City Research Online

City St George's, University of London

Citation: Beqiri, Z. (2016). Essays on banking in developing countries. (Unpublished Doctoral thesis, City, University of London)

This is the accepted version of the paper.

This version of the publication may differ from the final published version. To cite this item please consult the publisher's version.

Permanent repository link: https://openaccess.city.ac.uk/id/eprint/18102/

Copyright and Reuse: Copyright and Moral Rights remain with the author(s) and/or copyright holders. Copies of full items can be used for personal research or study, educational, or not-for-profit purposes without prior permission or charge, unless otherwise indicated, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way. For full details of reuse please refer to City Research Online policy.

City Research Online: http://openaccess.city.ac.uk/ publications@citystgeorges.ac.uk

Cass Business School
CITY UNIVERSITY LONDON

Essays on banking in developing countries

Zana Beqiri

This thesis is submitted for the degree of Doctor of Philosophy
Cass Business School, City University London
July, 2016

Contents

List of Tables **v**

List of Figures **vii**

Acknowledgements **ix**

Declaration **xi**

Abstract **xiii**

Abbreviations **xv**

1 Introduction **1**

1.1 Background 1

1.2 Research questions and motivation 3

1.3 Data 10

1.4 Main findings and contributions 13

1.5 Conclusion 15

2 Foreign bank entry and NIMs: evidence from SEE **17**

2.1 Introduction 17

2.2 Literature Review 23

2.3 Data and Methodology 27

2.3.1 Foreign banks in SEE countries 27

2.3.2 Net Interest Margins in SEE countries 29

2.3.3 Regulation and supervision 32

2.3.3.1 Activity restrictiveness 33

2.3.3.2 Capital regulation 34

2.3.3.3 Official supervisory power 35

2.3.3.4 Private monitoring 35

2.3.4 Control variables . . . 36
2.3.4.1 Bank-specific factors . . . 36
2.3.4.2 Market structure factors . . . 38
2.3.4.3 Macroeconomic factors . . . 38
2.3.5 Methodology . . . 39
2.4 Results . . . 41
2.4.1 Foreign ownership . . . 41
2.4.2 Mode of foreign bank entry . . . 42
2.4.3 Home-country characteristics . . . 43
2.4.4 Control variables . . . 44
2.5 Robustness . . . 45
2.5.1 Endogeneity concern . . . 46
2.5.2 Alternative measures of bank efficiency and market structure 48
2.6 Conclusion . . . 48
Tables . . . 51
Figures . . . 67
Appendices . . . 68

3 Organizational Hierarchy and Institutions 73

3.1 Introduction . . . 73
3.2 Related literature . . . 78
3.2.1 Organizational structure and information production: Theory . . . 79
3.2.2 Organizational structure and information production: Evidence . . . 81
3.2.2.1 Studies using indirect measures of bank organizational structure . . . 81
3.2.2.2 Studies using direct measures of bank organizational structure . . . 86
3.2.3 Organizational structure and loan contracts . . . 88
3.2.4 Institutional environment . . . 89
3.3 Data . . . 90
3.3.1 Bank Organizational Structure . . . 90
3.3.2 Loan and firm data . . . 92
3.3.3 Institutional and macroeconomic indicators . . . 93
3.4 Methodology . . . 95

3.5 Results . . . 97
3.5.1 Bank organizational structure and institutions . . . 97
3.5.2 Bank organizational structure and loan terms . . . 99
3.5.3 Robustness . . . 99
3.5.4 Firm heterogeneity . . . 100
3.6 Conclusion . . . 101
Tables . . . 102
Figures . . . 114

4 Mobile Money and Traditional Banking 117
4.1 Introduction . . . 117
4.2 Related literature . . . 121
4.2.1 Competition and bank performance . . . 121
4.2.2 Competition and access to finance . . . 123
4.3 Background on mobile money . . . 125
4.4 Data . . . 129
4.5 Results . . . 133
4.6 Additional results . . . 134
4.7 Conclusion . . . 136
Tables . . . 138
Figures . . . 146

5 Concluding remarks 149
5.1 Main findings . . . 149
5.2 Policy Implications . . . 151
5.3 Limitations . . . 153
5.4 Further research . . . 154

References 157

List of Tables

2.1 Variable Definitions and Sources. 51
2.2 Number of banks over time. 52
2.3 Average NIMs over time. 53
2.4 Average NIMs and Profits by countries and bank ownership type (1995-2011). 53
2.5 Home and Host Countries. 54
2.6 Regulation and Supervision in Home and Host Countries. 55
2.7 Descriptive statistics and correlation matrix. 56
2.8 The impact of foreign bank ownership on bank NIMs. 59
2.9 The impact of the mode of foreign bank entry on bank NIMs in host countries. 60
2.10 The impact of parent bank NIMs on bank NIMs in host countries. 61
2.11 The impact of home-country regulatory and supervisory indicators on bank NIMs in host countries. 62
2.12 Alternative efficiency measures 64
2.13 Alternative market structure measures 65
2.14 Instrumental Variables (IVs) Second-Stage Regression Results . . 66

3.1 Variable definitions and data sources 102
3.2 Summary Statistics by Country. 104
3.3 Differences in loan terms. 105
3.4 Summary Statistics and Correlations. 106
3.5 Decentralization and Institutions. 108
3.6 Decentralization and Loan Terms. 109
3.7 Firm heterogeneity. 110
3.8 Alternative Decentralization measure 111
3.9 Alternative controls 112
3.10 Alternative sample and clustering of standard errors 113

4.1 Variable definitions and data sources 138
4.2 Bank branches over time by bank name and ownership type. . . . 140
4.3 Descriptive Statistics, County Level. 141
4.4 Descriptive Statistics, Bank, Household and County Level. 142
4.5 The impact of M-Pesa: Bank's Perspective. 144
4.6 The impact of M-Pesa: Households' Perspective. 145

List of Figures

2.1 Host and home countries. 67

3.1 Defining distance. 114
3.2 A typical parent bank. 115

4.1 Mobile Payment Statistics. 146
4.2 Money transfer methods. 146
4.3 Use of M-Pesa. 147

Acknowledgements

I am hugely indebted to my supervisors Barbara Casu and Daniela Fabbri for their constant support and guidance. This thesis wouldn't have been possible without their patience, attention to detail and invaluable feedback. Everything I know about academic writing I owe it to them.

I would like to thank Thorsten Beck for being generous with his time whenever I needed to alleviate any doubts I had with formulating research questions, finding data sources or dealing with methodological issues. His passion for science is contagious and such a great source of inspiration.

I am extremely grateful to the European Bank for Reconstruction and Development for their hospitality during my visit and for kindly providing me with the BEPS II and BEEPS V data used in the third chapter. I thank Ralph de Haas for providing invaluable feedback on the third chapter of the thesis; Helena Schweiger for her help with the BEEPS V data and all staff at the Office of the Chief Economist for a supportive and encouraging environment.

I thank my PhD examiners, Sonia Falconieri and John Wilson, for their constructive comments and suggestions on the thesis.

I would like to thank City University London for the financial support and Cass Business School for a stimulating research environment. I thank Ian Marsh for his advice with the job market and life after PhD. I also thank Malla Pratt and Abdul Momin in the PhD Office for administrative support.

Thanks to all my colleagues at 24 Chiswell Street for making this a great PhD experience.

Finally, I could not thank enough the most deserving people for all my successes. It is through the work discipline, the confidence and the determination they instilled in me, that I have made it so far. I am of course referring to my dear parents - thank you Nuçi and thank you Buço, I owe you so much. A big thanks to my sisters for their moral support during tough times that come with living 2,500 km away from home.

A very special *Faleminderit* to Artan. I am blessed having had you by my side for the past fifteen years and am looking forward to many more together.

Declaration

I grant powers of discretion to the University Librarian to allow this thesis to be copied in whole or in part without further reference to me. This permission covers only single copies made for study purposes, subject to normal conditions of acknowledgement.

Abstract

This thesis consists of three essays examining different aspects relevant to the banking sectors of developing economies. The first two essays focus on Emerging Europe a region with one of the highest foreign bank presence in the world - to study the impact of foreign bank ownership and bank organizational structure on the cost of financial intermediation and terms of loan contracts. The last essay focuses on Kenya which is home to M-Pesa the mobile-phone based money transfer and financing service initially launched in Kenya in 2007 and subsequently in other emerging countries such as Albania, Romania, India, Egypt and several other African countries - to examine its impact on the performance and outreach of commercial banks.

The first essay investigates the impact of foreign bank entry, home and host country conditions on net interest margins (NIMs), using a newly collected panel dataset with ownership information for 265 banks operating in nine Southeast European countries over the period 1995-2011. As the banking sector of many emerging markets and in particular the European transition economies have been dominated by foreign banks understanding the impact of such reforms on host country banking sectors is important for designing supportive policies. We do not find evidence of foreign bank entry having a beneficial effect for host countries in terms of reducing the cost of financial intermediation in the long run, as foreign banks change their behaviour over time. We show that foreign banks have initially lower NIMs compared to domestic banks, however this effect weakens the larger the foreign presence and the more established foreign banks become. We find that home country regulation and supervision have an effect on bank behaviour, with foreign banks coming from countries with stricter regulation having higher NIMs in host countries.

The second essay studies the impact of institutions on bank organizational hierarchy. Studying the internal organizational structure of banks is important as it determines the type of information acquired and used in lending decisions and consequently the type of borrowers banks lend to. This is important not only for bank's loan portfolio composition and their financial soundness but also for

borrower's ability to access funds on favourable terms and the overall financial system stability and economic development. Using a unique bank-level survey dataset covering 32 countries and 611 banks, we introduce a new and direct measure of organizational hierarchy and exploit the distinctive feature of multinational banks which face different institutional environments in the countries they operate. We find that the same parent bank is more likely to grant decision-making authority to its foreign affiliates operating in countries with stronger institutions compared to those operating in weaker institutional environments. Combining the bank- with firm-level data we further find that a strong institutional environment which favours a decentralized organizational structure leads to better lending terms to SMEs decentralized banks grant loans with longer maturities, lower interest rates and are less likely to require collateral compared to their centralized counterparts. These findings further our understanding of bank organizational structure as a channel through which law affects lending.

In the last essay we use the advent of the mobile money innovation in Kenya in 2007 as an interesting laboratory to investigate the impact of a financial innovation on the performance and outreach of commercial banks. Providing more insights about this link is important as it helps inform the debate among policy-makers and regulators on the impact of a non-traditional source of competition on the service provision of formal financial institutions. Given that financial inclusion is a major problem in developing countries, detailed micro-level evidence on this issue is important for promoting household welfare. Combining the 2006, 2009 and 2013 FinAccess household surveys with bank financial statement and branch penetration data at the county level we find that banks more exposed to the competitive pressure induced by the mobile money innovation improved their performance and expanded their outreach towards households traditionally excluded by formal financial institutions. Additional results further show that households report less supply side barriers to financial access in counties more exposed to the advent of the mobile money innovation. These results highlight the importance of increasing the contestability of banking markets in order to promote financial inclusion and a more competitive banking sector.

Abbreviations

BEEPS - Business Environment Enterprise Performance Survey

BEPS - Banking Environment Performance Survey

CEE - Central Eastern Europe

EBRD - The European Bank for Reconstruction and Development

EU - The European Union

GDP - Gross Domestic Product

HHI - Herfindahl-Hirschman Index

IV - Instrumental Variables

NIM - Net Interest Margin

OLS - Ordinary Least Square

SEE - South East Europe

SME - Small and Medium size Enterprise

WDI - World Development Indicators

WGI - World Governance Indicators

Chapter 1

Introduction

This introductory chapter will give an overview of the research area this thesis belongs to, will place the specific research questions in the context of the theoretical and empirical literature and will present the key findings of the research highlighting the main contributions of the thesis.

1.1 Background

The banking sectors of many developing economies have undergone considerable reforms aiming at developing a competitive and efficient financial system in order to facilitate economic growth and financial system stability. Although the pace and the extent of the reforms varied across countries a common objective has been reversing the negative consequences of the repressive financial policies inherited from the previous regimes. In Eastern Europe, for instance, the transition from centrally-planned to market-oriented economies entailed the replacement of socialist banks who acted mainly as bookkeepers for the planned allocation of resources with modern banks whose role is to efficiently channel funds to its most productive uses. Similar transformations took place in other parts of the developing world such as Latin America, Asia or Africa. In Sub-Saharan Africa, for instance, financial sector reforms aimed at dealing with the negative outcomes from the post-independence era characterized by the creation of government-

owned banks and a large number of other banks and non-bank financial institutions most of them unsound, with strong political connections. In general, as a consequence of a long period of government intervention the banking sectors of these countries were characterized by lack of competition, lack of risk management practices for monitoring and evaluating the creditworthiness of borrowers, wide interest spreads as an indication of inefficient intermediation of funds, lack of interest in lending to local customers and expanding access to finance as well as unsound lending practices motivated by political considerations. This, coupled with a poor regulatory environment resulted in several banking crisis. In light of these fragilities, financial sector reforms included internal structural changes such as restructurings and consolidations of unviable financial institutions, privatisations, the liberalization of interest rates, regulations strengthening bank's capital bases as well as opening up to foreign competition in order to reduce the role of state-owned banks, introduce new know-how and expertise as well as recapitalize the banking sector. In addition, technological innovation has been an important driving force for expanding access to finance and introducing new sources of competition which have changed the landscape of traditional banking and have facilitated the reform process.

These reforms raise a number of questions regarding the structure of the banking system, its competitiveness, the availability and quality of financial services provided to firms and households and ultimately the economic development. Despite the potentially beneficial role that these reforms are intended to play, they also introduce new challenges for regulators and supervisors to guard against fragilities and risks that consumers might be exposed to. Arguments in favour include the transformation of poorly performing state-influenced banks into well-capitalized banks, with new risk management procedures able to price risks more realistically, allocate funds more efficiently, that make use of new technologies to offer their services and operating in a competitive environment with an improved regulatory framework. Arguments against point to the new challenges that may arise from increased foreign bank presence, increased competition from non-bank institutions and consolidations in the banking industry. In particular, larger banks created as a result of consolidations and foreign-owned banks are

often accused of cherry picking the best customers leaving unattended small and medium size enterprises which require local knowledge and building personal relationships. Furthermore, the large presence of foreign banks in these countries makes them prone to imported fragilities from abroad posing the need for supervisors and regulators from home and host countries to expand cooperation and the information exchange as highlighted by the recent financial crisis. Finally, the advent of non-bank institutions (such as mobile phone operators) as financial service providers has given rise to the issue of whether to regulate them under banking laws and regulations to ensure that the schemes present little risk to customers and are trustworthy or to offer a more supportive regulatory environment in order not to put a heavy regulatory burden on initiatives aimed at facilitating the provision of financial services to all market segments, including those neglected by traditional banks.

Against this background, this thesis examines the impact of financial system reforms in developing countries on the quality and availability of financial services provided by their banking systems in order to provide policy recommendations for the future. This is especially important for developing countries with bank-based financial systems which have under-developed capital markets and rely mainly on bank financing.

1.2 Research questions and motivation

The first question addresses the impact of foreign bank entry on the cost of financial intermediation as measured by net interest margins (NIMs). The motivation for focusing on NIMs (measured as the difference between interest income and interest expense over total earning assets) is the fact that this indicator is a commonly accepted measure of how costly bank intermediation services are for the society. High NIMs are usually associated with inefficient allocation of resources as they discourage savings with low returns on deposits and increase financing costs for borrowers with high interest rates on loans. Given the evidence that finance is important for driving economic growth (Beck, Levine and Loayza (2000);

Levine (1997)) and alleviating poverty (Levine (2005)) understanding whether the reform process more specifically, the liberalisation of the banking sector has achieved the intended effect of reducing the cost of financial intermediation is important for identifying policy areas that have a first-order effect on creating a legal and macroeconomic environment conducive to the efficient operation of the banking sector.

We aim to answer the following questions: (i) Do foreign banks operate with lower NIMs compared to domestic banks and has foreign bank entry lead to an overall reduction of NIMs in host countries? (ii) Does the mode of foreign bank entry (acquisition vs. greenfield entry) matter for NIMs? and (iii) Do home country conditions such as parent bank NIM and the home country regulatory environment impact the NIMs of foreign bank in host countries?

Theoretically the effects of foreign bank entry have been modelled as information asymmetry problems between incumbent (domestic banks) and new entrants (foreign banks). Domestic banks poses an incumbency advantage in terms of acquiring information about existing borrowers, whereas foreign banks poses better screening technology for evaluating the creditworthiness of new applicants. In other words domestic banks are better at dealing with soft information, whereas foreign banks have an advantage in processing hard information (Dell'Ariccia and Marquez (2004); Detragiache, Tressel and Gupta (2008)). If foreign banks enter through acquisition they inherit a customer base with all the related information about them, which is not the case when entering via greenfield investment. Claeys and Hainz (2014) argue that the incumbency (informational) advantage of domestic banks is lower when entry is made via acquisition as these banks inherit information about the existing customer base on top of the screening advantage they possess. Domestic banks thus demand a higher interest rate to compensate for this informational disadvantage, which allows foreign banks to demand a higher interest rate as well. Thus, when entry is made via acquisition the competition is less intense and the interest rates are higher compared to greenfield investments. Van Tassel and Vishwasrao (2007) also imply that greenfield entry leads to more competition and lower interest rates in host markets.

Empirical studies have found mixed results. Some studies find that foreign bank entry has contributed to a reduction of NIMs mainly due to increased bank competition (Barajas, Steiner and Salazar (2000); Martinez Peria and Mody (2004)) while others find a positive association between foreign bank entry and bank margins due to market power and macroeconomic instability (Chirwa and Mlachila (2004)). A third group of studies find no significant impact of foreign bank entry on bank margins (Beck and Hesse (2009); Brown, Maurer, Pak and Tynaev (2009); Dabla-Norris and Floerkemeier (2007)) or a mixed impact depending on the level of economic development of host countries (Claessens, Demirguc-Kunt and Huizinga (2001); Demirguc-Kunt and Huizinga (1999)). In terms of modes of foreign bank entry the empirical literature has generally found support for the hypothesis predicting a lower interest margin of greenfield compared to acquisition banks (Havrylchyk and Jurzyk (2011); Martinez Peria and Mody (2004)).

These studies have generally treated foreign banks as a homogeneous group regardless of the characteristics of their parent banks or home country conditions. There is however evidence that foreign banks are sensitive to home country factors. Accounting for this heterogeneity is important for countries dealing with majority foreign-owned banking sectors in order to guide regulatory reform in this area. A number of papers have found that foreign bank lending reflects conditions of parent banks in different macroeconomic environments. De Haas and Van Lelyveld (2010) find that foreign banks with financially strong parents expand their lending faster. The impact of home country conditions is even more pronounced in crisis times. Peek and Rosengren (1997) show how the sharp decline of Japanese stock prices was transmitted to the United States resulting in a decline in lending by US branches of Japanese parent banks. Schnabl (2012) uses the Russian crisis of 1998 as a negative liquidity shock and finds that after the shock international banks reduce lending to Peruvian banks which in turn reduce lending to Peruvian firms. Evidence from the 2007-2008 financial crisis (Cetorelli and Goldberg (2011); De Haas and Van Horen (2013); Popov and Udell (2012)) has also shown that foreign banks act as transmitters of their home country conditions. Furthermore, there is evidence that globally active banks have an incentive to engage in regulatory arbitrage in order to maximize profits (Houston,

Lin and Ma (2012); Ongena, Popov and Udell (2013)). The aim of this essay is to provide evidence on the consequences of uneven regulation between home and host countries for the behaviour of foreign banks in host countries.

The second essay examines how the institutional environment affects bank organizational hierarchy (i.e. centralized vs. decentralized organizational structures) and how that in turn affects loan terms to SMEs. The motivation for focusing on the determinants and consequences of bank organizational hierarchy is that the level of decision-making authority impacts the amount and type of information (hard versus soft) that enters the decision-making process and consequently the type of borrowers served as well as the terms under which these borrowers obtain financing. This has an impact on bank performance, its portfolio composition, SME financing and ultimately on local economic development. The widespread entry of foreign banks in developing countries has raised many concerns that because of their complexity and large hierarchical distance between host country subsidiaries and home country headquarters, foreign banks cannot effectively lend to small and opaque borrowers compared to domestic banks which are usually less hierarchical. The aim of this essay is to examine whether a certain type of bank organizational structure is more prevalent in a particular institutional environment and what the implications are for SME financing arrangements.

Theoretically, the hierarchical distance between information-collecting officers and decision-making centres can change incentives for the production and use of information and lead to worse credit outcomes. At the centre of all theoretical models is the idea that in more hierarchical organizations information sharing between hierarchical layers becomes difficult. Two groups of theories put forward different explanations. Incentive-based theories (Aghion and Tirole (1997); Stein (2002)) emphasise the role of ex-ante incentives for the production of information. In hierarchical (centralized) structures the incentives of lower hierarchical levels to produce information are diminished as they have to transfer this information to higher hierarchical levels for decision-making. Given that they cannot utilize this information themselves and given the possibility that their decision may be overruled (i.e. their information disregarded) by the prin-

cipal, they have less incentive ex-ante to invest time and effort in producing it. This is even more pronounced for soft information which is not directly verifiable and not easily transferred between hierarchical layers. Communication cost theories (Becker and Murphy (1992); Bolton and Dewatripont (1994); Crawford and Sobel (1982); Dessein (2002); Radner (1993)) emphasise communication and coordination costs between different hierarchical layers arising from the tendency of informed agents to add noise and strategically manipulate the information which can lead to suboptimal decisions if their objectives are sufficiently divergent from those of the uninformed principal. Overall, these theories imply that in choosing an organizational structure there is a trade-off between information and control. Decentralized organizational structures utilize the information collected by lower hierarchical layers however it entails a loss of control for the principal.

Empirically, studies directly testing these theories are scarce as it has been difficult to operationalize concepts such as hierarchical structure or authority. Studies have often used indirect measures of organizational hierarchy such as foreign ownership, bank size or bank complexity. Studies using bank size as a measure of organizational hierarchy (Berger, Miller, Petersen, Rajan and Stein (2005); Berger and Udell (1996); Cole, Goldberg and White (2004); Strahan and Weston (1998)) generally find that large banks tend to lend more to large firms with good financial history and rely mainly on hard information when making their loan approval decisions. Another strand of literature has used distance be it cultural, geographical, organizational or institutional between banks and borrowers to measure its impact on lending to different market segments. The intuition is that more hierarchically organized banks such as foreign and large banks are more distant from local information and are therefore at a disadvantage when lending to small and opaque borrowers. Studies have generally found support for this prediction showing that foreign banks tend to shy away from soft-information based loans (De Haas, Ferreira and Taci (2010); Mian (2006); Popov and Udell (2012)) or target the same clientele as domestic banks but with transaction-based lending technologies (Beck, Ioannidou and Schaefer (2014)). The bank-borrower closeness becomes even more valuable during crisis times when information asymmetries are more severe, as there is evidence that banks which had prior established re-

lationships with borrowers continued to lend to SMEs during the recent financial crisis (Beck, Degryse, De Haas and Van Horen (2014); De Haas and Van Horen (2013)).

Few studies that use direct measures of bank organizational hierarchy rely either on single country data, or use proprietary data from a single bank. Canales and Nanda (2012) create direct measures of bank decentralization based on the degree of autonomy that branch managers have over various lending decisions. They find that decentralized banks give larger loans to soft-information (small) firms. Other studies use bank proprietary data focusing on the direct allocation of authority (Agarwal and Hauswald (2010); Liberti and Mian (2009); Qian, Strahan and Yang (2015); Skrastins and Vig (2014)) and generally find that higher hierarchical layers rely more on objective hard information and less on subjective information. The aim of this essay is by using direct measures of bank organizational hierarchy on a cross-country setting to investigate the role of the institutional environment in shaping the organizational structure of banks and the implications for small business lending.

The third essay focuses on a different aspect of financial sector developments, namely the advent of M-Pesa - a financial innovation that allows users to transfer money fast and at a low cost using simple short messaging service (SMS) technology that has changed not only the way households manage their finances but also the landscape of traditional banking. Specifically, we investigate the impact of the competitive pressure induced by the advent of a non-bank entrant on the performance and outreach of commercial banks. The focus on the service provision of formal financial institutions is important as financial exclusion (i.e. lack of access to traditional banking services) is considered an important impediment to growth in developing countries ((see Schumpeter, 1912; King and Levine, 1993; Levine, 1997)). At the micro level, access to basic savings and credit services helps individuals smooth consumption and invest in productive activities such as entrepreneurship and education. At the macro level, access to finance is strongly predictive of future economic growth. Yet, barriers to basic financial services exist, especially among the world's poor. Market imperfections

such as transaction costs, information asymmetries or an inadequate contractual environment limit the supply of financial services and lead to involuntary excluded population segments. It is therefore not surprising that there have been numerous policy efforts to expand outreach starting from microfinance lending, state-led bank branch expansion programs, agency banking as well as the introduction of new products and technological innovations that foster financial inclusion. The aim of this paper is to assess whether one such innovation mobile money had spill over effects in terms of encouraging commercial banks to become more inclusive while remaining profitable in the process.

Theoretically the impact of competition on bank performance and outreach is ambiguous. Theories predicting a negative relation between bank competition and performance rely on general economic theory emphasising inefficiencies arising from market power. The *structure-conduct-performance hypothesis* (Bain (1951)) predicts that higher concentration in the banking system lowers the cost of collusion thereby allowing banks to earn above competitive profits. The *efficient structure hypothesis* (Demsetz (1973)) posits that it is the efficiency of banks rather than their market share or concentration that explains their superior performance. On the other hand, the *quiet life hypothesis* (Hicks (1935)) posits that banks enjoy the advantages of market power by incurring inefficiencies rather than reaping monopolistic rents, implying a negative relation between competition and bank performance. With regards to the relation between competition and banking sector outreach the *market power hypothesis* (Klein (1971)) argues that market power is detrimental for consumer welfare as it allows banks to charge a price above marginal costs and ration credit. Alternatively, the *information hypothesis* (Petersen and Rajan (1995)) posits that more competitive banking sectors make it more difficult for banks to invest in relationship building as the best customers have more options to opt out leaving the bank to bear the initial cost of building the relationship, which leads in a reluctance to engage with less transparent customers.

Empirical studies have found support for both views. Regarding bank performance studies have found a positive relation between competition and bank per-

formance (Berger and Hannan (1998); Delis and Tsionas (2009); Schaeck and Cihak (2008)) supporting the quiet life hypothesis and the need to increase the contestability of banking markets in order to improve bank efficiency. Others have found a negative relation between competition and bank performance rejecting the quiet life hypothesis (Berger (1995); Koetter, Kolari and Spierdijk (2012); Maudos and Fernandez de Guevara (2007)). With regards to access to finance studies have found support for both the market power hypothesis (Beck, Demirguc-Kunt and Maksimovic (2004); Beck, Demirguc-Kunt and Martinez Peria (2008); Love and Martinez Peria (2014)) and the information hypothesis (Berlin and Mester (1999); Cetorelli and Gambera (2001); Petersen and Rajan (1994)).

These studies mainly focus on developed country banking sectors which have different specificities compared to developing countries. Developing countries are plagued by information asymmetries, a weak institutional framework and lack of basic infrastructure necessary for banking which calls for different solutions to the financial exclusion problem. Moreover, all of these studies focus on interbank competition as opposed to competition from non-traditional sources such as telecommunication companies. Commercial banks have a roughly similar business model in terms of customers they target and are therefore less likely to push the access frontier towards less formally included population segments. The aim of this paper is to examine whether the advent of M-Pesa as a new non-bank entrant in the financial landscape of Kenya, has changed the way traditional commercial banks operate. More specifically, we test whether banks more exposed to the advent of M-Pesa (as measured by a bank-level exposure index) expanded their outreach towards more opaque market segments, traditionally excluded by commercial banks and whether they remained profitable in the process.

1.3 Data

The thesis makes use of different data sources starting from hand-collected bank ownership data, proprietary bank-, firm- and household-level survey data, bank

financial statement and branch penetration data as well as publically available macroeconomic and regulatory indices. The first two essays focus on Emerging Europe - a geographical area typically used when examining issues relating with foreign bank entry. The focus on this geographical area is important for several reasons: *first*, the asset share of foreign-owned banks in the region is among the highest of any banking sector in the world; *second*, despite a large presence of foreign-owned banks and banking sector reforms, although considerable progress has been made, these countries still exhibit high costs of financial intermediation and an inadequate credit supply to the SME sector which because of their opacity and under-developed capital markets rely mainly on bank financing; *third*, recent data-collection efforts in the region have made possible a thorough investigation of the impact of different bank business models and ownership structures on the availability and quality of financial services.

To address the questions posed in the first essay we collect time-varying bank ownership data for 265 banks operating in nine South-east European countries: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Romania and Serbia over the period 1995-2011. For each bank and for each year we know whether the bank is foreign- or domestic-owned. For foreign banks we know the mode of entry (greenfield vs. acquisition), the country of origin as well as the name of the parent bank. Unlike Claessens and Van Horen (2014), we define ownership and country of origin based on ultimate (indirect) rather than immediate (direct) ownership. Identifying the ultimate ownership is more time-consuming as it requires tracking the ownership chain all the way up to the principal owner however it is a better representative of the ultimate decision-making authority within a banking group. The ownership data is then supplemented with financial statement data from BankScope, macroeconomic data from the World Development Indicators database as well as banking regulation and supervision variables from the indices compiled by Barth, Caprio and Levine (2013) based on the Banking Regulation and Supervision Survey carried out by the World Bank.

For the second essay we combine two main databases: bank-level data from

the EBRD Banking Environment and Performance Survey (BEPS) II with firm-level data from the fifth round of the EBRD-World Bank Business Environment Enterprise Performance Survey (BEEPS). BEPS II was carried out by a team of specialized consultants who administered a common questionnaire through a face-to-face interview with the bank's CEO across 32 countries in Eastern Europe, Central Asia and southern and eastern Mediterranean and a total of 611 banks. The main purpose of the survey is to provide information on bank lending activities, funding and risk management strategies, bank lending technologies as well as the competitive and regulatory environment. BEEPS is a joint initiative of the European Bank for Reconstruction and Development and the World Bank Group. The survey was first undertaken in 1999-2000 and subsequently in 2002, 2005, 2008-2009 and the most recent fifth round used in our analyses in 2011-2013. The fifth round of the survey (BEEPS V) covered around 15,600 enterprises in 30 countries. The main purpose of the survey is to provide information on the extent to which different aspects of the business environment represent obstacles to firm growth. In addition the survey provides detailed information on firm characteristics and their financing arrangements. These data are supplemented with bank ownership information, bank financial statement information from BankScope, regulatory and macroeconomic indicators from the Doing Business, Worldwide Governance Indicators and the World Development Indicators database.

The third essay focuses on Kenya - a country which has been at the forefront of efforts to expand access to finance. The focus on Kenya is important for several reasons. *First*, the Kenyan financial landscape witnessed a financial innovation the money transfer platform M-Pesa - that has drawn global attention and has had transformative effects on the way households manage their finances as well as on the service provision of the formal financial sector. *Second*, as in many developing countries despite efforts to increase financial inclusion and financial sector development, the number of households who are excluded from even the basic financial services remain high, albeit declining. *Third*, the data collection effort of the Financial Sector Deepening Trust of Kenya (FSD Kenya) in 2006, 2009 and 2013 provides detailed household-level survey data on access and usage

of financial services by product type and institution type before and after the advent of M-Pesa, which, together with bank financial and branch penetration data allows us to provide micro-evidence that can inform policy debates on ways to promote financial inclusion.

1.4 Main findings and contributions

The first essay examines the impact of foreign bank entry on NIMs taking into account both home and host country factors. We find that during the first years of banking sector liberalization foreign banks operate with lower NIMs compared to domestic banks, whereas at more advanced stages of reform this difference weakens and foreign banks start operating with higher NIMs. This effect is stronger for foreign greenfield banks as they have an efficiency advantage compared to foreign acquisition banks which may inherit low quality loan portfolio or an inefficient organizational structure. Furthermore greenfield banks have an informational disadvantage as they lack proprietary customer information which gives them an incentive to target the most transparent segments of the market which by being more competitive provide lower NIMs. Greenfield banks may later tilt their portfolio composition towards more opaque market segments as they operate longer in the market and acquire more proprietary information, hence their higher NIM during the second sample period. Finally, when incorporating home-country factors into the analysis we find that foreign banks coming from home countries with stricter regulation on bank activities and capital requirements operate with higher NIMs in host countries compared to their domestic counterparts. This is consistent with the idea that foreign banks compensate for the more limited profit opportunities at home by operating with higher NIMs abroad. These results contribute to the foreign bank entry literature: *first*, we exploit the heterogeneity of foreign banks due to their home country conditions and find that stricter home country regulation has a strong positive association with foreign bank NIMs in host countries; *second*, we make use of the newly collected time-varying panel dataset of bank ownership allowing us to explore the dynamics of foreign banks'

NIMs and the time span required for the change of ownership to affect bank NIMs and find that foreign banks change their behaviour during different stages of financial sector reforms. The results also contribute to the multinational bank profitability literature by showing that the cost of financial intermediation in host countries is a function of both domestic and multinational factors.

The second essay examines the impact of the institutional environment on the level of decentralization of bank lending activities and its impact on SME loan contracts. We find that a strong institutional environment favours a decentralized organizational structure. The results confirm the hypothesis that strong institutions reduce information asymmetries and make monitoring lower hierarchical levels easier thereby lowering both the within bank and the bank-borrower distance. Strong institutional environments (as measured by the quality of contract enforcement, availability of credit information and the efficiency of the banking regulator) which favour decentralized organizational structures lead to better lending terms for SMEs decentralized banks are less likely to require collateral, give longer maturity loans and charge lower interest rates than their centralized counterparts. The results contribute to the literature on organizational structure and information production in two ways: *first*, by introducing a new and direct measure of bank organizational hierarchy. Studies using bank size or foreign ownership as a proxy, implicitly assume that banks have a homogeneous organizational structure across all market segments i.e. SME, retail and large corporates, masking important differences on the intensity of information required for different market segments, hence the appropriate level of decision-making authority; and *second*, by showing, for the first time in the literature across a large sample of countries that cross-country differences in the institutional environment have a significant impact on bank organizational hierarchies. The results also add to the law and finance literature by revealing a channel through which law impacts lending, namely, the hierarchy of bank lending decisions.

The third essay examines the impact of the competition induced by a non-bank entrant on the service provision of formal financial institutions. We find that banks more exposed to the advent of M-Pesa tilted their portfolio composition to-

wards more opaque market segments i.e. households with no permanent dwelling and lower asset holdings. We also show that they remained profitable in the process - a higher exposure index is positively associated with bank ROA and negatively related with their overhead costs. Overall, these results support theories predicting a positive relation between competition and bank performance and outreach. The results advance the competition-access to finance literature in several ways: *first*, to the best of our knowledge we are the first to link the advent of M-Pesa to the service provision of formal financial institutions. Previous studies have investigated the impact of M-Pesa on household welfare or firm performance but evidence on the impact on commercial banks is lacking. There are also studies looking at the impact of interbank competition on bank performance and firm access to finance, whereas the focus here is on the competitive pressure induced by a non-bank entrant and the household rather than the firm market segment; *second*, the focus on a single country Kenya, home to the financial innovation which has drawn global attention and has later spread to many other developing countries is important as it allows us to abstract from regulatory and institutional heterogeneity and focus on the effect of local market competition only; *third*, we have detailed data at the county level allowing us to provide micro-evidence on the impact of competition on financial inclusion. Studies using aggregate measures of outreach might mask important variation in access and use of financial services at the local level.

1.5 Conclusion

Overall, the thesis presents new evidence on the impact of financial sector reforms on the availability and quality of financial services in developing economies. Besides the academic contribution the results presented in this thesis have policy implications by advancing our knowledge on ways to make the financial system more inclusive and affordable for all market segments. We show that foreign bank entry which was regarded as one of the necessary steps to introduce fresh capital and know-how to the post-transition banking systems had a heterogeneous

impact on the cost and the availability of credit in host countries depending on the home country regulatory environment and the business model (i.e. centralized vs. decentralized organizational structures) adopted by commercial banks. Countries dealing with majority foreign-owned banking sectors should consider the origin of foreign banks as well as the business model they operate with so as to design supportive policies and create a regulatory environment that promotes financial intermediation. Furthermore, this research shows that banking sector competition need not come from traditional commercial banks only, rather competition from non-bank entrants can be as effective if not more effective in expanding access to basic financial services to a wide spectrum of the population including the lower end of the market.

The remainder of the thesis is organised as follows. The next chapter presents the first essay on the impact of foreign bank entry on host country net interest margins. The third chapter presents the second essay on the impact of the institutional environment on bank organizational hierarchy. The third essay on the impact of the competition induced by the advent of a mobile money innovation on the performance and outreach of commercial banks is presented in chapter four. Chapter five summarizes the main findings and contributions of the thesis, gives policy implications of the results and suggests areas for future research.

Chapter 2

Foreign bank entry and net interest margins: evidence from Southeast Europe

2.1 Introduction

In this paper, we investigate the impact of foreign bank entry on the cost of financial intermediation in domestic (host) markets. We focus on the net interest margin (NIM) as a high differential between deposit and lending interest rates is commonly associated with decreased credit availability and inefficient financial intermediation.[1] High NIMs may hinder the efficient allocation of resources and reduce the effectiveness with which the financial system channels funds from borrowers to lenders, more so for emerging economies with under-developed capital markets that rely mostly on bank financing. This may in turn slow down economic growth as there is ample evidence about the importance of finance for economic development (Levine (1997, 2005)). The literature has associated high

[1]NIM is a measure of the ex post (realized) bank interest spread. The ex ante spread would be the difference between the contractual rates charged on loans and rates paid on deposits. The ex post spreads, or margins, are the actually received interest revenue minus the interest costs on deposits. Margins are usually lower than spreads because of the lost interest on non-performing loans. Data about ex ante rates is less readily available and if it is, it comes from different sources (i.e. not comparable) and at the aggregate level, therefore the use of ex post spreads is preferred (Demirguc-Kunt and Huizinga (1999)).

NIMs with inefficient banks exploiting dominant positions in their host markets, as well as an inefficient regulatory environment (Demirguc-Kunt and Huizinga (1999); Demirguc-Kunt, Laeven and Levine (2004)). In this context, the entry of foreign banks becomes relevant, although their role in domestic economies remains controversial. Arguments in favour rely on the premise that foreign bank entry may improve access to international capital markets; enhance the availability and quality of financial services by increasing competition and transferring of know-how and expertise (Bruno and Hauswald (2014)). In addition, foreign banks' presence may improve the regulatory framework, overall financial system development and economic growth. Arguments against posit that foreign bank entry may facilitate capital outflows; foreign banks may service only the most profitable market segments and increase banking system fragility (Giannetti and Ongena (2009); Gormley (2010)). Although the impact of increased foreign presence is controversial in the academic literature, one key step of many emerging markets' reform process involves the privatization of state-owned banks and the opening of the financial sector to foreign investors. The rapid expansion of foreign bank presence in recent years has raised many questions about the costs and benefits of this process for domestic banks, borrowers and governments. This process has been even more remarkable in transition economies. The proportion of assets owned by foreign banks increased from virtually zero in the early 1990s to 73.5 % in Central and Eastern Europe (CEE) and 84.7 % in South East Europe (SEE).[2] This can be attributed to two related phenomena. *First*, the desire of these transition countries to qualify for EU membership was a strong catalyst for reform and improvements in bank regulation and supervision. *Second*, the prospects of EU membership, made these under-banked markets attractive to foreign investors.

