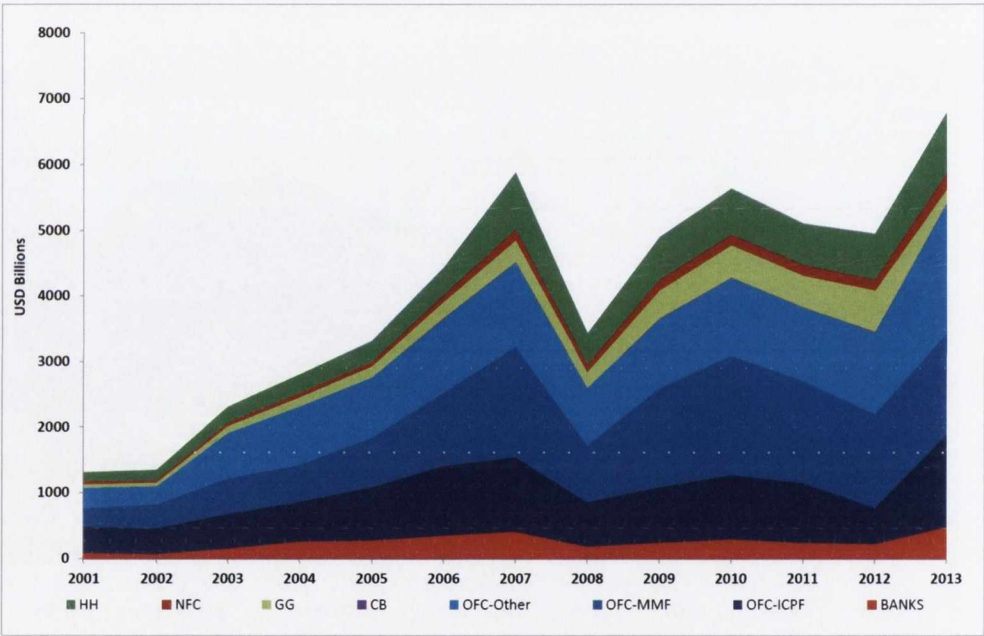
This paper set out to see if bilateral biases or frictions play varying roles of significance across sectors. We proposed that institutional investors might be less sensitive to bilateral ties than non-institutional investors. The theory is that investors with sophisticated information sets may not need to rely on bilateral frictions as much as non-institutional sectors such as households or NFCs for portfolio asset allocation. For equity assets, the hypothesis of unsophisticated investors holding equities along bilateral lines is found in the data. Distance has similar effects across sectors and non-institutional sectors respond significantly more to language and trade. However, this is less true for the case of portfolio debt. Banks held considerably less assets of distant issuers. This result highlights the importance of considering the more granular level of data and that banks and OFCs do not hold similar bilateral portfolios. An unexpected finding to emerge is that across asset classes, central banks are not sensitive to the friction of distance. For the bust period, they actually significantly held portfolio debt of distance issuers. Central banks also were the least responsive sector to legal origins and other measures of bilateral ties.

Figure 4.1: Portfolio Debt: Sectoral Composition of Assets



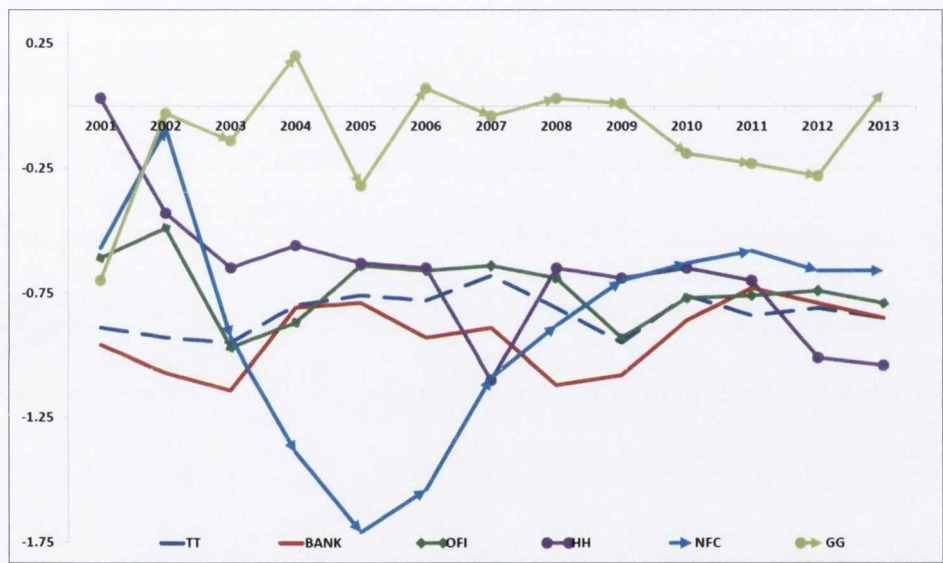
Note: The chart depicts the portfolio debt sectoral composition of CPIS reporting countries.