Despite the growing trend among transition economies to allow greater foreign

[2]CEE countries are: Estonia, Latvia, Lithuania, Slovenia, Hungary, Poland and Slovakia. These countries became EU member states in 2004 (Fourth Enlargement, Part 1). SEE countries are: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Romania and Serbia. Bulgaria and Romania became EU member states in 2007 (Fourth Enlargement, Part 2), whereas Croatia joined the EU in 2013. Albania, Bosnia-Herzegovina and Kosovo have applied for EU membership; Macedonia, Montenegro and Serbia are official candidate countries.

bank entry, the question of whether this process lead to an overall reduction of NIMs in domestic markets remains controversial. In this paper we study the impact of foreign bank entry on the cost of financial intermediation in SEE countries (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Romania and Serbia). SEE countries experienced considerable political, economic and financial sector reforms over the past two decades as they moved from centrally planned to market oriented economies. A particularly difficult aspect of the transition process was the transformation of their banking systems. After more than two decades of reforms, although considerable progress has been made, SEE countries are still lagging behind Western European countries. The SEE banking system is small, both in absolute terms and in relation to its GDP. The average credit to GDP ratio in 2011 amounted to 63% in SEE, compared to 168% in the EU-15 countries.[3] Furthermore, SEE has an even lower intermediation in the private sector: the average private sector credit to GDP ratio in 2011 was 54% compared to 152% in the EU-15 countries. In addition, the SEE banking sector has high liquidity and capitalization ratios, while the level of non-performing loans has often been a cause of concern. In terms of market structure, the number of banks operating in the SEE banking sector is large compared to its size. As of 2011, there were 217 banks operating in SEE countries. The total number of banks has however declined over the years and the sector is moderately concentrated.[4] Notwithstanding the successful reforms[5], and the substantial presence of foreign banks, the region is characterised by very high NIMs. Average NIMs over the period 1998-2008 amounted to 6.75% in SEE, compared to 6.17% in Latin America, 4.01% in Central and Eastern Europe and to 3.84% in the EU-15.[6] This empirical observation motivates us to examine the

[3]The EU-15 refers to the number of member countries in the European Union prior to the accession of ten countries on 1 May 2004. The EU-15 is still used to define the 'old' EU member states and comprises the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

[4]A detailed overview of the SEE banking sector is provided by Bonin, Hasan and Wachtel (2009).

[5]The EBRD index of banking sector reform shows that most SEE countries have a score of 3, which indicates substantial progress in liberalizing interest rates and allocating credit to private enterprises, privatizing the banking sector, establishing of bank solvency and of a framework for bank supervision and regulation.

[6]Figures from BankScope.

impact of foreign bank entry of NIMs in SEE. In particular, we aim to answer the following questions: (i) Do foreign banks operate with lower NIMs compared to domestic banks? (ii) Has foreign bank entry lead to an overall reduction of NIMs in domestic markets? (iii) Does the mode of foreign bank entry matter? and (iv) Do home country conditions matter?

To answer these questions we collect detailed information on bank ownership for 265 banks operating in nine SEE countries over the period 1995-2011. The SEE region presents a considerable degree of heterogeneity in terms of progress towards EU membership: Bulgaria and Romania became EU member states in 2007; Croatia joined the EU in 2013. Albania, Bosnia-Herzegovina and Kosovo have applied for EU membership while Macedonia, Montenegro and Serbia are official candidate countries. These differences should allow us to tease out the variation in NIMs associated with differences in home-country regulatory environments. In addition, this data set is particularly suited to investigate the impact of foreign bank entry for several reasons. *First*, the banking sector of the SEE area has attracted among the highest foreign bank presence in the world (on average, across the region, around 80 per cent of bank assets is foreign owned). *Second*, we hand-collected ownership information for all banks in the sample, and for foreign banks we also collected information about the mode of entry, the country of origin and the name of the parent bank. This allowed us to match the home and host country characteristics, as well as parent bank and foreign affiliate characteristics to analyze which entry modes (acquisition vs. greenfield) and which home country characteristics impact the relation between foreign bank ownership and NIMs in host countries. This latter information is supplemented with balance sheet and income statement data from BankScope, making it one of the most comprehensive data sets of bank ownership for the sample of SEE banks. Accounting for these differences will allow us to more precisely disentangle the relationship between foreign bank ownership and NIMs in host countries. *Third*, the long sample period allows us to exploit the time-series dimension of foreign bank entry, by focusing on the evolution of NIMs in two different periods: the first one characterized by the rapid expansion of foreign bank presence and the second one with a banking sector almost saturated in terms of foreign bank entry

with a high percentage of banking assets owned by foreign banks. *Finally*, the high degree of heterogeneity in the country origin of foreign banks allows us to identify if home country conditions influence foreign bank NIMs. Specifically, we collect information of the regulatory and supervisory standards in the home and host countries, as there is evidence that these influence the behaviour of foreign banks.

Our results show that foreign banks' behaviour changes over time. When foreign banks enter a host country, they initially do so with lower NIMs compared to their domestic counterparts. However, as they become more established and the foreign presence in a host country increases, so do foreign bank NIMs. As a consequence, over time, we do not find evidence of foreign bank entry having a beneficial effect for host countries in terms of reducing the cost of financial intermediation. These results are consistent with the analysis of the mode of entry: up to 2004 foreign banks entered the SEE market via greenfield investment, after which acquiring existing banks became more common. We find that while entry both via acquisitions and greenfield is associated with foreign banks operating with significantly lower NIMs than domestic banks in the first part of the sample period, only entry via greenfield remains significant in the second part of the sample period. However, the relation with NIMs becomes positive, indicating a shift towards higher margin lending, possibly to SMEs. We also find evidence that foreign banks from countries with more restrictions on bank activities and ownership that limit diversification opportunities have higher NIMs in host countries compared to domestic banks. This might indicate possible regulatory arbitrage, as bank seek profit opportunities to compensate forgone profits and higher regulatory costs at home. This is particularly relevant in emerging markets, as the process of financial liberalization often (but not always) implies a more lenient regulatory structure. However, we also find evidence of regulatory spillovers: stricter supervisory standards at home, possibly extending to the supervision of foreign subsidiaries, seem to translate into lower NIMs in host countries. This may suggest that stronger home country supervision can limit risk-taking abroad if foreign banks are supervised by authorities in the country of origin.

Our analysis contributes to the literature along different directions. *First*, we exploit the heterogeneity of foreign bank entry and home country conditions, to investigate whether this impacts NIMs in host countries. *Second*, by using the newly hand-collected panel data set of bank ownership we are able to explore the dynamics of foreign banks' NIMs over a relatively long transition period, encompassing relevant regulatory changes, as well as changes in market structure and industry characteristics. Our paper also adds to the strand of the literature on multinational bank profitability by analyzing the cost of financial intermediation in host countries as a function of both domestic and multinational factors. *Finally*, our study also relates to the strand of literature on the impact of distance on bank activities, such as loan rationing (Petersen and Rajan (2002)), lending constraints (Mian (2006)), and loan rates (Degryse and Ongena (2005)) by considering the impact of geographical and institutional distance between home and host countries. More generally, we contribute to the debate of weather the rapid expansion of foreign banks has been beneficial for host countries in terms of reducing the cost of financial intermediation and generating economic growth. In addition, we contribute to the debate on EU integration, by investigating possible cross-border spillover effects of bank regulation through the behaviour of foreign banks in host countries. A successful EU integration will depend on the degree to which reforms have contributed to a sound financial sector which will in turn fund a sustainable growth and ensure economic convergence. The general framework for evaluating the success of financial sector reforms in SEE, more specifically the liberalization of the banking sector to foreign entry, relies largely on the evaluation of the impact this process has had on reducing the gap between the economic development of EU and new or potential EU member states.

The rest of the paper is organized as follows. Section 2.2 reviews the relevant literature. Section 2.3 describes the data and the methodology. Section 2.4 presents the results. Section 2.5 shows several robustness tests. Finally, Section 2.6 concludes.

2.2 Literature Review

Studies analyzing the determinants of bank NIMs date back to the pioneering work of Ho and Saunders (1981). In their model they view the bank as a risk-averse dealer that faces uncertainty regarding the flow of deposits and loans. The bank will demand a positive interest spread for providing immediacy of services in the face of this uncertainty. The model shows that the optimal interest spread is a function of: the degree of bank risk-aversion, the average transaction size, the degree of competition in the market and the variance of interest rates. Subsequent work has extended their analysis in several ways. In McShane and Sharpe (1985) the source of interest rate risk is situated in the uncertainty of the money market. Allen (1988) allows for different types of credits and deposits and shows that pure interest margins may be reduced as a result of diversification of bank services and products. Angbazo (1997) in addition to interest rate risk includes default risk and investigates whether risks are heterogeneous across banks of different size. Starting from these models several studies have empirically investigated NIM determinants including different countries, time periods and different explanatory variables. However, only recently has research focused on the impact of foreign bank entry on NIMs. As foreign bank entry has been more pronounced in emerging economies, such studies have mostly focused on these countries.

Theoretically, the relation between foreign bank entry and NIMs in host countries has been modelled as an information asymmetry problem between incumbent (domestic banks) and new entrants (foreign banks). Incumbent banks have better soft information, while foreign banks are better at processing hard information (Dell'Ariccia and Marquez (2004)). The main channels through which foreign bank entry influences interest margins in host countries are the spillover channel and the competition channel (Goldberg (2007); Lehner and Schnitzer (2008)). The spillover effect results from the transfer of better screening technology, better utilization of resources and know-how from foreign to domestic banks. This will decrease the cost of financial intermediation (NIMs). The competition channel results from an increase in the number of banks in the domestic banking market

as a result of opening up the market to foreign entry. Foreign bank entry will increase the number of banks if it is done via greenfield investments as opposed to foreign acquisition and will lower NIMs more strongly (Claeys and Hainz (2014)). This literature identifies the following testable prediction.

H1: Foreign bank entry lowers NIMs in host countries.

Studies that empirically investigate this issue find mixed results. For Latin American countries, Martinez Peria and Mody (2004) find that foreign banks are able to charge lower spreads than domestic banks, however, they do not find consistent evidence regarding the direct impact of foreign bank participation on domestic bank spreads. For CEE countries, Claeys and Vander Vennet (2008) find that foreign bank entry has contributed to the reduction of interest margins. Other studies have found a less favourable effect of foreign bank entry for NIMs in host countries. Claessens et al. (2001) using bank-level data from 80 countries find that foreign banks in developed countries have lower interest margins than domestic banks, whereas the opposite is true for foreign banks in developing countries. Similarly, Demirguc-Kunt and Huizinga (1999) find that foreign ownership is associated with higher interest margins, especially in developing countries. These mixed empirical results can be due either to different sample periods corresponding to different stages of foreign bank entry, different control variables or to treating foreign banks as a homogeneous group. The importance of treating foreign banks as a heterogeneous group has been highlighted by a number of studies investigating the modes of foreign bank entry (Claeys and Hainz (2014); Degryse, Havrylchyk, Jurzyk and Kozak (2012)) and the behaviour of foreign banks as a function of both domestic and multinational factors (Claessens and Van Horen (2012); Williams (2003)). Accounting for this heterogeneity will allow us to more precisely disentangle the relationship between foreign bank ownership and NIMs in host countries.

Theory suggests that the behaviour of foreign banks in host countries depends on whether banks enter domestic markets via greenfield investment or by acquiring existing domestic banks. Banks entering by acquiring existing domestic institutions may inherit inefficient organizational structures and a low quality

loan portfolio, but they also obtain information on existing customers and bank personnel. Greenfield banks have higher efficiency advantage and higher informational disadvantage compared to domestic banks and banks entering via acquisition (Degryse et al. (2012)). The ultimate impact on host market NIMs will depend on which effect dominates the other. Martinez Peria and Mody (2004) find that greenfield banks were able to charge lower spreads compared to banks that entered through acquisition. Havrylchyk and Jurzyk (2011) find that greenfield banks have higher profitability relative to other banks, but this higher profitability stems from lower costs rather than from higher interest margins. This literature identifies the following testable prediction:

H2: The mode of foreign bank entry (acquisition vs. greenfield) has a significant impact on foreign bank NIMs.

Another source of foreign bank heterogeneity comes from the country of origin of the foreign bank. Based on the multinational bank profitability literature, we use two groups of home country factors: parent bank NIMs and home country regulatory conditions.The relation between parent bank profits and profits in the host country can be ambiguous. Williams (2003) argues that more profitable parent banks can devote more resources to foreign subsidiaries and they do so only if they expect to earn a higher return than they would in the home country. Furthermore, a more profitable parent bank signals a more stable foreign bank in the eyes of depositors resulting in a lower cost of deposited funds. Therefore a positive association between parent bank profitability and the profitability of their affiliates abroad is expected. Alternatively, parent banks operating in competitive home countries where the opportunity for high bank margins is low, may be willing to invest resources in foreign subsidiaries where higher profit margins are expected to compensate for the low margins at home. This would yield a negative relation between parent bank profitability and the profitability of the host nation affiliate. Kosmidou, Pasiouras and Tsaklanganos (2007) find that the profitability of the parent bank has a robust and positive impact on the profits of Greek banks abroad. Williams (2003) on the other hand, does not find support for the hypothesis that parent NIM is positively related to Australian

bank profits. Finally, Chen and Liao (2011) find that foreign banks are more profitable than domestic banks when the parent bank in the home country is highly profitable.

H3: Parent bank NIMs have a significant impact on foreign bank NIMs in host countries.

The second group of factors relate to home country regulatory conditions. A number of studies have shown that the performance of foreign banks depends on the characteristics of their home countries. Berger, DeYoung, Genay and Udell (2000) find that the relative cost and profit efficiency of foreign vs. domestic banks depends on home and host country conditions. They test two main hypotheses: the global advantage hypothesis and the home field advantage hypothesis and find support for the limited form of the global advantage hypothesis. According to this hypothesis only efficient institutions from home countries with certain favourable market or regulatory conditions can operate more efficiently than their domestic counterparts. These favourable home country conditions may include a more competitive home market forcing banks to use more advanced technologies, an active market for corporate control that prevents investments abroad that reduce shareholder value, access to an educated labour force able to employ new technologies and risk management techniques. Furthermore, home countries with favourable regulatory or supervisory conditions may be able to enjoy stronger safety net guarantees that will allow them to make high risk-high return investments. Alternatively, home countries with relatively tough supervision or regulation may give their banks operating abroad an advantage by certifying their quality or reducing counterparty risk. Lensink, Meesters and Naaborg (2008) find that on average foreign banks are less cost efficient than domestic banks. However, taking home country conditions into account they find that higher quality of the institutions in the home country reduce foreign bank inefficiency. Claessens and Van Horen (2012) find that foreign banks in developing countries tend to perform better when from a high income country and when regulation in the host country is relatively weak. Furthermore, they find that foreign banks from home countries with similar regulation and the same language as

the host country perform better. These studies focus either on bank profitability or efficiency and do not explicitly account for the cost of financial intermediation in host countries. A recent paper by Ongena et al. (2013) finds that bank regulation is associated with cross-border spillover effects through the lending (risk-taking) behaviour of multinational banks. The question we are interested is whether regulation at home affects bank NIMs abroad. The proposition we test is the following:

H4: Home country regulatory and supervisory conditions have a significant impact on foreign bank NIMs in host countries.

2.3 Data and Methodology

In this section we illustrate our data sources and provide a discussion of our dataset.

2.3.1 Foreign banks in SEE countries

As we wish to determine the impact of foreign bank entry on NIMs in SEE countries, we start by building a database of commercial banks operating in Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Montenegro, Romania and Serbia over the period 1995-2011. We include all commercial banks active in at least one year over the period 1995-2011 in one of the nine SEE countries. We exclude savings houses, microcredit organisations, entities established by the government for the purpose of promoting the development of the economy (such as for e.g. the Croatian Bank for Reconstruction and Development). The final sample consists of a total of 265 banks, divided by countries as follows: Albania (14 banks); Bosnia-Herzegovina (33 banks); Bulgaria (34 banks); Croatia (59 banks); Kosovo (7 banks); Macedonia (21 banks); Montenegro (12 banks); Romania (42 banks) and Serbia (43 banks). The 2515 bank-year observations over the sample period 1995-2011 are shown by year in Table 2.2. The total number of banks has steadily increased up to 2003 after which the number remains stable or

declines. This is consistent with the fact that the dominant form of foreign bank entry up to 2004 was via greenfield investment, after which acquiring existing banks became more popular.[7]

The next step required coding bank ownership. To this end, we examined each bank individually, for each year it was active over the sample period. Sometimes more than one data source had to be used for tracking the ownership of a single bank. The starting point was the Bankscope database, which provides ownership history at each closing date for a certain number of banks and years (usually the most recent years). For banks and years where this information was not available other sources were used, including individual banks' annual reports and websites, central banks' publications, parent banks' websites and reports as well as databases such as Zephyr and Factiva for information on bank mergers and acquisitions. Following the standard practice in the literature, a bank is coded as foreign (fb) if 50% or more of its shares are owned by foreigners (Claessens et al. (2001)).

We also identify the country of origin as follows: if a bank is foreign owned (as defined above), the nationality of the foreign shareholder with the highest percentage ownership is used as the country of origin. This foreign shareholder can be the largest shareholder of the whole company or the largest shareholder among foreign shareholders only. In both cases its nationality is used as the country of origin of the bank. Unlike Claessens and Van Horen (2014), we define ownership and country of origin based on ultimate (indirect) rather than immediate (direct) ownership. For example, if a bank in Bulgaria is 70% foreign owned (30% domestic), of which 20% is owned by an Italian subsidiary in Austria as the largest foreign shareholder, the bank will be coded as foreign with Italy as the country of origin. This is so, despite the fact that the percentage share ultimately owned by Italian shareholders (20%) is lower than domestic ownership (30%).

Foreign banks are further categorised by mode of entry: banks that entered the

[7]Appendix 2C shows the number of banks and total assets. This information is provided by the respective central banks. The coverage ratios vary by countries and years, however, on average Bankscope provides about 85% coverage of the SEE banking system, which allows us to make valid inferences about the region

host country by acquiring existing banks (*fb_acq*) versus those that entered via greenfield investment (*fb_green*). Finally, for each foreign bank the name of the parent bank is recorded.

Of the 2515 bank-year observations in our sample, 1289 observations (51.25%) are foreign banks. The number of foreign banks has rapidly increased over the years, as has the share of the foreign banks in the total banking assets. Foreign bank share (foreignshare) increased from 6.34% in 1997 to 81.6% in 2011. The most rapid increase in foreign bank share occurred up to 2004, after which foreign bank participation in the domestic banking sector of the countries under analysis levelled off at a high level (around 80%). This gives us an interesting opportunity to investigate the behaviour of foreign banks in two financial sector environments, one in which financial liberalization is at its infancy and foreign bank presence is limited but increasing rapidly, and the other in which foreign bank presence has become predominant.[8]

2.3.2 Net Interest Margins in SEE countries

Our main variables of interest are the bank NIMs, measured as the ex post (realized) bank interest spread (the difference between the contractual rates charged on loans and rates paid on deposits, net of the lost interest on non-performing loans). Bank specific information (balance sheet and income statement data) are from Bankscope.[9]

Table 2.3 shows average values of NIMs over time, average net interest margins are reported for all banks, and separately for foreign and domestic banks. Looking at the whole SEE region, NIMs remain persistently high until recent years. The average bank NIM was 6.2% for the period 1995-2011; the average NIM of foreign banks was 5.47% and that of domestic banks, 6.91%. While foreign bank

[8]In addition to relying on the visual inspection of the time series plots to detect the change in the trend of the foreign bank presence we conduct a more formal structural break test based on the modified Chow test. As anticipated we find that the break date occurs in 2004. The details of the Chow test are given in Appendix 2A.

[9]To avoid double counting bank financial information unconsolidated statements are used. When unconsolidated statements were not available consolidated ones were used, whereas for parent banks financial information is taken from their consolidated statements.

NIMs were substantially lower than domestic banks in the 1990s and early 2000s, these difference reduce from 2005 onwards, possibly indicating greater market integration and a shift in the activities of foreign banks.

Overall, SEE bank profitability has been low over the sample period, with Montenegro and Serbia displaying negative average Return on Asset values (net income over total earning assets). NIMs were the main components of banks' net income, more so for domestic banks than for foreign banks, as illustrated in Table 2.4, with the region average equalling 6.2%. Country differences are apparent: Serbia has the highest level of bank NIMs with an average of 8.2%, followed by Romania with 7.6%. Albania, on the other hand, has the lowest average NIM, 3.7%, followed by Croatia with 4.8%. Serbian banks not only have the highest spreads, both for interest and non-interest income, but also have high overhead costs and loan loss provisions, indicating an inefficient banking system, with high margins, high costs and low asset quality.

Looking at the difference between domestic and foreign banks in terms of income composition, on average, foreign banks have lower NIMs and lower overhead costs and loan loss provisions. However, foreign banks are also on average less profitable than domestic banks. This is in line with the finding of Claessens et al. (2001), who argue that foreign banks may be willing to accept a lower profitability to the extent that their cost of capital is lower compared to that of domestic banks or to the extent that they can benefit from a foreign tax credit.

Next, we look more closely at which banks have entered the SEE market over the sample period and match them with their respective host countries.[10] Figure 2.1 shows the map of home and host countries: the SEE banking sector is mainly owned by banks from EU countries, Turkey and the United States. These countries of origin represent different levels of economic development, regulatory environments and geographical and cultural proximity to host countries. This heterogeneity may imply different incentives for the behaviour of foreign banks in host countries.

[10] Although foreign banks originate from a number of different countries, in this part of the analysis we consider only home countries whose banks are present in two or more countries in the SEE region.

Table 2.5, Panel A illustrates the number of banks which have entered each of the SEE countries (foreign banks) and the respective countries of origin (home countries). It also shows the average differences in NIM between the parent bank (in the home country) and the foreign bank (the subsidiary in the host country) as well as average differences between home and host country NIMs. Table 2.5, Panel B shows the number of foreign subsidiaries each home country has set up during the sample period and in how many different host countries in the SEE region. It also shows the average differences in NIM between the parent bank (in the home country) and the foreign subsidiaries (in the different host countries) as well as average differences between NIM at the country level.

Looking at the number of entries, Bulgaria, Croatia and Romania have attracted the highest number of foreign banks from a larger number of countries. This is in line with the fact that these three countries have become EU member states during the sample period. At the country level, the average NIM in Albania is only marginally higher than the average NIM in the home countries (+0.35%). In all other SEE countries, the average NIM is higher than in the countries of origin, with Kosovo, Romania and Serbia having the highest differences. Similarly, at the bank level (that is the difference in NIMs between the parent bank and the foreign subsidiaries), foreign banks going to Albania do not charge substantially higher NIMs than they would in their home countries (+0.74% on average). Foreign banks going to Kosovo, Romania and Serbia, on the other hand, charge NIMs much higher than they do in their home countries. In the remaining SEE countries, foreign banks NIMs are, on average, between 1-3 percentage points higher than those of their parent bank.

Looking at foreign expansion from the countries of origin, we notice that Austrian and Italian banks have been the most active in the SEE region, closely followed by Germany and Greece. Not only banks originating from these countries have set up the highest number of subsidiaries in the region, but they have also expanded in a large number of countries. For example, Austrian banks are present in all the nine countries in our sample. This might be explained by geographical and cultural proximity and close trade relations.

When we consider differences in NIMs at the country level, in all countries of origin (except from Turkey) the NIMs are lower than the average in the SEE countries. In Turkey, the average NIM is 2.78% higher than in the SEE countries where Turkish banks are present. This might be explained by country specific conditions, whereby the Turkish banking sector is more inefficient, in terms of NIMs, than the SEE countries. This is also reflected in the fact that Turkish subsidiaries abroad have substantially lower NIMs than their parent banks (-1.30%). In addition, Hungarian banks have lower NIMs in SEE countries than they have at home (parent bank). This could be explained by the fact that, similar to Turkish banks, Hungarian banks might have to offer better rates than domestic (host countries) banks to obtain market share as they might be perceived as risky and therefore lack the competitive advantage of banks originating from, for example, Italy, France and the US, which have the highest NIM differentials between parent bank and foreign subsidiary.

2.3.3 Regulation and supervision

The analysis of the dynamics of NIMs has highlighted a considerable heterogeneity among countries, both in the SEE region and in terms of country of origin. To better understand the effect of the impact of country specific characteristics on banks' intermediation function, we focus on the impact of bank regulation and supervision in home and host countries. To this end, we collect information on regulatory and supervisory variables which have been identified in the literature as relevant in the setting of bank rates and therefore affecting bank NIMs. Our aim is to identify how differences in home-host country regulation and supervisory practices can impact bank behaviour.

We draw on the database compiled by Barth et al. (2013) based on the Banking Regulation and Supervision Survey (BRSS) carried out by the World Bank. We build six different indices reflecting the regulatory conditions at different points in time, based on specific survey questions. Given that the country level regulatory data is collected in four survey exercises (1999, 2002, 2006 and 2011) as described in Barth et al. (2013), we match the data for the regulatory variables as follows:

the 1999 survey data is used for the period 1995-2001; the end-2002 data for the period 2002-2005; the end-2006 data for the period 2006-2010 and the end-2011 data for the last year, 2011. This should allow us to map the relevant changes during the sample period, both for the country of origin (home) and host country of foreign banks. The advantage of using the Barth et al. (2013) version of the dataset, as opposed to the raw data from the surveys, is that the authors have corrected any inconsistencies between the four rounds of the survey, have filled in missing values where possible and have aggregated several questions into useful indices. The survey questions behind the indices used in this study are shown in Appendix 2B. All indices are normalized to take values in the interval [0, 1]. This normalization also has the intuitively appealing property of a percentage interpretation on initial analysis.

In choosing the indices we focus on those aspects of regulation and supervision that theory highlights as affecting bank behaviour. More specifically we focus on three indicators of bank regulation (*Activity restrictions, Ownership restrictions* and *Capital regulations*) and three indicators of bank supervision (*Official supervisory power, External auditing* and *Transparency*). The extant literature finds that various aspects of regulation and supervision can be important determinants of bank performance. Table 2.6 illustrates the average value for the indices in the host and selected home countries. These indices indicate a large cross-country variation, which needs to be put into context of the different characteristics of banking systems (in terms of size, type of institutions, competitive conditions, etc.) as well as differences in the organization of bank regulatory and supervisory institutions.

2.3.3.1 Activity restrictiveness

Activities restrictions (*act_restr*) measure the degree to which national regulations restrict banks from engaging in (a) securities activities (underwriting, brokering, dealing in securities and all other aspects of the mutual fund industry), (b) insurance activities (underwriting and selling insurance) and (c) real estate activities (real estate investment, development and management). Higher values

indicate more restrictions on banks in performing these activities. Bank ownership restrictions (*ownership_restr*), measures the degree to which banks and nonbanks may combine to form financial conglomerates. This index captures the extent to which national regulations restrict (a) banks from owning non-financial firms, (b) non-financial firms from owning banks as well as (c) nonbank financial firms from owning banks. Both *act_restr* and *ownership_restr* specify the scope of permissible bank activities. Some countries restrict banks to a narrow range of activities, others allow them to engage in a broad array; these differences can affect banks' ability to diversify revenue streams. There are conflicting views on the impact of activity restrictions on bank behaviour. Regulations which limit the range of activities banks can engage in may limit the exploitation of economies of scale and scope in obtaining information about borrowers, building reputational capital and providing different services (Barth, Caprio and Levine (2004); Laeven and Levine (2009)). Conversely, regulations allowing banks to engage in a broad range of activities might intensify moral hazard (Boyd, Chang and Smith (1998)) and lead to the creation of large and complex entities which are difficult to monitor (Laeven and Levine (2009)) providing more opportunities for banks to increase risk taking. Demirguc-Kunt et al. (2004) find that activity restrictions increase net interest margins while Barth et al. (2001) report mixed results for their impact on margins and overheads. The impact of activity restrictiveness on bank NIMs remains therefore unclear.

2.3.3.2 Capital regulation

Capital regulation (*cap_reg*) measures the nature of capital in terms of policies concerning the definition of capital banks must hold beyond cash or government securities as well as regulations that govern the sources of regulatory capital. This index does not measure statutory capital requirements, instead it measures the rules and policies used in assessing and verifying the degree of capital at risk in a bank. If bank capital requirements are seen as a mechanism to align the incentives of bank owners with depositors and other creditors, the more capital at risk they are required to hold the more prudent they should become in their

lending behaviour. This would imply a negative relation between the capital regulatory index and bank NIMs, as more prudent lending behaviour should imply lower lending rates to less risky projects. On the other hand, several studies (Saunders and Schumacher (2000)) show that banks which are required to hold more capital tend to demand higher NIMs to lower the cost of holding more equity. Finally, Barth et al. (2004) suggest that capital regulation do not seem to have a clear impact on bank margins, although they find that more stringent capital regulations are associated with lower levels of non-performing loans.

2.3.3.3 Official supervisory power

Official supervisory power (*sup_power*) measures the degree to which a country's bank supervisory agency has the authority to obtain sufficient information from banks to assess their financial soundness and to impose changes to banks' behaviour, if necessary. It measures whether a country's supervisory authority has the power to take specific actions to prevent and correct problems. To the extent that a powerful supervisory agency has the incentive and expertise to overcome market failures due to imperfect information as argued in Beck et al. (2006) and Barth et al. (2013), it boosts bank efficiency, hence it should lead to lower NIMs. However as Beck et al. (2006) argue, if bank supervisors use their power for private or political benefits rather than overcoming market failures they will contribute to bank inefficiency, hence higher NIMs. In addition, Barth et al. (2004) show that the presence of more powerful government supervisors is linked to higher levels of non-performing loans.

2.3.3.4 Private monitoring

Transparency measures the extent to which regulatory policies encourage private monitoring. For example, the extent to which supervisory agencies require banks to disseminate comprehensive information about their activities can influence the quality of private sector scrutiny by forcing information disclosure. Similarly, the

degree to which regulation holds bank directors legally liable for erroneous or misleading information can influence the quality of information that banks provide to investors, which impacts investor's ability to monitor and govern the banks. Similar to the *transparency* index, the strength of external audit (*ext_audit*) measures the extent to which regulations facilitate external governance of banks. For instance, the degree to which supervisory agencies require banks to obtain certified audits can influence the quality of information disclosed, hence the quality of external governance. Private sector monitoring can be more efficient than official supervision of banks, as supervisors do not have an ownership stake in banks, which can lead to different incentives when monitoring and disciplining banks. Barth et al. (2013) find that private monitoring of banks in terms of strength of external audit and information disclosure is positively associated with bank operating efficiency, which should imply lower NIMs. Similar results are found by Delis, Molyneux and Pasiouras (2011) who report that regulations and policies that promote private monitoring have a positive impact on bank performance.

2.3.4 Control variables

Other factors are likely to impact bank NIMs, such as differences in bank level characteristics, market structure and macroeconomic variables.

2.3.4.1 Bank-specific factors

The literature identifies a comprehensive set of bank specific characteristics that are likely to significantly affect spreads, including size, leverage, capitalisation. We include proxies for size (*share*); equity ratio (*equityratio*); liquidity (*liquidity*) and cost to income ratio (*cti*).

A common factor used in the empirical analyses of bank NIMs is the liquidity ratio (*liquidity*). Banks with high liquidity ratios face an opportunity costs since they have to forego holding higher-earning assets. They may in turn pass this opportunity cost to borrowers increasing the interest rate spreads. Martinez Peria and Mody (2004) and Brock and Rojas Suarez (2000) find that liquidity has a

positive and significant impact on bank spreads. A second variable is the equity ratio (*equityratio*). As holding high equity ratios is costly for banks, they are likely to demand higher interest margins, hence inducing a positive relation between equity ratios and NIMs. Similarly, banks with higher equity ratios are perceived as less risky, with a low risk of insolvency which reduces the cost of borrowed funds hence boosts margins. In contrast, a negative relation between equity ratios and NIMs is expected if the equity ratio is taken as a proxy for bank's risk aversion (Poghosyan (2013)). More risk-averse banks with high equity ratios tend to invest in safer assets which yield lower returns hence a reduction in bank interest margins. Saunders and Schumacher (2000) find that banks tend to lower the cost of holding more equity (regulatory or endogenously determined) by demanding higher NIMs. Bank size as proxied by market share (*share*) is another relevant factor. There are conflicting hypothesis regarding the impact of this variable on bank NIMs. Banks with a high market share may be able to exercise market power and charge higher loan rates (Relative Market Power hypothesis). On the other hand, banks with high market share can benefit from economies of scale and transfer this benefit to their customers in the form of lower spreads. The loan loss provision ratio (*llp_tea*) captures the quality of the loan portfolio and is expected to be positively related to NIMs as a poor loan quality induces banks to charge customers a premium for these loans. Several studies find a positive association between the non-performing loan ratio and NIMs. Degryse et al. (2012) for instance, find that banks with higher credit risk, as measured by the deviations from the median non-performing loans, are more likely to charge higher lending rates. Other studies, however, do not find a significant relation (Martinez Peria and Mody (2004)) or find a negative relation (Brock and Rojas Suarez (2000)) between non-performing loans and NIMs, the latter being explained as a result of inadequate provisioning for loan losses by banks in some countries. Bank efficiency (*cti*) is another variable impacting bank NIMs. Most studies include efficiency variables as controls and find significant correlation with NIMs.

2.3.4.2 Market structure factors

Important factors in determining bank NIMs are the market conditions in which banks operate. The theoretical predictions relating NIMs and the bank market structure stem from the extensive literature studying the impact of concentration on bank profitability (Berger (1995)). Most studies use the paradigm of Structure-Conduct-Performance to explain the positive association between profitability and concentration. In the context of the NIM-market structure relationship, this predicts a negative association between levels of concentration and NIMs. Martinez Peria and Mody (2004) find a significant positive association between concentration and spreads. They interpret high concentration levels as implying less competition in the banking sector. Research however shows that concentrated markets are not necessarily uncompetitive (Beck (2008); Matutes and Vives (1996)). The primary measure of market structure used in our specifications, the Herfindahl-Hirschman index (*hhi*).[11]

2.3.4.3 Macroeconomic factors

Macroeconomic indicators commonly used in empirical analyses of NIMs are the GDP growth rate, inflation and real interest rates.[12] The relation between GDP growth rates (*gdpgrowth*) and NIMs can be ambiguous. High GDP growth rates imply more investment opportunities for banks which may in turn increase the deposit rate to attract more funds for these new investment opportunities; in contrast, during times of declining GDP rates loan quality deteriorates forcing companies to borrow at higher rates, hence a negative expected relationship between GDP growth and interest spreads (Bernanke and Gertler (1989)). The impact of inflation (*inflation*) on interest spreads depends on which of the bank costs or revenues increase faster than the other. Perry (1992) points out that the influence of inflation on bank margins depends on whether inflation is anticipated or not. If inflation is not fully anticipated and banks react slowly to adjusting

[11] Alternative measures of market structure, including the CR-3 ratio, as well as the Lerner Index and the Rosse-Panzar H-statistics are used for robustness checks.

[12] Macroeconomic variables are from the World Development Indicators database. Table 2.1 provides detailed variable definitions and their sources.

the interest rates, bank costs may increase faster than revenues hence reducing bank margins (Brock and Rojas Suarez (2000); Demirguc-Kunt and Huizinga (1999)). Finally, the real market interest rates (*real_ir*) represent opportunity cost for banks and are expected to be positively associated with NIMs. So if the marginal cost of funds increases (decreases) the bank margins will also increase (decrease).

Table 2.7 illustrates the descriptive statistics for our variables and shows the pairwise correlation matrix for the variables used in the estimations. From Table 2.7 we can see that foreign banks have higher market share (*share*) and higher liquidity ratios (*liquidity*), whereas their equity ratio (*equityratio*) is lower compared to domestic banks. In terms of efficiency measures, foreign banks appear less efficient than domestic banks based on the cost to income ratio (*cti*). In terms of sample periods, all banks had higher NIMs during the first sample period (1995-2004). Compared to the first period all banks have increased their liquidity, while the equity ratio and the loan loss provisioning ratio (*llp_tea*) have declined. Macroeconomic and market structure indicators also show variation between the two subsamples. Overall, summary statistics evidence different characteristics between foreign and domestic banks, which may partly explain their different NIMs.

2.3.5 Methodology

The relationship between foreign bank ownership and NIMs in host countries is evaluated using the following specification:

$$NIM_{itc} = \alpha_0 + \alpha_1 fb_{ict} + \theta_j^{'} X_{ict} + \mu_k^{'} Y_{ct} + \omega_n^{'} Z_{ct} + \varepsilon_{ict} \tag{2.1}$$

where, NIM_{itc} is the net interest margin of bank i in country c and at time t. fb_{ict} is the ownership dummy variable equal to one if the bank is foreign-owned and zero otherwise. X_{ict} is a vector of bank-specific variables: liquidity ratio (*liquidity*), the equity ratio (*equityratio*), the loan loss provision ratio (*llp_tea*), bank market share (*share*) and the cost to income ratio (*cti*). Y_{ct} is a vector of

two country variables describing the overall banking industry, namely its degree of market concentration as measured by the Herfindahl-Hirschman index (*hhi*) and the share of foreign over total bank assets (*foreignshare*). Z_{ct} is a vector of country macroeconomic variables: the rate of GDP growth (*gdpgrowth*), the inflation rate (*inflation*) and the real interest rates (*real_ir*).

We estimate the model using OLS with both country and year fixed effects. In this way we compare foreign and domestic banks within a given host country. The coefficient α_1 compares the NIMs of foreign and domestic banks within a country.

To investigate the impact of the mode of foreign bank entry on NIMs, in a second step, we decompose our main variable of interest, the foreign ownership dummy (*fb*), into two dummy variables corresponding to two different modes of foreign entry: foreign greenfield banks (*fb_green*) and foreign acquisition banks (*fb_acq*). The specification takes the following form:

$$NIM_{itc} = \alpha_0 + \alpha_1 fb_acq_{ict} + \alpha_2 fb_green_{ict} + \theta_j^{'} X_{ict} + \mu_k^{'} Y_{ct} + \omega_n^{'} Z_{ct} + \varepsilon_{ict} \quad (2.2)$$

where, fb_acq_{ict} is a dummy variable equal to one if a foreign bank entered the market acquiring an existing bank, and zero otherwise and fb_green_{ict} is a dummy variable equal to one if a foreign bank entered the market via greenfield investment, and zero otherwise. The remaining variables are the same as in equation (2.1).

Finally, to evaluate the impact of home country factors on NIMs in host countries, we estimate the following specification:

$$NIM_{itc} = \alpha_0 + \alpha_1 fb_{ict} + \alpha_2 fb_{ict} * F_{ct} + \theta_j^{'} X_{ict} + \mu_k^{'} Y_{ct} + \omega_n^{'} Z_{ct} + \varepsilon_{ict} \quad (2.3)$$

where, F_{ct} represents home country factors. We include parent bank NIMs (*NIM_parent*) and home country regulatory indices as described in section 2.3.3. The coefficient α_2 measures whether a particular home country attribute significantly impacts foreign bank NIMs compared to domestic banks in host countries.

2.4 Results

This section presents the results of our multiple regression analysis. In particular, Subsection 2.4.1 looks at the impact of foreign bank entry on NIMs. Subsection 2.4.2 investigates whether the mode of entry (greenfield versus acquisition) does matter in explaining the cost of financial intermediation, while Subsection 2.4.3 focuses on the role of home-country characteristics.