Figure 4.2: Portfolio Equity: Sectoral Composition of Assets



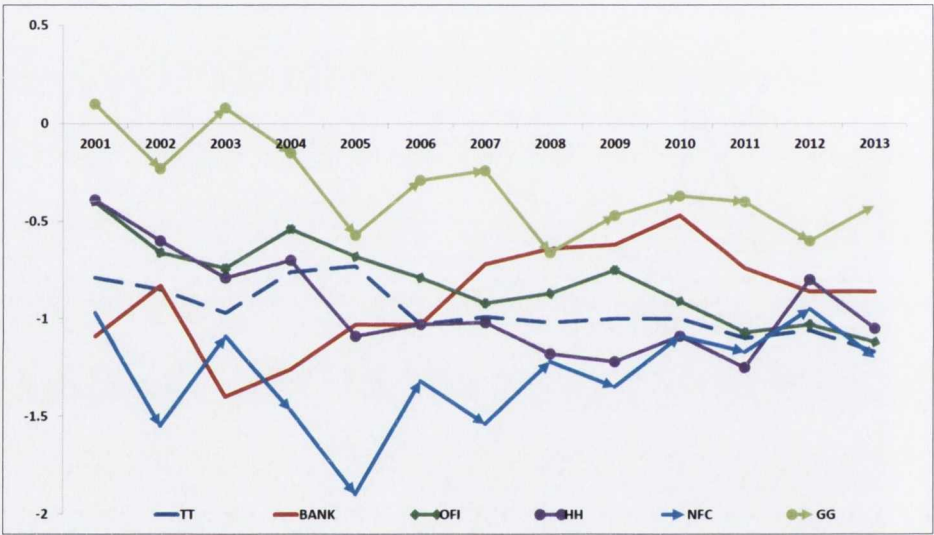
Note: The chart depicts the portfolio equity sectoral composition of CPIS reporting countries.

Figure 4.3: Portfolio Debt: Role of Bilateral Distance over Time



Note: The graph depicts the regression coefficients of the variable distance for annual cross section estimations. Home and host country fixed effects are applied in the regressions. The included control variables are: language; colonial link; legal origins; trade; NAFTA; ASEAN; EEA; EA.

Figure 4.4: Portfolio Equity: Role of Bilateral Distance over Time



Note: The graph depicts the regression coefficients of the variable distance for annual cross section estimations. Home and host country fixed effects are applied in the regressions. The included control variables are: language; colonial link; legal origins; trade; NAFTA; ASEAN; EEA; EA.

Table 4.1: Holding Countries Included in Each Sample

Boom	DEBT Bust	Recovery	Boom	EQUITY Bust	Recovery
Argentina	Argentina	Argentina	Argentina	Argentina	Argentina
Australia	Australia	Australia	Australia	Australia	Australia
Austria	Austria	Austria	Austria	Austria	Austria
Bulgaria	Bulgaria	Bolivia	Belgium	Belgium	Belgium
Chile	Chile	Bulgaria	Brazil	Brazil	Bolivia
Colombia	Colombia	Chile	Bulgaria	Bulgaria	Brazil
Costa	Costa	Colombia	Chile	Chile	Bulgaria
Cyprus	Cyprus	Costa	Colombia	Colombia	Chile
Czech Republic	Czech Republic	Cyprus	Costa	Costa	Colombia
Denmark	Denmark	Czech Republic	Cyprus	Cyprus	Costa
Egypt	Egypt	Denmark	Czech Republic	Czech Republic	Cyprus
Finland	Finland	Egypt	Denmark	Denmark	Czech Republic
France	France	Estonia	Egypt	Egypt	Denmark
Greece	Germany	Finland	Estonia	Estonia	Egypt
Hungary	Greece	France	Finland	Finland	Estonia
India	Hungary	Germany	France	France	Finland
Indonesia	India	Greece	Germany	Germany	France
Israel	Indonesia	Hungary	Greece	Greece	Germany
Italy	Israel	Iceland	Hungary	Hungary	Greece
Japan	Italy	India	Iceland	Iceland	Hungary
Kazakhstan	Japan	Indonesia	India	India	Iceland
Malaysia	Kazakhstan	Israel	Indonesia	Indonesia	India
Mexico	Kuwait	Italy	Israel	Israel	Indonesia
Netherlands	Malaysia	Japan	Italy	Italy	Israel
New Zealand	Mexico	Kazakhstan	Japan	Japan	Italy
Norway	Netherlands	Korea,	Kazakhstan	Kazakhstan	Japan
Pakistan	Norway	Kuwait	Korea,	Korea,	Kazakhstan
Portugal	Pakistan	Lithuania	Kuwait	Kuwait	Korea,
Romania	Portugal	Malaysia	Latvia	Latvia	Kuwait
Russian	Romania	Mexico	Malaysia	Malaysia	Latvia
South Africa	Russian	Mongolia	Malta	Malta	Lithuania
Spain	South Africa	Netherlands	Mexico	Mexico	Malaysia
Sweden	Spain	Norway	Netherlands	Netherlands	Malta
Thailand	Sweden	Pakistan	New Zealand	New Zealand	Mexico
Turkey	Thailand	Poland	Norway	Norway	Mongolia
Ukraine	Turkey	Portugal	Pakistan	Pakistan	Netherlands
United Kingdom	Ukraine	Romania	Philippines	Philippines	New Zealand
Uruguay	United Kingdom	Russian	Poland	Poland	Norway
Venezuela,	Uruguay	Slovenia	Portugal	Portugal	Pakistan
	Venezuela,	South Africa	Romania	Romania	Philippines
		Spain	Russian	Russian	Poland
		Sweden	Singapore	Singapore	Portugal
		Thailand	Slovak	Slovak	Romania
		Turkey	South Africa	South Africa	Russian
		Ukraine	Spain	Spain	Singapore
		United Kingdom	Sweden	Sweden	Slovak
		Uruguay	Thailand	Thailand	Slovenia
		Venezuela,	Turkey	Turkey	South Africa
			Ukraine	Ukraine	Spain
			United Kingdom	United Kingdom	Sweden
			Uruguay	Uruguay	Thailand
			Venezuela,	Venezuela,	Turkey
					Ukraine
					United Kingdom
					Uruguay
					Venezuela,

Table 4.2: Average Institutional and non-Institutional Shares of Portfolio Debt for Holding Regions

Year	Region	Institutional Investors	Non-Institutional Investors
2005	East Asia and Pacific	0.63	0.37
2008		0.92	0.08
2010		0.68	0.32
2012		0.70	0.30
2005	Europe Central Asia	0.93	0.07
2008		0.88	0.12
2010		0.89	0.11
2012		0.41	0.59
2005	Latin America Caribbean	0.66	0.34
2008		0.40	0.60
2010		0.25	0.75
2012		0.23	0.77
2005	OECD	0.92	0.08
2008		0.92	0.08
2010		0.91	0.09
2012		0.89	0.11
2005	Other High Income	0.66	0.34
2008		0.80	0.20
2010		0.82	0.18
2012		0.69	0.31

Table 4.3: Average Institutional and non-Institutional Shares of Portfolio Equity for Holding Regions

Year	Region	Institutional Investors	Non-Institutional Investors
2005	East Asia and Pacific	0.28	0.72
2008		0.61	0.39
2010		0.43	0.57
2012		0.29	0.71
2005	Europe Central Asia	0.58	0.42
2008		0.56	0.44
2010		0.73	0.27
2012		0.46	0.54
2005	Latin America Caribbean	0.94	0.06
2008		0.64	0.36
2010		0.56	0.44
2012		0.66	0.34
2005	OECD	0.85	0.15
2008		0.81	0.19
2010		0.82	0.18
2012		0.76	0.24
2005	Other High Income	0.66	0.34
2008		0.60	0.40
2010		0.68	0.32
2012		0.67	0.33