2.4.1 Foreign ownership

Table 2.8 shows the results of estimating our baseline specification (Equation 2.1). The coefficient on the foreign bank dummy variable (*fb*) is not significant when we consider the full sample period (column 1) but it is negative and significant in the first sub-sample period 1995-2004 (column 2) and positive and significant in the second sub-sample 2005-2011 (column 3). These results seem to suggest that foreign banks change their behaviour over time. At the beginning of the foreign bank entry process, foreign banks operate with lower NIMs than domestic banks, consistently with our preliminary analysis and with several emerging market studies.[13] However, as the presence of foreign banks increases, foreign banks operate with higher NIMs than their domestic counterparts. Our results are confirmed when we interact our foreign bank dummy variable with the time trend (column 4): foreign banks operate with lower NIM than domestic banks but over time the gap between foreign and domestic NIM goes down.

In the last column of Table 2.8, we interact our foreign bank dummy variable (*fb*) with a proxy of foreign bank presence at the country level (*foreignshare*) to see whether the NIM charged by foreign banks also depends on the ownership composition of the overall banking industry. Foreign bank entry can force domestic banks to become more efficient or give up some of the revenues they were able to realize before; hence a reduction in the overall level of bank spreads in host countries. Alternatively, foreign bank entry may force domestic banks to tilt their loan portfolios towards less transparent market segments, where they

[13]Martinez Peria and Mody (2004); Claeys and Vander Vennet (2008), among others.

have informational advantages and can charge higher interest rates, making the overall impact on host country bank NIMs less clear cut.

The results of column 5 in Table 2.8 show that *foreignshare* alone (as measured by the share of total banking assets in the hand of foreign owners) has a positive and statistically significant coefficient on NIMs, suggesting that on average foreign bank presence increases the average NIM of the banking sector. Moreover the interacted term between *fb* and *foreignshare* is again positive and significant, suggesting that when the overall presence of foreign banks increases they start charging higher rates leading to higher NIMs than their domestic counterparts (notice that the interacted coefficient is larger than the coefficient of *fb* alone).

Overall this evidence suggests that in the long term foreign bank entry does not have the beneficial effect of reducing intermediation costs.

2.4.2 Mode of foreign bank entry

Table 2.9 shows the results from estimating equation (2.2) and provide evidence consistent with the one shown in the previous table. The mode of foreign entry seems to have no impact on NIMs when we consider the full sample (column 1). When looking at the two sub-sample periods separately, we find that both foreign acquisition and foreign greenfield banks operate with significantly lower NIMs than domestic banks in the first sample period (column 2), with foreign greenfield having a stronger effect (about 1.0% lower than those for domestic banks, compared with a 0.6% differential between foreign acquisition and domestic banks). However, in the second sample period, only foreign entry through greenfield remains significant but with positive sign, suggesting that in the long run foreign entry is associated with increasing NIMs, consistent with Degryse et al. (2012).

This evidence is confirmed when we interact the mode of entry with a time trend (column 4) or with the foreign bank presence (column 5).

2.4.3 Home-country characteristics

In this section we incorporate home-country factors into the analysis. In particular, we test whether parent bank NIMs (Table 2.10) and characteristics of the country of origin of foreign banks, like regulatory indicators (Table 2.11), have an effect on NIMs charged by foreign banks in the host country.

Table 2.10 shows the results from estimating equation (2.3) with parent bank NIMs as the main variable of interest. We find that foreign banks have lower NIMs than their domestic counterparts but foreign banks whose parent banks charge higher NIMs at home, operate with higher NIMs than domestic banks in host countries (column 1). The interaction term is particularly strong in the later sample period (column 3). Our findings are consistent with Kosmidou et al. (2007) and Chen and Liao (2011) who find a strong positive relation between the profitability of the parent bank and the profitability of their subsidiaries/branches abroad. The positive relation may indicate that more profitable parent banks (i.e. with high NIMs) enter host countries because they can realize higher margins than in their home markets and possibly attract cheaper funding because of reputational benefits.

In Table 2.11, we interact our foreign bank dummy variable (*fb*) with home country regulatory indicators. Because some of the home country regulatory indices are highly correlated they have been included in the specification one at a time. The control variables are the same as the ones reported in previous tables. The coefficients of the interaction terms with the restrictiveness of bank activity (*act_rest*) and bank ownership index (*ownership_restr*) and with the capital regulatory index (*cap_reg*) are positive and significant (and larger than the coefficient of *fb* alone), indicating that foreign banks whose countries of origin impose stricter restrictions on bank activities and stricter capital regulation operate with larger NIMs compared to their domestic counterparts (Panel A). This evidence is consistent with the idea that foreign subsidiaries compensate the more limited profits opportunities in the country of origin, due to extensive restrictions imposed, by charging high NIMs in host countries. Another plausible explanation for the positive association of stricter home country regulation and foreign

bank NIMs in host countries is the argument put forward by Berger et al. (2000) that home countries with relatively tough regulation reduce the counterparty risk or certify the quality of their banks operating abroad. This allows them to get access to cheaper funding relative to other foreign banks, hence their higher margins. Similar results were reported by Ongena et al. (2013) who find that home-country regulation is associated with higher risk-taking and lower lending standards abroad.

On the other hand, the coefficients of the interaction term with the two other indices (*sup_power*) and (*ext_audit*) are negative, suggesting that foreign banks charge lower NIMs than domestic banks when the countries of origin have stricter external audit and supervisory powers.[14] This evidence may suggest that stronger home country supervision can limit risk-taking activities also in the host country as long as foreign subsidiaries keep being under the control and scrutiny of home country supervisors.

Overall our results show the importance of taking into account both host and home country factors when analysing the determinants of bank NIMs. Moreover, they suggest that there are cross-border regulatory spillovers through the behaviour of foreign banks in host countries. As emerging market regulation and supervision can be more lenient when countries are embarking in periods of financial liberalisation, foreign banks may engage in regulatory arbitrage in order to maximize their profits.

2.4.4 Control variables

Important insights about factors influencing NIMs can be gained from the control variables included in the specifications. Banks with higher liquidity ratios (*liquidity*) have higher NIMs. Higher liquidity ratios impose a cost on banks as they forego investing in more profitable investments which cost they are able to

[14]Whether this leads to welfare gains is unclear. As a result of stricter regulation at home foreign banks may become more prudent and target the most transparent market segments only, which provide lower margins, aspect which we can only speculate on but not test due to lack of loan portfolio composition data.

pass on to their customers by increasing margins. The findings are consistent with Martinez Peria and Mody (2004), Brock and Rojas Suarez (2000) and others. The equity ratio (*equityratio*) is both positively and significantly related to NIMs. As with liquidity ratios, holding a high equity ratio is costly for banks, which makes them seek higher interest margins. Furthermore, well capitalized banks are seen as less risky, attracting lower deposit rates hence boosting the net interest margins. The loan loss provisioning ratio (*llp_tea*) has also shown a strong positive association with NIMs. As expected, high loan loss provision ratio is an indicator of the low quality of the loan portfolio, which includes riskier but more profitable lending, which in turn reflects into higher NIMs. Bank efficiency is a significant determinant of NIMs. Results show that banks with higher cost to income ratios (*cti*) have lower NIMs. With regards to bank market structure, results show that it has a significant impact on NIMs: the primary measure of market structure used in our specifications, the Herfindahl-Hirschman index (*hhi*), is significantly associated with lower NIMs. This result supports the efficient-structure hypothesis according to which banks with larger market shares i.e. operating in more concentrated banking systems may be more efficient and gain from economies of scale thus reducing NIMs. Finally, among macroeconomic variables the GDP growth rate (*gdpgrowth*) and the rate of inflation (*inflation*) are the most important determinants of NIMs.

2.5 Robustness

In this section we address some concerns regarding the robustness our results. *First*, we address a possible endogeneity problem. *Second*, we show that our results still hold when we use alternative measures for bank efficiency and market structure.

2.5.1 Endogeneity concern

An obvious concern with studies that investigate foreign bank entry is that the decision to enter the host country can be endogenous. Foreign banks may decide to enter countries where NIMs are particularly high, as the profit opportunities are higher in these markets. Conversely, foreign banks may view high NIMs markets as riskier and be more prone to enter the markets with the lower NIMs. Therefore, the direction of the bias caused by endogeneity is a priori not clear. One way to address this problem is to rely on the instrumental variables (IV) approach. The challenge is to find valid instruments that are highly correlated with the bank decision to enter a foreign market and that influence NIMs through foreign bank presence only and not through other channels. We consider three instruments to model the decision of a foreign bank to enter a country at the first stage: the population size of the host country as a measure of market size (*population*), a measure of financial freedom (*financial_freedom*) and finally whether the host country is EU member (*eu_member*). The rationale behind the first instrument is that foreign bank entry is significantly associated with the size of the host country. As Abiad, Detragiache and Tressel (2010) argue, foreign banks entering small countries have an advantage as they need a relatively small investment to gain a significant market share in host countries. In addition by investing in several countries they can diversify their exposure to specific country risks. Foreign banks may also be inclined to enter larger countries as the opportunities for economies of scale are much higher. Therefore, a significant relation between population and foreign bank entry is expected.

The second instrument, *financial_freedom*, is the Heritage Foundation's index which measures, among others, the restrictiveness of bank regulation and supervision, the ease of foreign bank entry and the extent to which their operations are restricted in host countries. The identification strategy is similar to that of Jayaratne and Strahan (1996) who use the relaxation of bank branch restrictions in the US as an instrument to show that the quality of bank lending is positively related to economic growth.[15] It seems plausible that regulation on foreign bank

[15]A similar identification strategy is used by Giannetti and Ongena (2009), Bruno and

entry alone should not affect the NIMs in host countries, satisfying the exclusion assumption. In a similar vein, we include the dummy variable indicating whether the host country is member of the EU. The rationale is that foreign banks are more likely to enter countries that are institutionally similar.

We have run our IV regression analysis using various combinations of the three instruments, all three at the same time, or a combination of two instruments at a time, or each instrument individually. We confirm all the results of our main analysis without IV, when we use the financial freedom index and the EU member dummy as instruments for foreign bank entry. Results are reported in Table 2.14, columns 1-3.

In addition to country-level instruments we also consider bank-level instruments which can impact the decision of banks to acquire a particular bank in the host country. We use the ratio of net loans to total assets (*loan_ta*) as an indication of banks ability to transform deposits into loans and the return on average assets (*roaa*) as an indication of bank performance. Studies on the microeconomic determinants of cross border bank acquisitions (Lanine and Vander Vennet (2007); Poghosyan and de Haan (2010)) find that foreign banks decision to acquire banks in host countries is driven by the intermediation activity and performance of the target bank. Although we cannot completely rule out that these indicators do not have a direct impact on bank NIMs we carry out several tests to check the validity of the instruments used. The Kleibergen-Paap LM statistics rejects in all specifications the null hypothesis of under-identification (p-value < 0.01). The Kleibergen-Paap Wald F-statistics exceeds in all specifications the critical values of Stock and Yogo (2005), i.e. the null hypothesis of weak instruments is rejected. We confirm all our results when adding these bank-level instruments. Results are reported in Table 2.14, columns 4-6.

Hauswald (2014), Ongena et al. (2013).

2.5.2 Alternative measures of bank efficiency and market structure

We also run a set of robustness tests using alternative measures of bank efficiency, market structure and foreign bank presence. *First*, we use the overhead costs to total earning assets ratio (*overh_tea*) as an alternative eficiency measure. Given that related literature shows that the traditional cost ratios are not suitable measures of bank efficiency and that methods such as Data Envelopment Analysis (DEA) deliver better insights into bank efficiency and productivity, we also use the non-parametric DEA approach and calculate scale efficiency (*scale*) and technical efficiency (*technical*). Results, shown in Table 2.12, remain qualitatively unchanged with these alternative measures of bank efficiency.

Second, our results are robust to different measures of market structure. As reported in Table 2.13, we obtain very similar results if we use the three bank concentration ratio (*cr3*), the Lerner index or the Panzar-Rosse H-statistics.

In conclusion, our results seem not to be driven by the endogeneity of foreign bank entry and are robust to different measures of bank efficiency and market structure.

2.6 Conclusion

In this paper we investigate the impact of foreign bank entry on net interest margins in South East Europe over the period 1995 -2011. During this time frame, SEE countries experienced considerable political, economic and financial sector reforms, as they moved from centrally planned to market oriented economies. One of the key financial liberalisation policies during the transition period was increasing the presence of foreign investors, which lead to the proportion of assets owned by foreign banks to increase from virtually zero in the early 1990s to over 80% by 2011. However, whether the presence of foreign banks has been beneficial for the local economies remains controversial. Theory presents conflicting predictions on the role of foreign banks in emerging markets and the empirical evidence

is equally inconclusive. Our analysis contributes to the literature along different directions. We hand collect a new data set of bank ownership, which allows us to explore the dynamics of foreign banks' NIMs over the transition period. We carefully match parent banks with foreign affiliates and home and host countries, to exploit the heterogeneity of foreign bank entry and home country conditions and evaluate the resulting impact on NIMs in host countries. Finally, our study also relates to the strand of literature on the impact of distance on bank activities. We show that foreign banks initially enter host countries' banking markets with lower NIMs compared to domestic incumbents. However, we also find evidence that foreign banks change their behaviour over time and tend to increase their margins during the later stages of foreign bank entry. This finding is particularly significant for greenfield entry.

We also find that regulatory conditions in the home country influence bank behaviour. Foreign banks from countries with more stringent restrictions on bank activities have higher NIMs compared to domestic banks; this can be explained by banks seeking increased profit opportunities on activities which are restricted in their country of origin. This might also indicate that banks tend to engage in regulatory arbitrage. As home country regulation becomes more stringent, banks shift riskier activities abroad. This is particularly significant for emerging markets undergoing financial liberalization, as reforms might entail a more lenient regulatory structure that can be exploited by large multinational banks seeking profit opportunities in a less regulated environment. However, we also find evidence of regulatory spillovers: stricter supervisory standards at home, possibly extending to the supervision of foreign affiliates, seem to translate into lower NIMs in host countries. This may suggest that stronger home country supervision can limit risk-taking abroad if foreign banks remain under the supervision of the country of origin. This has particular relevance in a EU context as regulatory authorities are implementing a more stringent and unified supervisory framework. Our findings seem to suggest that the process of EU integration has lead to positive regulatory spillovers, particularly driven by a combination of increased supervisory power and private sector monitoring. Indeed the countries that have attracted the highest number of foreign bank entry are those countries

which have become EU member states during the sample period, which had to adhere to the EU regulatory framework.

Tables

Table 2.1: Variable Definitions and Sources.

Variable	Definition	Source
Bank characteristics		
NIM	(Interest Income-Interest Expense)/Total Earning Assets	Bankscope
fb	A dummy variable equal to 1 if the bank is at least 51% foreign owned.	Hand collected
fb_acq	A dummy variable equal to 1 if at least 51% of the bank is owned by foreign investors which entered the market acquiring an existing bank.	Hand collected
fb_green	A dummy variable equal to 1 if at least 51% of the bank is owned by foreign investors which entered the market by establishing a new bank.	Hand collected
share	Share of total assets held by each bank to the country's total bank assets.	Bankscope
liquidity	Cash and due from other banks including the central bank over total assets	Bankscope
equityratio	Total equity (bank capital plus reserves) over total assets	Bankscope
llp_tea	The ratio of loan loss provisions over total earning assets	Bankscope
overh_tea	The ratio of overheads over total earning assets	Bankscope
cti	Cost to income ratio	Bankscope
technical	Technical Efficiency estimated using DEA	own calculations
scale	Scale efficiency estimated using DEA	own calculations
Banking sector characteristics		
foreignshare	Share of assets held by foreign banks.	Hand collected
hhi	Sum of the squared bank market shares (total assets).	Bankscope
cr3	Share of total assets held by the top 3 banks in the system.	Bankscope
lerner	A non-structural measure of competition as measured by the Lerner index.	Bankscope
hstat	A non-structural measure of competition as measured by the Panzar Rosse H-stat.	Bankscope
Macroeconomic variables		
gdpgrowth	Gross Domestic Product growth rate.	World Development Indicators
inflation	Consumer Price Index growth rate.	World Development Indicators
real_ir	The real market interest rate.	World Development Indicators
trend	A variable capturing the time trend over the sample period (1995-2011) taking the values from 1 to 17.	own calculations
Banking regulation and supervision		
act_restr	Index relating to restrictions on bank activities.	Barth et al (2013)
ownership_restr	Index relating to restrictions on bank ownership.	Barth et al (2013)
cap_reg	Index relating to bank capital requirements.	Barth et al (2013)
sup_power	Index relating to bank supervisory powers.	Barth et al (2013)
ext_audit	Index relating to the effectiveness of the bank external audit.	Barth et al (2013)
transparency	Index relating to the measure of bank transparency.	Barth et al (2013)
IVs		
financial_freedom	A measure of the restrictiveness of bank regulation and supervision, the ease of foreign bank entry and the extent to which their operations are restricted in host countries.	Heritage Foundation
population	The population size of the country at the time of foreign bank entry.	World Development Indicators
eu_member	=1 if the host country was an EU member at the time of foreign bank entry.	europa.eu
loan_a	Net loans to total assets ratio.	Bankscope
roaa	Return on average assets=Net income/average total assets.	Bankscope

Table 2.2: Number of banks over time.

Variables	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total number of banks	36	65	106	120	136	146	158	176	189
Number of foreign banks	1	5	19	28	44	60	71	82	96
- M&A	0	0	4	6	10	26	29	35	46
- Greenfield	1	5	15	22	34	34	42	47	50
Foreign Bank share (assets)	0.0027	0.0103	0.0634	0.114	0.1951	0.4347	0.4733	0.5525	0.6065

Variables	2004	2005	2006	2007	2008	2009	2010	2011	1995-2011
Total number of banks	186	178	176	174	176	178	173	142	2515
Number of foreign banks	92	105	113	120	121	120	119	93	1289
- M&A	43	56	69	79	78	79	78	59	697
- Greenfield	49	49	44	41	43	41	41	34	592
Foreign Bank share (assets)	0.6195	0.785	0.8214	0.8392	0.8469	0.8377	0.8364	0.816	0.5973

This table shows the breakdown of the total number of banks and foreign banks in the sample by years. The distinction between foreign greenfield banks and foreign M&A banks is also made. Foreign bank share (assets) represents the presence of foreign banks in terms of total banking assets. The last column 1995-2011 shows aggregate values for the entire sample period.

Table 2.3: Average NIMs over time.

Variables	NIM-all banks	NIM-domestic banks	NIM-foreign banks	Δ NIM
1995	0.062	0.063	0.036	0.027
1996	0.089	0.095	0.028	0.067
1997	0.071	0.074	0.062	0.012
1998	0.082	0.087	0.066	0.02
1999	0.08	0.087	0.067	0.02
2000	0.068	0.073	0.061	0.011
2001	0.061	0.071	0.05	0.021
2002	0.056	0.066	0.045	0.021
2003	0.061	0.069	0.053	0.016
2004	0.064	0.072	0.057	0.014
2005	0.06	0.065	0.056	0.009
2006	0.056	0.061	0.053	0.007
2007	0.053	0.054	0.053	0.001
2008	0.058	0.06	0.057	0.003
2009	0.062	0.054	0.065	-0.011
2010	0.045	0.048	0.044	0.004
2011	0.049	0.045	0.051	-0.006
1995-2011	0.062	0.069	0.055	0.014

This table shows the evolution of average NIMs of all banks, foreign and domestic banks over time. It also shows the average difference in NIMs between domestic and foreign banks over time. The last row 1995-2011 shows aggregate values for the entire sample period.

Table 2.4: Average NIMs and Profits by countries and bank ownership type (1995-2011).

Country	NIM	NII	OC	LLP	Taxes	NI
Albania	3.70%	1.20%	3.50%	0.70%	0.30%	0.70%
Bosnia-Herzegovina	5.80%	5.60%	7.80%	2.50%	0.10%	0.60%
Bulgaria	5.00%	6.50%	8.30%	2.10%	0.50%	1.30%
Croatia	4.80%	2.80%	5.20%	1.40%	0.30%	0.80%
Kosovo	6.70%	2.40%	5.80%	1.40%	0.40%	1.50%
Macedonia (FYROM)	6.70%	4.60%	8.10%	2.50%	0.30%	0.60%
Montenegro	6.20%	4.80%	8.50%	2.50%	0.10%	-0.20%
Romania	7.60%	5.70%	16.90%	1.80%	0.80%	-6.10%
Serbia	8.30%	13.30%	14.60%	5.60%	0.10%	1.60%
All countries-by ownership						
All countries	6.20%	6.00%	9.70%	2.40%	0.40%	-0.20%
Domestic banks	6.90%	7.80%	9.70%	3.30%	0.50%	1.40%
Foreign banks	5.50%	4.20%	9.70%	1.70%	0.30%	-1.80%

This table shows the decomposition of bank Net Income (after tax) according to the following accounting identity: Net Income (NI) ≡ Net interest income (NIM) + Noninterest Income (NII) - Overhead Costs (OC) Loan Loss Provisions (LLP) - Taxes. The figures are shown over Total Earning Assets.

Table 2.5: Home and Host Countries.

Host Country	N. of foreign banks	N. of home countries	Foreign-Parent NIM	Host-Home Country NIM
Panel A				
Albania	12	8	0.74%	0.35%
Bosnia	18	6	1.76%	2.49%
Bulgaria	23	10	2.47%	1.62%
Croatia	31	5	1.97%	1.81%
Kosovo	5	4	4.91%	4.48%
Macedonia	8	7	3.54%	3.63%
Montenegro	9	7	2.85%	3.30%
Romania	38	9	5.07%	4.01%
Serbia	22	9	4.24%	5.56%
Home Country	N. of foreign banks	N. of host countries	Foreign-Parent NIM	Host-Home Country NIM
Panel B				
Austria	34	9	2.32%	3.72%
France	15	8	4.37%	4.06%
Germany	21	8	2.97%	3.20%
Greece	23	6	1.79%	3.64%
Hungary	7	5	-1.67%	1.88%
Italy	34	6	5.70%	2.82%
Netherlands	3	2	2.50%	4.39%
Slovenia	13	6	2.20%	4.72%
Turkey	9	4	-1.30%	-2.78%
USA	10	3	4.90%	2.12%

This table shows, in *Panel A*, the number of banks which have entered each of the SEE countries (foreign banks) and the number of countries of origin (home countries). It also shows the average differences in NIM between the parent bank (in the home country) and the foreign bank (in the host country) as well as average differences between NIM at the country level. In *Panel B*, it shows the number of foreign banks each home country has set up during the sample period and in how many different host countries in the SEE region. It also shows the average differences in NIM between the parent bank (in the home country) and the foreign bank (in the host country) as well as average differences between NIM at the country level.

Table 2.6: Regulation and Supervision in Home and Host Countries.

Host Country		Regulation			Superivision	
	act_restr	own._restr	cap_reg	sup_power	ext_audit	transp.
Albania	0.57	0.59	0.14	0.72	0.77	0.41
Bosnia-Herzegovina	0.56	0.54	0.33	0.84	0.93	0.46
Bulgaria	0.6	0.42	0.58	0.71	0.99	0.75
Croatia	0.43	0.31	0.24	0.72	1	0.87
Kosovo	0.86	0.79	0.62	0.86	0.89	0.44
Macedonia	0.62	0.53	0.24	0.76	0.73	0.59
Montenegro	0.4	0.43	0.6	0.16	0.48	0.5
Romania	0.82	0.46	0.27	0.63	0.75	0.43
Serbia	0.61	0.34	0.49	0.34	0.62	0.55
Average	0.6	0.43	0.35	0.64	0.86	0.62

Home Country		Regulation			Superivision	
	act_restr	own._restr	cap_reg	sup_power	ext_audit	transp.
Austria	0.25	0.33	0.54	0.73	0.99	0.49
Italy	0.75	0.64	0.23	0.44	0.54	0.87
Greece	0.55	0.34	0.34	0.66	0.9	0.81
Germany	0.21	0.36	0.5	0.53	0.85	0.55
France	0.44	0.35	0.53	0.5	0.83	0.68
Slovenia	0.68	0.48	0.58	0.85	1	0.96
Turkey	0.66	0.37	0.38	0.9	1	0.84
United States	0.76	0.72	0.41	0.86	0.75	0.75
Hungary	0.73	0.44	0.74	0.91	1	0.86
Netherlands	0.25	0.25	0.49	0.48	0.9	0.83
Average	0.49	0.43	0.44	0.65	0.84	0.72

This table shows the average values for three indicators of bank regulation (*Activity restrictions*, *Ownership restrictions* and *Capital regulations*) and three indicators of bank supervision (*Official supervisory power*, *External Auditing* and *Transparency*), based on the Regulation and Supervision Survey (BRSS) carried out by the World Bank and the database compiled by Barth et al. (2013).

Table 2.7: Descriptive statistics and correlation matrix.

Variables	All banks			Foreign banks			Domestic banks			Mean Diff.	(1995-2004)			(2005-2011)			Mean Diff.
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	For. vs Dom.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	(95-04) vs (05-11)
Dependent variable																	
NIM	2487	0.062	0.054	1283	0.055	0.052	1199	0.069	0.056	0.014***	1291	0.068	0.055	1196	0.055	0.053	-0.013***
Independent variables																	
Bank characteristics																	
Fb	2515	0.513	0.5	1289	1	0	1221	0	0	-1	1318	0.378	0.485	1197	0.661	0.474	0.283***
fb_acq	2515	0.277	0.448	1289	0.541	0.499	1221	0	0	-0.541***	1318	0.151	0.358	1197	0.416	0.493	0.265***
fb_green	2515	0.235	0.424	1289	0.459	0.499	1221	0	0	-0.459***	1318	0.227	0.419	1197	0.245	0.43	0.018
Share	2515	0.052	0.087	1289	0.059	0.087	1221	0.043	0.085	-0.016***	1318	0.052	0.096	1197	0.053	0.077	0.001
Liquidity	1910	0.218	0.155	976	0.234	0.151	930	0.201	0.156	-0.033***	1040	0.166	0.136	870	0.281	0.153	0.115***
Equityratio	2515	0.191	0.18	1289	0.163	0.195	1221	0.22	0.156	0.057***	1318	0.217	0.163	1197	0.162	0.192	-0.055***
llp_tea	2382	0.024	0.073	1239	0.017	0.032	1139	0.033	0.099	0.016***	1227	0.031	0.093	1155	0.017	0.041	-0.014***
Cti	2488	0.097	0.493	1281	0.097	0.654	1202	0.097	0.22	0	1294	0.092	0.208	1194	0.103	0.679	2.411
NIM_parent	1097	0.031	0.027	1097	0.031	0.027					385	0.03	0.027	712	0.031	0.026	0.001
Market structure																	
foreignshare	2515	0.597	0.309								1318	0.389	0.287	1197	0.826	0.097	0.437***
Hhi	2515	0.146	0.083								1318	0.162	0.098	1197	0.128	0.058	-0.034***
Macroeconomic																	
Gdpgrowth	2495	0.037	0.044								1298	0.044	0.045	1197	0.029	0.041	-0.014***
Inflation	2473	0.193	0.958								1276	0.323	1.32	1197	0.054	0.037	-0.269***
real_ir	2396	0.055	0.118								1208	0.057	0.162	1188	0.054	0.034	-0.003
Home Country Regulation																	
act_restr	1247	0.493	0.249								497	0.446	0.265	750	0.524	0.233	0.079***
ownership_restr	1245	0.432	0.189								495	0.368	0.228	750	0.474	0.144	0.106***
cap_reg	1254	0.442	0.252								494	0.467	0.247	760	0.426	0.255	-0.040***
sup_power	1286	0.647	0.187								497	0.657	0.187	789	0.64	0.187	-0.017
ext_audit	1279	0.841	0.215								497	0.81	0.269	782	0.862	0.168	0.052***
transparency	1279	0.724	0.236								497	0.601	0.224	782	0.802	0.21	0.201***

Panel A. Descriptive Statistics. - This table shows descriptive statistics for the variables used. Obs. denotes the number of observations; Std. Dev. the standard deviation; Summary statistics are shown for the whole sample, as well as separately for bank ownership types and two sample periods. Mean difference tests are based on the t-test with equal variances. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level. Table 2.1 contains variable definitions.

Table 2.6 - (*Continued*)

		1	2	3	4	5	6	7	8	9	10
1	NIM	1									
2	fb	-0.1314***	1								
3	fb_acq	-0.0936***	0.6039***	1							
4	fb_green	-0.0558***	0.5411***	-0.3436***	1						
5	share	-0.0916***	0.0867***	0.1724***	-0.0797***	1					
6	liquidity	0.1215***	0.1061***	0.1221***	-0.0049	-0.0011	1				
7	equityratio	0.2958***	-0.1578***	-0.1529***	-0.0246	-0.2084***	-0.1069***	1			
8	llp_tea	0.1947***	-0.1107***	-0.0453**	-0.0821***	-0.0246	-0.0216	0.0604***	1		
9	cti	-0.0611***	0.0850***	0.026	0.0726***	-0.1758***	0.0678***	0.0177	-0.0241	1	
10	NIM_parent	0.1550***	.	-0.2392***	0.2392***	0.0315	-0.049	0.0700**	-0.0345	0.0261	1
11	foreignshare	-0.1943***	0.3560***	0.3205***	0.0814***	-0.0231	0.2559***	-0.1974***	-0.1619***	0.0473**	0.0035
12	hhi	0.007	-0.0501**	-0.1079***	0.0548***	0.3802***	-0.1733***	-0.0031	-0.012	-0.0093	0.1332***
13	gdpgrowth	-0.0452**	-0.0319	-0.0471**	0.0123	0.0579***	0.0233	0.0259	-0.032	-0.0311	0.0079
14	inflation	0.0486**	-0.0683***	-0.0761***	0.0002	-0.0003	-0.0187	0	0.2481***	-0.0485***	-0.0229
15	real_ir	0.0063	-0.0048	0.0137	-0.0202	0.0550***	-0.0851***	0.0179	-0.1533***	0.0133	0.0721**
16	act_restr	0.0536*	.	0.1792***	-0.1792***	-0.0545*	0.0811**	-0.0014	0.0571**	0.0238	0.0451
17	ownership_restr	0.0898***	.	0.1312***	-0.1312***	0.0173	0.1706***	-0.0148	0.0563*	0.0123	0.0166
18	cap_reg	-0.0187	.	-0.0385	0.0385	-0.0243	-0.0462	-0.0247	0.0046	0.0515*	0.0356
19	sup_power	-0.0193	.	-0.0146	0.0146	-0.0184	-0.1110***	0.0980***	0.0213	0.0056	0.0303
20	ext_audit	-0.0768***	.	0.0504*	-0.0504*	0.0649**	0.0364	-0.0055	-0.0276	-0.0078	0.0275
21	Transparency	0.0281	.	0.2288***	-0.2288***	-0.011	0.1943***	-0.0185	0.0635**	-0.0215	0.0203

Panel B. Correlation Matrix. This table shows pair-wise correlation coefficients between variables. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 2.6 - (*Continued*)

		11	12	13	14	15	16	17	18	19	20	21
11	foreignshare	1										
12	hhi	-0.2706***	1									
13	gdpgrowth	-0.0832***	0.0348*	1								
14	inflation	-0.2168***	0.0979***	-0.1376***	1							
15	real_ir	0.0354*	0.0360*	0.1376***	-0.7638***	1						
16	act_restr	0.1708***	-0.013	-0.0304	-0.0242	-0.0002	1					
17	ownership_restr	0.3172***	-0.0343	-0.0789***	-0.0418	0.0096	0.6063***	1				
18	cap_reg	-0.0809***	0.0398	0.036	-0.0014	0.0174	-0.0866***	-0.2809***	1			
19	sup_power	-0.0771***	0.0182	0.0346	0.0208	-0.0068	-0.0035	-0.2388***	0.3921***	1		
20	ext_audit	0.0913***	-0.0578**	0.0493*	-0.0246	-0.0016	-0.3330***	-0.4507***	0.2556***	0.5952***	1	
21	Transparency	0.3639***	-0.0931***	-0.0458	-0.1032***	0.0321	0.5632***	0.4389***	-0.2363***	0.0638**	-0.1124***	1

Table 2.8: The impact of foreign bank ownership on bank NIMs.

	(1)	(2)	(3)	(4)	(5)
	(1995-2011)	(1995-2004)	(2005-2011)	Trend interact.	Foreign Share Inter.
fb	-0.003	-0.008***	0.004*	-0.015***	-0.010*
	(0.002)	(0.003)	(0.002)	(0.005)	(0.005)
fb*trend				0.001***	
				(0.000)	
trend				-0.002**	
				(0.001)	
fb*foreignshare					0.012*
					(0.007)
foreignshare					0.022**
					(0.011)
share	-0.000	-0.008	-0.012	-0.006	-0.004
	(0.012)	(0.017)	(0.011)	(0.011)	(0.012)
liquidity	0.045***	0.039*	0.051***	0.046***	0.045***
	(0.010)	(0.021)	(0.011)	(0.010)	(0.011)
equityratio	0.116***	0.115***	0.116***	0.116***	0.117***
	(0.017)	(0.021)	(0.026)	(0.017)	(0.017)
llp_tea	0.065***	0.080***	0.055	0.063***	0.065***
	(0.018)	(0.020)	(0.043)	(0.018)	(0.018)
cti	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hhi	-0.079***	-0.064	-0.114*	-0.074***	-0.070**
	(0.027)	(0.050)	(0.064)	(0.027)	(0.027)
gdpgrowth	-0.155***	-0.164**	-0.038	-0.156***	-0.141**
	(0.058)	(0.079)	(0.051)	(0.059)	(0.057)
inflation	-0.002	-0.002	0.134***	-0.001	-0.003
	(0.003)	(0.003)	(0.048)	(0.003)	(0.003)
real_ir	-0.008	-0.001	-0.001	-0.008	-0.021
	(0.030)	(0.034)	(0.050)	(0.030)	(0.031)
Constant	0.082***	0.059	0.051***	0.086***	0.080***
	(0.024)	(0.039)	(0.014)	(0.024)	(0.023)
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	1694	860	834	1694	1694
R-sq	0.324	0.343	0.417	0.327	0.329

This table shows regression results of the impact of foreign bank ownership on host country NIMs while controlling for bank specific, market structure and macroeconomic factors. The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 2.9: The impact of the mode of foreign bank entry on bank NIMs in host countries.

	(1)	(2)	(3)	(4)	(5)
	(1995-2011)	(1995-2004)	(2005-2011)	Trend interact.	Foreign Share Inter.
fb_acq	-0.003	-0.006**	0.003	-0.015***	-0.003
	(0.002)	(0.003)	(0.003)	(0.005)	(0.006)
fb_green	-0.002	-0.010***	0.005**	-0.016**	-0.014**
	(0.002)	(0.003)	(0.002)	(0.007)	(0.006)
fb_acq*trend				0.001***	
				(0.000)	
fb_green*trend				0.001**	
				(0.001)	
trend				-0.002**	
				(0.001)	
fb_acq*foreignshare					0.001
					(0.007)
fb_green*foreignshare					0.019**
					(0.008)
foreignshare					0.023**
					(0.011)
share	0.001	-0.011	-0.010	-0.004	-0.003
	(0.012)	(0.017)	(0.010)	(0.011)	(0.012)
liquidity	0.045***	0.038*	0.051***	0.046***	0.044***
	(0.010)	(0.021)	(0.011)	(0.011)	(0.011)
equityratio	0.116***	0.114***	0.115***	0.116***	0.116***
	(0.017)	(0.021)	(0.026)	(0.017)	(0.017)
llp_tea	0.065***	0.079***	0.055	0.063***	0.065***
	(0.018)	(0.020)	(0.043)	(0.018)	(0.018)
cti	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hhi	-0.079***	-0.065	-0.116*	-0.075***	-0.068**
	(0.027)	(0.050)	(0.064)	(0.027)	(0.028)
gdpgrowth	-0.155***	-0.165**	-0.039	-0.156***	-0.140**
	(0.058)	(0.079)	(0.051)	(0.059)	(0.057)
inflation	-0.002	-0.002	0.133***	-0.001	-0.003
	(0.003)	(0.003)	(0.048)	(0.003)	(0.003)
real_ir	-0.008	-0.001	0.001	-0.008	-0.022
	(0.030)	(0.034)	(0.051)	(0.030)	(0.031)
Constant	0.081***	0.062	0.051***	0.085***	0.080***
	(0.024)	(0.039)	(0.014)	(0.024)	(0.023)
Country FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	1694	860	834	1694	1694
R-sq	0.324	0.343	0.417	0.327	0.330

This table shows regression results of the impact of the mode of foreign bank entry on host country NIMs while controlling for bank specific, market structure and macroeconomic factors. The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 2.10: The impact of parent bank NIMs on bank NIMs in host countries.

	(1)	(2)	(3)
	(1995-2011)	(1995-2004)	(2005-2011)
fb	-0.006***	-0.009***	-0.002
	(0.002)	(0.003)	(0.003)
fb*NIM_parent	0.155***	0.035	0.229***
	(0.043)	(0.080)	(0.047)
NIM_parent	0.000	0.000	0.000
	(.)	(.)	(.)
share	-0.002	-0.008	-0.014
	(0.012)	(0.017)	(0.010)
liquidity	0.046***	0.039*	0.052***
	(0.010)	(0.021)	(0.011)
equityratio	0.117***	0.115***	0.119***
	(0.017)	(0.021)	(0.026)
llp_tea	0.065***	0.080***	0.059
	(0.018)	(0.020)	(0.042)
cti	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
hhi	-0.076***	-0.064	-0.120**
	(0.027)	(0.050)	(0.061)
gdpgrowth	-0.154***	-0.165**	-0.013
	(0.059)	(0.079)	(0.050)
inflation	-0.002	-0.002	0.144***
	(0.003)	(0.003)	(0.045)
real_ir	-0.008	-0.001	0.017
	(0.030)	(0.034)	(0.048)
Constant	0.082***	0.059	0.048***
	(0.023)	(0.039)	(0.014)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	1694	860	834
R-sq	0.329	0.343	0.443

This table shows regression results of the impact of parent bank NIMs on foreign bank NIMs in host countries while controlling for bank specific, market structure and macroeconomic factors. For completeness parent bank NIM (NIM_parent) is also included in addition to its interaction with the foreign bank dummy variable (fb*NIM_parent) however it does not yield any estimations because NIM_parent takes values (varies) only among foreign banks and stays constant (has a value of zero) for domestic banks. NIM_parent can therefore be omitted from the estimations without affecting the rest of the results. The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 2.11: The impact of home-country regulatory and supervisory indicators on bank NIMs in host countries.