Table 4.4: Average Sectoral Shares of Portfolio Debt for Holding Regions

Year	Region	Banks	Central Bank	OFCs	NFCs	HH	GG	Non-Fin Sector Other
2005	East Asia and Pacific	0.48	0.01	0.14	0.05	0.01	0.02	0.28
2008		0.31	0.01	0.61	0.03	0.01	0.04	0.01
2010		0.21	0.00	0.47	0.09	0.00	0.22	0.00
2012		0.24	0.00	0.45	0.13	0.00	0.16	0.00
2005	Europe Central Asia	0.66	0.18	0.09	0.05	0.01	0.01	0.01
2008		0.30	0.44	0.14	0.09	0.02	0.01	0.00
2010		0.32	0.41	0.16	0.08	0.02	0.01	0.00
2012		0.21	0.04	0.16	0.04	0.03	0.52	0.00
2005	Latin America Caribbean	0.18	0.23	0.26	0.12	0.05	0.16	0.01
2008		0.15	0.06	0.20	0.11	0.04	0.44	0.00
2010		0.08	0.05	0.12	0.06	0.02	0.19	0.47
2012		0.09	0.03	0.10	0.03	0.02	0.26	0.47
2005	OECD	0.38	0.01	0.53	0.01	0.03	0.04	0.00
2008		0.38	0.03	0.51	0.01	0.02	0.04	0.00
2010		0.34	0.01	0.56	0.01	0.03	0.05	0.00
2012		0.29	0.04	0.57	0.01	0.02	0.07	0.00
2005	Other High Income	0.55	0.00	0.11	0.27	0.06	0.00	0.01
2008		0.62	0.07	0.12	0.12	0.07	0.01	0.00
2010		0.67	0.00	0.14	0.13	0.05	0.01	0.00
2012		0.38	0.12	0.20	0.19	0.06	0.01	0.05

Table 4.5: Average Sectoral Shares of Portfolio Equity for Holding Regions

Year	Region	Banks	Central Bank	OFCs	NFCs	HH	GG	Non-Fin Sector Other
2005	East Asia and Pacific	0.14	0.11	0.04	0.06	0.04	0.04	0.58
2008		0.45	0.10	0.06	0.22	0.06	0.06	0.06
2010		0.39	0.04	0.00	0.23	0.00	0.33	0.00
2012		0.26	0.02	0.00	0.25	0.00	0.46	0.00
2005	Europe Central Asia	0.33	0.07	0.17	0.15	0.04	0.04	0.19
2008		0.27	0.13	0.16	0.35	0.04	0.02	0.02
2010		0.45	0.10	0.18	0.10	0.13	0.02	0.02
2012		0.33	0.12	0.02	0.05	0.19	0.28	0.02
2005	Latin America Caribbean	0.92	0.01	0.01	0.03	0.01	0.01	0.01
2008		0.62	0.01	0.01	0.32	0.01	0.02	0.01
2010		0.54	0.02	0.00	0.42	0.01	0.00	0.00
2012		0.63	0.02	0.00	0.30	0.02	0.02	0.00
2005	OECD	0.73	0.12	0.00	0.02	0.05	0.08	0.00
2008		0.75	0.06	0.00	0.02	0.05	0.11	0.00
2010		0.76	0.06	0.00	0.02	0.05	0.11	0.00
2012		0.71	0.05	0.00	0.02	0.06	0.16	0.00
2005	Other High Income	0.60	0.04	0.01	0.12	0.19	0.01	0.02
2008		0.45	0.15	0.01	0.20	0.14	0.02	0.04
2010		0.55	0.12	0.00	0.17	0.13	0.01	0.00
2012		0.56	0.10	0.00	0.13	0.12	0.02	0.06

Table 4.6: Portfolio Debt by Sector Boom 2005-2007

Boom	(1) SOPHIS	(2) UNSOPH	(3) OFT	(4) ODX	(5) CB	(6) NFC	(7) HH	(8) GG
Distance	-0.68*** (0.05)	-0.46*** (0.05)	-0.55*** (0.07)	-0.85*** (0.07)	-0.09* (0.05)	-0.59*** (0.06)	-0.49*** (0.05)	-0.22*** (0.05)
Language	-0.09 (0.12)	0.13 (0.11)	-0.17 (0.18)	-0.12 (0.18)	0.13 (0.13)	0.06 (0.14)	0.15 (0.12)	-0.01 (0.11)
Colonial Link	0.30** (0.12)	-0.06 (0.12)	0.51*** (0.17)	0.23 (0.18)	-0.03 (0.13)	-0.09 (0.15)	0.05 (0.13)	-0.13 (0.12)
Legal Origins	0.31*** (0.07)	0.30*** (0.06)	0.29*** (0.09)	0.38*** (0.09)	-0.05 (0.06)	0.11 (0.08)	0.22*** (0.07)	0.23*** (0.07)
L.TRADE	0.04* (0.02)	-0.02 (0.02)	-0.00 (0.03)	0.07** (0.03)	-0.01 (0.02)	-0.09*** (0.02)	-0.07*** (0.02)	-0.00 (0.02)
NAFTA	0.86 (0.94)	-0.66 (1.06)	1.04 (1.04)	0.26 (1.84)	1.00 (1.83)	-0.23 (1.32)	-1.15** (0.46)	-1.35*** (0.42)
ASEAN	0.09 (0.34)	-0.11 (0.23)	0.15 (0.35)	-0.13 (0.51)	0.17 (0.14)	-0.69*** (0.27)	0.11 (0.19)	0.39** (0.19)
EEA	0.78*** (0.14)	0.51*** (0.13)	1.42*** (0.19)	0.32* (0.18)	0.32*** (0.12)	0.54*** (0.16)	-0.02 (0.14)	0.51*** (0.14)
EA13	1.49*** (0.11)	1.42*** (0.15)	1.73*** (0.20)	1.41*** (0.18)	2.40*** (0.24)	1.31*** (0.20)	1.26*** (0.17)	1.55*** (0.21)
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,810	3,801	3,809	3,803	3,811	3,806	3,811	3,801
R-squared	0.79	0.63	0.69	0.65	0.40	0.42	0.45	0.57

Note: The dependant variables are the log of portfolio debt holdings for the sector. The model is estimated using pooled OLS. Portfolio data are sourced from the CPIS. Trade data are taken from DOT. CEPII data are used for the gravity type variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.7: Portfolio Debt by Sector: Bust 2008-2009

Bust	(1) SOPHIS	(2) UNSOPH	(3) OFT	(4) ODX	(5) CB	(6) NFC	(7) HH	(8) GG
Distance	-0.79*** (0.06)	-0.40*** (0.06)	-0.55*** (0.09)	-1.13*** (0.08)	0.11** (0.05)	-0.49*** (0.06)	-0.48*** (0.07)	-0.20*** (0.06)
Language	0.19 (0.14)	0.20 (0.15)	0.09 (0.19)	0.18 (0.18)	0.07 (0.13)	0.10 (0.14)	0.42** (0.17)	-0.18 (0.13)
Colonial Link	0.30** (0.15)	-0.08 (0.17)	0.32 (0.20)	0.44** (0.20)	0.01 (0.10)	-0.02 (0.15)	-0.17 (0.21)	-0.02 (0.13)
Legal Origins	0.23*** (0.08)	0.19** (0.08)	0.34*** (0.10)	0.28*** (0.11)	-0.13** (0.06)	0.14* (0.08)	0.17* (0.09)	0.14* (0.08)
L.TRADE	0.05* (0.02)	0.03 (0.02)	0.06* (0.03)	-0.00 (0.03)	0.06*** (0.01)	0.01 (0.02)	-0.02 (0.02)	0.04* (0.02)
NAFTA	-0.12 (0.58)	-2.97*** (0.38)	-1.05 (0.75)	3.13*** (0.94)	-0.66** (0.28)	-3.19*** (0.44)	-2.00*** (0.42)	-2.15*** (0.47)
ASEAN	-1.13*** (0.38)	0.34 (0.33)	-1.07** (0.45)	-0.94* (0.50)	0.26*** (0.10)	0.17 (0.45)	0.03 (0.25)	0.10 (0.25)
EEA	0.84*** (0.17)	0.55*** (0.16)	1.28*** (0.22)	0.60*** (0.22)	0.83*** (0.14)	0.58*** (0.18)	0.48*** (0.18)	0.20 (0.16)
EA13	1.34*** (0.13)	1.60*** (0.18)	1.56*** (0.19)	1.69*** (0.18)	2.35*** (0.27)	1.84*** (0.21)	0.91*** (0.23)	2.04*** (0.23)
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,897	2,888	2,883	2,890	2,914	2,914	2,881	2,914
R-squared	0.80	0.63	0.75	0.72	0.47	0.52	0.47	0.61

Note: The dependant variables are the log of portfolio debt holdings for the sector. The model is estimated using pooled OLS. Portfolio data are sourced from the CPIS. Trade data are taken from DOTS. CEPII data are used for the gravity type variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.8: Portfolio Debt by Sector: Recovery Period 2010-2012