PANEL A Home country var.:	act_restr			ownership_restr			cap_reg		
	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)
fb	-0.010***	-0.011***	-0.004	-0.017***	-0.017***	-0.014***	-0.009***	-0.007	-0.005*
	(0.003)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)	(0.003)	(0.005)	(0.003)
fb*home country var.	0.007**	0.005	0.004	0.024***	0.023***	0.025***	0.005	-0.004	0.008*
	(0.003)	(0.006)	(0.003)	(0.005)	(0.007)	(0.005)	(0.004)	(0.006)	(0.004)
home country var.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
NIM_parent	0.153***	0.025	0.246***	0.166***	0.035	0.266***	0.159***	0.036	0.233***
	(0.045)	(0.083)	(0.049)	(0.043)	(0.079)	(0.047)	(0.044)	(0.080)	(0.048)
share	-0.001	-0.005	-0.015	-0.004	-0.008	-0.016	-0.001	-0.006	-0.015
	(0.012)	(0.017)	(0.010)	(0.012)	(0.017)	(0.010)	(0.012)	(0.017)	(0.011)
liquidity	0.047***	0.039*	0.054***	0.046***	0.038*	0.054***	0.047***	0.038*	0.054***
	(0.011)	(0.021)	(0.011)	(0.011)	(0.021)	(0.011)	(0.011)	(0.021)	(0.011)
equityratio	0.117***	0.114***	0.123***	0.115***	0.112***	0.122***	0.118***	0.114***	0.123***
	(0.018)	(0.021)	(0.029)	(0.018)	(0.021)	(0.029)	(0.018)	(0.022)	(0.029)
llp_tea	0.065***	0.080***	0.059	0.064***	0.079***	0.059	0.066***	0.081***	0.059
	(0.018)	(0.020)	(0.042)	(0.018)	(0.020)	(0.042)	(0.018)	(0.020)	(0.042)
cti	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hhi	-0.072**	-0.053	-0.141**	-0.073***	-0.056	-0.136**	-0.070**	-0.053	-0.136**
	(0.028)	(0.051)	(0.065)	(0.028)	(0.051)	(0.064)	(0.028)	(0.051)	(0.064)
gdpgrowth	-0.157***	-0.173**	0.004	-0.154**	-0.168**	0.003	-0.160***	-0.175**	-0.008
	(0.060)	(0.080)	(0.051)	(0.060)	(0.080)	(0.051)	(0.060)	(0.080)	(0.051)
inflation	-0.002	-0.003	0.155***	-0.002	-0.003	0.157***	-0.002	-0.003	0.148***
	(0.003)	(0.003)	(0.047)	(0.003)	(0.003)	(0.046)	(0.003)	(0.003)	(0.047)
real_ir	-0.011	-0.006	0.026	-0.013	-0.008	0.025	-0.011	-0.007	0.017
	(0.031)	(0.035)	(0.049)	(0.031)	(0.035)	(0.049)	(0.031)	(0.035)	(0.049)
Constant	0.067***	0.040	0.048***	0.071***	0.045	0.049***	0.065***	0.041	0.049***
	(0.023)	(0.039)	(0.015)	(0.023)	(0.039)	(0.014)	(0.023)	(0.040)	(0.015)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1656	857	799	1654	855	799	1659	855	804
R-sq	0.330	0.347	0.444	0.335	0.351	0.452	0.330	0.348	0.444

(*Continued*)

Table 2.11: (*Continued*)

PANEL B Home country var.:		sup_power			ext_audit			transparency	
	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)
fb	-0.000	0.005	-0.001	0.006	0.001	0.015***	-0.009**	-0.008	-0.004
	(0.003)	(0.006)	(0.003)	(0.004)	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
fb*home country var.	-0.010**	-0.022***	-0.002	-0.015***	-0.013**	-0.020***	0.004	-0.001	0.003
	(0.004)	(0.008)	(0.004)	(0.005)	(0.006)	(0.006)	(0.004)	(0.008)	(0.004)
home country var.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
NIM_parent	0.153***	0.033	0.229***	0.164***	0.041	0.241***	0.158***	0.034	0.236***
	(0.042)	(0.077)	(0.047)	(0.043)	(0.079)	(0.047)	(0.043)	(0.080)	(0.047)
share	-0.001	-0.006	-0.014	0.001	-0.005	-0.013	-0.002	-0.005	-0.015
	(0.012)	(0.017)	(0.010)	(0.012)	(0.017)	(0.010)	(0.012)	(0.017)	(0.010)
liquidity	0.045***	0.039*	0.052***	0.047***	0.039*	0.054***	0.047***	0.039*	0.054***
	(0.010)	(0.021)	(0.011)	(0.011)	(0.021)	(0.011)	(0.011)	(0.021)	(0.011)
equityratio	0.117***	0.115***	0.119***	0.116***	0.113***	0.119***	0.116***	0.115***	0.119***
	(0.017)	(0.021)	(0.026)	(0.017)	(0.021)	(0.027)	(0.017)	(0.022)	(0.026)
llp_tea	0.066***	0.080***	0.059	0.065***	0.080***	0.058	0.065***	0.081***	0.058
	(0.018)	(0.020)	(0.042)	(0.018)	(0.020)	(0.042)	(0.018)	(0.020)	(0.042)
cti	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hhi	-0.074***	-0.058	-0.120*	-0.077***	-0.058	-0.135**	-0.072***	-0.053	-0.128**
	(0.027)	(0.051)	(0.061)	(0.028)	(0.051)	(0.061)	(0.028)	(0.051)	(0.062)
gdpgrowth	-0.160***	-0.180**	-0.011	-0.158***	-0.175**	-0.013	-0.159***	-0.176**	-0.013
	(0.059)	(0.080)	(0.050)	(0.059)	(0.080)	(0.050)	(0.060)	(0.080)	(0.050)
inflation	-0.002	-0.003	0.145***	-0.002	-0.003	0.149***	-0.002	-0.003	0.142***
	(0.003)	(0.003)	(0.045)	(0.003)	(0.003)	(0.045)	(0.003)	(0.003)	(0.046)
real_ir	-0.012	-0.006	0.019	-0.013	-0.006	0.011	-0.011	-0.006	0.010
	(0.031)	(0.035)	(0.048)	(0.031)	(0.035)	(0.047)	(0.031)	(0.035)	(0.048)
Constant	0.069***	0.045	0.047***	0.070***	0.043	0.052***	0.068***	0.040	0.050***
	(0.022)	(0.040)	(0.014)	(0.023)	(0.040)	(0.014)	(0.023)	(0.039)	(0.014)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1689	857	832	1682	857	825	1682	857	825
R-sq	0.332	0.350	0.443	0.334	0.349	0.452	0.331	0.347	0.444

This table represents the impact of home-country banking regulation (Panel A) and supervision indicators (Panel B) on foreign bank NIMs in host countries while controlling for bank specific, market structure and macroeconomic factors. Each column represents a single regression for different home-country variables. For completeness home country variables (home country var.) have also been included in addition to their interactions with the foreign bank dummy variable (fb*home country var.) however it does not yield any estimations because home country var. take values (vary) only among foreign banks and stay constant (have a value of zero) for domestic banks. Home country var. can therefore be omitted from the estimations without affecting the rest of the results. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 2.12: Alternative efficiency measures

	Overhead Costs			Scale Efficiency			Technical Efficiency		
	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)
fb	-0.002	-0.006**	0.003	-0.003	-0.007**	0.002	0.001	-0.003	0.005**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)
share	0.021**	0.011	0.013	-0.001	-0.009	-0.016	0.056***	0.040**	0.044***
	(0.011)	(0.017)	(0.011)	(0.010)	(0.017)	(0.011)	(0.011)	(0.017)	(0.012)
liquidity	0.025**	0.016	0.037***	0.044***	0.056**	0.040***	0.039***	0.042	0.041***
	(0.011)	(0.026)	(0.009)	(0.011)	(0.028)	(0.010)	(0.011)	(0.027)	(0.011)
equityratio	0.097***	0.098***	0.097***	0.113***	0.116***	0.105***	0.143***	0.134***	0.145***
	(0.014)	(0.021)	(0.020)	(0.016)	(0.023)	(0.022)	(0.020)	(0.028)	(0.027)
llp_tea	-0.007	-0.027	0.045	0.060	0.108	0.041	0.046	0.088	0.031
	(0.043)	(0.082)	(0.044)	(0.041)	(0.075)	(0.041)	(0.042)	(0.080)	(0.041)
overh_tea	0.122***	0.141	0.091***						
	(0.046)	(0.094)	(0.033)						
scale				-0.038**	-0.041	-0.034***			
				(0.016)	(0.029)	(0.013)			
technical							-0.045***	-0.045***	-0.037***
							(0.005)	(0.008)	(0.004)
hhi	-0.048	-0.015	-0.136**	-0.065***	-0.015	-0.115	-0.056***	-0.023	-0.101
	(0.029)	(0.053)	(0.064)	(0.021)	(0.049)	(0.074)	(0.019)	(0.041)	(0.070)
gdpgrowth	-0.170***	-0.206**	-0.059	-0.116**	-0.219**	-0.021	-0.105**	-0.201**	-0.015
	(0.058)	(0.083)	(0.048)	(0.056)	(0.092)	(0.052)	(0.053)	(0.093)	(0.050)
inflation	-0.004	-0.003	0.120**	0.001	0.001	0.117**	-0.002	-0.002	0.144***
	(0.003)	(0.003)	(0.048)	(0.009)	(0.007)	(0.048)	(0.008)	(0.006)	(0.046)
real_ir	-0.016	0.011	-0.024	-0.070	0.002	0.002	-0.100*	-0.038	-0.005
	(0.029)	(0.034)	(0.051)	(0.057)	(0.081)	(0.054)	(0.054)	(0.079)	(0.051)
Constant	0.062**	0.024	0.054***	0.103***	0.052	0.078***	0.105***	0.073**	0.061***
	(0.024)	(0.042)	(0.015)	(0.023)	(0.041)	(0.019)	(0.020)	(0.033)	(0.016)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1702	866	836	1454	645	809	1454	645	809
R-sq	0.350	0.353	0.446	0.356	0.358	0.428	0.391	0.379	0.460

This table shows regression results of the impact of foreign bank ownership on host country NIMs while controlling for bank specific, market structure and macroeconomic factors. Overhead costs, technical and scale efficiency measured using the non-parametric Data Envelopment Analysis approach are used as alternative efficiency measures to the cost to income ratio used in the baseline specification. The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 2.13: Alternative market structure measures

	Top three concentration ratio			Lerner Index			Panzar-Rosse H-Statistics		
	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)	(1995-2011)	(1995-2004)	(2005-2011)
fb	-0.003	-0.008***	0.004*	-0.003	-0.008***	0.004*	-0.002	-0.008***	0.004*
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)
share	-0.004	-0.010	-0.013	-0.002	-0.008	-0.012	-0.006	-0.012	-0.013
	(0.012)	(0.018)	(0.011)	(0.011)	(0.017)	(0.010)	(0.011)	(0.017)	(0.010)
liquidity	0.045***	0.038*	0.051***	0.049***	0.053**	0.053***	0.044***	0.039*	0.051***
	(0.011)	(0.021)	(0.011)	(0.011)	(0.022)	(0.011)	(0.011)	(0.021)	(0.011)
equityratio	0.116***	0.115***	0.115***	0.118***	0.120***	0.116***	0.116***	0.116***	0.115***
	(0.017)	(0.021)	(0.026)	(0.018)	(0.023)	(0.026)	(0.017)	(0.021)	(0.026)
llp_tea	0.065***	0.079***	0.055	0.065***	0.078***	0.057	0.066***	0.081***	0.055
	(0.018)	(0.020)	(0.043)	(0.018)	(0.021)	(0.042)	(0.018)	(0.020)	(0.043)
cti	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
cr3	-0.018	-0.042	-0.017						
	(0.024)	(0.036)	(0.027)						
lerner				-0.008	0.002	0.012*			
				(0.008)	(0.016)	(0.007)			
hstat							-0.015*	-0.012	0.003
							(0.008)	(0.013)	(0.011)
gdpgrowth	-0.150**	-0.194**	-0.036	-0.171***	-0.246***	-0.046	-0.132**	-0.159**	-0.037
	(0.060)	(0.082)	(0.051)	(0.059)	(0.083)	(0.050)	(0.060)	(0.080)	(0.051)
inflation	-0.002	-0.002	0.138***	-0.004	-0.002	0.132***	-0.001	-0.002	0.133***
	(0.003)	(0.003)	(0.049)	(0.004)	(0.004)	(0.048)	(0.003)	(0.003)	(0.048)
real_ir	-0.005	-0.005	-0.006	-0.023	0.012	0.005	0.002	0.007	-0.006
	(0.031)	(0.035)	(0.051)	(0.041)	(0.053)	(0.051)	(0.031)	(0.035)	(0.051)
Constant	0.056	0.068	0.038**	0.045**	0.018	0.018	0.049***	0.026	0.024
	(0.035)	(0.050)	(0.019)	(0.019)	(0.021)	(0.013)	(0.018)	(0.019)	(0.017)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1692	858	834	1625	791	834	1694	860	834
R-sq	0.320	0.343	0.415	0.335	0.357	0.416	0.319	0.341	0.415

This table shows regression results of the impact of foreign bank ownership on host country NIMs while controlling for bank specific, market structure and macroeconomic factors. The top three concentration ratio (CR3), Lerner index and the Panzar-Rosse H-Statistics are used as alternative market structure measures to the Herfindahl Hirschman index (hhi) used in the baseline specification. The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

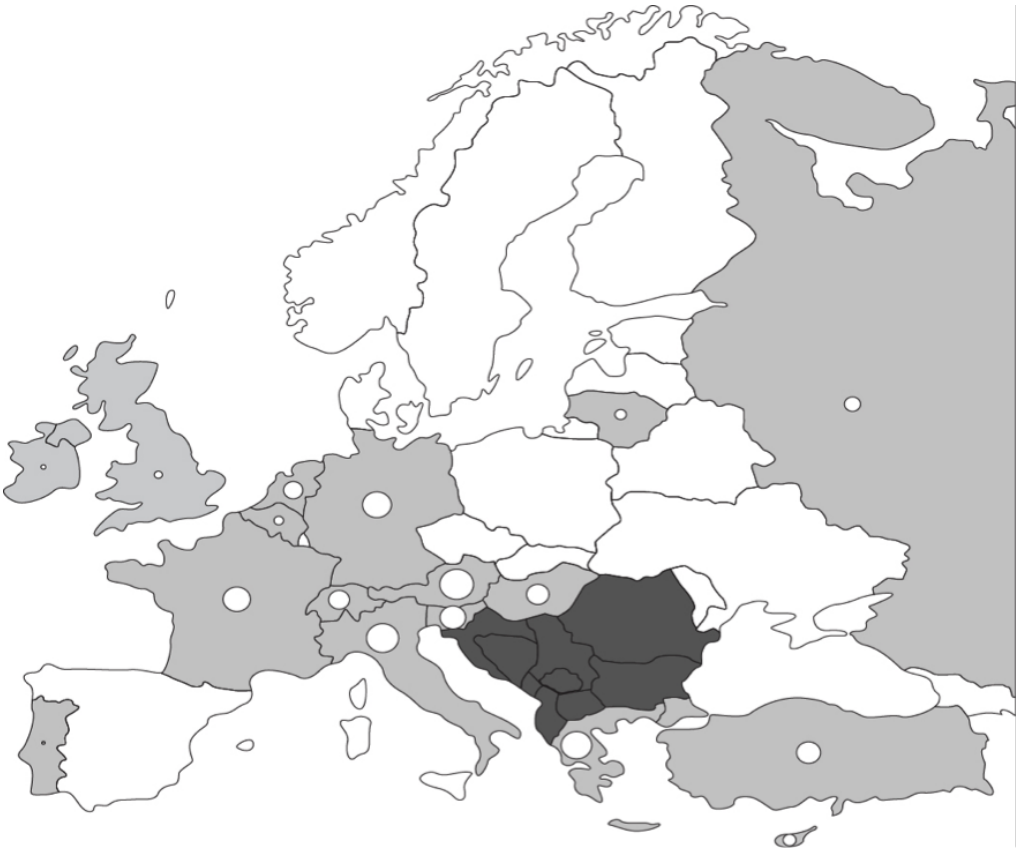
Table 2.14: Instrumental Variables (IVs) Second-Stage Regression Results

	(1) (1995-2011)	(2) (1995-2004)	(3) (2005-2011)	(4) (1995-2011)	(5) (1995-2004)	(6) (2005-2011)
Instruments:	Financial Freedom, EU Member			Financial Freedom, EU Member, ROA, Loan to Assets		
fb	-0.003**	-0.008***	0.003*	-0.003*	-0.007***	0.003**
	(0.002)	(0.003)	(0.001)	(0.002)	(0.003)	(0.002)
share	-0.010	-0.007	-0.034***	-0.010	-0.006	-0.036***
	(0.013)	(0.018)	(0.009)	(0.013)	(0.018)	(0.009)
liquidity	0.042***	0.044**	0.036***	0.042***	0.045**	0.037***
	(0.010)	(0.022)	(0.007)	(0.010)	(0.022)	(0.007)
equityratio	0.099***	0.117***	0.057***	0.100***	0.117***	0.058***
	(0.016)	(0.023)	(0.010)	(0.016)	(0.023)	(0.010)
llp_tea	0.070***	0.079***	0.063	0.070***	0.079***	0.063
	(0.018)	(0.020)	(0.050)	(0.018)	(0.020)	(0.050)
cti	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
hhi	-0.081***	-0.071	-0.084	-0.081***	-0.071	-0.083
	(0.027)	(0.050)	(0.062)	(0.027)	(0.050)	(0.062)
gdpgrowth	-0.193***	-0.168**	-0.065	-0.193***	-0.168**	-0.065
	(0.061)	(0.080)	(0.047)	(0.061)	(0.080)	(0.047)
inflation	-0.002	-0.002	0.120**	-0.002	-0.002	0.120**
	(0.003)	(0.003)	(0.053)	(0.003)	(0.003)	(0.053)
real_ir	-0.005	-0.009	0.001	-0.005	-0.009	0.001
	(0.031)	(0.034)	(0.050)	(0.031)	(0.034)	(0.050)
Constant	0.092***	0.065	0.055***	0.092***	0.064	0.063***
	(0.024)	(0.040)	(0.015)	(0.024)	(0.040)	(0.015)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	17.98	25.97	18.09	17.98	26.03	18.07
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Kleinbergen-Paap LM statistics	803.698	445.824	353.103	814.506	452.657	359.003
p-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Kleinbergen-Paap Wald F statistics	4341.369	1204.000	1348.791	2674.790	5437.820	912.55
N	1533	829	704	1533	829	704
R-sq	0.336	0.350	0.444	0.335	0.350	0.444

This table reports second-stage regression results of the Instrumental Variables (IVs) two-stage least squares (2SLS) estimation. In columns (1) to (3) *Financial Freedom* and whether the country was member of the European Union (*EU Member*) was used as an instruments for *fb*. In columns (4) to (6) *Financial freedom*, *EU Member*, *ROA*,and the *Loan to Assets* ratio are used as instruments for *fb*. The dependent variable is bank NIM. Table 2.1 contains definitions of all variables. The model is estimated using OLS with both country and year fixed effects. All the estimations are made for the whole sample (1995-2011), for the first sample period only (1995-2004) and for the second sample period only (2005-2011). Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Figures

Figure 2.1: Host and home countries.



The map shows nine South-east European countries as host countries (in dark grey) and the home countries of foreign banks operating in this region (in light grey). The size of the circles shows the relative importance of home countries in the total South-east European banking system. The larger the circle the higher the number of foreign banks in SEE coming from that country.(Note: United States also belongs to home countries, although it does not appear on the map).

Appendices

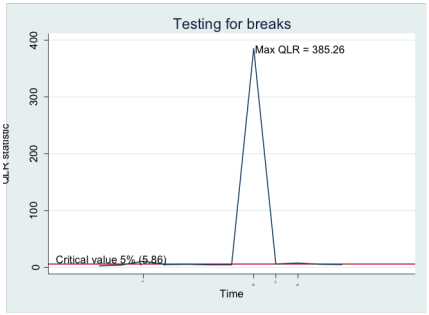
Appendix 2A. Testing for structural breaks in foreignshare variable.

The Chow test (Chow (1960)) pre-supposes that we know the date at which the structural break occurs. More realistically, in our case the exact structural change can happen at years shortly before or after the year 2005 suggested by the visual inspection of the time series plot. Because we cannot state with accuracy the year of the structural change, a modified Chow test-the Quandt likelihood ratio (QLR) statistics is used (also known as the sup-Wald statistics) (Quandt (1960)). The QLR statistic is a modified Chow test which tests for breaks at all possible dates within a sub-sample range, and then using the largest of the resulting F-statistics to test for a break at an unknown date. Since the QLR statistics is the largest of many F-statistics, its critical values are obtained from a special distribution which is different from that of an individual F-statistic. This distribution depends on the number of restrictions, i.e. the number of coefficients (including the intercept) that are allowed to break (change) under the alternative hypothesis as well as on the subsample range over which the F-statistics are computed. A common choice is a 15% trimming, which means that the F-statistics are computed for break dates within the central 70% of the sample. The critical values for different trimming percentages, number of restrictions and significance levels are given in Stock and Watson (2012) Table 14.6 and Andrews (2003). In our case the critical value with 15% trimming, 2 degrees of freedom (one lag and the intercept) and 5% significance level is $F_2 5\% = 5.86$. Results are shown in Table 2A. We note that the largest of the F-values is realized in 2004 and exceeds the 5% critical value, suggesting that this is an estimator of the break date.

Table 2A. QRL test for break in Foreignshare series with 15% trimming.

Year	QLR statistics
1995	.
1996	.
1997	2.8443
1998	3.9448
1999	10.9186
2000	4.819
2001	5.4693
2002	4.3989
2003	4.6363
2004	385.2596
2005	5.9758
2006	7.6145
2007	5.2487
2008	4.8765
2009	.
2010	.
2011	.

Figure 2A. QRL test for break in Foreignshare series.



Appendix 2B. Definition of Banking Regulation and Supervision indices *

Index (notation)	Definition	Survey Questions
Restrictions on banking activities (*act_restr*)	The extent to which banks may engage in securities, insurance and real estate activities.	What are the conditions under which banks can engage in securities/insurance/real estate activities?
Restrictions on bank ownership (*ownership_restr*)	The extent to which banks may own nonfinancial firms and the extent to which nonfinancial firms and nonbank financial firms may own and control banks.	What are the conditions under which banks can engage in nonfinancial businesses? Can nonfinancial firms own voting shares in commercial banks? Can nonbank financial firms own voting shares in commercial banks?
Capital regulatory index (*cap_reg*)	Whether capital requirements reflect certain risk elements and deduct certain market value losses from capital before minimum capital adequacy is determined and whether certain funds may be used to initially capitalize a bank.	Is the capital ratio risk weighted in line with Basel guidelines? Does the minimum ratio vary with an individual bank's credit risk? Does the minimum ratio vary as a function of market risk? Before minimum capital adequacy is determined which items are deducted from the book value of capital? Are the sources of funds to be used as capital verified by the regulatory/supervisory authorities? Can the initial disbursement or subsequent injections of capital be done with assets other than cash or government securities? Can the initial disbursement of capital be done with borrowed funds?
Official supervisory power (*sup_power*)	Whether supervisory authorities have the authority to take specific actions to prevent and correct problems.	Can supervisors meet external auditors to discuss report without bank approval? Are auditors legally required to report misconduct by managers/directors to supervisory agency? Can legal action against external auditors be taken by supervisors for negligence? Can supervisors force banks to change internal organizational structure? Are off-balance sheet items disclosed to supervisors? Can the supervisory agency order directors/management to constitute provisions to cover actual/potential losses? Can the supervisory agency supercede bank shareholder rights and declare bank insolvent? Does banking law allow supervisoy agency to suspend some or all ownership rights of a problem bank?
Strength of external audit (*ext_audit*)	The effectiveness of external audit of banks.	Is an external audit a compulsory obligation for banks? Are specific requirements for the extent or nature of the audit spelled out? Are auditors licensed or certified? Do supervisors get a copy of the auditor's report? Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank? Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in illicit activities, fraud, or insider abuse? Can supervisors take legal action against external auditors for negligence?
Financial statement transparency (*transparency*)	The transparency of bank financial statements practices.	Does accrued, though unpaid, interest/principal enter the income statement while the loan is still performing? Are banks required to prepare consolidated accounts for accounting purposes? Do banks disclose to the public: off-balance sheet items; risk management procedures? Are bank directors legally liable if information disclosed is erroneous or misleading? Does accrued, though unpaid, interest/principal enter the income statement while the loan is still non-performing?

Source: Barth et al. (2013), * higher values indicate more restrictive banking regulation and supervision indicators.

Appendix 2C. Data coverage for selected years.

Countries	Variables	1999	2001	2003	2005	2007	2008	2009	2010	2011
Albania	Total number of banks	13	13	16	17	16	16	16	16	16
	Number of banks in Bankscope	6	6	11	9	11	9	10	11	8
	Total banking assets	249484.6	318456.9	373600	496561.49	742900	834100	886300	990600	1120200
	Total banking assets in Bankscope	208586.1	278154.3	344399.1	441840.9	621820.4	682222.3	763821.5	870270.2	816190.3
	Coverage(nr. of banks)	46.15%	46.15%	68.75%	52.94%	68.75%	56.25%	62.50%	68.75%	50.00%
	Coverage(total assets)	83.61%	87.34%	92.18%	88.98%	83.70%	81.79%	86.18%	87.85%	72.86%
Bosnia-Herzegovina	Total number of banks		48	36	33	32	30	30	29	29
	Number of banks in Bankscope	18	19	29	23	23	23	24	24	21
	Total banking assets	3904.3	5574.9	7688	11874.6	19603.2	21118.3	21009.6	21177.7	21898.1
	Total banking assets in Bankscope	1778.309	3486.057	6768.336	11591.72	18876.34	20331.31	20191.68	19881.2	16697.8
	Coverage(nr. of banks)		40%	81%	70%	72%	77%	80%	83%	72%
	Coverage(total assets)	45.55%	62.53%	88.04%	97.62%	96.29%	96.27%	96.11%	93.88%	76.25%
Bulgaria	Total number of banks	34	35	35	34	29	30	30	30	31
	Number of banks in Bankscope	23	28	28	30	22	24	24	22	19
	Total banking assets	8,186	12,221	17,324	32,851	59,090	69,560	70,868	73,726	76,811
	Total banking assets in Bankscope	7969.55	11890.03	16609.92	32543.08	56038.09	65896.96	67429.38	69373.12	65233.99
	Coverage(nr. of banks)	67.65%	80.00%	80.00%	88.24%	75.86%	80.00%	80.00%	73.33%	61.29%
	Coverage(total assets)	97.36%	97.30%	95.88%	99.06%	94.84%	94.73%	95.15%	94.10%	84.93%
Croatia	Total number of banks	53	43	41	34	33	34	34	33	32
	Number of banks in Bankscope	35	37	38	28	28	31	30	30	26
	Total banking assets	93522.9	148428.3	204115	260277.2	345081.4	370093	378370.6	391071.2	406965
	Total banking assets in Bankscope	91667.3	149560	202508.8	247904.9	339824.6	367443.1	375371.5	387950.9	401105.1
	Coverage(nr. of banks)	66.04%	86.05%	92.68%	82.35%	84.85%	91.18%	88.24%	90.91%	81.25%
	Coverage(total assets)	98.02%	100.76%	99.21%	95.25%	98.48%	99.28%	99.21%	99.20%	98.56%
Kosovo	Total number of banks		7	7	7	7	8	8	8	8
	Number of banks in Bankscope		2	2	5	5	4	4	4	4
	Total banking assets		519	589.198	984.412	1435	1808.1	2204.1	2455.2	2660
	Total banking assets in Bankscope		379.3	370.6	868.332	1282.586	1568.3	1630.7	1758.5	1828.2
	Coverage(nr. of banks)		28.57%	28.57%	71.43%	71.43%	50.00%	50.00%	50.00%	50.00%
	Coverage(total assets)		73.08%	62.90%	88.21%	89.38%	86.74%	73.98%	71.62%	68.73%

(*Continued*)

Appendix 2C. - (*Continued*)

Countries	Variables	1999	2001	2003	2005	2007	2008	2009	2010	2011
Macedonia	Total number of banks	23	21	21	20	18	18	18	18	17
	Number of banks in Bankscope	13	14	15	13	16	16	15	14	11
	Total banking assets	72254.61	105633	104875	140436	223659	250704	268543	305290	331176
	Total banking assets in Bankscope	64368.7	93921.4	95318.1	130506.6	220957.2	247340.1	264089.2	298039.9	270894.4
	Coverage(nr. of banks)	56.52%	66.67%	71.43%	65.00%	88.89%	88.89%	83.33%	77.78%	64.71%
	Coverage(total assets)	89.09%	88.91%	90.89%	92.93%	98.79%	98.66%	98.34%	97.63%	81.80%
Montenegro	Total number of banks			10	10	11		11		
	Number of banks in Bankscope			6	9	10	10	10	7	7
	Total banking assets			349.761	695.757	2976.363	3309	3025	2,944	2,810
	Total banking assets in Bankscope			231.8	739.058	2966.579	2868.499	2540.516	1989	2096
	Coverage(nr. of banks)			60.00%	90.00%	90.91%	NA	90.91%	NA	NA
	Coverage(total assets)			66.27%	106.22%	99.67%	86.69%	83.98%	67.57%	74.60%
Romania	Total number of banks	41	41	38	39	41	42	41	41	40
	Number of banks in Bankscope	28	28	29	30	29	29	31	31	21
	Total banking assets	16899	34522	60458.1	128089.6	250,782.8	313,745.4	329,399.5	341,150.0	353,057.0
	Total banking assets in Bankscope	32090.41	38888.51	57473.2	120363.8	242747.3	302438.8	311093.8	324601.1	299252.3
	Coverage(nr. of banks)	68.29%	68.29%	76.32%	76.92%	70.73%	69.05%	75.61%	75.61%	52.50%
	Coverage(total assets)	189.90%	112.65%	95.06%	93.97%	96.80%	96.40%	94.44%	95.15%	84.76%
Serbia	Total number of banks		49	47	40	35	34	34	33	33
	Number of banks in Bankscope	13	24	31	31	30	30	30	30	25
	Total banking assets	146548	291460.1	367486	775413	1561822	1776919	2160411	2534000	2650000
	Total banking assets in Bankscope	143179	205309.1	314459.6	731286.2	1540405	1741612	2141086	2514295	2451556
	Coverage(nr. of banks)		48.98%	65.96%	77.50%	85.71%	88.24%	88.24%	90.91%	75.76%
	Coverage(total assets)	97.70%	70.44%	85.57%	94.31%	98.63%	98.01%	99.11%	99.22%	92.51%

Chapter 3

Organizational Hierarchy and Institutions

3.1 Introduction

In his theory of the firm, Coase (1937) argues that the optimal structure of a firm depends on its institutional environment. Subsequent work in this literature have tried to understand how informational and agency problems between managers and their employees shape the nature of information acquisition and the kinds of activities that a firm can efficiently undertake (Bolton and Dewatripont (1994); Aghion and Bolton (1997); Baker, Gibbons and Murphy (1999); Stein (2002); Dewatripont and Tirole (2005)). The central idea in this literature is that in more hierarchical production processes information flows between different levels of hierarchies become difficult. These models apply naturally to the banking industry where lending activities are very sensitive to information sharing. Despite the theoretical emphasis, not much is known about the impact of institutions on bank organizational structures. One of the reasons for a lack of empirical work is data availability. Bank internal organizational structures are very difficult to observe in practice. It is even more difficult to obtain this data for a cross-section of countries.

In this paper we investigate how the legal and institutional environment in a

country affects bank organizational structures using a unique bank-level survey dataset. The dataset contains information on the hierarchy of bank lending decisions, lending techniques used by banks, risk management procedures as well as their perceptions of the institutional environment they operate in. The use of this data makes it possible to distinguish the behaviour of banks operating in countries with different financial and institutional environments. To further sharpen the analysis we focus on foreign affiliates of the same parent bank operating in countries with different financial and institutional environments, thereby implicitly controlling for factors common to all affiliates of the same parent bank. This offers a cleaner test of the impact of institutions on the choice of bank organizational structures.

Studying bank internal organizational structures is important for both academics and policy makers alike. The level of decision-making authority has an impact on the type of information acquired and used in lending decisions and consequently on the type of borrowers banks lend to. This has an impact on bank performance, the kinds of risks banks are exposed to as well as the overall stability of the banking sector and the local economic development. The results of this paper present the first empirical evidence on the role of institutions in shaping the internal organization structure of banks.

A priori it is not clear whether weak financial and legal institutions will favour a centralized (i.e. more hierarchical) or a decentralized organizational structure. The theory of hierarchical control (Williamson (1967)) suggests that as the organization becomes more hierarchical it loses control between successive hierarchical layers because of distortions in information flows. Given that an important part of bank operations is local in nature (i.e. lending to information-intensive borrowers) the level of decentralization of bank lending decisions becomes an important mechanism for addressing information asymmetries and the resulting agency problems between local information-collecting officers and the decision-making centres. In order to minimize information distortions managers may choose to delegate decision-making authority to lower hierarchical levels. As illustrated in Figure 3.1 this reduces information asymmetries *between* banks and

borrowers, but at the same time increases the *within* bank information asymmetries (i.e. the hierarchical distance between loan officers and headquarters). To the extent that this increased information asymmetry is offset by better insight into the local market, headquarters will grant more lending discretion to local loan officers. We posit that the need for local insight is higher in countries with weaker institutions where information asymmetries are of a greater concern. This would imply a negative relation between institutional quality and the level of decentralization.

On the other hand the weaker the institutional environment the higher the informational rent of local loan officers who can acquire specific knowledge of the local economy and use it strategically (to make biased lending decisions), especially when dealing with soft information, unverifiable by higher bank levels. To ensure that loans are evaluated properly and uncalculated risks not taken, headquarters are inclined to adopt a more centralized organizational structure. Because weak institutions make foreign affiliates less transparent (i.e. more difficult to monitor), informational and agency problems within the organization are increased. To maintain control over the whole organization headquarters may choose to centralize decision-making and impose formal accountability at the expense of losing local market knowledge. This implies a positive relation between institutional quality and the level of decentralization. Uncovering which effect dominates the other therefore remains an empirical question. The hypothesis we test is the following:

H1: The institutional environment has a significant impact on bank organizational hierarchy.

The analysis makes use of the EBRD Banking Environment and Performance Survey (BEPS) II conducted through face-to-face interviews with bank CEOs across 32 EBRD countries of operation and a total of 611 banks[16]. The banking

[16]The EBRD countries of operation include: Central Europe and the Baltic states: Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia; South-eastern Europe: Albania, Bosnia-Herzegovina, Bulgaria, Macedonia, Montenegro, Romania, Serbia and Turkey; Eastern Europe and Caucasus: Armenia, Azerbaijan, Belarus, Georgia, Moldova, Ukraine and Russia; Central Asia: Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan; SEMED: Egypt, Jordan, Morocco and Tunisia.

sector of these countries is mainly owned by a handful of Western European banks which have a network of foreign affiliates in several countries in the region making it an ideal testing ground for the current analysis. We first examine the impact of host country institutions on the level of decentralization of bank activities. The results show a strong positive relation between institutional quality and decentralization, suggesting that parent banks derive informational benefits from strong institutions in host countries making the net effect of institutional quality on decentralization positive and significant.

Building on this initial result and using the same theoretical framework as above, we conjecture that decentralized organizational structures have an advantage in lending to SMEs in strong institutional environments where both the within bank and the bank-borrower distance are reduced. The ability of decentralized banks to gather information specific to the local economy gives them an advantage in effectively screening and monitoring potential borrowers which would imply better lending terms compared to centralized banks. The more decision-making authority given to lower hierarchical levels the more incentive they have to acquire and act on soft information (Stein (2002)), thereby increasing the bank's ability to discriminate between good and bad borrowers. The second hypothesis we test is therefore:

H2: SME loan terms improve with the decentralization of bank lending activities driven by institutional quality.

We supplement the bank-level data with firm and loan-level information form the Business Environment Enterprise Performance Survey (BEEPS) V, and assess whether centralized and decentralized banks give different loan terms to SMEs in different institutional environments. We find that strong institutional environments (as measured by the quality of contract enforcement, availability of credit information and the efficiency of the banking regulator) which favour decentralized organizational structures lead to better lending terms for SMEs - decentralized banks are less likely to require collateral, give longer maturity loans and charge lower interest rates than their centralized counterparts. Furthermore, we investigate whether these relationships vary across different types

of firms. We find that it is the most informationally-intensive firms (smaller, younger, non-audited), which are otherwise at a disadvantage when borrowing from banks, that benefit the most from stronger institutions by receiving better loan contracts from decentralized banks. This is consistent with previous studies (Berger et al. (2005); Mian (2006); Canales and Nanda (2012)) who find that decentralized organizational structures lend more to soft-information borrowers.

This paper adds to the literature on organizational structure and information production. Theoretical work has emphasized the role of hierarchical distance between managers and employees in shaping the incentives to acquire and use various types of information. Hierarchical organizations reduce the incentives to acquire soft unverifiable information as this information cannot be credibly shared between hierarchical layers (Aghion and Tirole (1997); Stein (2002)). Information collecting agents, therefore reduce their ex-ante effort as they cannot act on the information acquired but instead have to pass it to higher decision-making levels. Information flows between hierarchical layers, especially when information is soft, is difficult because of strategic manipulation of information (Crawford and Sobel (1982)) or ex-post communication costs (Radner (1993); Bolton and Dewatripont (1994)). Empirically, studies have used intra-firm data (Liberti and Mian (2009); Skrastins and Vig (2014)) or within country data (Cole et al. (2004); Berger et al. (2005); Mian (2006); Canales and Nanda (2012); Beck, Ioannidou and Schaefer (2014)) to provide evidence on the impact of internal distance within organizations on the type of information used. We contribute to this literature by introducing a new and direct measure of within bank hierarchical distance and by showing that institutional quality has a strong positive association with the decentralization of bank lending activities.

The results of the paper also contribute to the law and finance literature pioneered by La Porta, Lopez-de Silanes, Shleifer and Vishny (1997, 1998), which supports the view that stronger institutional environments are correlated with better financial and economic outcomes. Empirical studies in this line of research have found that legal and institutional differences across countries not only impact the total supply of credit i.e. the extensive margin (Djankov, Mc Liesh and

Shleifer (2007), Haselmann, Pistor and Vig (2010)) but also shape financial contracts - the intensive margin - for firms with access to credit. Qian and Strahan (2007) for instance, using a sample of bank loans made to large firms across 43 countries, show that under strong creditor protection, loans have longer maturities, lower interest rates and more concentrated ownership. We contribute to this literature by revealing a channel through which the legal and institutional environment impacts lending, namely, the hierarchy of bank lending decisions.

The paper proceeds as follows. The next section provides the theoretical framework and reviews the related empirical literature. Section 3.3 presents the data and descriptive statistics. The empirical methodology is provided in Section 3.4. Section 3.5 presents the results and Section 3.6 concludes.

3.2 Related literature

There is a vast literature in organizational theory emphasising the role of organizational structure in the acquisition, transmission and usage of information within an organization. The separation of tasks across organizational layers with agents from one layer relying on information produced by agents from another layer gives rise to information asymmetries within an organization. The dichotomy between centralized (i.e. hierarchical) and decentralized (i.e. delegated) organizational structures is at the centre of theories relating organizational design to information production. In centralized organizational structures decisions are taken at higher hierarchical levels using information produced by agents at lower hierarchical levels. In decentralized organizational structures the decision-making authority is delegated to agents at lower hierarchical layers responsible for generating the information. The advantage of decentralization is a better utilization of information as decision-making is closer to information production. The disadvantage, on the other hand, is the loss of control between successive hierarchical layers. The preferred organizational design therefore depends on the trade-off between information and control.

3.2.1 Organizational structure and information production: Theory

Theories of the optimal delegation of authority can be classified into two broad categories: incentive-based and communication cost theories. Incentive-based theories argue that in hierarchical organizations the ex-ante incentive to acquire and use information is diminished as information-collecting agents cannot utilize the information instead have to pass it on to higher hierarchical levels for decision-making. Aghion and Bolton (1997) develop a theory of the allocation of authority within an organization distinguishing between formal authority (the right to decide) and real authority (the effective control over decisions). Key to their analysis is the existence of information asymmetries between the uninformed principal who has formal authority and the informed agent. If the principal is sufficiently uninformed relative to the agent and if their objectives are not too divergent, the principal will never overrule the agent's decision, i.e. will give the agent real authority. The more real authority an agent has the higher his initiative to invest in information acquisition but at the same time the higher the loss of control for the principal. Stein (2002) makes the distinction between hard and soft information. Soft information by its nature is not directly verifiable by anyone other than the agent that produces it. As such, it cannot be unambiguously passed on to a different hierarchical layer. In contrast, hard information is easily verifiable and can be transferred easily between hierarchical layers. An implication of his model is that large hierarchical firms are at a disadvantage when dealing with soft information. In the context of banks lending to SMEs the model implies that large banks are not well suited for small-business lending as it relies heavily on soft information.

Communication cost theories emphasise the role of communication and coordination across hierarchical levels in determining the optimal organizational design. The focus here is on the delegation of information-processing rather than the delegation of incentives. Emphasising the tendency of the informed party to strategically manipulate his information Crawford and Sobel (1982) develop a model of strategic communication where the informed agent (the sender) sends a

noisy signal, based on his private information, to the uninformed principal (the receiver). An implication of their model is that the less divergent the objectives of the sender and the receiver are the more communication is likely to play an important role, and that equilibrium signalling is more informative the more similar their preferences are. Dessein (2002) focuses on delegation as an alternative to communication within an organization. He argues that the principal delegates authority in order to avoid communication with the agent which can be noisy and used strategically by the agent because of their different objectives. The agent's superior information stems from his local knowledge of the business environment and is assumed to be soft, i.e. it cannot be certified by the agent. The principal can utilize the local knowledge of the agent either through delegation or communication. Delegation is preferred to communication when the divergence of incentives is not too large relative to the principal's uncertainty about the environment. In the context of small business lending the uncertainty about the possible outcomes of the decision is large which would favour decentralization rather than centralization and communication. Other work has focused on ex-post communication costs. Becker and Murphy (1992) argue that while specialization (which is more likely in hierarchies) increases productivity it also increases coordination costs among specialized workers. Radner (1993) shows that hierarchical organizations are in fact more effective in decentralizing information-processing activities. The large scale of hierarchies and the limited information-processing capability of individuals make decentralization an efficient organizational form (where efficiency is measured as the time between the receipt of information and the time the decision is made). Similarly, Bolton and Dewatripont (1994) emphasise the trade-off between specialization and communication giving particular importance to returns to specialization. The question they address is how can organizations minimize the costs of processing and communicating information. When returns to specialization (which stem from the increased ability of workers over time to process a particular type of information) outweigh the costs of communication, it is efficient to delegate tasks to subordinates.

Overall, both the incentive and non-incentive based theories of organizational structures suggest that centralization while maintaining control and allowing for

greater specialization, because of agency and communication costs cannot fully utilize the information generated by lower hierarchical levels. This is particularly important for soft information which is subjective in nature and not easily transferred across organizational layers. As SMEs rely heavily on soft information the organizational structure of banks is of paramount importance for the amount and terms of lending.

3.2.2 Organizational structure and information production: Evidence

Empirically, studies have used intra firm data or within country data to provide evidence about the effect of organizational structures on information production and use. Some studies use direct measures of allocation of authority, while others use indirect measures such as bank size, complexity or foreign ownership.

3.2.2.1 Studies using indirect measures of bank organizational structure

Important insights about the effects of bank organizational structure can be gained from studies using indirect measures. The literature has usually associated large, organizationally complex or foreign-owned banks as having a hierarchical and centralized business model. Using a data set with information on over 900,000 loans made by a sample of US banks during the late 80s and early 90s Berger and Udell (1996) examine the relation of bank size and complexity with loan price and quantity. They posit that as banks become larger and more organisationally complex they will reduce the supply of credit (i.e. increase price and lower quantity) to small businesses because of Williamson-type organizational diseconomies from the joint provision of multiple activities. As more activities are added to bank's operations it complicates the management of the banking organization which has often resulted in increased layers of management. This incentivizes large banks to abandon small business lending and instead focus their resources on a narrower range of activities in order to avoid the organizational

diseconomies associated with more complex organizations. They find support for the hypothesis that large banks reduce lending to small businesses. Furthermore, they find that larger banks charge lower interest rates and less often require collateral from small business borrowers. Results are less conclusive for organizational complexity variables (measured as layers of bank management, number of different bank units and different functions within a bank).

Strahan and Weston (1998) address a related question focusing on the trade-off between organizational diseconomies and diversification benefits as the size of the banking company increases. Organizational diseconomies resulting from the increased complexity of a large bank may increase the relative cost of providing relationship lending to small businesses. On the other hand as bank size increases diversification reduces the cost of monitoring and improves internal capital markets which should decrease the cost of small business lending. They test these hypotheses for US using the Call Report data and find support for the diversification hypothesis. Specifically, as bank size increases so does the level of small business lending, although for very large banks small business lending as a percentage of total assets declines because lending to large businesses increases faster, consistent with the idea that diversification enhances lending to both small and large businesses. Using the same database DeYoung, Goldberg and White (1999) provide further evidence by testing whether bank size impacts small business lending after controlling for a number of age-related variables. They find that the size of the bank is negatively associated with small business lending, whereas the number of bank branches has no consistent impact on small business lending.

Several studies have provided indirect evidence on the impact of bank size, complexity and organizational structure on small business lending by examining bank consolidation activities. Berger, Saunders, Scalise and Udell (1998) analyse the effects of over 6,000 US bank M&As from the late 70s to the early 90s on the lending of almost all US banks. They find that the aggregation of banking institutions is negatively associated with small business lending, although other banks in the same local market offset this negative effect. Results are consistent with

the idea that consolidated institutions may avoid relationship-based small business loans because of their lack of comparative advantage in this market segment, but as long as these loans are positive NPV investments they will be picked up by other local lenders. Peek and Rosengren (1998) find that the small business loan portfolio share of the consolidated bank reverts to the pre-merger portfolio share of the acquirer. For large acquirers, which typically have a smaller portfolio share of small business loans it means that mergers shrink small business lending. Sapienza (2002) analyses the effects of banking consolidation on individual borrowers. Using individual loan data between banks and companies they analyse changes in loan terms of the consolidated institutions. They find that as the local market share of the acquired bank increases the efficiency effect is offset by monopoly power (i.e. an increase in interest rates). Furthermore, they find that the probability of a small firm to borrow in the future from the consolidated bank is lower when it is a client of the target bank than small borrowers of banks that do not merge. The results are consistent with the idea that large and small banks have different organizational structures and lending technologies.

In a similar vein, Cole et al. (2004) use survey data from a nationally representative sample of small businesses operating in US as of year-end 1992 to investigate differences in the loan approval decisions made by banks of different sizes. They provide supporting evidence for the hypothesis that small and large banks use different approaches when evaluating small business loan applications. Large banks rely more on quantitative indicators when making their loan approval decisions. They are more likely to grant loans to firms that are larger, with a longer track record and those that keep formal financial records. In contrast, small banks look beyond these formal financial indicators and rely more on pre-existing relationships with the borrower which allows them to accumulate knowledge about the character of the borrower. Berger et al. (2005) test the theory of Stein (2002) that small banks provide greater incentives for the production and usage of soft information as the decision-making authority is more likely to be closer to the source of information collection, whereas large banks are better at dealing with hard information. Using the Federal Reserve's 1993 National Survey of Small Business Finance (NSSBF) they find support for this theory - large banks tend

to lend mostly to large firms with good financial history while small banks lend to more financially opaque clients. Using survey data from a sample of US small firms conducted by the National Federation of Independent Business (NFIB), Scott (2004) constructs an index that proxies for the quality of soft information production. Business owners are asked to rate the importance of a set of characteristics that describe the interaction between them and their primary financial institution on a scale of 1 to 5. These characteristics include: the knowledge of the bank about the firm and its business, the industry, the local market/community and the personal contact of the borrower with the loan officer which all capture some aspects of soft information production. Businesses also rank the performance of the bank they do business with along each of these dimensions. Banks with a higher ranking generally do a better job at dealing with soft information. He finds that community financial institutions (CFIs) are ranked higher by their small business borrowers indicating their superior ability in soft information production compared to other banks.

Another trend of literature uses geographical or cultural distance between borrowers and banks to measure its impact on small business finance. The rationale is that banks headquartered at a greater cultural or geographical distance to their borrower are typically larger and more hierarchically organized which prevents them from utilizing all the soft information generated at lower hierarchical levels. This puts them at a disadvantage when lending to SMEs.

Using loan-level data for Pakistan Mian (2006) shows that foreign banks tend to shy away from soft-information based loans such as loans made to small firms, firms located in smaller cities, first-time borrowers which require relational contracting. This is consistent with the hypothesis that foreign banks face informational and agency costs when making relational loans at a distance. Distance could be defined either as geographical distance between foreign bank headquarters and the local subsidiary, cultural distance, within-bank distance due to bank size or legal/institutional distance between the country of origin of the foreign bank and the host country. They find that geographical and cultural distance are the most important attributes explaining lending differences between foreign

and domestic banks. Alessandrini, Presbitero and Zazzaro (2009) examine the impact of reduced operational distance (between banks and borrowers) and increased functional distance (between decision-making centres and local branches i.e. within bank distance) on firm's financing constraints using a sample of Italian manufacturing firms from 1995 to 2003. They find that a greater functional distance adversely affects local firms' credit availability. In contrast, a reduced operational distance has an ambiguous impact on firm financing constraints. De Haas et al. (2010) show that bank size and ownership are important determinants of banks' portfolio composition. Foreign banks are more active in lending to subsidiaries of international firms. In addition, large banks lend relatively less to SMEs and more to large corporates compared to small banks. Popov and Udell (2012) using survey data for a sample of SMEs in emerging Europe find that SMEs in localities dominated by branches or subsidiaries of foreign banks reported higher credit constraints during the early stages of the 2007-2008 financial crisis. De Haas and Van Horen (2013) show that during the financial crisis when cross-border banks had to reassess the attractiveness of lending abroad, they were less likely to curtail lending to markets that were geographically close, where they had established prior lending relationships, where they were present via a local subsidiary and where they cooperated with local banks. This indicates that bank-borrower closeness helps banks overcome information asymmetries especially so during crisis times when this closeness becomes more valuable. In a similar vein Beck, Degryse, De Haas and Van Horen (2014) show that a higher proportion of relationship banks in the vicinity of the firm is associated with less credit constraints in 2008-2009 when the financial crisis had started but had no significant impact in 2005 during the lending boom. Beck, Ioannidou and Schaefer (2014) compare loan terms of foreign and domestic banks holding constant differences in their clienteles. Using loan-level data from the credit registry of Bolivia for the period 1999-2003, they find that foreign bank loans are more likely to have collateral and have shorter maturities than domestic bank loans. They also find that foreign banks charge lower interest rates compared to domestic banks. Furthermore, credit scores and collateral explain a much larger variation of the pricing of foreign bank loans compared to domestic bank loans. Overall,

the results show that foreign banks rely more on transaction-based technologies to overcome information asymmetries in credit markets whereas domestic banks on relationship lending.

Overall this strand of literature shows that greater distance between banks and borrowers increases information asymmetries and worsens lending outcomes especially for small businesses for which soft information is very important for designing loan contracts.

3.2.2.2 Studies using direct measures of bank organizational structure

Studies using direct measures of bank organizational structure focus on the direct allocation of authority. As these data is more difficult to obtain all of these studies focus either on survey data from a single country or on proprietary data from a single bank allowing them to provide important insights about the impact of bank organizational structure on lending outcomes.

Canales and Nanda (2012) using a loan-level dataset on SME loans in Mexico for the period 2002-2006 find that small firms and firms that rely more on soft information get larger loans from decentralized banks. Furthermore, they find that the ability of decentralized banks to collect and act on soft information may allow them to better exploit their market power in concentrated markets. In concentrated banking markets, decentralized banks give smaller loans and charge higher interest rates compared to their centralized counterparts. Overall, their results indicate that the relative benefit of decentralized organizational structures in terms of SME lending depends on the institutional and competitive environment in which banks operate. Qian et al. (2015) use the reforms implemented in China's banking sector following China's entrance into the World Trade Organization which delegated authority to individual loan officers as an exogenous shock to their incentives to produce information. Exploiting a proprietary loan-level data from a large state-owned bank they find that better loan officer incentives and reduced communication costs (measured as the length of time the loan officer - the information producer and the branch president - the decision-making

authority have worked together) improve information production and use leading to increased credit supply and better loan outcomes. Liberti and Mian (2009) use data from the credit dossiers of above 400 large corporate loan applicants in 1998 of a multinational bank operating in Argentina. The data contains the loan approval process and the type of information (subjective and objective) gathered for each applicant. They exploit an exogenous variation of the hierarchical distance travelled by a loan application for it to be approved, generated by a predetermined bank rule. While some loan applications are approved at lower hierarchical levels others have to go at higher hierarchical levels for approval. They find that the approved loan amount is more sensitive to objective information at higher hierarchical levels, whereas the sensitivity to subjective information is significantly lower. Agarwal and Hauswald (2010) use information from all small business loan applications to a large US bank over a fifteen-month period as well as the credit offers made by the bank. They find that there is a trade-off between the availability and pricing of credit. Bank-borrower proximity facilitates access to credit but increases loan rates. Higher subjective (proprietary) information about the firm decreases loan rates, however this effect weakens for firms located close to their branches consistent with the idea that banks enjoy local informational advantage which they use to carve out local captive markets only for nearby firms. For peripheral firms the informational advantage of the bank erodes (due to the diminishing quality of their private information) subjecting them to more competition and more switching by firms. Similarly, Degryse and Ongena (2005) using a proprietary dataset consisting of loans made by a large Belgian bank to SMEs analyse the impact of geographical distance on loan interest rates. In line with the spatial price discrimination hypothesis they find that bank-borrower distance decreases loan rates, whereas competing bank-borrower distance increases them, indicating that banks derive location rents from nearby firms. Finally, Skrastins and Vig (2014) use information from a large state-owned bank operating across India with over 2,000 branches. They exploit a branch restructuring policy driven by pre-determined rules which gives more discretionary power to branches which over the last two years have exceeded a fixed cut-off point in terms of total loans and deposits. The branch organizational design is thus exogenous

from the borrower perspective. Using a difference-in-difference research strategy they find that an increase in organizational hierarchy reduces lending to new borrowers, increases loan delinquencies and decreases the return on loans consistent with the incentive-based theories predicting an information loss in more hierarchical organizations. They also find that hierarchical structures perform better in more corrupt states as it facilitates control. This is consistent with the view that while delegation provides incentives for (soft) information production it also enables rent extraction from more informed information-collecting agents more so in corrupt environments where the tendency for strategic manipulation of private information is more pervasive.

We contribute to the strand of literature using direct measures of bank organizational hierarchy by employing a large cross-section of countries to provide direct evidence on the role of the institutional environment in shaping the internal organizational structure of banks.

3.2.3 Organizational structure and loan contracts

Banks use contractual features to overcome information asymmetries which in turn are a function of their organizational structure and the environment in which they operate. The literature on financial intermediation emphasises the role of banks in producing information about borrowers (Diamond (1984, 1991); Ramakrishnan and Thakor (1984)). The incomplete contracts theory (Aghion and Bolton (1992); Hart and Moore (1994, 1998)) suggests that creditors will give more favourable loan terms if they are better protected in the case of default. Banks as opposed to public debt markets have a comparative advantage and enjoy economies of scale in producing information about borrowers especially for information-intensive ones (such as SMEs) which require close relationships with the lending bank. Banks use the information generated to monitor borrowers and design contract terms in a way that improves borrower incentives. Boot and Thakor (1994) demonstrate that as the bank-borrower relationship matures the loan interest rate and the amount of collateral pledged decline. In contrast, Sharpe (1990) shows that interest rates increase over time as banks subsidize

borrowers early in the relationship to be reimbursed in later periods. Berger and Udell (1995) using data from the National Survey of Small Business Finances (NSSBF) find that bank-borrower relationships reduce the probability of pledging collateral and interest rates charged. We contribute to this literature by analyzing loan contracts offered by banks of different organizational structures (centralized vs. decentralized) in response to the institutional environment they operate.

3.2.4 Institutional environment

The institutional quality of a country shapes the incentives of borrowers and lenders, hence the outcome of credit contracts. In their seminal papers (La Porta et al. (1997, 1998)) show that stronger legal protection of investors are associated with better financial and economic outcomes. Djankov et al. (2007) show that better creditor rights and information sharing institutions increase the ratio of private credit to GDP. At the micro level Haselmann et al. (2010) for a sample of banks in twelve transition economies show that banks increase the supply of credit after a legal change. Similarly, Haselmann and Wachtel (2010) find that the better the legal environment the more willing a bank is to lend to informationally opaque borrowers such as SMEs, whereas the proportion of lending to large enterprises and the government is lower. Qian and Strahan (2007) use a sample of bank loans made to large borrowers across 43 countries to investigate the impact of legal and institutional differences on loan terms. They find that strong creditor rights protection is associated with longer loan maturities, lower interest rates, more concentrated loan ownership and an increased participation by foreign banks. Similarly, Bae and Goyal (2009) using a sample of bank loans made to firms in 48 countries show that it is the enforceability of contracts, not merely the existence of rights that is important for credit contract terms. They find that better enforceability of contracts increases the loan amount, lengthens loan maturity and reduces the loan spread. Finally, Liberti and Mian (2010) focus on a sample of small business loans issued by a multinational bank across 15 countries to investigate the impact of different levels of financial and institutional environments on the collateral cost of capital. Using creditor rights, legal origin

and information sharing institutions as instruments for financial development they find that the collateral spread (defined as the difference in collateralization rates between low and high risk borrowers) declines with improvements in financial development driven by institutional quality.

We add to this line of research by revealing a channel through which law impacts lending, namely, the hierarchy of bank lending decisions.

3.3 Data

To investigate the relation between bank organizational structure and loan terms to firms operating in different institutional environments we combine two main databases: bank-level data from the EBRD Banking Environment and Performance Survey (BEPS) II[17] with firm and loan level data from the EBRD-World Bank Business Environment Enterprise Performance Survey (BEEPS)[18]. In addition, we supplement the data with indicators of institutional and macroeconomic environment as well as bank ownership and financial statements data, which will be described later in the section.

3.3.1 Bank Organizational Structure

To classify banks as either having a centralized or a decentralized organizational structure we use BEPS II. The main purpose of this survey is to provide data on bank lending activities, funding and risk management strategies, bank lending technologies, the competitive environment, the relation between parent and foreign subsidiaries as well as the senior managers' perceptions of the legal and

[17]BEPS II was jointly undertaken in 2012 by the EBRD and the European Banking Center (EBC) at Tilburg University. A team of specialized consultants administered a common questionnaire through a face-to-face interview with the bank's CEO across 32 countries in Eastern Europe, Central Asia and southern and eastern Mediterranean and a total of 611 banks. Due to confidentiality agreements with the participating banks the underlying data is not publicly available.

[18]BEEPS is a joint initiative of the European Bank for Reconstruction and Development and the World Bank Group. The survey was first undertaken in 1999-2000 and subsequently in 2002, 2005, 2008-2009 and the most recent fifth round in 2011-2013. The fifth round of the survey (BEEPS V) covered around 15,600 enterprises in 30 countries.

regulatory systems. The measure of organizational structure we use indicates the hierarchical nature or the level of decision making authority within a bank. To construct this variable we focus on the following question *Where are SME Customers' applications typically (highest number of loans) finally approved?*. The respondents choose one of the options: (1) Headquarters (foreign), (2) Headquarters (domestic), (3) Regional Office/Branch, (4) Local Office/Branch. Using the responses to these questions we define the dummy variable *Decentralized* which is one if lending decisions are made at either the regional or local office/branch level, and zero otherwise.

Unlike previous studies that proxy hierarchical distance with bank size or foreign ownership, we have a direct measure of organizational structure allowing us to differentiate between size or ownership effects and organizational structure effects. Furthermore, these proxies implicitly assume that banks have a homogeneous organizational structure across the different market segments, i.e. SME, large corporate and retail lending, which masks important differences on the intensity of information required, hence the appropriate level of decision making authority, when lending to different types of customers[19]. As the survey asked the above question separately for the three market segments, it allows us to focus on bank organizational structure related specifically to SME lending and match it to information on loans granted to SMEs across countries with different institutional environments. Table 3.2 reports country level summary statistics. There is considerable variation in the proportion of decentralized banks operating across countries. Banks in Albania and Serbia operate mainly with a centralized business model. On the other hand above 65% of banks in Turkey, Morocco and Kyrgyzstan adopt a decentralized business model.

[19]Indeed, unreported summary statistics for the same decentralization measure constructed for large corporate and retail lending highlight this heterogeneity. Only 2.4% of interviewed banks decentralize decision making for large corporate customers, whereas 40% of banks decentralize decision making for retail customers. This percentage is 22% for SME lending.

3.3.2 Loan and firm data

To construct loan and firm-level variables we use the fifth round of BEEPS (2011-2013). The purpose of this survey is to measure firms' perceptions of the environment in which they operate and the extent to which different aspects of the business environment represent obstacles to enterprise growth. In addition, the survey provides information on a number of firm characteristics such as firm age, legal status, number of employees, location, industry etc. What is more important for the current analysis is that the survey includes detailed questions on firms' financing arrangements. We focus only on firms that have a loan or line of credit from a financial institution. For these firms we know the bank that provided the most recent loan or line of credit which enables us to match firms to the type of banks they borrow from, as measured by the *Decentralized* variable constructed from BEPS II. More specifically, BEEPS provides information on lending terms such as loan amount, annual nominal interest rate, loan maturity, information on whether collateral was required as well as the type and value of the collateral required, loan age and loan currency.

Table 3.3 compares loan terms of centralized and decentralized banks for all the countries in the sample as well as divided by institutional environment. Looking at the difference in loan terms across all the countries in the sample, decentralized bank loans are less likely to have collateral, have shorter maturities and similar (slightly higher) interest rates compared to centralized bank loans. These relationships however change when I split the countries into high and low institutional environments (as measured by credit information availability, the quality of contract enforcement or control of corruption). In countries with a weaker coverage of credit information available through credit bureaus decentralized banks are more likely to require collateral, grant loans with shorter maturities and charge higher interest rates than centralized bank loans. In countries with more credit information availability decentralized banks lend more favourably to SMEs compared to centralized banks - are less likely to require collateral and do not give significantly shorter loans or charge significantly higher interest rates. Similarly, in countries with higher contract enforcement quality and control of corruption

decentralized banks do not charge significantly higher interest rates or grant significantly shorter loans and are less likely to require collateral. The descriptive statistics is consistent with the hypothesis that decentralized banks derive informational benefits from strong institutions and are better at processing soft information.

3.3.3 Institutional and macroeconomic indicators

In addition to the organizational structure questions described above, and in order to better understand the environment in which banks operate in different countries BEPS II asked bank senior managers a number of questions relating to their perceptions of the legal and regulatory systems in the countries they operate. We use the responses to these questions to construct several bank level variables: *Pledges*, *Courts*, *Regulator* and *Corruption*.

Pledges measures the quality of the law and its enforcement related to pledges (security rights over movable assets). In particular, it measures the extent to which respondents agree that the laws related to pledges enable efficient enforcement of security rights (simple, cheap, fast). The answers are given on a five-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). *Court System* measures the extent to which the respondents agree that the court system is quick and efficient in resolving business disputes, whereas *Banking Regulator* measures the extent to which the respondents agree that the banking regulator is able to enforce its decisions. They range between 1 (Almost never) and 5 (Very frequently). Finally, *Corruption* measures the extent to which banks agree that it is common for banks to have to pay some irregular payments/gifts to court officials. It ranges between 1 (Never) to 6 (Always). Banks perceive the quality of the laws on pledges, the court system, banking regulator and the absence of corruption on average to be the highest in countries like Estonia, Georgia, Hungary and Turkey; and the lowest in Moldova, Mongolia, Ukraine and Tajikistan.

The institutional variables described above are based on banks' own assessments of the environment they operate in. In addition to these variables we also consider

institutional indicators from the Doing Business and the Worldwide Governance Indicators database. We use two indices from the Doing Business database: the contract enforcement quality and the credit information availability. The *Contract Enforcement* quality assesses the efficiency of the judicial system in resolving a commercial dispute. The longer the time (recorded in calendar days) from the moment the plaintiff decides to file the lawsuit in court until payment, the lower the contract enforcement quality is. *Credit Information* availability measures the coverage, scope and accessibility of credit information available through credit reporting service providers. Credit bureau coverage reports the number (as a percentage of the adult population) of individuals and firms covered by the credit bureau with information on their borrowing history. Control of corruption and rule of law are taken from the Worldwide Governance Indicators database. *Control of Corruption* measures the extent to which public power is exercised for private gain as well as the strength of a country's institutional framework to prevent and combat corruption, whereas *Rule of Law* measures the extent to which agents have confidence in the quality of contract enforcement, property rights, the police, and the courts.

The macroeconomic variables are from the World Development Indicators database and include: GDP per capita and Bank Credit/GDP. Table 3.2 shows that there is substantial variation among the countries in our sample. GDP per capita ranges from $846 in Tajikistan to $23,760 in Slovenia. The Bank Credit to GDP ratio as a measure of financial development also varies across countries, ranging from 13% in Kyrgyzstan to 84% in Latvia.

In addition, bank balance sheet and income statement data such as: total assets, liquidity, solvency, net income etc. are taken from the BankScope database[20], whereas bank ownership data are from the foreign ownership database of Claessens and Van Horen (2014)[21]. The detailed definition of all the variables is given in

[20]BankScope is a product of Bureau van Dijk and is the most comprehensive global database of banks' financial statements with a coverage of over 32,000 banks (public and private) worldwide. It contains detailed financial statements in various formats, including a universal format to ensure global comparability. Consolidated and/or unconsolidated balance sheet and income statement data are available for up to 16 years.

[21]This database provides time varying ownership information for more than 5,498 banks operating in 138 host countries over the period 1995-2013.

Table 3.1.

Table 3.4 reports sample statistics and correlations for the main variables. Banks with a larger market share tend to operate with a decentralized model, whereas foreign bank ownership is negatively correlated with decentralization. Among foreign banks those that entered by acquiring existing banks tend to be more decentralized. Decentralization is also positively correlated with banks' perceptions of the legal and institutional environment in the countries they operate, such as the quality of laws on security rights, court system and banking regulator. Institutional indicators are also correlated with each other and therefore enter the regression analysis one at a time.

3.4 Methodology

We start the empirical analysis by examining the drivers of bank organizational structure. The summary statistics (Table 3.2) have shown a large cross-country variation in the institutional environment and the proportion of banks that operate with a decentralized organizational structure. The correlation matrix (Table 3.4) between the decentralized measure and different institutional indicators also shows significant correlations. We further examine these relationships by estimating the following equation:

$$Decentralized_{kc} = \alpha_1 + \beta_1 Institutions_c + \beta_2 Bank_{kc} + \beta_3 Country_c + \varepsilon_{kc} \quad (3.1)$$

where, $Decentralized_{kc}$ is a dummy variable which takes the value of one if bank k, operating in country c follows a decentralized business model. $Institutions_c$ indicates one of the country-level (or bank-level) institutional indicators; $Bank_{kc}$ includes bank-level controls such as market share and foreign ownership; $Country_c$ is the natural logarithm of GDP per capita (in USD) and ε_{kc} is the error term. The coefficient of interest is β_1. A positive and significant coefficient would indicate that a stronger institutional environment is associated with more decentralized lending decisions. Standard errors are clustered at the country level to

allow for correlations across banks within a country.

As the banking sector of the countries in the sample are majority foreign-owned, with banking groups operating foreign affiliates in several of the countries in the region, it offers an opportunity to sharpen the analysis by exploiting this feature of multinational banks which face different institutional environments in the countries they operate. For instance, as illustrated in Figure 3.2, a large Italian banking group follows a decentralized business model across half of its foreign affiliate network and a centralized model in the rest of its foreign affiliates. Similarly, a French banking group with a strong presence in the region decentralizes decision making in every third foreign affiliate it operates in the region. We therefore augment equation (3.1) with parent bank fixed effects and assess whether this variation in business models is significantly related with the host country institutional environment. As before, β_1 is the coefficient of interest. The vector $Bank_{kc}$ besides market share is now supplemented with additional controls specific to foreign banks such as the geographical distance between the host and the home country of the foreign bank, the number of years since the foreign bank has entered/started operated in the host country as well as the mode of entry (greenfield vs. acquisition), which could all impact the choice of foreign bank organizational structure in host countries.

To investigate the impact on borrowers of different bank business models we compare the lending terms given by decentralized and centralized banks. We initially estimate the following specification, which we later augment with interaction terms with the type of firm receiving the loan:

$$\begin{aligned} LoanTerms_{ijklc} = \alpha_1 + \beta_1 Decentralized_{kc} + \beta_2 Firm_{jlc} + \beta_3 Loan_{ijklc} \\ + \beta_4 Country_c + \varepsilon_{ijklc} \end{aligned} \tag{3.2}$$

where, i, j, k, l, c denote loan, firm, bank, industry and country, respectively. $LoanTerms_{ijklc}$ include three dependent variables: (i) a dummy variable indicating whether the loan or line of credit required collateral, (ii) the natural logarithm of one plus the number of months between loan origination and maturity, (iii) the natural logarithm of one plus the annual nominal interest rate of the loan or line

of credit. As before $Decentralized_{kc}$ indicates banks that follow a decentralized model. $Firm_{jlc}$ includes firm controls: Employees, Opaque, Firm Age, Foreign Firm Non-Exporter and Small City. $Loan_{ijklc}$ includes other loan characteristics such as: Loan Age and Loan Currency. $Country_c$ is the natural logarithm of GDP per capita; ε_{ijklc} is the error term. We instrument $Decentralized_{kc}$ with *Credit Information* availability to find out if the institutional environment impacts loan terms by promoting a certain bank organizational structure. A statistically significant β_1 would indicate that banks that decentralize their lending decisions in response to a strong institutional environment, give different loan terms compared to their centralized counterparts.

We also test how the impact of bank organizational structure on lending terms varies across different types of firms. Based on theory we expect smaller, younger and more opaque firms to receive more favourable lending terms from decentralized banks. Equation (3.2) takes the following form:

$$\begin{aligned} LoanTerms_{ijklc} = \alpha_1 + \beta_1 Decentralized_{kc} + \beta_2 Decentralized_{kc} * Firm_{jlc} \\ + \beta_3 Firm_{jlc} + \beta_4 Loan_{ijklc} + \beta_5 Country_c + \varepsilon_{ijklc} \end{aligned} \tag{3.3}$$

We estimate equations (3.1)-(3.3) with a linear probability model due to the difficulty of including a large number of fixed effects with a non-linear probit or logit model, also known as the incidental parameters problem. The interpretation of marginal effects of interaction terms is also problematic in non-linear probability models (Ai and Norton (2003)).

3.5 Results

3.5.1 Bank organizational structure and institutions

Results in Table 3.5 show a positive correlation between the perceived institutional quality and the level of decentralization of bank lending activities within the same country. A one unit increase in the perception of the quality of laws that

enable efficient enforcement of security rights over pledges increases the probability of decentralizing decision making by 3%. The economic magnitude is similar for the quality of courts and somewhat larger for the quality of the banking regulator (5.2%) and perceived corruption (-4.1%). In terms of control variables, foreign bank ownership is not significantly related to decentralization, whereas banks with larger market share are 104 to 122 percentage points more likely to decentralize decision making; a large effect given that about 23% of all banks in the sample are decentralized. Column 5 does not include country fixed effects (but controls for GDP per capita) as it assesses the level of decentralization of bank lending activities across countries with different levels of contract enforcement quality. Banks in countries with stronger contract enforcement quality are 8.4% more likely to decentralize decision-making.

Table 3.5 (columns 6-8) also presents results for the sample of foreign banks only. In these specifications we include parent bank but not country fixed effects. For the sample of foreign banks it is not so much the perceptions of the quality of host country institutions that matter for the choice of bank organizational structure, rather the country-level institutional indicator as well as the relative economic development between the host and the home country of the foreign bank. The same parent bank is 16% more likely to decentralize decision making in countries where perceptions about the quality of the banking regulator are higher. This economic effect is 34% for countries with stronger contract enforcement quality. Finally, the greater the home-host country distance in terms of the level of economic development, the less likely the foreign bank to adopt a decentralized business model.

Overall, the results in this section point to the role of strong institutions in mitigating information and agency problems within an organization, making decentralization the prevalent organizational form in strong institutional environments. Consistent with the hypothesis developed in section 3.1 this also means a reduced bank-borrower distance, benefiting borrowers, especially more information-intensive ones, such as SMEs. In the next section we examine whether and how these benefits materialize through contract terms given to SMEs by centralized

and decentralized banks in different institutional environments.

3.5.2 Bank organizational structure and loan terms

In this section we present results from estimating equation (3.2). Table 3.3 has already shown that centralized and decentralized banks give different loan terms to SMEs in different institutional environments. Table 3.6 formalizes these relationships. Results shows that in countries with strong institutional environments which favour decentralized organizational structures, decentralized banks give more favourable lending terms - lower interest rates, longer maturities and less required collateral - to SMEs compared to their centralized counterparts. Decentralized bank loans are about 70 percentage points less likely to have collateral; a large effect given that 79% of all loans in the sample are collateralized. Furthermore, loans granted by decentralized banks have 110-112 basis points longer maturities than loans granted by centralized banks. Given the average loan maturity of 37 months this difference is substantial - 40 to 41 months. With respect to interest rates, decentralized banks charge 145-167% lower interest rates than centralized banks. At an average interest rate of 11% this discount amounts to 16-18%.

Overall, these findings suggest that a strong institutional environment which favours a decentralized organizational structure leads to better lending terms to SMEs - decentralized banks grant loans with longer maturities, lower interest rates and are less likely to require collateral compared to centralized banks.

3.5.3 Robustness

We subject the results to various robustness tests. *First*, we employ alternative variable definitions. We use an alternative question, from BEPS II, to measure the hierarchical nature of bank lending activities. Namely, the survey asked bank managers *For first time SME Customers: How many hierarchical layers are involved in making a lending decision?*. The responses vary from 1 to 8 layers,

with a mean of 2.4 layers. Results, reported in Table 3.8, do not materially change. *Second*, we use alternative firm level controls. Instead of the number of employees as a proxy of firm size we use the log of total sales; we use *Certification* ,i.e. whether the firm has an internationally-recognized quality certification, as an alternative measure of firm opaqueness; we add *Domestic Firm* (percentage of the firm owned by domestic investors), *Sole Proprietorship* (whether the firm's current legal status is sole proprietorship) and *Privatized* (whether the firm is established through privatization of a state-owned firm) which could all impact how risky the firm is perceived by banks, hence the loan contract they receive. We confirm the main results with these alternative combinations (Table 3.9). *Third*, as shown in Table 3.10, we exclude Russia and Turkey from the sample to make sure that the results are not driven by these two countries (Columns 1-3) and cluster the standard errors at the industry level to allow for correlations across firms within an industry (Columns 4-6). The main results continue to hold.

3.5.4 Firm heterogeneity

In Table 3.7 we present the results of estimating equation (3.3). We interact the decentralization measure with several firm characteristics such as: firm size, age, opacity and exporter status. The impact of decentralization on lending terms remains significant but is attenuated for larger firms, older firms, firms with an exporter status and those that are audited. The evidence in this section is consistent with decentralized banks having less of a competitive advantage in lending to these types of firms compared to centralized banks. Together with the previous results, this evidence points to the beneficial impact of strong institutions in mitigating information asymmetries both within a bank and between the bank and the borrower, thereby improving lending terms, especially for the most opaque segments of the SME population, which are otherwise disadvantaged when borrowing from financial institutions.

3.6 Conclusion

While there is a vast theoretical literature emphasising the role of organizational structure on information production and use far less is known empirically. We use a unique bank-level survey dataset containing detailed information on bank organizational hierarchy i.e. the level of decision-making authority across a sample of banks operating in 32 countries representing different levels of legal and institutional development. We find that countries with strong institutional environments are more likely to favour a decentralized organizational structure, supporting the hypothesis that the functional distance between bank headquarters where decisions are typically made and information collecting officers becomes less of a constrain in strong institutional environments where the possibility for information rent extraction and the strategic manipulation of information is limited. To investigate what is the impact on the ground of these different bank business models we combine the bank level data with firm-level survey data which also contain detailed loan information. We find that delegation of decision making authority driven by institutional quality leads to better lending terms to SMEs - decentralized banks charge lower interest rates, lend at longer maturities and are less likely to require collateral compared to their centralized counterparts. This holds in particular for more information-intensive firms such as smaller, younger or non-audited. Results are in line with information-based theories of financial intermediation suggesting that banks use their private information about borrowers to set loan terms that improve incentives especially in strong institutional environments where they are more protected in the event of a borrower defaulting. These findings taken together reveal that bank organizational structure is an important channel through which the institutional environment affects lending.

Tables

Table 3.1: Variable definitions and data sources

Variable Names	Definitions	Source
Loan Characteristics		
Collateral	=1 if collateral was required at loan origination, 0 otherwise	BEEPS V
Maturity	Number of months between loan origination and maturity.	BEEPS V
Interest rate	The annual nominal interest rate at loan origination.	BEEPS V
Loan age	Loan age in years (2014 - Year most recent loan/line of credit was approved)	BEEPS V
Local currency	=1 if the loan is denominated in local currency, 0 if in foreign currency	BEEPS V
Firm characteristics		
Employees	The number of permanent, full-time employees of the firm at the end of last fiscal year.	BEEPS V
Firm age	Firm age in years (2014 - Year the establishment began operations)	BEEPS V
Opaque	=1 if the financial statements of the firm are not audited by an external auditor, 0 otherwise	BEEPS V
Non-exporter	=1 if all of firms' sales are natioanl sales, 0 otherwise	BEEPS V
Audited	=1 if the financial statements of the firm are audited by an external auditor, 0 otherwise	BEEPS V
Exporter	=1 if firm's national sales are less than 100%, 0 otherwise	BEEPS V
Small city	=1 if the firm is located in a locality with population of less than 250,000, 0 otherwise	BEEPS V
Foreign firm	Percentage of the firm owned by foreign investors	BEEPS V
Sales	Firms' total annual sales	BEEPS V
Certification	=1 if the firm has an internationally-recognized quality certification, 0 otherwise	BEEPS V
Domestic firm	Percentage of the firm owned by domestic investors	BEEPS V
Sole proprietorship	=1 if the firm's current legal status is sole proprietorship, 0 otherwise	BEEPS V
Privatized	=1 if the firm is established through privatization of a state-owned firm, 0 otherwise	BEEPS V
Bank characteristics		
Decentralized	Where are SME Customers' applications typically (highest number of loans) finally approved? Decentralized is equal to 1 if respondents choose Regional Office/Branch or Local Office/Branch, and 0 for Headquarters (foreign) or Headquarters (domestic).	BEPS II
Layers	For first time SME Customers: How many hierarchical layers are involved in making a lending decision?	BEPS II
Foreign bank	=1 if the bank is more than 50% owned by foreign investors, 0 otherwise.	Claessens and van Horen(2014)
Market share	Bank market share in terms of total assets.	BankScope
Acquisition	=1 if the foreign bank entered via merger and acquisition, 0 via greenfield investment.	Claessens and van Horen(2014)
Year since entry	The number of years the current foreign investor has been the owner of the bank.	Claessens and van Horen(2014)
Geo Distance	The geographical distance (in km) between the host and the home country of the foreign bank.	CEPII
GDP Distance	The absolute distance between the GDP per capita of the host and home country of the foreign bank.	WDI

(*Continued*)

Table 3.1 - (*Continued*)

Variable Names	Definitions	Source
Institutional and macroeconomic environment		
Pledges	The laws enable efficient enforcement of security rights (simple, cheap, fast). (1) Strongly disagree to (5) Strongly agree.	BEPS II
Courts	The court system is quick and efficient in resolving business disputes. (1) Almost never to (5) Very frequently.	BEPS II
Corruption	It is common for banks to have to pay some irregular "payments/gifts" to court officials. (1) Never to (6) Always.	BEPS II
Regulator	The banking regulator is able to enforce its decisions. (1) Almost never to (5) Very frequently.	BEPS II
Contract Enforcement	The efficiency of the judicial system in resolving a commercial dispute. Time (in calendar days) from the moment the moment the plaintiff decides to file the lawsuit in court until payment.	Doing Business
Credit Information	The number (as a % of the adult population) of individuals and firms listed in a credit bureau's database.	Doing Business
Control of Corruption	Captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Takes values from -2.5 to 2.5.	WGI
Rule of Law	Captures perceptions of the extent to which agents have confidence in the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Takes values from -2.5 to 2.5.	WGI
Credit to GDP	Domestic credit to private sector (% GDP)	WDI
GDP per capita	Natural logarithm of Gross Domestic Product per capita.	WDI

Table 3.2: Summary Statistics by Country.