2010-2012	(1) SOPHIS	(2) UNSOPH	(3) OFT	(4) ODX	(5) NFC	(6) CB	(7) GG	(8) HH
Distance	-0.72*** (0.05)	-0.51*** (0.04)	-0.68*** (0.06)	-1.02*** (0.06)	-0.38*** (0.05)	-0.07** (0.03)	-0.33*** (0.05)	-0.51*** (0.05)
Language	0.07 (0.12)	0.31*** (0.09)	0.27** (0.14)	0.03 (0.15)	0.20* (0.12)	0.01 (0.08)	-0.01 (0.11)	0.36*** (0.11)
Colonial Link	0.26** (0.12)	0.06 (0.10)	0.20 (0.14)	0.40** (0.16)	-0.02 (0.13)	0.05 (0.06)	0.08 (0.12)	0.17 (0.14)
Legal Origins	0.38*** (0.06)	0.37*** (0.05)	0.56*** (0.07)	0.39*** (0.08)	0.32*** (0.06)	-0.10** (0.04)	0.34*** (0.06)	0.25*** (0.07)
L.TRADE	0.08*** (0.02)	-0.00 (0.01)	0.04* (0.02)	0.05** (0.02)	-0.00 (0.02)	-0.02** (0.01)	-0.01 (0.02)	0.03 (0.02)
NAFTA	-0.69* (0.38)	2.57 (1.63)	0.28 (0.48)	-1.26* (0.76)	-1.75*** (0.60)	-0.16 (0.16)	-1.68*** (0.54)	-1.37** (0.63)
ASEAN	-0.58** (0.29)	0.85*** (0.23)	-1.40*** (0.35)	-0.03 (0.36)	0.92*** (0.28)	-0.04 (0.06)	0.13 (0.19)	-0.20 (0.18)
EEA	1.13*** (0.13)	0.52*** (0.11)	1.29*** (0.16)	0.89*** (0.17)	0.78*** (0.12)	0.24*** (0.07)	0.29** (0.12)	0.53*** (0.14)
EA13	1.36*** (0.10)	1.46*** (0.13)	1.52*** (0.14)	1.36*** (0.18)	1.61*** (0.17)	2.20*** (0.24)	1.80*** (0.18)	0.95*** (0.16)
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,985	4,986	4,981	4,965	4,984	4,986	4,984	4,984
R-squared	0.77	0.67	0.73	0.65	0.46	0.34	0.59	0.47

Note: The dependant variables are the log of portfolio debt holdings for the sector. The model is estimated using pooled OLS. Portfolio data are sourced from the CPIS. Trade data are taken from DOTY. CEPII data are used for the gravity type variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.9: Portfolio Equity by Sector: Boom Period 2005-2007

Boom	(1) SOPHIS	(2) UNSOPH	(3) OFT	(4) ODX	(5) CB	(6) NFC	(7) HH	(8) GG
Distance	-0.43*** (0.06)	-0.47*** (0.05)	-0.38*** (0.07)	-0.58*** (0.06)	-0.02 (0.02)	-0.53*** (0.06)	-0.49*** (0.06)	-0.11*** (0.04)
Language	-0.02 (0.12)	-0.09 (0.10)	-0.19 (0.16)	-0.14 (0.13)	0.04 (0.05)	-0.15 (0.11)	0.01 (0.13)	-0.22*** (0.07)
Colonial Link	0.02 (0.14)	0.17 (0.12)	0.08 (0.18)	0.12 (0.17)	-0.09** (0.03)	0.05 (0.14)	0.35** (0.14)	-0.08 (0.11)
Legal Origins	0.49*** (0.07)	0.24*** (0.06)	0.49*** (0.09)	0.35*** (0.08)	0.04** (0.02)	0.23*** (0.07)	0.28*** (0.07)	0.20*** (0.04)
L.TRADE	0.12*** (0.03)	0.05** (0.02)	0.11*** (0.04)	0.01 (0.03)	0.01 (0.01)	0.03 (0.03)	-0.06** (0.03)	0.06*** (0.02)
NAFTA	2.86*** (0.42)	-2.35*** (0.25)	3.18*** (0.52)	-2.17*** (0.29)	-0.12 (0.09)	-1.95*** (0.25)	-1.84*** (0.26)	-0.99*** (0.18)
ASEAN	0.32 (0.22)	0.24 (0.21)	0.03 (0.28)	0.11 (0.23)	0.02 (0.03)	-0.02 (0.26)	0.05 (0.17)	0.15 (0.12)
EEA	0.06 (0.14)	0.24** (0.12)	0.38** (0.19)	0.12 (0.15)	-0.05 (0.05)	-0.10 (0.14)	0.15 (0.14)	0.48*** (0.09)
EA13	0.44*** (0.15)	0.69*** (0.15)	0.58*** (0.18)	0.83*** (0.18)	0.37*** (0.08)	0.61*** (0.16)	1.01*** (0.17)	0.52*** (0.14)
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,565	4,564	4,564	4,533	4,568	4,564	4,568	4,568
R-squared	0.71	0.56	0.66	0.44	0.41	0.38	0.43	0.58