Country	GDP per capita	Credit to GDP	Control of Corrupt.	Rule of Law	Decentralized	Banks	Foreign	Firms
Albania	4272.08	38.09	-0.61	-0.52	0.00	13	11	84
Armenia	3263.66	35.31	-0.56	-0.41	0.12	17	10	151
Azerbaijan	6637.64	19.96	-1.08	-0.80	0.41	17	2	43
Belarus	6348.93	33.39	-0.63	-0.99	0.33	15	9	94
Bosnia and Herzegovina	4540.72	63.03	-0.30	-0.29	0.06	17	12	141
Bulgaria	7121.02	69.16	-0.24	-0.12	0.14	25	19	114
Croatia	13804.20	70.06	-0.01	0.19	0.30	30	16	188
Czech Republic	20129.52	48.43	0.26	0.98	0.25	12	10	112
Egypt	2961.61	31.45	-0.56	-0.32	0.21	14	7	0
Estonia	16507.49	83.58	0.96	1.13	0.18	11	9	93
Georgia	3079.99	33.94	0.05	-0.12	0.11	13	6	137
Hungary	13223.88	55.86	0.30	0.68	0.07	18	12	49
Jordan	4632.08	73.49	0.11	0.30	0.07	17	9	0
Kazakhstan	10665.14	39.57	-0.92	-0.63	0.27	17	5	55
Kyrgyzstan	1067.11	13.19	-1.14	-1.22	0.67	10	5	44
Latvia	13346.00	83.62	0.17	0.77	0.19	19	10	68
Lithuania	13639.34	49.52	0.26	0.76	0.17	12	8	68
Macedonia	4735.43	45.32	-0.03	-0.25	0.14	14	10	149
Moldova	1883.63	38.02	-0.66	-0.40	0.36	14	6	116
Mongolia	3391.96	44.68	-0.63	-0.34	0.44	9	2	164
Montenegro	6842.96	61.71	-0.19	0.01	0.18	11	7	59
Morocco	2944.55	69.78	-0.33	-0.20	0.67	7	2	0
Poland	12922.50	49.93	0.48	0.71	0.35	29	20	75
Romania	8641.37	44.46	-0.23	0.05	0.08	28	24	245
Russian Federation	12225.56	46.79	-1.04	-0.78	0.27	83	21	265
Serbia	5933.94	46.64	-0.29	-0.38	0.00	30	21	180
Slovak Republic	17246.46	46.59	0.17	0.50	0.50	11	9	72
Slovenia	23760.29	79.33	0.86	1.01	0.06	17	9	151
Tajikistan	846.50	16.95	-1.17	-1.21	0.46	14	3	40
Tunisia	4238.83	71.74	-0.16	-0.03	0.21	14	5	0
Turkey	10202.77	53.48	0.09	0.08	0.65	18	8	447
Ukraine	3394.87	76.62	-1.02	-0.81	0.07	35	24	81
Total	8862.37	52.24	-0.34	-0.16	0.23	611	331	3485

This table reports the mean of the decentralization variable and key institutional and macroeconomic variables across countries. It also shows the total number of banks, foreign owned banks and the total number of firms by country. Variable definitions are provided in Table 3.1.

Table 3.3: Differences in loan terms.

Variables	Centralized	Mean	Decentralized	Mean	MeanDiff
All countries					
Collateral	1776	0.834	1526	0.742	0.093***
Maturity	1591	39.057	1340	35.311	3.746***
Interest rate	1378	10.964	1117	11.476	-0.512
Low credit information availability					
Collateral	741	0.865	375	0.933	-0.068***
Maturity	635	40.800	346	33.740	7.060***
Interest rate	547	12.810	322	15.214	-2.404***
High credit information availability					
Collateral	1035	0.813	1151	0.679	0.133***
Maturity	956	37.900	994	35.858	2.041
Interest rate	831	9.750	795	9.962	-0.212
Low contract enforcement					
Collateral	1107	0.856	601	0.889	-0.032*
Maturity	979	39.061	546	33.293	5.768***
Interest rate	902	12.670	516	14.690	-2.020***
High contract enforcement					
Collateral	669	0.798	925	0.646	0.152***
Maturity	612	39.051	794	36.699	2.352
Interest rate	476	7.733	601	8.717	-0.984**
Low control of corruption					
Collateral	860	0.838	490	0.888	-0.049**
Maturity	748	36.222	441	31.719	4.503**
Interest rate	675	13.353	416	15.776	-2.424***
High control of corruption					
Collateral	916	0.831	1036	0.673	0.158***
Maturity	843	41.573	899	37.073	4.500**
Interest rate	703	8.671	701	8.924	-0.253

This table compares mean values of Collateral, Maturity and Interest rate in countries with different institutional environments. Variable definitions are provided in Table 3.1.

Table 3.4: Summary Statistics and Correlations.

Variable	Obs	Mean	Std. Dev.	Min	Max
Loan-level variables					
Collateral	3419	0.79	0.41	0	1
Maturity	3039	36.94	34.55	1	360
Interest rate	2593	11.19	8.43	0	100
Loan age	3317	3.00	2.18	0	24
Local currency	3479	0.69	0.46	0	1
Firm-level variables					
Employees	3472	81.73	311.67	1	9850
Firm age	3469	16.56	12.96	0	153
Opaque	3420	0.54	0.50	0	1
Non-exporter	3451	0.66	0.47	0	1
Small city	3485	0.54	0.50	0	1
Foreign firm	3467	4.89	19.47	0	100
Bank-level variables					
Decentralized	547	0.23	0.42	0	1
Foreign bank	611	0.54	0.50	0	1
Market share	518	0.06	0.08	0.0001	0.63
Acquisition	331	0.60	0.49	0	1
Year since entry	328	10.35	7.20	1	87
Geo Distance	330	1717.05	1931.50	59.62	10729.83
GDP Distance	328	27913.18	17482.08	293.34	140368.80
Pledges	593	2.60	1.00	1	5
Courts	597	2.29	0.93	1	5
Corruption	534	1.78	1.25	1	6
Regulator	599	4.34	0.70	1	5
Country-level variables					
Contract Enforcement	32	501.36	221.96	237	1286
Rule of Law	32	-0.08	0.65	-1.22	1.13
Credit Information	32	30.44	29.75	0	98.84
Control of Corruption	32	-0.25	0.56	-1.17	0.96
Credit to GDP	32	51.05	19.08	13.19	83.62
GDP per capita	32	8264.13	5893.16	846.50	23760.29

Panel A. Summary Statistics.
This table reports the number of observations, means, standard deviation, minimum and maximum values for the key variables in *Panel A*, whereas *Panel B* reports pair-wise correlation coefficients between variables. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level. Variable definitions are provided in Table 3.1.

Table 3.4 - (*Continued*).

		Decentr.	2	3	4	5	6	7	8
2	Foreign Bank	-0.0887**	1						
3	Market share	0.2489***	0.0775*	1					
4	Acquisition	0.1928***	.	0.2851***	1				
5	Year since entr.	0.0619	.	0.1834***	-0.1596***	1			
6	Geo Distance	0.0631	.	-0.1472**	-0.0979*	0.0932*	1		
7	GDP Distance	0.0163	.	0.1105*	-0.1356**	0.034	0.2024***	1	
8	Pledges	0.0968**	0.0277	0.1189***	0.0411	-0.0035	-0.0441	0.032	1
9	Courts	0.1062**	-0.1131***	0.0851*	0.0032	-0.0258	-0.0383	-0.0438	0.3839***
10	Corruption	-0.0099	-0.1314***	-0.1208**	-0.0385	-0.1550***	0.1254**	0.0807	-0.2985***
11	Regulator	0.0921**	-0.0625	0.0166	0.1310**	-0.0466	0.0039	-0.1450***	0.0314
12	Control of Corr.	-0.0711*	0.2280***	0.1648***	0.0804	0.1564***	-0.2742***	0.0211	0.2217***
13	Rule of Law	-0.0691	0.2028***	0.1389***	0.0807	0.1644***	-0.2491***	0.0397	0.1492***
14	Contract Enforc.	-0.1126***	0.1561***	0.0429	0.0326	0.1212**	-0.1775***	-0.0736	0.0373
15	Credit Inf.	-0.0261	0.1125***	-0.1187***	0.0317	-0.0288	-0.0959*	-0.0083	0.035
16	Credit to GDP	-0.1424***	0.1284***	-0.0636	0.0415	0.0857	-0.2563***	0.0029	-0.0018
17	GDP per capita	0.0033	0.025	-0.0619	0.0515	0.0906	-0.1710***	-0.0677	0.0625

		9	10	11	12	13	14	15	16
9	Courts	1							
10	Corruption	-0.1892***	1						
11	Regulator	0.0729*	-0.0047	1					
12	Control of Corr.	-0.0403	-0.5744***	-0.0676*	1				
13	Rule of Law	-0.0835**	-0.5098***	-0.0799*	0.9486***	1			
14	Contract Enforc.	-0.1376***	-0.3453***	-0.0478	0.6011***	0.5286***	1		
15	Credit Inf.	-0.0847**	-0.2389***	0.0253	0.3876***	0.3508***	0.3526***	1	
16	Credit to GDP	-0.1444***	-0.1775***	-0.0241	0.4762***	0.5190***	0.3086***	0.0494	1
17	GDP per capita	-0.02	-0.2051***	-0.0283	0.5093***	0.6233***	0.2618***	0.4747***	0.3385***

Panel B. Correlation matrix.

Table 3.5: Decentralization and Institutions.

	(1) Pledges	(2) Courts	(3) Corruption	(4) Regulator	(5) Contract Enf.	(6) Regulator	(7) Contract Enf.	(8) GDP Dist
Institutions	0.032*	0.030*	-0.041**	0.052**	-0.084*	0.163**	-0.348**	-0.200***
	(0.018)	(0.016)	(0.017)	(0.022)	(0.047)	(0.071)	(0.171)	(0.072)
Geo Distance						-0.070	-0.032	-0.019
						(0.106)	(0.102)	(0.104)
Year since entry						0.113	0.114	0.045
						(0.114)	(0.102)	(0.096)
Acquisition						0.157	0.246*	0.175
						(0.125)	(0.123)	(0.115)
Foreign bank	-0.016	-0.013	-0.008	-0.029	-0.070			
	(0.042)	(0.043)	(0.041)	(0.044)	(0.043)			
Market share	1.224***	1.210***	1.037**	1.206***	1.339***	0.672	0.478	0.806
	(0.366)	(0.363)	(0.403)	(0.366)	(0.329)	(0.627)	(0.592)	(0.624)
GDP per capita					0.003	0.036	0.100	-0.019
					(0.039)	(0.097)	(0.088)	(0.087)
Constant	-0.161**	-0.158***	-0.012	-0.274***	0.660	-1.223	0.665	1.131
	(0.065)	(0.057)	(0.055)	(0.096)	(0.483)	(1.293)	(1.238)	(1.143)
Country FE	Yes	Yes	Yes	Yes	No	No	No	No
Parent FE	No	No	No	No	No	Yes	Yes	Yes
N	470	468	414	464	471	222	227	226
R-sq	0.220	0.219	0.244	0.225	0.079	0.471	0.456	0.438

This table shows regression results of the impact of the institutional environment on the level of decentralization of bank lending activities while controlling for other bank and country characteristics. The dependent variable is Decentralized. The definition of all the variables is provided in Table 3.1. The model is estimated using OLS. Country and parent bank fixed effects are included as indicated in the table. Columns (1) to (5) report estimation results using the entire sample of banks, whereas columns (6) to (8) report estimation results using the sample of foreign banks only. Standard errors are clustered at the country level and appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 3.6: Decentralization and Loan Terms.

	(1) Collateral	(2) Maturity	(3) Interest Rate	(4) Collateral	(5) Maturity	(6) Interest Rate
Decentralized	-0.692***	1.104***	-1.671***	-0.702***	1.118***	-1.446***
	(0.188)	(0.351)	(0.589)	(0.179)	(0.324)	(0.462)
Loan Age	0.050*	0.683***	0.117**	0.051*	0.678***	0.088*
	(0.027)	(0.056)	(0.055)	(0.026)	(0.055)	(0.051)
Local Currency	0.035	-0.387***	0.364***	0.040	-0.384***	0.292***
	(0.032)	(0.059)	(0.081)	(0.029)	(0.054)	(0.064)
GDP per capita	-0.043**	-0.073**	-0.174***	-0.038*	-0.078**	-0.138***
	(0.019)	(0.036)	(0.047)	(0.021)	(0.039)	(0.045)
Collateral			-0.083			-0.026
			(0.061)			(0.053)
Maturity			-0.106***			-0.094***
			(0.029)			(0.026)
Small City				0.031	0.126***	-0.201***
				(0.022)	(0.042)	(0.042)
Firm Age				-0.005	0.033	-0.086**
				(0.018)	(0.033)	(0.037)
Employees				0.028***	-0.020	0.026
				(0.008)	(0.017)	(0.021)
Opaque				-0.042**	0.018	0.098**
				(0.020)	(0.039)	(0.044)
Foreign Firm				-0.001*	0.000	-0.003**
				(0.001)	(0.001)	(0.001)
Non-Exporter				0.023	0.097**	0.116**
				(0.022)	(0.046)	(0.049)
Constant	1.404***	2.842***	4.553***	1.268***	2.742***	4.280***
	(0.119)	(0.264)	(0.328)	(0.132)	(0.290)	(0.319)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	2218.24	6071.65	122.88	51418.67	285.93	61.62
N	3155	2850	2330	3054	2771	2274
R-sq (First Stage)	0.0767	0.0691	0.0496	0.0916	0.0834	0.0619

This table reports second-stage regression results of the Instrumental Variables (IV) two-stage least squares (2SLS) estimation. The dependent variables are Collateral, Maturity and Interest rate of loans granted to SMEs across 32 EBRD countries of operation. *Credit Information* availability is used as an instrument for *Decentralized*. Variable definitions are provided in Table 3.1. The estimation is based on cross-sectional data and includes a full set of industry dummies. Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 3.7: Firm heterogeneity.

Firm Type:		Employees			Firm Age			Exporter			Audited	
	Collateral	Maturity	Interest Rate	Collateral	Maturity	Interest Rate	Collateral	Maturity	Interest Rate	Collateral	Maturity	Interest Rate
Decentralized	-2.205***	4.518***	-6.207***	-2.134**	3.835**	-6.582	-1.249***	2.573***	-3.872*	-1.003***	1.721***	-1.889***
	(0.697)	(1.506)	(2.401)	(0.859)	(1.580)	(4.121)	(0.453)	(0.961)	(1.979)	(0.279)	(0.516)	(0.540)
Decentralized*Firm Type	0.567***	-1.214***	1.685***	0.078**	-0.144**	0.245	1.074**	-2.511***	3.806**	0.912***	-1.636***	1.813***
	(0.185)	(0.403)	(0.650)	(0.033)	(0.059)	(0.151)	(0.430)	(0.917)	(1.909)	(0.269)	(0.499)	(0.529)
Capital City	-0.010	0.006	-0.081	-0.090*	0.155	-0.338*	-0.097**	0.198*	-0.388**	-0.054*	0.088	-0.158***
	(0.024)	(0.055)	(0.064)	(0.049)	(0.095)	(0.196)	(0.047)	(0.102)	(0.186)	(0.028)	(0.058)	(0.054)
Firm Age	-0.001	0.002	-0.004	-0.033**	0.060**	-0.103	-0.002	0.003	-0.006*	-0.000	0.001	-0.002
	(0.001)	(0.002)	(0.003)	(0.014)	(0.025)	(0.063)	(0.001)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)
Employees	-0.252***	0.566***	-0.778**	0.004	0.021	-0.033	0.020*	-0.008	0.032	0.031***	-0.032*	0.035*
	(0.091)	(0.196)	(0.309)	(0.015)	(0.031)	(0.051)	(0.011)	(0.023)	(0.035)	(0.009)	(0.018)	(0.019)
Audited	0.057**	-0.061	-0.043	0.084**	-0.091	0.058	0.062**	-0.068	-0.018	-0.378***	0.724***	-0.908***
	(0.023)	(0.049)	(0.063)	(0.037)	(0.068)	(0.148)	(0.029)	(0.061)	(0.097)	(0.119)	(0.221)	(0.228)
Foreign Owned	0.001**	-0.004***	0.001	-0.001	0.001	-0.006	-0.001	0.000	-0.005*	-0.000	-0.001	-0.002*
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.004)	(0.001)	(0.001)	(0.002)	(0.000)	(0.001)	(0.001)
Exporter	-0.049*	-0.045	-0.150**	-0.052	-0.035	-0.245	-0.520**	1.058**	-1.824**	-0.025	-0.086*	-0.124**
	(0.027)	(0.057)	(0.067)	(0.036)	(0.075)	(0.152)	(0.202)	(0.434)	(0.879)	(0.023)	(0.049)	(0.048)
Loan Age	0.097***	0.605***	0.149**	0.068**	0.691***	0.112	0.039	0.723***	0.019	0.059**	0.668***	0.118**
	(0.023)	(0.056)	(0.065)	(0.034)	(0.077)	(0.104)	(0.037)	(0.081)	(0.104)	(0.027)	(0.055)	(0.049)
Local Currency	-0.001	-0.333***	0.206***	0.017	-0.390***	0.318**	0.026	-0.408***	0.333***	0.025	-0.382***	0.262***
	(0.027)	(0.053)	(0.059)	(0.040)	(0.081)	(0.149)	(0.036)	(0.077)	(0.124)	(0.030)	(0.055)	(0.053)
GDP per capita	-0.060***	-0.054	-0.184***	-0.042	-0.074	-0.141	-0.040	-0.081	-0.138	-0.036*	-0.079*	-0.177***
	(0.017)	(0.040)	(0.051)	(0.029)	(0.058)	(0.111)	(0.025)	(0.054)	(0.089)	(0.021)	(0.042)	(0.041)
Collateral			-0.013			-0.150			-0.055			-0.046
			(0.071)			(0.167)			(0.096)			(0.053)
Maturity			-0.098***			-0.128*			-0.091**			-0.105***
			(0.034)			(0.066)			(0.045)			(0.026)
Constant	2.219***	1.147*	6.939***	1.982***	1.654***	6.790***	1.590***	2.281***	5.359***	1.393***	2.758***	4.721***
	(0.289)	(0.631)	(0.990)	(0.295)	(0.613)	(1.481)	(0.178)	(0.441)	(0.690)	(0.132)	(0.304)	(0.315)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	167.51	12538.84	559.60	7798.31	12728.58	2266.44	30204.33	4225.29	1142.95	5410.91	4984.62	1470.92
N	3054	2771	2274	3054	2771	2274	3054	2771	2274	3054	2771	2274
R-sq (First stage)	0.8804	0.8801	0.8843	0.6497	0.6403	0.6283	0.3686	0.3656	0.3482	0.4895	0.4837	0.4745

This table reports second-stage regression results of the Instrumental Variables (IV) two-stage least squares (2SLS) estimation. The dependent variables are Collateral, Maturity and Interest rate of loans granted to SMEs across 32 EBRD countries of operation. Firm type indicates different characteristics of firms as a proxy for the degree of opacity of the firm such as firm size, age, exporter status and whether the firm's financial statements are audited. *Credit Information* availability is used as an instrument for *Decentralized*. Variable definitions are provided in Table 3.1. The estimation is based on cross-sectional data and includes a full set of industry dummies. Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 3.8: Alternative Decentralization measure

	(1) Collateral	(2) Maturity	(3) Interest Rate	(4) Collateral	(5) Maturity	(6) Interest Rate
Layers	-0.759***	0.457**	-1.017***	-0.857***	0.567**	-1.080***
	(0.225)	(0.230)	(0.352)	(0.265)	(0.264)	(0.410)
Loan Age	0.161***	0.574***	0.258***	0.164***	0.564***	0.244***
	(0.033)	(0.043)	(0.063)	(0.037)	(0.046)	(0.070)
Local Currency	-0.167***	-0.187***	0.039	-0.146***	-0.195***	0.025
	(0.045)	(0.049)	(0.067)	(0.048)	(0.051)	(0.068)
GDP per capita	-0.067***	-0.018	-0.187***	-0.085***	-0.001	-0.177***
	(0.021)	(0.027)	(0.043)	(0.023)	(0.028)	(0.042)
Collateral			0.022			0.046
			(0.055)			(0.059)
Maturity			-0.088***			-0.080***
			(0.028)			(0.029)
Small City				0.076**	0.064*	-0.163***
				(0.031)	(0.036)	(0.046)
Firm Age				0.056**	-0.027	0.011
				(0.029)	(0.031)	(0.041)
Employees				0.027*	-0.008	0.005
				(0.015)	(0.017)	(0.023)
Opaque				0.065	-0.077*	0.204***
				(0.041)	(0.047)	(0.057)
Foreign Firm				0.001	-0.002**	-0.001
				(0.001)	(0.001)	(0.001)
Non-Exporter				-0.060	0.175***	-0.075
				(0.046)	(0.051)	(0.080)
Constant	2.958***	1.851***	5.996***	3.035***	1.490***	6.064***
	(0.459)	(0.460)	(0.579)	(0.558)	(0.541)	(0.708)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	312.62	306.85	16.08	88.58	912.63	81.38
N	3260	2951	2418	3159	2872	2362
R-sq(First Stage)	0.0218	0.0241	0.0289	0.0277	0.0302	0.0353

This table reports second-stage regression results of the Instrumental Variables (IV) two-stage least squares (2SLS) estimation. The dependent variables are Collateral, Maturity and Interest rate of loans granted to SMEs across 32 EBRD countries of operation. *Credit Information* availability is used as an instrument for *Layers* which is an alternative measure of decentralization. Variable definitions are provided in Table 3.1. The estimation is based on cross-sectional data and includes a full set of industry dummies. Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

Table 3.9: Alternative controls

	(1) Collateral	(2) Maturity	(3) Interest Rate	(4) Collateral	(5) Maturity	(6) Interest Rate
Decentralized	-0.692***	1.104***	-1.671***	-0.854***	1.056***	-1.054**
	(0.188)	(0.351)	(0.589)	(0.215)	(0.354)	(0.445)
Loan Age	0.050*	0.683***	0.117**	0.043	0.670***	0.097**
	(0.027)	(0.056)	(0.055)	(0.031)	(0.058)	(0.045)
Local Currency	0.035	-0.387***	0.364***	0.048	-0.393***	0.247***
	(0.032)	(0.059)	(0.081)	(0.035)	(0.058)	(0.058)
GDP per capita	-0.043**	-0.073**	-0.174***	-0.033	-0.068*	-0.166***
	(0.019)	(0.036)	(0.047)	(0.022)	(0.038)	(0.040)
Collateral			-0.083			-0.028
			(0.061)			(0.047)
Maturity			-0.106***			-0.089***
			(0.029)			(0.024)
Small City				0.026	0.107**	-0.223***
				(0.027)	(0.045)	(0.042)
Firm Age				-0.004	0.031	-0.075**
				(0.021)	(0.034)	(0.033)
Sales				0.010***	-0.001	-0.004
				(0.004)	(0.007)	(0.007)
Certification				0.010	-0.037	-0.048
				(0.026)	(0.046)	(0.040)
Foreign Firm				-0.003**	0.005*	-0.005**
				(0.001)	(0.003)	(0.003)
Domestic Firm				-0.002**	0.005**	-0.003
				(0.001)	(0.002)	(0.002)
Non-Exporter				0.003	0.103**	0.077*
				(0.027)	(0.048)	(0.043)
Sole proprietorship				0.132**	-0.235**	0.348***
				(0.064)	(0.100)	(0.114)
Privatized				-0.064	-0.019	-0.031
				(0.040)	(0.074)	(0.071)
Constant	1.404***	2.842***	4.553***	1.396***	2.237***	4.880***
	(0.119)	(0.264)	(0.328)	(0.202)	(0.393)	(0.382)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	2218.24	6071.65	122.88	1079.45	1851.89	65.85
N	3155	2850	2330	2619	2423	2031
R-sq(First Stage)	0.0767	0.0691	0.0496	0.1009	0.0948	0.0741

This table reports second-stage regression results of the Instrumental Variables (IV) two-stage least squares (2SLS) estimation. The dependent variables are Collateral, Maturity and Interest rate of loans granted to SMEs across 32 EBRD countries of operation. *Credit Information* availability is used as an instrument for *Decentralized*. Variable definitions are provided in Table 3.1. The estimation is based on cross-sectional data and includes a full set of industry dummies. Robust standard errors appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

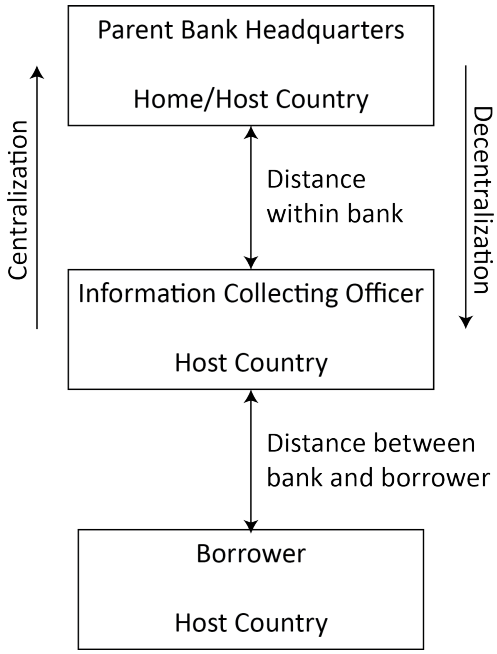
Table 3.10: Alternative sample and clustering of standard errors

	(1)	(2)	(3)	(4)	(5)	(6)
	Excluding Russia and Turkey			SE clustered at industry level		
	Collateral	Maturity	Interest Rate	Collateral	Maturity	Interest Rate
Decentralized	-0.610***	1.021***	-0.943**	-0.702***	1.118***	-1.446***
	(0.216)	(0.385)	(0.411)	(0.199)	(0.264)	(0.523)
Loan Age	0.047**	0.666***	0.054	0.051***	0.678***	0.088*
	(0.022)	(0.051)	(0.041)	(0.016)	(0.050)	(0.047)
Local Currency	0.012	-0.281***	0.138***	0.040**	-0.384***	0.292***
	(0.022)	(0.044)	(0.038)	(0.020)	(0.046)	(0.060)
GDP per capita	-0.067***	0.022	-0.277***	-0.038*	-0.078	-0.138**
	(0.014)	(0.031)	(0.026)	(0.020)	(0.051)	(0.058)
Collateral			-0.002			-0.026
			(0.047)			(0.042)
Maturity			-0.080***			-0.094***
			(0.024)			(0.024)
Small City	0.076***	-0.006	-0.061	0.031	0.126***	-0.201***
	(0.023)	(0.046)	(0.040)	(0.022)	(0.045)	(0.048)
Firm Age	-0.008	0.004	-0.026	-0.005	0.033	-0.086**
	(0.019)	(0.037)	(0.031)	(0.015)	(0.035)	(0.039)
Employees	0.028***	-0.022	-0.010	0.028***	-0.020	0.026
	(0.009)	(0.020)	(0.018)	(0.007)	(0.021)	(0.033)
Opaque	-0.043**	0.032	0.080**	-0.042*	0.018	0.098**
	(0.021)	(0.041)	(0.037)	(0.023)	(0.035)	(0.047)
Foreign Firm	-0.001*	-0.000	-0.001	-0.001	0.000	-0.003*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Non-Exporter	0.007	0.113**	0.075*	0.023	0.097	0.116***
	(0.024)	(0.050)	(0.042)	(0.017)	(0.071)	(0.036)
Constant	1.460***	2.190***	5.214***	1.268***	2.742***	4.280***
	(0.132)	(0.310)	(0.267)	(0.136)	(0.347)	(0.415)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
F-Stat	761.72	2880.58	658.99	51419.90	271.77	55.18
N	2475	2285	1926	3054	2771	2274
R-sq(First Stage)	0.0409	0.0390	0.0363	0.0916	0.0834	0.0619

This table reports second-stage regression results of the Instrumental Variables (IV) two-stage least squares (2SLS) estimation. The dependent variables are Collateral, Maturity and Interest rate of loans granted to SMEs across 32 EBRD countries of operation. *Credit Information* availability is used as an instrument for *Decentralized*. Variable definitions are provided in Table 3.1. The estimation is based on cross-sectional data and includes a full set of industry dummies. Columns (1) to (3) report estimation results for the sample excluding Russia and Turkey with robust standard errors. Columns (4) to (6) report estimation results for the entire sample of countries but with industry-clustered standard errors. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

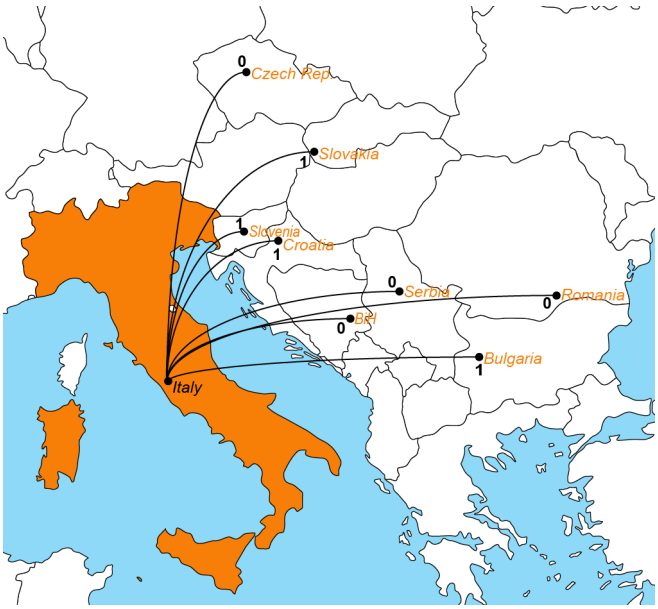
Figures

Figure 3.1: Defining distance.



This figure shows Decentralized and Centralized organizational structures as well as the *within* bank distance and the distance *between* the bank and the borrower. In centralized organizational structures decisions are taken at higher hierarchical levels using information produced by agents at lower hierarchical levels. In decentralized organizational structures the decision-making authority is delegated to agents at lower hierarchical layers responsible for generating the information. As illustrated by the arrows in the figure decentralization reduces information asymmetries between banks and borrowers, but at the same time increases the within bank information asymmetries. The opposite is true for centralized organizational structures. The preferred organizational design therefore depends on the trade-off between information and control.

Figure 3.2: A typical parent bank.



This figure shows a large banking group from Italy with a strong presence in Emerging Europe. This bank gives different degrees of decision-making authority to its foreign affiliates abroad (1 indicates a decentralized business model, whereas 0 a centralized one).

Chapter 4

Mobile Money and Traditional Banking

4.1 Introduction

Competition in the banking industry is important for the efficiency of financial institutions, the quality of financial services as well as the degree of innovation in the industry. The changing landscape of the banking industry with telecommunication companies offering financial services traditionally offered by banks has introduced new sources of competition from non-traditional competitors. Commercial banks have had to strategically respond to the changing external environment in order to remain competitive and maintain market share. The aim of this paper is to investigate the impact of a non-bank entrant on the service provision of commercial banks. We focus on the mobile money technology M-Pesa - a financial innovation which allows users to transfer money by simple short messaging service (SMS) technology - offered by the Kenyan mobile network operator Safaricom, which since its advent in 2007 has grown rapidly and has drawn global attention[22]. While previous studies have examined the impact of mobile money on household welfare (Jack and Suri (2014); Mbiti and Weil (2011)) or firm-level performance (Beck, Pamuk, Ramrattan and Uras (2015)), we assess its

[22]M stands for mobile and PESA means money in Swahili. M-Pesa was subsequently launched in other countries such as Tanzania, India, Egypt, Romania and a few others.

impact on commercial bank's behaviour. Specifically, we combine nationally representative household surveys on access to and use of financial services conducted before (2006) and after (2009, 2012) the advent of M-Pesa with commercial bank financial statement and branch penetration data to provide micro-evidence on the impact of the competition induced by a mobile money innovation on the performance and outreach of formal financial institutions.

Understanding the link between mobile money innovations and the service provision of the formal financial sector has important policy implications. The spillover effects of mobile money innovations on commercial banks in term of their performance and outreach have important implications for alleviating financial exclusion and in turn increasing household welfare. Regulatory authorities need to understand how efforts to reach the low-income and excluded market segments such as mobile money innovations relate to the broader financial context so as to design appropriate policies to promote a competitive banking system that facilitates access to financial services, especially among the poor.

Theory makes ambiguous predictions on the impact of competition on bank performance and access to finance. Theories predicting a positive relation between competition and bank performance rely on general economic theory pointing to inefficiencies arising from market power allowing banks to relax their efforts to reduce costs and behave in a competitive manner (*quiet life hypothesis*). On the other hand, market power may facilitate collusion among banks (*structure-conduct-performance hypothesis*) or may stem from increased bank efficiency (*efficient structure hypothesis*) implying a negative relation between competition and bank performance. The relation between competition and access to finance is a priori not clear as well. The conventional industrial organisation view - *market power hypothesis* - posits that increased competition in the banking sector reduces the cost of finance and increases the availability of credit. On the other hand, the *information hypothesis* posits that in the presence of information asymmetries between banks and customers increased competition makes it more difficult for banks to internalize the benefits of investing in relationship building, reducing the willingness of banks to lend, especially to opaque customers. Al-

though these theories relate specifically to credit services it can be argued that access to other financial services, such as deposit or payment services present issues for financial inclusion as well. Price (the fees of maintaining an account, minimum balances) and non-price barriers (lack of trust, documentation requirements) may be very severe and lead to financial exclusion especially in developing countries. When faced with competitive pressure banks will either try to maintain market share and profitability by seeking out ways to lower access barriers and serve the market segment they previously considered unbankable or will focus on their existing niche market as they will find it difficult to invest in relationship building and acquiring new (often more opaque) customers. Thus, theory offers conflicting predictions on the behaviour of banks when faced with a new source of competition. Empirical studies have found equally mixed results. Most of them focus on US, EU or other developed countries and all of them consider interbank competition as opposed to competition from a non-bank entrant that targets all market segments even those traditionally excluded by commercial banks.

We combine three datasets - household-level survey data, bank financial statement and branch penetration data at the county level - to examine the relationship between commercial banks' exposure to the advent of the mobile money technology and their performance and outreach. Specifically, we construct a bank-level exposure index which is zero for 2006 and varies in 2009 and 2013 for each bank. The more branches a bank has in counties with a higher number of M-Pesa registered users the higher the level of exposure of the bank. Using this new index we find that bank's exposure to the competition induced by the advent of M-Pesa is positively related with their profitability (ROA) and negatively related with their overhead cost and income from fees and commissions. A relevant feature of the data is that the household surveys classify each respondent as either being banked or unbanked. Banked households were asked to provide the name of the bank they currently hold an account in. This allows us to link banks with the type of clients they serve. We find that banks with a higher exposure index tend to expand their outreach towards more opaque households i.e those with lower level of education, no permanent dwelling and lower asset holdings. Overall, the results support theories predicting a positive relation between

competition and bank performance and access to finance.

Focusing on unbanked households only, we provide further evidence on the link between competition and financial inclusion. We analyse, at the county level, whether the advent of M-Pesa has a differential impact on the relation between banking sector outreach and different supply and demand side barriers to financial access. We find that supply side barriers (the cost of opening and maintaining a bank account) become less binding as banks expand in counties with more M-Pesa registered users. Instead, lack of literacy as a demand side barrier becomes more relevant. Combined with the bank-level results, these results provide evidence that banks have become more inclusive as a result of the advent of M-Pesa. This highlights the need for innovative solutions to the financial exclusion problem that has been especially prevalent in developing countries with weak institutional and contractual environment and lack of interbank competition.

This paper makes several contributions to the literature. *First*, to our knowledge this is the first paper to investigate the effect of a mobile money innovation on the performance and outreach of commercial banks. Previous studies have investigated the impact of competition in the banking sector on access to financial services mainly for firms. We focus on households and a different kind of competition to assess the impact of a financial innovation on the service provision of formal financial institutions. *Second*, focusing on one country has the advantage of eliminating institutional and regulatory heterogeneity, allowing us to isolate the effect of local market competition only. *Third*, linking bank branch penetration data at the county level with household surveys before and after the advent of M-Pesa together with bank financial statement data allows us to provide direct evidence on the impact of mobile money innovation on household welfare. As the market for basic banking services is local in nature using aggregate measures of competition and outreach might mask important variation in access and use of financial services at the local level.

A recent paper related to our analysis is Cull, Demirguc-Kunt and Morduch (2014). Combining data on bank penetration from Beck, Demirguc-Kunt and Martinez Peria (2007) with data on microfinance institutions from the Microfi-

nance Information eXchange they investigate whether the presence of banks affects the profitability and outreach of microfinance institutions. Across a sample of 38 countries they find that greater bank penetration in the country is associated with microfinance institutions pushing towards poorer market segments. We look at the performance and outreach of banks as a result of the competition induced by the advent of a mobile money innovation.

The remainder of the paper is organized as follows. Section 4.2 discusses the theoretical framework of the analysis. Section 4.3 gives a background of the mobile money innovation M-Pesa. Section 4.4 describes the data. Section 4.5 presents the results and Section 4.6 concludes.

4.2 Related literature

4.2.1 Competition and bank performance

There are two opposing views on the relation between competition and bank performance. The *structure-conduct-performance hypothesis* also known as the *market power* or *collusion hypothesis* (Bain (1951)) argues that high concentration (low competition) results in bank market power which enables them to earn abnormal profits by offering low deposit rates and charging high loan rates, implying a negative relation between competition and bank performance. In other words, this hypothesis argues that bank profitability is derived from market structure. The *efficient structure hypothesis*, however, interprets this relationship between competition and bank performance in terms of enhanced efficiency (Demsetz (1973)). More efficient firms have lower costs and in turn higher profits. The causality in this case is reversed and runs from bank performance to market structure. The most efficient firms are able to increase their market share leading to higher market concentration. Alternatively, the *quiet life hypothesis* argues that banks with market power have less incentive to maximize revenues and minimize costs (Hicks (1935)), implying a positive relation between competition and bank performance. A related theory, the *contestable market theory*

(Baumol (1982)), argues that even in concentrated markets the threat of competition from new entrants incentivizes banks to behave competitively. When there are no barriers for new entrants, a concentrated industry can behave competitively. In other words, in a market dominated by few large banks there is still a high level of competition.