Note: The dependant variables are the log of portfolio equity holdings for the sector. The model is estimated using pooled OLS. Portfolio data are sourced from the CPIS. Trade data are taken from DOTS. CEPII data are used for the gravity type variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.10: Portfolio Equity by Sector: Bust Period 2008-2009

Bust	(1) SOPHIS	(2) UNSOPH	(3) OFT	(4) ODX	(5) CB	(6) NFC	(7) HH	(8) GG
Distance	-0.55*** (0.07)	-0.43*** (0.06)	-0.47*** (0.09)	-0.59*** (0.07)	-0.01 (0.02)	-0.47*** (0.07)	-0.42*** (0.07)	-0.23*** (0.05)
Common	0.01 (0.14)	0.46*** (0.12)	-0.03 (0.18)	0.02 (0.14)	0.02 (0.05)	0.56*** (0.15)	0.30** (0.14)	-0.04 (0.10)
Colonial Link	0.07 (0.15)	0.13 (0.14)	0.17 (0.20)	0.01 (0.18)	-0.07** (0.04)	0.22 (0.17)	0.06 (0.18)	0.01 (0.13)
Legal Origins	0.43*** (0.07)	0.27*** (0.06)	0.36*** (0.11)	0.31*** (0.09)	0.02 (0.02)	0.06 (0.08)	0.43*** (0.08)	0.22*** (0.05)
L.TRADE	0.12*** (0.03)	0.05** (0.02)	0.18*** (0.04)	0.00 (0.02)	0.02 (0.01)	0.06** (0.03)	0.04 (0.03)	0.02 (0.02)
NAFTA	0.27 (0.94)	-1.18** (0.57)	-0.88 (2.02)	-1.31** (0.58)	0.02 (0.13)	-1.26** (0.58)	-1.19** (0.47)	-0.51* (0.28)
ASEAN	-0.15 (0.25)	0.61** (0.28)	-0.08 (0.36)	-0.21 (0.25)	0.07** (0.03)	0.47 (0.43)	0.26 (0.22)	0.03 (0.15)
EEA	-0.13 (0.15)	0.04 (0.13)	0.08 (0.22)	-0.15 (0.16)	-0.10 (0.06)	0.04 (0.17)	-0.04 (0.17)	0.17 (0.11)
EA13	0.55*** (0.15)	0.91*** (0.16)	1.12*** (0.19)	0.73*** (0.20)	0.33*** (0.11)	0.73*** (0.19)	1.17*** (0.20)	0.76*** (0.17)
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,496	3,495	3,500	3,475	3,507	3,507	3,486	3,507
R-squared	0.71	0.59	0.65	0.45	0.28	0.41	0.45	0.55

Note: The dependant variables are the log of portfolio equity holdings for the sector. The model is estimated using pooled OLS. Portfolio data are sourced from the CPIS. Trade data are taken from DOTY. CEPII data are used for the gravity type variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 4.11: Portfolio Equity by Sector: Recovery Period 2010-2012