Empirically, studies have found both a positive and a negative relationship between competition and bank performance. Berger (1995) for US finds partial support for both the efficient structure and the market power hypotheses, whereas Berger and Hannan (1998) find support for the quiet life hypothesis. They find that banks in more concentrated markets exhibit lower cost efficiency. Schaeck and Cihak (2008) for a large sample of European and US banks find a positive effect of competition on profit and cost efficiency. Similarly, Delis and Tsionas (2009) jointly estimating the efficiency and market power of individual banks in the European Monetary Union find a negative relation between efficiency and market power, supporting the quiet life hypothesis. In contrast, Maudos and Fernandez de Guevara (2007) for a sample of EU-15 countries find a positive relation between market power and cost efficiency, thus rejecting the quiet life hypothesis. Similarly, Casu and Girardone (2009) investigating the relation between competition and efficiency in the banking sectors of five EU countries do not support the quiet life hypothesis as they find that an increase in bank monopoly power does not lead to lower cost efficiency. They cannot support the efficient structure hypothesis either as they do not find a reverse causality from efficiency to competition. Koetter et al. (2012) for US find a consistently positive relation between market power and cost efficiency. In contrast, they find a significant negative relationship between profit efficiency and market power which supports the quiet life hypotheses. They encourage the development of policies that increase the contestability of banking markets. The hypothesis we test is the following:

H1: The competition induced by the advent of M-Pesa has a significant impact on bank performance (as measured by overhead costs, ROA, Income from fees and commissions and staff costs).

4.2.2 Competition and access to finance

Theory is ambiguous on the relation between competition and access to finance. The conventional *market power hypothesis* posits that market power is detrimental to consumer welfare by allowing banks to charge a price above marginal cost. In contrast, in perfect competition banks are price-takers where costs and prices are minimized. Traditional models such as Klein (1971) state that higher market concentration increases interest rates and reduces the equilibrium supply of loans. In a theoretical model, Besanko and Thakor (1992) analyse the allocational consequences of relaxing entry barriers and find that loan rates decrease and deposit rates increase as more banks are added to the market. Guzman (2000) confirms the detrimental effect of market power in a general equilibrium model of capital accumulation. He finds that a monopoly banking system is more likely to result in credit rationing and lower capital accumulation rate compared to a competitive banking system.

In contrast, the *information hypothesis* takes into account information asymmetries and agency problems in a dynamic setting. Petersen and Rajan (1995) argue that banks may engage in inter-temporal smoothing of contract terms, allowing losses for the bank in the short run that will be recouped later in the relationship. In a less competitive market the bank can rely on the fact that its most successful customers will stay with the bank for an extended period of time. In a competitive market, however, the bank bearing the initial cost of building the relationship finds it more difficult to retain its successful customers leading to reluctance to finance riskier ventures. Marquez (2002) presents a model in which increased bank competition leads to more dispersion of borrower-specific information and an increase in equilibrium lending interest rates. Hauswald and Marquez (2006) show that competition may reduce lending to informationally opaque borrowers. As competition increases, banks have less incentive to invest in information acquisition leading to lower interest rates but also less efficient lending decisions. However, the link between competition and relationship banking is not unambiguous. Relationship banking can be used strategically as an incumbent's bank comparative advantage over de novo entrants. Boot and Thakor (2000) argue

that a more competitive banking system may encourage banks to become more client-driven and engage more in relationship building. Similarly, Dinc (2000) shows that competition may increase a bank's incentive to engage in relationship lending. Dell'Ariccia and Marquez (2004) show that banks may lend more to informationally opaque borrowers when competition increases from outside lenders.

Empirical studies on the relationship between competition and access to financial services offer mixed results. Beck et al. (2004) find that bank concentration increases financing obstacles for SMEs, providing support for the theories predicting a negative effect of bank market power (market power hypothesis). Similarly, using a sample of 209 banks in 62 countries Beck, Demirguc-Kunt and Honohan (2008) find that barriers such as minimum balances to open a bank account or obtain a loan, account fees and documentation requirements are higher in countries with less contestable banking sectors i.e. more stringent restrictions on bank entry and range of permissible bank activities. More recently, Love and Martinez Peria (2014) using firm-level surveys for 53 countries find that low competition decreases firm's access to finance consistent with the market power hypothesis. Other studies have found support for the information hypothesis. Petersen and Rajan (1994) using data from the National Survey of Small Business Finance in US find that firms in areas with less bank competition are less likely to be rationed consistent with the notion initially put forward by Mayer (1988) that more bank market power increases the value of bank-firm relationships. Berlin and Mester (1999) find that increased competition reduces relationship lending by forcing banks to pay market rates on deposits, thereby complicating the value-enhancing smoothing of lending rates. Cetorelli and Gambera (2001) find that more concentrated banking systems promote the growth of those industries that are more dependent on external finance by facilitating credit access to younger firms consistent with models predicting a positive effect of market power on lending relationships and firms' access to credit. The hypothesis we test is the following:

H2: The competition induced by the advent of M-Pesa has a significant impact

on bank outreach (as measured by the education level of banked households, whether or not they have a permanent dwelling, asset holdings or a salaried job).

4.3 Background on mobile money

M-Pesa is one of the world's most widely adopted mobile phone-based financial services. It enables individuals to exchange cash for e-money with any of its agents distributed around the country. It was developed by Vodafone and launched commercially in March of 2007 by its Kenyan affiliate Safaricom, the main mobile network operator in Kenya. As shown in Figure 4.1, in March of 2008, after only one year of operation it reached 2 million active customers, whereas after five years of operation, in March of 2012, this number reached around 15 million. By this time the deposit value of the service had reached Kshs. 65.391 billion; withdrawals of Kshs. 58.857 billion and a value of Kshs. 66.010 billion was transferred over the system.[23] The 2012 wave of the FinAccess survey shows that around 77% of Kenya's adult population report having used M-Pesa, a substantial increase from around 39% reported in 2009.

In order to use M-Pesa, Safaricom users should create an account using their national ID or passport. When they deposit cash in their accounts, Safaricom issues e-float which is held in M-Pesa users' accounts and is backed by three commercial banks in Kenya, which donate the interest earned to charity allowing Safaricom to avoid the heavy regulatory burden that banks face. Once money is deposited in their account, users can make transfers to other people, can withdraw the money or use it to pay bills. Users can deposit and withdraw money at one of the agents distributed around the country, eliminating the need to visit bricks-and-mortar bank branches and expanding the number of access points they can use to conduct basic financial transactions. Agents are typically retail outlets such as mobile phone retail outlets, airtime distribution stores, grocery stores, bank branches and the like. Figure 4.1 shows the rapid increase of M-Pesa agents and the customers they serve over the years. The large number of M-Pesa agents,

[23]Figures from Safaricom

especially when compared to the number of bank branches or ATMs is one of the reasons behind its success.

When launched, the system was initially used mainly for domestic remittances due to the high labour migration from rural to urban areas which resulted in a high demand for a safe channel to send money from urban areas to families and friends living in rural areas (Jack and Suri (2011); Mbiti and Weil (2011). Prior to the advent of M-Pesa people used various formal and informal channels to transfer money. As shown in Figure 4.2 these included transferring money through friends or family, bus companies, the post office, directly into a bank account and to a lesser extent through money transfer companies such as Western Union or MoneyGram, and by cheque. These methods were either expensive, inconvenient due to their limited network of outlets or risky due to theft. M-Pesa with its affordability, extensive network of agents and user-friendly features dramatically changed the money transfer market. In 2009 and 2013 the use of other money transfer methods have substantially declined in favour of M-Pesa. Around 56% of respondents report using M-Pesa for sending or receiving money within Kenya in 2009 and around 91% in 2013. Other transfer methods have declined in importance. The use of bank accounts, for instance declined from around 24% in 2006 to only 4% of respondents in 2009 and 2013 reporting sending or receiving money directly into a bank account.

Although initially used mainly for money transfers, the mobile money system quickly matured beyond person-to-person transfers into a payment platform for utility bills, school fees, rent and other retail payments. Businesses and governments are also using it for payments and transfers although not as intensively as households[24]. Figure 4.3 shows that the main use of M-Pesa in 2009 as measured by the 2009 wave of the FinAccess Survey is buying airtime, where 42% of M-Pesa users report having used M-Pesa for this purpose. About 27% of respondents report having used M-Pesa to save. This is a relatively high figure given that balances kept in M-Pesa accounts do not pay any interest, emphasising the latent

[24]Beck et al. (2015) using a novel enterprise survey from Kenya (FinAccess Business Survey 2014) show that 35% of firms report accepting M-Pesa as a common method of payment from their customers and 32% of firms report using M-Pesa as a common method of payment to their suppliers.

demand for affordable, reliable and easy to reach financial services. Around 18% of users report buying M-Pesa when travelling so they don't have to carry cash, most likely for safety reasons as described in Morawczynski (2009). Only 6% of users received payments through M-Pesa and an even lower percentage (about 2%) report having received or paid salaries through M-Pesa. Even though these figures are low almost half of the respondents report they would like to receive their main income by M-Pesa, mainly due to the ability to access their money fast and easy. Among those that wouldn't prefer receiving their income by M-pesa the main reasons were a preference for cash (30%), fear of losing the phone (25%), concern about accessing the money too easily and spending it fast (17%) and the need to go to a proper financial institution like a bank as their salary won't fit into M-Pesa (14%). The 2013 wave of the FinAccess survey shows that the service has evolved from a pure money transfer system into a widely used payment platform and a formal financial service. Buying airtime, saving money and depositing into the M-Pesa account when travelling continue to be the top three reasons of using M-Pesa. In 2013 there was an increase in the use of M-Pesa for buying goods and services, paying bills, receiving and paying salaries as well as receiving payments from customers. This is a reflection of numerous strategic partnerships initiated by Safaricom to allow customers to use M-Pesa for various financial transactions. In 2013 a small proportion of users (around 1%) report using M-Pesa to pay or receive MFI or bank loans. Although the number is modest, as more banks integrate M-Pesa into their service offerings, it is expected to increase.

Financial institutions have capitalized on the rapid expansion of mobile money systems to increase the geographical reach of their services. Initially, the advent of M-Pesa was seen as a form of disruptive innovation from commercial banks' perspective. The competition from telecommunication companies offering financial services was eroding the potential revenue pool especially in consumer banking and payments. As banks saw the rapid growth of M-Pesa as a threat to their operations, tensions grew between them and telecommunication companies pressuring the Central Bank in different directions. Banks expressed their concerns about the creation of an uneven playing-field and lobbied the Central Bank

to regulate M-Pesa (and other mobile money platforms) under the commercial banking regulation. Safaricom, on the other hand, emphasized the innovative nature of the service and its impact on serving the base of the pyramid, traditionally neglected by formal financial institutions. After ensuring that all the necessary controls, management functions and reporting mechanisms were in place M-Pesa secured the full backing of the regulatory authority - the Central Bank of Kenya which allowed M-Pesa to launch. In fact, the supportive regulatory environment is considered as the main reason M-Pesa was so successful in Kenya. Other factors that made M-Pesa a success were the socio-economic and demographic characteristics of the Kenyan population, the nature of the Kenyan banking industry as well as the ubiquity of Safaricom - the company responsible for rolling out M-Pesa. At the time the service was launched in 2007 financial exclusion was pervasive in Kenya. The 2006 wave of the FinAccess survey shows that only 17% of the Kenyan adult population were currently banked. Due to the high rural-urban migration the need for an affordable and safe money transfer method was high. The banking sector of Kenya was not designed to serve all market segments. In 2006 there were around 600 bank branches in Kenya with a population of around 37 million people (Table 4.3). Moreover, bank branches were mainly concentrated in urban and densely populated areas. Finally, Safaricom (40% owned by the UK-based Vodafone) as the mobile operator in Kenya with the largest market share had already earned the trust of Kenyans prior to the launch of M-Pesa. The familiar brand name together with the extensive agent network facilitated the adoption of the service by over 70% of the Kenyan adult population in 2013.

Gradually, commercial banks began seeing M-Pesa as an opportunity rather than a competitor. Today, most financial service providers in Kenya are using mobile platforms as a channel for their clients to make deposits and withdrawals from their bank accounts and other financial products. Since the inception of M-Pesa in 2007, Safaricom has partnered with more than 30 banks to allow customers to move funds from their bank accounts to their M-pesa accounts. M-Kesho is an initiative developed through the partnership between Equity Bank and Safaricom in 2010. It is a bank account linked to the M-Pesa account and has no opening

fees, monthly charges or minimum balances. The account can be opened at Equity Bank branches or any of the M-Pesa agents. It offers three services to M-Pesa users: a micro-savings account, short-term credit and insurance (Mbiti and Weil (2011)). Another example is M-Shwari, launched in 2012, a partnership between Commercial Bank of Africa and Safaricom which is an improved version of M-Kesho offering customers a way to earn interest and obtain small loans (Mbiti and Weil (2013)). These and other initiatives are perfect examples of the convergence between mobile phones and banking as a powerful lever to increase the banking penetration rate. The aim of this paper is to focus on the initial phase of the mobile money innovation, namely, the impact of the increased competition caused by the advent of M-Pesa on commercial banks in Kenya. As more survey rounds become available it would be interesting to examine the second phase, namely the effect of the cooperation between M-Pesa and the commercial banks, which we leave for future research.

4.4 Data

We combine three data sources to construct the variables used in the analysis: household-level data, bank branch penetration and bank financial statement data.

Household-level data come from the FinAccess surveys conducted in Kenya in 2006, 2009 and 2013. FinAccess is a nationally representative household-level survey implemented by the Central Bank of Kenya (CBK) and the Financial Sector Deepening Trust of Kenya (FSD Kenya). The aim of the survey is to provide information about access and usage of financial services, the main barriers to financial access as well as to offer insights about types of financial products and delivery channels that are demanded by different market and population segments. Sampling was conducted by the Kenya National Bureau of Statistics (KNBS) using a stratified three-stage design. At the first level, in order to ensure representation at national, regional and urbanization level 710 clusters were sampled. At the second level of selection, 12 households were selected in each of the sampled clusters. At the third level of selection, a respondent aged 16

years and above was randomly selected using the KISH grid approach[25]. In 2006, 4333 interviews were completed; 5443 in 2009 and 6773 interviews in 2013. An important feature of the data is that banked households were asked to provide the name of the bank they currently hold an account in. This allows us to construct variables regarding the type of clients banks serve. As our goal is to test whether banks reach out to more underserved market segments in response to the advent of M-Pesa we construct several variables to proxy for the quality (degree of opacity) of the banked households. Households with lower levels of education, no permanent dwelling, lower asset holdings and no regular income are generally considered by banks as being less profitable to serve and have been traditionally neglected by the formal financial sector. Our dependent variables that proxy for the depth of outreach: *Education*, *Permanent dwelling*, *Asset holdings* and *Salaried job* measure the share of bank customers with secondary or tertiary education, living in a permanent dwelling, owning assets and having a salaried job, respectively.

The second data source is the bank branch information for all commercial banks in Kenya in 2006, 2009 and 2013. As shown in Table 4.2 there has been an expansion of bank branches over time for almost all banks operating in Kenya. There were 583 bank branches operating in Kenya in 2006. This number increased to 1046 in 2009 (around 80% increase) and 1355 in 2013 (about 132% increase from 2006). The expansion has been more pronounced among private locally owned banks, followed by foreign banks and banks with government participation. Table 4.3 reports summary statistics at the county level. There is substantial variation in the number of bank branches both across counties and over time. Urban counties have the highest number of bank branches compared to rural ones, however the branch expansion in the period 2006-2013 was strongest in rural counties, possibly reflecting the lower initial level of rural bank branches. Similarly, the proportion of registered M-Pesa users varies substantially across counties. In 2009 only 3% of interviewed households were registered M-Pesa users in Samburu county compared to 62% in Nairobi county. The number of registered M-Pesa users has

[25]The KISH grid is an approach for selecting individuals to be interviewed within a household using a pre-assigned table of random numbers.

more than doubled; from 28% in 2009 it increased to 59% in 2013. This increase has been more pronounced among rural counties. This is consistent with previous studies (Jack and Suri (2011, 2014)) who find that early adopters of M-Pesa were wealthier, more educated and more likely to be banked than late or never adopters. To examine which banks are more exposed to the competition induced by the advent of M-Pesa we construct a bank-level *Exposure* index, calculated as:

$$Exposure_{it} = \frac{\sum_{c=1}^{j} N_{ict} \cdot MPesa_{ct}}{max \sum_{c=1}^{j} N_{ict} \cdot MPesa_{ct}} \tag{4.1}$$

where, N_{ict} is the total number of branches of bank i in county c at time t. $MPesa_{ct}$ is the proportion of M-Pesa registered users in county c at time t. The denominator is the panel maximum i.e. the maximum exposure that any bank faced over the entire observation period. The numerator is similar to the interaction term ($MPesa_{ct} * Branches_{ct}$) used in specification (4.3), however (as indicated by the subscripts) our aim here is to study the impact on bank performance and outreach and therefore look at the number of branches each bank has in a given county and year and sum over counties to obtain a bank level exposure index. Specification (4.3) in contrast measures the impact from household's perspective where the interaction term is at the county-level and measures how households fare in counties with different degrees of M-Pesa and total bank branch presence. The exposure index is constructed to range from 0 to 1 consistent with the other variables used in the analysis. The index takes the value of 0 for the period before 2007 (before the launch of M-Pesa).

The construction of the index is based on the idea that banking activities are local in nature and the actual influence occurs at the local level. The advantage of this spatially disaggregated measure relative to aggregate country-level measures (such as the number of M-Pesa agents over time, M-Pesa registered users or a post M-Pesa launch dummy) is that it offers more accurate information on the impact of M-Pesa presence on individual banks. As shown in Table 4.3 bank branch networks and the M-Pesa network are not spread out evenly across the country

causing some banks to have more overlap with the M-pesa network than others. This determines the level of exposure the bank has to the competitive pressure induced by the advent of M-Pesa. For instance, a bank with most of its branches located in urban counties where a high proportion of the local population are M-Pesa registered users will be exposed to a completely different impact from the advent of M-Pesa compared to a bank with branches located in both urban and rural counties where on average a lower proportion of the local population they target are M-Pesa registered users. Furthermore, relying on aggregate measures might make it difficult to disentangle the effect of M-Pesa presence over time from other relevant macro-factors. The exposure index which varies across banks allows us to abstract from macro-factors common to all banks and focus on the effect of M-Pesa presence only.

Finally, we have detailed financial statement information for all commercial banks in Kenya provided by the Central Bank of Kenya. We want to examine whether efforts to make banks more inclusive and tilt their portfolio composition towards more opaque market segments have impacted their performance as well. Our dependent variables measuring bank performance are *ROA*, *Overhead costs*, *Income from fees and commissions* and *Staff costs*. If the competition induced by the advent of M-Pesa have made banks operate more efficiently we should expect a negative association between our exposure index and overhead costs and staff costs, and a positive association with ROA. We have also included income from fees and commissions as a dependent variable to examine if the competition from a non-bank entrant focused on the low-income market segment have impacted the ability of banks to generate non-traditional sources of income. If banks have started targeting the low-income market segment we should find a relative decline in non-traditional sources of income (such as income generated from investment and brokerage services) which are typically demanded by more wealthy customers.

We also control for bank market share, total equity and bank age. Well-established banks may have a different profile in terms of performance and outreach than younger banks which seek to gain market share and have less information about

the market. Similarly, larger banks are better able to take advantage of scale economies, but because of organizational diseconomies may be less inclined to reach out to less transparent market segments. The level of equity of a bank has also been shown to impact bank performance and their ability to expand their outreach.

Table 4.4 shows descriptive statistics for the main variables of interest over time, whereas the definition of all the variables is given in Table 4.1.

4.5 Results

To examine the impact of the advent of M-Pesa on bank performance and outreach we estimate the following specification:

$$Bankoutcome_{it} = \alpha + \beta_i + \gamma Exposure_{it} + \delta X_{ti}^{'} + \varepsilon_{it} \tag{4.2}$$

where, $Bankoutcome_{it}$ indicates either the performance or outreach measure of bank i in year t as defined in the previous section. The main independent variable is $Exposure_{it}$ indicating the M-Pesa exposure of bank i at time t. $X_{ti}^{'}$ is a vector of time-variant bank variables that are shown to impact bank performance and outreach such as bank market share, total equity, bank age. β_i are bank fixed effects that control for time invariant bank-specific factors such as ownership, location or business model. ε_{it} is the error term. Standard errors are clustered at the bank-level to allow for both heteroskedasticity and correlation across multiple observations of the same bank.

Results are presented in Table 4.5. Panel A shows that competition is fostering broader outreach. As banks' exposure to M-Pesa increases so does the proportion of their borrowers with no permanent dwelling and lower asset holdings. This indicates that the competitive pressure induced by the advent of M-Pesa has encouraged banks to serve the lower-end of the market and become more inclusive. Results are in line with the conventional industrial organization view which emphasises the benefits of competition for increasing consumer welfare by reducing

prices and in turn increasing the availability of funding. Similarly, we find support for the hypothesis that more competition encourages banks to become more client-driven and reach out to excluded market segments in order to maintain profitability and remain competitive. Gine, Martinez Cuellar and Keenan Mazer (2014) for instance also find that in markets where consumers have less outside alternatives local bank managers provide little information, offer more expensive products and provide a lower quality of service than they do in more competitive markets. The results are also consistent with anecdotal evidence that the success of M-Pesa have had positive spillover effects on the formal financial institutions by demonstrating that the lower income population represents an untapped market segment with potential for increasing bank profitability and market share.

Next, we investigate if banks maintained a good performance in the process of expanding their outreach to more opaque market segments. Panel B shows that competition is enhancing bank's profitability and efficiency. Higher M-Pesa exposure index is associated with higher levels of bank profitability and lower overhead costs. A one unit increase in the exposure index increases profitability by 1.2 per cent and decreases overhead expenses and staff costs by 3.1 and 0.7 per cent, respectively. It is also associated with lower levels of income from fees and commissions possibly reflecting the fact that banks are penetrating into market segments where non-traditional banking services such as investment banking or brokerage services are in low demand. The results are in line with theories predicting a positive relation between competition and bank performance.

4.6 Additional results

In this section we provide further evidence about the impact of M-Pesa on financial inclusion by looking at barriers to financial access. The FinAccess surveys ask unbanked households about the reasons why they do not currently have a bank account. The responses range from access barriers related to the cost of opening and maintaining a bank account to households choosing voluntarily not to have a bank account either because they do not need one or because they

prefer other options rather than a bank. We use this information to categorize the responses into five groups indicating different reasons for not having a bank account, including both supply and demand side barriers. Supply side barriers consist of those related to access barriers due to geographical distance to the nearest financial service provider, due to the cost of opening and maintaining a bank account as well as due to the documentation and other requirements for opening a bank account. Demand side barriers consist of those related to the lack of literacy for opening a bank account as well as reasons related with respondents choosing voluntarily not to have a bank account either due to behavioural reasons or the lack of need for a bank account. This detailed information allows us to examine the effect the advent of M-Pesa has had on different demand and supply side barriers reported by unbanked households. If the competitive pressure induced by the advent of M-Pesa has encouraged banks to become more inclusive we should expect households to report lower supply side barriers. The impact of bank branch expansion should have a greater impact in lowering access barriers in counties with a larger number of M-Pesa registered users. We estimate the following specification:

$$\begin{aligned} Barriers_{ict} = \alpha + \beta_c + \gamma_t + \delta MPesa_{ct} + \rho Branches_{ct} \\ + \theta MPesa_{ct} Branches_{ct} + \mu X_{ict} + \varepsilon_{ict} \end{aligned} \tag{4.3}$$

where, i denotes households, c denotes counties and t denotes time; Barriers is a dummy variable representing one of the reasons for not having a bank account: Cost, Choice, lack of Documentation, lack of Literacy or barriers due to Geography. The definition of all the variables, including the survey questions used to construct each of the variables is provided in Table 4.1. β is a set of county fixed effects which control for unobservable time-invariant county characteristics; γ denotes time fixed effects which control for macroeconomic fluctuations and other year-specific effects that may influence access barriers; X is a matrix of individual control variables (education, gender, age, wealth). MPesa is the proportion of M-Pesa registered users at the county level at time t (it is zero for the year 2006). Branches is the total number of bank branches in county c at time t. The coefficient of interest is θ which tests whether the presence of M-Pesa

has a differential impact on the relationship between bank branch expansion and access barriers. Standard errors are clustered at the county level to allow for correlations across households within a county. We estimate the equation using a linear probability model due to the difficulty of interpreting interaction terms in non-linear logit or probit models. Furthermore, non-linear models with a large number of fixed effects are subject to the incidental parameters problem.

Results are presented in Table 4.6. The evidence suggests that the advent of M-Pesa weakens the positive relation between bank branch expansion and access barriers related to the cost of opening and maintain a bank account. This is consistent with the prediction that the competitive pressure by a non-bank entrant encourages banks to become more competitive in order to maintain market share. Bank-level results in the previous section that banks more exposed to the advent of M-Pesa have moved down-market seem to be explained by the fact that they have made opening and maintaining a bank account more affordable. Column 5 shows that the advent of M-Pesa weakens the negative relation between bank branch expansion and barriers related to literacy. The result indicates that literacy as a demand side barrier becomes more relevant in counties with branch expansions with more M-Pesa users reflecting the fact that competition in the banking sector can help alleviate access barriers related with the supply of banking services and less so for demand barriers such as lack of literacy or financial exclusion due to choice (voluntary excluded).

4.7 Conclusion

Combining household-level data with branch penetration data at the county level as well as bank financial statement information we examine the impact of a financial innovation on the service provision of commercial banks. We use the advent of M-Pesa - a mobile-phone based money transfer and financing platform initially launched in Kenya in 2007 - as an interesting laboratory to investigate the impact of a non-bank entrant on the activities of formal financial institutions. Consistent with theories predicting a positive relation between competition and

bank performance and outreach we find that banks more exposed to the advent of M-Pesa (as measured by an exposure index) experienced an increase in their profitability and a decrease in overhead expenses. With regards to banking sector outreach we find that banks with a higher exposure index tilted their portfolio composition towards more opaque market segments: lower levels of education, no permanent dwelling and lower asset holdings. These results highlight the need for innovative solutions to the financial exclusion problem that has been especially prevalent in developing countries with weak institutional and contractual environment. Another important policy implication is to encourage governments to increase the contestability of banking sectors in order to ensure a more inclusive and stable financial system. The results of this paper provide micro-level evidence that increased competition can be beneficial for both customers and financial service providers.

Tables

Table 4.1: Variable definitions and data sources

Variable Name	Definition	Source
Dependent variables:		
- bank-level		
ROA	Return on assets calculated as profit/loss before tax and exceptional items over total assets.	Central Bank of Kenya
Fees and Commissions	The ratio of income from fees and commissions over total assets.	Central Bank of Kenya
Overhead	The ratio of overhead costs over total assets.	Central Bank of Kenya
Staff costs	The ratio of staff costs over total assets.	Central Bank of Kenya
Education: sec./tertiary	The proportion of banked households with secondary or tertiary education.	FinAccess 2006, 2009, 2013
Permanent Dwelling	The proportion of banked households living in a permanent dwelling.	FinAccess 2006, 2009, 2013
Asset holdings	A score which increases with the number of assets a banked household owns.	FinAccess 2006, 2009, 2013
Salaried job	The proportion of banked households with a salaried job.	FinAccess 2006, 2009, 2013
- household-level		
Geography	The respondent answered affirmative to "The bank is too far from where you live" as a reason why he/she does not currently have a bank account. Asked only to those not currently banked.	FinAccess 2006, 2009, 2013
Costly	The respondent answered affirmative to "You don't want to pay service fees"; "You have to keep a minimum balance in the bank"; "It takes too long to get your money" as a reason why he/she does not currently have a bank account. Asked only to those not currently banked.	FinAccess 2006, 2009, 2013
Choice	The respondent answered affirmative to "You prefer dealing in cash"; "You prefer to use other options rather than a bank"; "You don't need a bank account"; "You don't trust banks"; "You can do all the transactions you need using a different kind of institution" as a reason why he/she does not currently have a bank account. Asked only to those not currently banked.	FinAccess 2006, 2009, 2013
Documentation	The respondent answered affirmative to "You do not have a job"; "You don't have a national ID"; "You don't qualify to open an account"; "You are too young to have a bank account"; as a reason why he/she does not currently have a bank account. Asked only to those not currently banked.	FinAccess 2006, 2009, 2013
Literacy	The respondent answered affirmative to "You can't read or write"; "You don't know how to open an account" as a reason why he/she does not currently have a bank account. Asked only to those not currently banked.	FinAccess 2006, 2009, 2013

(*Continued*)

Table 4.1. - (*Continued*)

Variable Name	Definition	Source
Independent variables:		
- household-level		
Education	The level of education of the respondent: primary, secondary, tertiary. No education is the omitted category.	FinAccess 2006, 2009, 2013
Female	Equals one if the repondent is female.	FinAccess 2006, 2009, 2013
Age	The age of the respondent (in years).	FinAccess 2006, 2009, 2013
Household size	The total number of persons in the household.	FinAccess 2006, 2009, 2013
Asset holdings	A score which increases with the number of assets a household owns. There are 17 asset categories present in all three waves of the survey.	FinAccess 2006, 2009, 2013
Permanent Dwelling	Equals one if the household lives in a permanent dwelling.	FinAccess 2006, 2009, 2013
Income	The type of income of the respondent: agriculture, employed, self-employed.	FinAccess 2006, 2009, 2013
Minority language	Equals one if the respondent speaks a minority language.	FinAccess 2006, 2009, 2013
Swahili	Equals one if the respondent speaks Swahili.	FinAccess 2006, 2009, 2013
- bank-level		
Exposure index	Calculated as the product of the number of bank branches in a county and the proportion of M-Pesa registered users at the county level.	FinAccess and CBK
Market share	The market share of the bank in terms of total customer deposits.	Central Bank of Kenya
Bank age	The number of years the bank has been operating in the country.	Central Bank of Kenya
Total equity	The ratio of total shareholders' funds over total assets.	Central Bank of Kenya
- county-level		
Branches	The total number of bank branches by county.	Central Bank of Kenya
MPesa	The proportion of M-Pesa registered users by county.	FinAccess 2006, 2009, 2013

Table 4.2: Bank branches over time by bank name and ownership type.

Nr.	Banks locally owned	Branches 2006	Branches 2009	Branches 2013
1	African Banking Corporation Ltd.	8	10	11
2	CharterHouse Bank Ltd.	10	10	10
3	Chase Bank Kenya Ltd.	2	12	22
4	City Finance Bank Ltd.	1	1	0
5	Co-operative Bank of Kenya Ltd.	52	83	139
6	Commercial Bank of Africa Ltd.	18	20	28
7	Credit Bank Ltd.	4	5	8
8	Dubai Bank Ltd.	3	4	5
9	Equatorial Commercial Bank Ltd.	3	5	13
10	Equity Bank	34	112	155
11	FINA Bank Ltd.	5	14	15
12	Family Finance Bank	23	50	66
13	Fidelity Commercial Bank Ltd.	5	7	12
14	Giro Commercial Bank Ltd.	6	8	7
15	Guardian Bank Ltd.	6	7	9
16	Imperial Bank Ltd.	6	13	26
17	Investments and Mortgages	9	17	29
18	Jamii Bora Bank Hse	0	0	19
19	Middle East Bank Kenya Ltd.	2	3	4
20	National Industrial Credit Bank Ltd.	16	16	27
21	Oriental Commericial Bank Ltd.	4	8	7
22	Paramount Universal Bank Ltd.	4	7	6
23	Prime Bank Ltd.	9	14	18
24	Southern Credit Banking Corporation Ltd	9	10	0
25	Trans-National Bank Ltd.	9	13	19
26	Victoria Commercial Bank Ltd.	1	1	3
	Total	249	450	658
Nr.	Foreign owned banks	Branches 2006	Branches 2009	Branches 2013
1	Bank of Africa Kenya Ltd.	4	10	28
2	Bank of Baroda Kenya Ltd.	6	9	11
3	Bank of India Ltd.	4	5	5
4	Barclays Bank of Kenya Ltd.	49	119	108
5	Citibank N.A.	3	4	4
6	Diamond Trust Bank of Kenya Ltd.	6	32	46
7	ECO BANK	9	19	31
8	Faulu Kenya MFI	0	6	6
9	First Community Bank	0	18	18
10	Gulf African Bank Ltd	0	14	16
11	Habib Bank A.G. Zurich	4	5	5
12	Habib Bank Ltd.	6	4	4
13	K-Rep Bank Ltd.	19	30	37
14	Standard Chartered Bank Kenya Ltd.	30	35	41
15	UBA	0	4	4
	Total	140	314	364
Nr.	Banks with government participation	Branches 2006	Branches 2009	Branches 2013
1	CFC Bank Ltd.	7	17	20
2	CFC STANBIC	0	18	24
3	Consolidated Bank of Kenya Ltd.	12	13	18
4	Development Bank of Kenya Ltd.	1	2	3
5	Housing Finance Company of Kenya Ltd.	10	11	15
6	Kenya Commercial Bank Ltd.	117	169	182
7	National Bank of Kenya Ltd.	31	43	71
8	Savings & Loans Kenya Ltd.	9	9	0
9	Stanbic Bank Kenya Ltd.	7	0	0
	Total	194	282	333
50	Grand Total	583	1046	1355

This table reports the number of bank branches in 2006, 2009 and 2013 for all Kenyan banks classified by ownership type. Source: Central Bank of Kenya, bank websites, annual reports and government publications.

Table 4.3: Descriptive Statistics, County Level.

Nr.	County	Branches 2006	Branches 2009	Branches 2013	M-Pesa 2009	M-Pesa 2013	Area (km2)	Population (2009 Census)
1	BARINGO	3	5	8	0.387	0.69	1,970	555,561
2	BOMET	2	4	7	0.283	0.444	1,630	724,186
3	BUNGOMA	8	13	16	0.193	0.486	3,123	1,630,934
4	BUSIA	3	9	13	0.234	0.581	1,171	488,075
5	ELGEYO MARAK-WET	2	2	5	0.105	0.484	1,107	369,998
6	EMBU	7	10	11	0.17	0.686	1,296	516,212
7	GARISSA	1	8	9	0.062	n.a.	861	623,060
8	HOMA BAY	2	8	11	0.151	0.563	1,754	749,331
9	ISIOLO	2	5	6	0.579	0.27	397	143,294
10	KAJIADO	6	22	34	0.457	0.659	1,105	687,312
11	KAKAMEGA	7	14	16	0.189	0.58	3,343	1,660,651
12	KERICHO	7	12	12	0.221	0.664	1,886	758,339
13	KIAMBU	25	52	71	0.376	0.799	4,946	1,623,282
14	KILIFI	8	26	36	0.11	0.43	2,343	1,109,735
15	KIRINYAGA	6	10	13	0.257	0.622	1,401	528,054
16	KISII	5	13	18	0.144	0.534	2,588	1,152,282
17	KISUMU	23	32	37	0.308	0.605	2,407	968,909
18	KITUI	3	11	14	0.136	0.541	3,587	1,012,709
19	KWALE	3	9	12	0.069	0.514	1,265	649,931
20	LAIKIPIA	6	10	12	0.412	0.747	1,023	399,227
21	LAMU	2	4	8	0.091	0.513	265	101,539
22	MACHAKOS	9	16	19	0.206	0.674	3,052	1,098,584
23	MAKUENI	4	9	11	0.2	0.523	2,344	884,527
24	MANDERA	1	2	2	0.061	n.a.	1,038	1,025,756
25	MARSABIT	2	5	6	0.083	0.19	653	291,166
26	MERU	14	26	35	0.127	0.542	3,196	1,356,301
27	MIGORI	6	7	13	0.205	0.481	489	256,086
28	MOMBASA	58	85	113	0.359	0.708	3,079	939,370
29	MURANGA	15	20	20	0.216	0.617	2,517	942,581
30	NAIROBI	236	413	540	0.62	0.827	10,323	3,138,369
31	NAKURU	29	48	57	0.436	0.741	4,650	1,603,325
32	NANDI	3	9	11	0.244	0.597	1,777	752,965
33	NAROK	5	7	11	0.222	0.339	1,852	850,920
34	NYAMIRA	3	7	6	0.346	0.594	1,291	598,252
35	NYANDARUA	5	8	9	0.415	0.757	1,259	596,268
36	NYERI	18	24	28	0.331	0.812	2,077	693,558
37	SAMBURU	1	2	4	0.032	0	542	223,947
38	SIAYA	3	6	8	0.138	0.488	2,183	842,304
39	TAITA TAVETA	3	11	10	0.135	0.61	971	284,657
40	TANA RIVER	1	2	3	0.093	0.375	626	240,075
41	THARAKA NITHI	4	6	6	0.143	0.595	1,102	365,330
42	TRANS NZOIA	9	13	14	0.188	0.572	1,611	818,757
43	TURKANA	2	3	4	0.041	0.044	1,520	855,399
44	UASIN GISHU	17	25	41	0.458	0.667	2,112	894,179
45	VIHIGA	2	6	7	0.191	0.429	1,271	554,622
46	WAJIR	1	4	5	0.056	n.a.	815	661,941
47	WEST POKOT	1	3	3	0.057	0.255	1,407	512,690
	Total/Average	583	1,046	1,355	0.276	0.587	93,225	37,734,550

This table reports descriptive statistics at the county level. Source: Bank branch data from the Central Bank of Kenya, bank websites, annual reports and government publications. Proportion of M-Pesa registered users from the 2009 and 2013 FinAccess households surveys and county population and area from the 2009 Kenyan census.

Table 4.4: Descriptive Statistics, Bank, Household and County Level.