2010-2012	(1) SOPHIS	(2) UNSOPH	(3) OFT	(4) ODX	(5) CB	(6) NFC	(7) HH	(8) GG
Distance	-0.62*** (0.05)	-0.54*** (0.04)	-0.58*** (0.07)	-0.59*** (0.06)	-0.01 (0.01)	-0.44*** (0.05)	-0.45*** (0.05)	-0.32*** (0.04)
Language	0.21* (0.12)	0.30*** (0.10)	0.04 (0.15)	0.33*** (0.12)	0.01 (0.03)	0.49*** (0.12)	0.13 (0.12)	0.02 (0.08)
Colonial Link	0.08 (0.13)	0.21** (0.11)	-0.01 (0.16)	0.19 (0.16)	-0.03 (0.02)	0.30** (0.12)	0.31** (0.14)	-0.00 (0.10)
Legal Origins	0.53*** (0.06)	0.31*** (0.05)	0.71*** (0.08)	0.22*** (0.07)	-0.00 (0.01)	0.14** (0.07)	0.42*** (0.07)	0.19*** (0.05)
L.TRADE	0.07*** (0.02)	0.04** (0.02)	0.13*** (0.03)	-0.02 (0.02)	0.01 (0.00)	0.03 (0.02)	0.02 (0.02)	0.01 (0.02)
NAFTA	1.16*** (0.29)	-2.53*** (0.51)	2.09*** (0.41)	-2.03*** (0.57)	-0.19* (0.11)	-2.33*** (0.54)	-2.23*** (0.44)	-1.00*** (0.25)
ASEAN	-0.31 (0.24)	0.96*** (0.20)	-0.53* (0.30)	-0.18 (0.29)	0.03 (0.02)	0.96*** (0.33)	0.22 (0.18)	0.13 (0.16)
EEA	-0.20 (0.12)	-0.13 (0.10)	-0.04 (0.16)	-0.14 (0.13)	-0.08** (0.04)	-0.06 (0.14)	0.14 (0.13)	-0.07 (0.10)
EA13	0.64*** (0.12)	1.07*** (0.12)	0.87*** (0.15)	0.65*** (0.17)	0.14** (0.06)	1.23*** (0.15)	0.97*** (0.16)	0.93*** (0.13)
Host F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,914	5,913	5,910	5,880	5,917	5,907	5,916	5,916
R-squared	0.66	0.61	0.64	0.41	0.21	0.39	0.46	0.57

Note: The dependant variables are the log of portfolio debt holdings for the sector. The model is estimated using pooled OLS. Portfolio data are sourced from the CPIS. Trade data are taken from DOTS. CEPII data are used for the gravity type variables. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Chapter 5

Conclusion

This thesis has addressed three main questions. In Chapter 2, we ask whether or not informational frictions played a part in the adjustment of bank assets during the boom and bust periods of the global financial crisis. In Chapter 3, we propose that the credit growth behaviour of foreign banks might vary depending characteristics of the country of ownership. Finally, in Chapter 4 we investigate whether informational frictions differ across sectors of portfolio investors.

In relation to the first question, addressed in Chapter 2, the main conclusions are as follows. First, bilateral factors are relevant for the adjustment of bank assets. This finding is consistent across locational and consolidated banking data. Second, these effects are non-uniform for advanced and emerging countries. We show that BIS reporting banks adjusted more negatively in distant emerging countries than faraway advanced economies. We find an exception to this during the boom period, if the assets were denominated in the domestic currency of the source banks, there is no evidence of non-uniform effects. Third, we find that trade, colonial ties and the history of a position are important for the adjustment of bank assets, so too but in lesser instances are common languages and regional group membership.

The second question, discussed in Chapter 3 yielded three main results. Primarily, the country of ownership of the foreign bank matters. Banks with advanced country owners behaved differently than those with emerging owners for the 2006-2009 period. Secondly, this behaviour varied

during the global crisis years. Banks with advanced country owners grew credit faster in the pre-crisis period, and shrank credit faster too in the bust period. Thirdly, when controlling for these advanced country differences, we show foreign banks with tighter capital regulation in the home country had less credit growth in the boom period and provided a buffer during the crisis. This finding suggests evidence of regulation pass through from home country to host country.

In Chapter 4, we investigated the third question. The results show that informational frictions differ across investors, and that this differs for risk periods. Interestingly, these frictions do not decrease in the sophistication of investors. This result is high-lighted by the stronger friction of distance for bank investors of portfolio debt than OFCs. Furthermore the gravity ties differ for asset class, distance affects NFCs and households more than OFCs for equity portfolios. Within the OFC sector, other funds diverge from mutual and insurance funds in their behaviour. During the global financial crisis, the friction of distance was more important for portfolio debt than portfolio equity investors. Finally, we show that the positive effect of the common currency was significantly reduced for some sectors during the recent crises. For the European sovereign debt crisis, the common currency had less of a positive effect for households holding either debt or equity. The positive role of the common currency was also significantly lower for the banking sector.

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