	2006				2009				2013			
Variable	Obs		Mean	Std. Dev.	Obs		Mean	Std. Dev.	Obs		Mean	Std. Dev.
Bank Level	Nr. Of banked HH	Nr. Of banks			Nr. Of banked HH	Nr. Of banks			Nr. Of banked HH	Nr. Of banks		
Education	889	10	0.8337	0.1317	1941	34	0.8621	0.1868	2190	37	0.6702	0.3251
Permanent dwelling	889	10	0.7634	0.1863	1941	34	0.8756	0.1493	2190	37	0.5864	0.2732
Asset holdings	889	10	7.2017	3.4275	1941	34	8.0827	3.7457	2190	37	3.9820	2.0389
Salaried job	889	10	0.5548	0.1947	1941	34	0.4745	0.2983	2190	37	0.4011	0.2474
Exposure index		44	0.0000	0.0000		48	0.0795	0.0989		46	0.1815	0.2293
ROA		41	0.0233	0.0192		43	0.0123	0.0488		43	0.0300	0.0268
Overhead costs		41	0.0671	0.0316		43	0.0782	0.0546		43	0.0570	0.0302
Income fees commisions		41	0.0203	0.0162		43	0.0191	0.0146		43	0.0158	0.0111
Staff costs		41	0.0261	0.0112		43	0.0313	0.0202		43	0.0239	0.0118
Market share (deposits)		41	0.0244	0.0359		44	0.0227	0.0334		44	0.0227	0.0287
Total Equity		41	0.1767	0.1149		43	0.1844	0.1404		43	0.1630	0.0588
Bank Age		42	30	21.0771		43	31.3721	21.8839		42	35.7857	21.9784

(*Continued*)

Table 4.4 - (*Continued*)

	2006					2009					2013				
Variable	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max	Obs	Mean	Std. Dev.	Min	Max
Household Level															
Geography	3690	0.0415	0.1994	0	1	4991	0.0866	0.2812	0	1	3361	0.0556	0.2293	0	1
Cost	3690	0.2011	0.4009	0	1	4991	0.1146	0.3186	0	1	3361	0.0747	0.2629	0	1
Choice	3690	0.1656	0.3718	0	1	4991	0.2070	0.4052	0	1	3361	0.1021	0.3028	0	1
Documentation	3690	0.2222	0.4158	0	1	4991	0.2452	0.4303	0	1	3361	0.1226	0.3280	0	1
Literacy	3690	0.0515	0.2210	0	1	4991	0.1192	0.3241	0	1	3361	0.0351	0.1841	0	1
Household size	4418	2.6668	1.4065	1	8	6598	4.9617	2.6012	1	20	6449	4.4308	2.5414	1	24
Education: primary	4418	0.4531	0.4979	0	1	6598	0.4682	0.4990	0	1	6449	0.4886	0.4999	0	1
Education: secondary	4418	0.2782	0.4482	0	1	6598	0.2701	0.4440	0	1	6449	0.2751	0.4466	0	1
Education: tertiary	4418	0.0887	0.2844	0	1	6598	0.0849	0.2787	0	1	6449	0.0802	0.2716	0	1
Female	4418	0.5604	0.4964	0	1	6598	0.5870	0.4924	0	1	6449	0.5914	0.4916	0	1
Asset holdings	4418	2.0512	2.7167	0	17	6598	2.2292	2.6240	0	17	6449	1.8547	2.0082	0	15
Permanent dwelling	4418	0.3067	0.4612	0	1	6598	0.3871	0.4871	0	1	6449	0.3176	0.4656	0	1
Income: agriculture	4418	0.4950	0.5000	0	1	6598	0.5059	0.5000	0	1	6449	0.5029	0.5000	0	1
Income: employed	4418	0.3137	0.4641	0	1	6598	0.3134	0.4639	0	1	6449	0.3923	0.4883	0	1
Income: self-employed	4418	0.2816	0.4498	0	1	6598	0.2793	0.4487	0	1	6449	0.2331	0.4228	0	1
Age: 18-24	4418	0.2030	0.4023	0	1	6598	0.1784	0.3829	0	1	6449	0.1763	0.3811	0	1
Age: 25-34	4418	0.2845	0.4512	0	1	6598	0.2584	0.4378	0	1	6449	0.2976	0.4572	0	1
Age: 35-44	4418	0.1983	0.3987	0	1	6598	0.2073	0.4054	0	1	6449	0.1867	0.3897	0	1
Age: 45-54	4418	0.1231	0.3286	0	1	6598	0.1338	0.3405	0	1	6449	0.1124	0.3159	0	1
Age: 55over	4418	0.1449	0.3520	0	1	6598	0.1834	0.3870	0	1	6449	0.1862	0.3893	0	1
Language: Swahili	4418	0.4810	0.4997	0	1	6598	0.6485	0.4775	0	1	6449	0.4567	0.4982	0	1
Minority language	4418	0.4230	0.4941	0	1	6598	0.2304	0.4211	0	1	6449	0.3542	0.4783	0	1
County level															
Total nr. of branches	47	12.40	34.78	1	236	47	22.26	60.17	2	413	47	28.83	78.77	2	540
Mpesa registered user						47	0.22	0.14	0.03	0.62	44	0.54	0.18	0	0.83

This table reports the number of observations, means and standard deviations of the main variables. Bank financial data are from the Central Bank of Kenya whereas the household characteristics are from the 2006, 2009 and 2013 household surveys. The definition of all the variables is given in Table 4.1.

Table 4.5: The impact of M-Pesa: Bank's Perspective.

	Panel A			
	Education	Permanent Dwelling	Asset Holding	Salaried Job
	(1)	(2)	(3)	(4)
	Education	Permanent Dwelling	Asset Holding	Salaried Job
Exposure Index	-0.114	-0.187*	-1.769*	-0.085
	(0.097)	(0.098)	(1.040)	(0.093)
Market share	-1.292	-0.277	9.530	1.001
	(1.051)	(1.076)	(11.583)	(1.260)
Total Equity	1.029	1.228	2.185	0.978
	(1.284)	(0.828)	(7.818)	(1.236)
Bank Age	-0.292**	-0.341	-6.749**	0.041
	(0.140)	(0.261)	(3.002)	(0.118)
Constant	1.664***	1.727*	28.697***	0.134
	(0.507)	(0.891)	(10.189)	(0.425)
Bank FE	Yes	Yes	Yes	Yes
N	72	72	72	72
R-sq	0.133	0.109	0.191	0.043
	Panel B			
	Overhead Costs	ROA	Income from fees and comm.	Staff Costs
Exposure Index	-0.031***	0.012*	-0.028***	-0.007**
	(0.006)	(0.007)	(0.006)	(0.003)
Market share	-0.227***	0.044	-0.210**	-0.215***
	(0.071)	(0.069)	(0.097)	(0.022)
Total Equity	0.067	0.033	0.007	0.036**
	(0.044)	(0.063)	(0.021)	(0.014)
Bank Age	-0.017**	0.021**	0.000	-0.008**
	(0.007)	(0.009)	(0.003)	(0.004)
Constant	0.118***	-0.053*	0.024**	0.053***
	(0.025)	(0.030)	(0.011)	(0.012)
Bank FE	Yes	Yes	Yes	Yes
N	117	117	117	117
R-sq	0.176	0.124	0.498	0.236

This table reports regression results of the impact of M-Pesa on bank performance (*Panel B*) and outreach (*Panel A*) while controlling for other bank characteristics and including bank fixed effects. Each column uses a different dependent variable corresponding to different measures of bank performance and outreach. The definition of all the variables is given in Table 4.1. The model is estimated using OLS. Standard errors are clustered at the bank level and appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

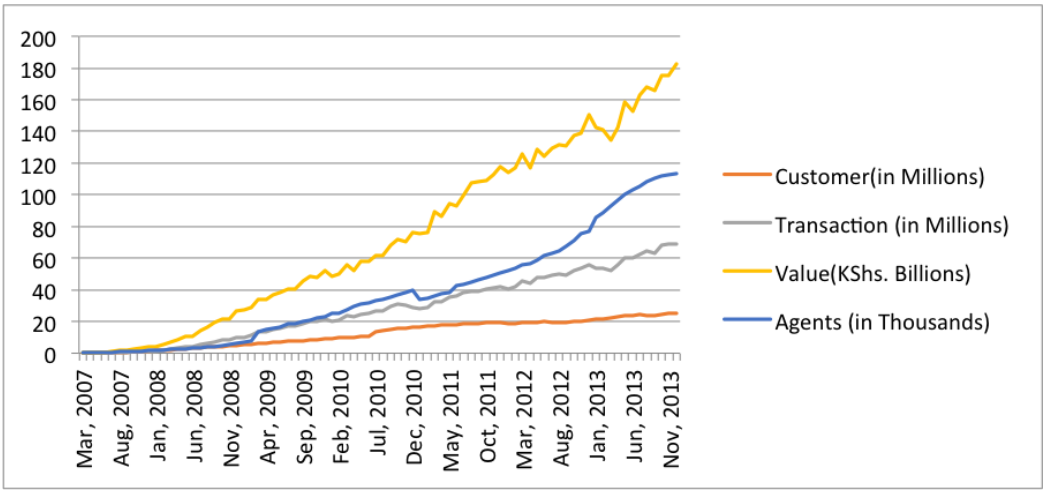
Table 4.6: The impact of M-Pesa: Households' Perspective.

	Geography	Costly	Choice	Documentation	Literacy
Bank branches	-0.003***	0.005***	-0.000	-0.001	-0.006***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
M-Pesa registered users	-0.245***	-0.091**	-0.106**	-0.216***	-0.188***
	(0.034)	(0.045)	(0.050)	(0.053)	(0.035)
Bank Branches*Mpesa registered users	0.002***	-0.004***	0.000	0.001	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Household size	0.004***	-0.001	-0.003**	0.006***	-0.000
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Education: primary	-0.002	0.019**	0.004	0.006	-0.112***
	(0.008)	(0.010)	(0.010)	(0.011)	(0.009)
Education: secondary	-0.003	0.023**	0.026**	0.026**	-0.126***
	(0.008)	(0.012)	(0.013)	(0.013)	(0.010)
Education: tertiary	-0.011	0.019	0.071***	-0.007	-0.142***
	(0.013)	(0.021)	(0.025)	(0.023)	(0.011)
Female	-0.014***	-0.018***	-0.019***	0.019***	0.019***
	(0.005)	(0.007)	(0.007)	(0.007)	(0.005)
Asset holdings	-0.002**	-0.001	0.012***	-0.001	-0.003**
	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Permanent dwelling	-0.009*	0.018**	0.006	0.008	-0.005
	(0.005)	(0.008)	(0.009)	(0.009)	(0.005)
Income: agriculture	0.042***	0.024***	0.046***	-0.058***	0.015***
	(0.005)	(0.007)	(0.007)	(0.008)	(0.005)
Income: employed	0.000	0.015**	0.022***	-0.050***	0.007
	(0.005)	(0.007)	(0.008)	(0.008)	(0.005)
Income: self-employed	0.020***	0.028***	0.074***	-0.082***	-0.014**
	(0.006)	(0.008)	(0.009)	(0.008)	(0.005)
Age: 18-24	0.023**	0.055***	0.059***	-0.274***	-0.022*
	(0.009)	(0.013)	(0.013)	(0.022)	(0.012)
Age: 25-34	0.024**	0.060***	0.080***	-0.395***	-0.032***
	(0.010)	(0.013)	(0.013)	(0.022)	(0.012)
Age: 35-44	0.017*	0.061***	0.108***	-0.429***	-0.034***
	(0.010)	(0.014)	(0.014)	(0.022)	(0.013)
Age: 45-54	0.018	0.058***	0.114***	-0.422***	-0.030**
	(0.011)	(0.015)	(0.016)	(0.022)	(0.014)
Age: 55 over	0.009	0.047***	0.114***	-0.434***	-0.027**
	(0.011)	(0.015)	(0.015)	(0.022)	(0.014)
Language: Swahili	0.000	-0.004	-0.017	0.006	0.004
	(0.008)	(0.012)	(0.014)	(0.015)	(0.007)
Language: minority	0.009	0.006	-0.027*	-0.026	0.021**
	(0.009)	(0.013)	(0.015)	(0.016)	(0.008)
Constant	0.070**	0.133***	0.141***	0.592***	0.214***
	(0.029)	(0.035)	(0.042)	(0.039)	(0.029)
County FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
N	12042	12042	12042	12042	12042
R-sq	0.065	0.051	0.062	0.128	0.101

This table reports regression results of the impact of M-Pesa on barriers to financial access while controlling for an array of household characteristics and including year and county fixed effects. Each column uses a different dependent variable, corresponding to different reported reasons for not having a bank account. The definition of all the variables is given in Table 4.1. The model is estimated using OLS. Standard errors are clustered at the county level and appear in brackets. * indicates significance at the 10% level. ** at the 5% level. *** at the 1% level.

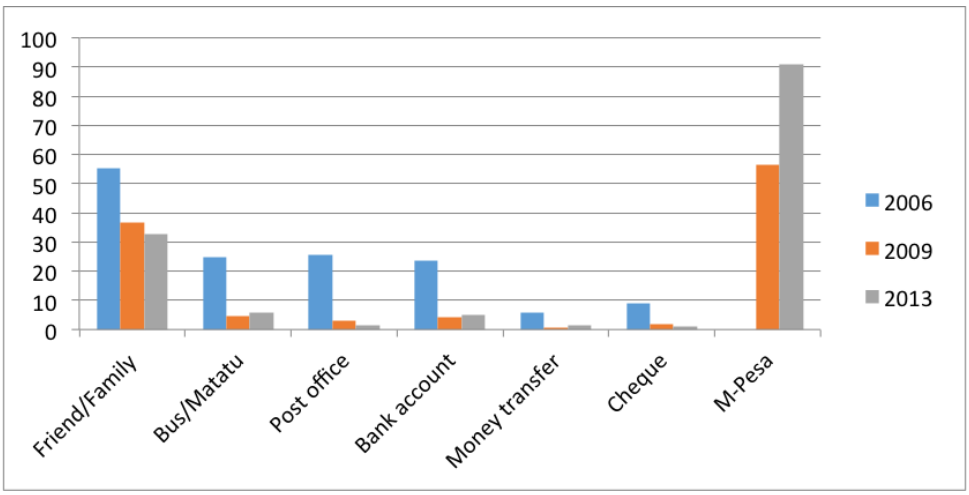
Figures

Figure 4.1: Mobile Payment Statistics.



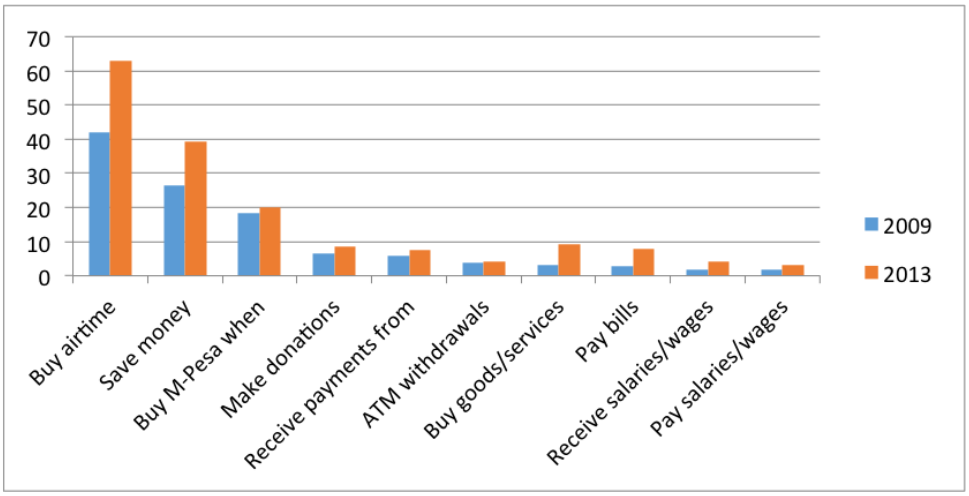
This figure shows the number of mobile money customers, agents as well as the amount and value of transactions carried out through the mobile platform. Source: Central Bank of Kenya.

Figure 4.2: Money transfer methods.



This figure shows different methods used by respondents to send or receive money within Kenya. The data is based on the 2006, 2009 and 2013 waves of the FinAccess surveys.

Figure 4.3: Use of M-Pesa.



This figure shows the different reasons for using mobile money. Data is based on the 2009 and 2013 wave of the FinAccess surveys.

Chapter 5

Concluding remarks

As the banking sectors of many developing countries have undergone considerable transformations aiming at reversing the negative consequences of government-controlled repressive regimes, a number of questions arise about the costs and benefits of these reforms for banks, borrowers and the governments. This thesis has presented the findings of three essays examining different aspects of financial sector developments starting from the widespread entry of foreign banks in the first essay, the institutional and regulatory reforms in the second essay and financial innovations aiming at facilitating access to financial services in the third essay. This last chapter will summarize the main findings, give policy implications of the findings and highlight the limitations and areas for future research.

5.1 Main findings

The first essay has analysed the impact of foreign bank entry on the cost of financial intermediation in host countries. Using time-varying ownership data for a sample of 265 banks operating in nine South-East European countries characterised by one of the largest foreign bank presence among developing countries, we find that foreign banks operate with lower NIMs compared to domestic banks during the initial years of financial sector liberalization. At later stages of foreign bank entry foreign banks start operating with higher NIMs. This shift of be-

haviour is more pronounced for foreign greenfield banks which have an efficiency advantage compared to domestic and foreign acquisition banks as they do not acquire existing institutions which often have inefficient organizational structures and low quality loan portfolios. Greenfield banks, however, have an informational disadvantage as they do not inherit a customer base with all the related information about them, rather start building a new customer base. With time, as they start acquiring proprietary information about customers they may tilt their portfolio composition from transparent towards more opaque market segments. Finally, incorporating home country factors into the analysis we find evidence about cross-border spill-over effects of bank regulation through the behaviour of foreign banks in host countries. Foreign banks coming from countries with stricter regulations operate with higher NIMs in host countries. These results advance the foreign bank entry and the multinational bank profitability literature by analyzing the cost of financial intermediation as a function of both domestic and multinational factors and by treating foreign banks as a heterogeneous group in terms of home country characteristics and parent bank conditions.

The second essay examines the impact of the institutional environment on bank organizational hierarchy and the implications for SME loan contracts. Using a bank-level survey dataset with unique information on bank internal organizational structures for a sample of 32 EBRD countries of operation we find that banks tend to decentralize decision making more in countries with a stronger institutional environment. Furthermore, combining the bank-level with firm-level data containing detailed information on their financing arrangements we find that strong institutions which favour a decentralized organizational structure lead to better lending terms to SMEs decentralized banks grant loans with longer maturities, lower interest rates and are less likely to require collateral compared to their centralized counterparts. These findings contribute to the literature on organizational structure and information production and the law and finance literature by introducing a new and direct measure of bank organizational hierarchy across a large sample of countries and by analysing bank organizational structure as a function of the institutional environment they operate in.

In the third essay we have investigated the link between the advent of mobile money and the service provision of traditional banks. Using the advent of M-Pesa in Kenya in 2007 as an interesting laboratory and micro-level data on the household use and access to financial services, bank branch penetration data at the county level as well as bank financial statement information we find that the advent of the mobile money innovation has made the banking sector more inclusive. Banks more exposed to the advent of M-Pesa (as measured by a bank-level exposure index) tilted their portfolio composition towards more opaque market segments, while maintaining a good performance in the process (as measured by their ROA and cost to income ratios). These results add to the competition-access to finance and competition-bank performance literature by investigating, for the first time in the literature, the effect of the competition induced by a non-bank entrant on the outreach and performance of traditional commercial banks.

5.2 Policy Implications

Besides advancing the academic literature, the findings presented above have important policy implications and can help inform the debate about ways to make the financial system more inclusive and affordable for all market segments.

The policy implication of the first essay is that countries dealing with majority foreign-owned banking sectors should closely follow the regulatory changes in foreign banks' home countries as their foreign-owned banking sectors act as transmitters of such regulatory changes. In order to reduce negative externalities from stricter home-country regulation, host countries should direct regulatory reforms towards increasing the level of cross-border cooperation and levelling the playing field with foreign bank home countries so as to reduce the opportunity for regulatory arbitrage. The results provide useful policy recommendations in light of the recent discussions (after the 2007/2008 financial crisis) to strengthen bank regulation and supervision in the EU. These regulatory changes can have an impact on smaller less developed countries, which are host to large EU bank-

ing groups, and if not done in coordination can lead to negative externalities. Furthermore, the way foreign banks are allowed to enter the host countries is important as the results show that greenfield banks behave differently from foreign acquisition banks.

The results of the second essay clearly show that countries seeking to improve the quality of financial services provided to SMEs should aim at improving the quality of institutions that reduce information asymmetries between banks and borrowers. This will enable banks to adopt an organizational structure that facilitates the utilization of local information and allows them to offer better loan contracts to SMEs which by being more opaque and with a lack of credit history rely heavily on soft information. Another implication of the results is that bank size or foreign ownership per se do not determine the quality of lending, rather the internal organizational structure that banks choose is what matters for loan contract terms. The dichotomy usually associating foreign and large banks with centralized organizational structures and domestic and small banks with decentralized ones, is over simplistic and does not allow for more nuanced policy recommendations. What is obvious from our results is that even within the group of foreign banks for instance, both organizational structures are prevalent leading to different lending outcomes. Large and foreign banks, if adopting the right level of decentralization, can enjoy the best of both worlds economies of scale and diversification from their size and a utilization of local information due to their decentralized organizational structures.

The results of the third essay show that initiatives such as M-Pesa a mobile phone-based money transfer, financing and micro-financing service initially launched in Kenya in 2007 - can have not only direct effects in terms of allowing (unbanked) individuals to deposit, transfer, withdraw money as well as pay for goods and services fast and more conveniently, but also has positive spill-over effects in terms of introducing a new source of competition in the Kenyan financial landscape and demonstrating that low-income unbanked market segments can be a profitable customer base to target. Developing countries with a weak institutional environment and lack of infrastructure for access to basic financial

services that seek to expand access to financial services to a wide range of customers can benefit from innovative solutions to the financial exclusion problem such as the case of M-Pesa in Kenya. Our results show that increasing the contestability of the banking market by allowing non-bank entrants to provide a range of financial services traditionally offered by banks can have positive effects by encouraging banks to behave more competitively and re-consider what they previously considered an un-bankable market segment. A final policy implication is that regulators should be careful not to discourage efforts to increase financial inclusion by placing heavy regulatory burden on these and similar initiatives. At the same time a prudent regulatory approach is required so as not to expose customers to unwanted risks and the banking system to potential instabilities.

5.3 Limitations

In this section we will highlight some limitations which need to be taken into account when interpreting the findings of this thesis.

When studying the impact of foreign bank entry on NIMs in host countries it should be taken into account the sample used to draw our conclusions. Although the coverage ratio in terms of total banking assets is high we analyze the banking sectors of only nine SEE countries. Extending the analysis to include more developing countries from different parts of the world can help generalize the results. Even within the group of developing countries there are differences in terms of the institutional and macroeconomic environment which may lead to a different impact of foreign bank entry for host countries. Another limitation of the study is that it does not investigate the specific channels through which foreign bank entry affects NIMs in host countries. As such, we cannot differentiate between the *performance hypothesis* and the *portfolio composition hypothesis* usually put forward in the literature when examining the behaviour of foreign and domestic banks.

The second essay of the impact of the institutional environment on the decentralization of bank lending activities and loan terms granted to SMEs in 32 EBRD

countries of operation uses cross-sectional data at one point in time, i.e. year 2012. This does not allow us to exploit the time dimension of the reforms given that these countries have experienced considerable institutional reforms during their transition period from centrally planned to market-oriented economies.

Finally, a limitation of the third essay analyzing the impact of the competition induced by the advent of M-Pesa on the performance and outreach of formal financial institutions is the lack of data on the roll-out of M-Pesa agents across Kenya which would provide an additional source of exogenous variation in banks exposure to the financial innovation. Consistent with the location data of commercial bank branches we would like to have location data for M-Pesa agents as well, but rely on M-pesa registered users instead to measure the presence of the financial innovation at the county level. The use of M-Pesa agent location data would strengthen the results and alleviate any concerns due to endogenous M-Pesa adoption. In addition, as with the first essay, generalizing the results to other countries experiencing the same or similar financial innovations is difficult when focusing the analysis on a single representative country. Conducting a similar analysis in other countries where M-Pesa or similar initiatives have been launched will help make the results more informative about the impact of a financial innovation on formal financial institutions in different institutional settings.

Notwithstanding these limitations we believe the results of this thesis provide useful and novel insights about ways to make the financial system more inclusive and affordable for all market segments and provide policy recommendations for reforming the macroeconomic and legal infrastructure of a country to facilitate achieving these goals.

5.4 Further research

The results presented in this thesis can be extended in several ways which we leave for future research.

When examining the impact of foreign bank entry on the cost of financial intermediation it would be informative to investigate deeper the reasons why foreign banks operate with different NIMs compared to domestic banks at different stages of foreign bank entry. A more detailed loan portfolio composition data would allow a thorough investigation of welfare implications of our results. If foreign banks initially cherry pick the most transparent clients because of their informational disadvantage compared to domestic banks and later as they gain more proprietary information serve less transparent clients, a shift of NIMs relative to domestic banks would reflect this portfolio composition effect rather than the efficiency advantage of foreign banks. Distinguishing between the portfolio composition and the performance hypothesis would allow a better understanding of the effects of foreign bank entry for host countries.

With regards to the second essay some interesting issues left unexplored are whether the institutional environment impacts the degree of decentralization of bank lending activities for the household market segment as well. Retail lending presents an important part of credit growth in our sample of countries and is important for household welfare. Financial exclusion is prevalent not only among the SME market segment but also among households and can have negative consequences for investments in productive activities such as entrepreneurship and education. How different bank organizational structures impact the availability of financial services to households is important for informing the debate on ways to foster financial inclusion. Given firm financial statement data it would also be informative to investigate whether the improved loan contracts have real impact on firm performance and be able to make welfare statements. This would give direct evidence on the real impact of the legal and institutional environment in developing countries.

Finally, as more data become available the third essay could be extended to investigate the recent co-operations that were established between Safaricom and commercial banks using the M-Pesa platform as an alternative delivery channel. What started as a competition and rivalry between commercial banks on one hand and telecommunication companies wanting to offer financial services on the

other hand, ended up in several joint initiatives to offer financial services through the M-Pesa platform. In 2010, for example, Safaricom introduced M-Kesho, a partnership with Equity Bank which makes three services available to M-Pesa users: a micro-savings account, short-term credit and insurance. These partnerships have also induced other banks in Kenya to try to compete by improving their products and services. In 2012, M-Shwari was launched as a partnership with Commercial Bank of Kenya, which offers customers a way to earn interest on their savings and also obtain small loans through Commercial Bank of Kenya. Users can now use M-Pesa to access their bank accounts in 36 different banks in Kenya. These examples show that M-Pesa is not a mechanism to replace traditional banks rather a supplemental platform that has encouraged banks to find new ways to serve the previously unbankable. Banks that have integrated mobile money into their service offerings aim to expand their outreach at lower cost per transaction by eliminating the need of physical infrastructure required to service poor clients in rural and remote areas, whose low balances and unpredictable cash flows make them an otherwise unprofitable market segment to serve via traditional bricks-and-mortar branches. From the households' perspective the integration of banks with mobile money increases the number of points they can access their bank accounts and transact at lower costs compared to having to visit bank branches or ATMs which are often less in number and concentrated in wealthy or urban areas. Understanding how these new delivery channels can impact banks and households is important for countries that seek to expand access to financial services to as wide a spectrum of the population as possible.

References

Abiad, A., Detragiache, E. and Tressel, T. (2010). A new database of financial reforms, *IMF Staff Papers* .

Agarwal, S. and Hauswald, R. (2010). Distance and private information in lending, *Review of Financial Studies* **23**: 2757–2788.

Aghion, P. and Bolton, P. (1992). An incomplete contracts approach to financial contracting, *Review of Economic Studies* **59**: 473–494.

Aghion, P. and Bolton, P. (1997). A theory of trickle-down growth and development, *Review of Economic Studies* **64**: 151–172.

Aghion, P. and Tirole, J. (1997). Formal and real authority in organizations, *Journal of Political Economy* **105**: 1–29.

Ai, C. and Norton, E. (2003). Interaction terms in logit and probit models, *Economics Letters* **80**: 123–129.

Alessandrini, P., Presbitero, A. F. and Zazzaro, A. (2009). Banks, distances and firms' financing constraints, *Review of Finance* **13**: 261–307.

Allen, L. (1988). The determinants of bank net interest margins: A note, *Journal of Financial and Quantitative Analysis* **23**: 231–235.

Andrews, D. (2003). Tests for parameter instability and structural change with unknown change point: A corrigendum, *Econometrica* **71**: 395–397.

Angbazo, L. (1997). Commercial bank net interest margins, default risk, interest-rate risk and off-balance sheet banking, *Journal of Banking and Finance* **21**: 55–87.

Bae, K.-H. and Goyal, V. K. (2009). Creditor rights, enforcement and bank loans, *Journal of Finance* **64**: 823–860.

Bain, J. S. (1951). Relation of profit rate to industry concentration: American manufacturing, 1936-1940, *Quarterly Journal of Economics* **65**: 293–324.

Baker, G., Gibbons, R. and Murphy, K. J. (1999). Informal authority in organizations, *Journal of Law, Economics and Organization* **15**: 56–73.

Barajas, A., Steiner, R. and Salazar, N. (2000). The impact of liberalization and foreign investment in colombia's financial sector, *Journal of Development Economics* **63**: 157–196.

Barth, J. R., Caprio, G. and Levine, R. (2001). *Banking systems around the globe: Do regulations and ownership affect performance and stability?*, Prudential Supervision: What works and what doesn't, University of Chicago Press, Chicago.

Barth, J. R., Caprio, G. and Levine, R. (2004). Bank regulation and supervision: what works best?, *Journal of Financial Intermediation* **13**: 205–248.

Barth, J. R., Caprio, G. and Levine, R. (2013). Measure it, improve it; bank regulation and supervision in 180 countries 1999-2011, *Milken Institute* .

Baumol, W. J. (1982). Contestable markets: An uprising in the theory of industry structure, *American Economic Review* **72**: 1–15.

Beck, T. (2008). Bank competition and financial stability: Friends or foes?, *World Bank Policy Research Working Paper* **4656**.

Beck, T., Degryse, H., De Haas, R. and Van Horen, N. (2014). When arm's length is too far. relationship banking over the business cycle, *CentER Discussion Paper No. 2014-042, Tilburg University* .

Beck, T., Demirguc-Kunt, A. and Honohan, P. (2008). Finance for all? policies and pitfalls in expanding access, *Policy Research Report. World Bank* .

Beck, T., Demirguc-Kunt, A. and Levine, R. (2006). Bank supervision and corruption in lending, *Journal of Monetary Economics* **53**: 2131–2163.

Beck, T., Demirguc-Kunt, A. and Maksimovic, V. (2004). Bank competition and access to finance: International evidence, *Journal of Money, Credit and Banking* **36**.

Beck, T., Demirguc-Kunt, A. and Martinez Peria, M. S. (2007). Reaching out: Access to and use of banking services across countries, *Journal of Financial Economics* **85**: 234–266.

Beck, T., Demirguc-Kunt, A. and Martinez Peria, M. S. (2008). Banking services for everyone? barriers to bank access and use around the world, *The World Bank Economic Review* **22**.

Beck, T. and Hesse, H. (2009). Why are interest spreads so high in uganda?, *Journal of Development Economics* **88**: 192–204.

Beck, T., Ioannidou, V. and Schaefer, L. (2014). Foreigners vs. natives: Bank lending technologies and loan pricing, *Working Paper Series Cass Business School* **No.28**.

Beck, T., Levine, R. and Loayza, N. (2000). Finance and sources of growth, *Journal of Financial Economics* **58**: 261–300.

Beck, T., Pamuk, H., Ramrattan, R. and Uras, B. R. (2015). Mobile money, trade credit and economic development: Theory and evidence, *CentER Working Paper* **No. 2015-023**.

Becker, G. S. and Murphy, K. M. (1992). The division of labor, coordination costs and knowledge, *Quarterly Journal of Economics* **107**: 1137–1160.

Berger, A. N. (1995). The profit-structure relationship in banking-tests of market-power and efficient-structure hypotheses, *Journal of Money, Credit and Banking* **27**: 404–431.

Berger, A. N., DeYoung, R., Genay, H. and Udell, G. F. (2000). Globalization of financial institutions: Evidence from cross-border banking performance, *Brookings-Wharton Papers on Financial Services* **3**: 23–120.

Berger, A. N. and Hannan, T. H. (1998). The efficiency cost of market power in the banking industry: A test of the "quiet life" and related hypotheses, *Review of Economics and Statistics* **80**: 454–465.

Berger, A. N., Miller, N. H., Petersen, M. A., Rajan, R. G. and Stein, J. C. (2005). Does function follow organizational form? evidence from the lending practices of large and small banks, *Journal of Financial Economics* **76**: 237–269.

Berger, A. N., Saunders, A., Scalise, J. M. and Udell, G. F. (1998). The effects of bank mergers and acquisitions on small business lending, *Journal of Financial Economics* **50**: 187–229.

Berger, A. N. and Udell, G. F. (1995). Relationship lending and lines of credit in small firm finance, *Journal of Business* **68**: 351–381.

Berger, A. N. and Udell, G. F. (1996). *Universal banking and the future of small business lending*, Financial system design: the case for universal banking, Irwin, Burr Ridge, IL.

Berlin, M. and Mester, L. J. (1999). Deposits and relationship lending, *Review of Financial Studies* **12**.

Bernanke, B. and Gertler, M. (1989). Agency costs, net worth and business fluctuations, *American Economic Review* **79**: 14–31.

Besanko, D. and Thakor, A. V. (1992). Banking deregulation: Allocational consequences of relaxing entry barriers, *Journal of Banking and Finance* **16**.

Bolton, P. and Dewatripont, M. (1994). The firm as a communication network, *Quarterly Journal of Economics* **109**: 809–839.

Bonin, J. P., Hasan, I. and Wachtel, P. (2009). *Banking in transition countries*, The Oxford Handbook of Banking, Oxford University Press, Oxford.

Boot, A. W. A. and Thakor, A. V. (1994). Moral hazard and secured lending in an infinitely repeated credit market game, *International Economic Review* **35**: 899–920.

Boot, A. W. A. and Thakor, A. V. (2000). Can relationship banking survive competition?, *Journal of Finance* **55**: 679–713.

Boyd, J. H., Chang, C. and Smith, B. D. (1998). Moral hazard under commercial and universal banking, *Journal of Money, Credit and Banking* **30**: 426–468.

Brock, P. L. and Rojas Suarez, L. (2000). Understanding the behavior of bank spreads in latin america, *Journal of Development Economics* **63**: 113–134.

Brown, M., Maurer, M. R., Pak, T. and Tynaev, N. (2009). The impact of banking sector reform in a transition economy: Evidence from kyrgyzstan, *Journal of Banking and Finance* **33**: 1677–1687.

Bruno, V. and Hauswald, R. (2014). The real effect of foreign banks, *Review of Finance* **18**: 1683–1716.

Canales, R. and Nanda, R. (2012). A darker side to decentralized banks: Market power and credit rationing in sme lending, *Journal of Financial Economics* **105**: 353–366.

Casu, B. and Girardone, C. (2009). Testing the relationship between competition and efficiency in banking: A panel data analysis, *Economics Letters* **105**: 134–137.

Cetorelli, N. and Gambera, M. (2001). Banking market structure, financial dependence and growth: International evidence from industry data, *Journal of Finance* **56**.

Cetorelli, N. and Goldberg, L. S. (2011). Global banks and international shock transmission: Evidence from the crisis, *IMF Economic Review* **59**: 41–76.

Chen, S.-H. and Liao, C.-C. (2011). Are foreign banks more profitable than domestic banks? home- and host-country effects of banking market structure, governance and supervision, *Journal of Banking and Finance* **35**: 819–839.

Chirwa, E. W. and Mlachila, M. (2004). Financial reforms and interest rate spreads in the commercial banking system in malawi, *IMF Staff Papers* **51**: 96–122.

Chow, G. (1960). Tests of equality between sets of coefficients in two linear regressions, *Econometrica* **28**: 591–605.

Claessens, S., Demirguc-Kunt, A. and Huizinga, H. (2001). How does foreign entry affect domestic banking markets?, *Journal of Banking and Finance* **25**: 891–911.

Claessens, S. and Van Horen, N. (2012). Being a foreigner among domestic banks: asset or liability?, *Journal of Banking and Finance* **36**: 1276–1290.

Claessens, S. and Van Horen, N. (2014). Foreign banks: Trends and impact, *Journal of Money, Credit and Banking* **46**: 295–326.

Claeys, S. and Hainz, C. (2014). Modes of foreign bank entry and effects on lending rates: Theory and evidence, *Journal of Comparative Economics* **42**: 160–177.

Claeys, S. and Vander Vennet, R. (2008). Determinats of bank interest margins in central and eastern europe: A comparison with the west, *Economic Systems* **32**: 197–216.

Coase, R. H. (1937). The nature of the firm, *Economica* **4**: 386–405.

Cole, R. A., Goldberg, L. G. and White, L. J. (2004). Cookie cutter vs. character: the micro structure of small business lending by large and small banks, *Journal of Financial and Quantitative Analysis* **39**: 227–251.

Crawford, V. P. and Sobel, J. (1982). Strategic information transmission, *Econometrica* **50**: 1431–1451.

Cull, R., Demirguc-Kunt, A. and Morduch, J. (2014). Banks and microbanks, *Journal of Financial Services Research* **46**.

Dabla-Norris, E. and Floerkemeier, H. (2007). Bank efficiency and market structure: What determines banking spreads in armenia?, *IMF Working Paper WP/07/134* pp. 1–28.

De Haas, R., Ferreira, D. and Taci, A. (2010). What determines the composition of banks' loan portfolios? evidence from transition countries, *Journal of Banking and Finance* **34**: 388–398.

De Haas, R. and Van Horen, N. (2013). Running for the exit? international bank lending during a financial crisis, *Review of Financial Studies* **26**: 244–285.

De Haas, R. and Van Lelyveld, I. (2010). Internal capital markets and lending by multinational bank subsidiaries, *Journal of Financial Intermediation* **19**: 1–25.

Degryse, H., Havrylchyk, O., Jurzyk, E. and Kozak, S. (2012). Foreign bank entry, credit allocation and lending rates in emerging markets: Empirical evidence from poland, *Journal of Banking and Finance* **36**: 2949–2959.

Degryse, H. and Ongena, S. (2005). Distance, lending relationships and competition, *Journal of Finance* **60**: 231–266.

Delis, M. D., Molyneux, P. and Pasiouras, F. (2011). Regulations and productivity growth in banking: Evidence from transition economies, *Journal of Money, Credit and Banking* **43**: 735–764.

Delis, M. D. and Tsionas, E. G. (2009). The joint estimation of bank-level market power and efficiency, *Journal of Banking and Finance* **33**: 1842–1850.

Dell'Ariccia, G. and Marquez, R. (2004). Information and bank credit allocation, *Journal of Financial Economics* **72**: 185–214.

Demirguc-Kunt, A. and Huizinga, H. (1999). Determinants of commercial bank interest margins and profitability: Some international evidence, *The World Bank Economic Review* **13**: 379–408.

Demirguc-Kunt, A., Laeven, L. and Levine, R. (2004). Regulations, market structure, institutions and the cost of financial intermediation, *Journal of Money, Credit and Banking* **36**: 593–622.

Demsetz, H. (1973). Industry structure, market rivalry and public policy, *Journal of Law and Economics* **16**: 1–9.

Dessein, W. (2002). Authority and communication in organizations, *Review of Economic Studies* **69**: 811–838.

Detragiache, E., Tressel, T. and Gupta, P. (2008). Foreign banks in poor countries: Theory and evidence, *Journal of Finance* **63**: 2123–2160.

Dewatripont, M. and Tirole, J. (2005). Modes of communication, *Journal of Political Economy* **113**: 1217–1238.

DeYoung, R., Goldberg, L. G. and White, L. J. (1999). Youth, adolescence, and maturity of banks: credit availability to small business in an era of banking consolidation, *Journal of Banking and Finance* **23**: 463–492.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring, *Review of Economic Studies* **51**: 393–414.

Diamond, D. W. (1991). Monitoring and reputation: the choice between bank loans and directly placed debt, *Journal of Political Economy* **99**: 689–721.

Dinc, I. S. (2000). Bank reputation, bank commitment and the effects of competition in credit markets, *Review of Financial Studies* **13**: 781–812.

Djankov, S., Mc Liesh, C. and Shleifer, A. (2007). Private credit in 129 countries, *Journal of Financial Economics* **84**: 299–329.

Giannetti, M. and Ongena, S. (2009). Financial integration and firm performance: evidence from foreign bank entry in emerging markets, *Review of Finance* **13**: 181–223.

Gine, X., Martinez Cuellar, C. and Keenan Mazer, R. (2014). Financial (dis-) information: Evidence from an audit study in mexico, *World Bank Policy Research Working Paper* **6902**.

Goldberg, L. S. (2007). Financial sector fdi and host countries: New and old lessons, *FRBNY Economic Policy Review* **March**: 1–17.

Gormley, T. A. (2010). The impact of foreign bank entry in emerging markets: Evidence from india, *Journal of Financial Intermediation* **19**: 26–51.

Guzman, M. G. (2000). Bank structure, capital accumulation and growth: a simple macroeconomic model, *Economic Theory* **16**.

Hart, O. and Moore, J. (1994). A theory of debt based on the inalienability of human capital, *Quarterly Journal of Economics* **109**: 841–879.

Hart, O. and Moore, J. (1998). Default and renegotiation: a dynamic model of debt, *Quarterly Journal of Economics* **113**: 1–41.

Haselmann, R., Pistor, K. and Vig, V. (2010). How law affects lending, *Review of Financial Studies* **23**: 549–580.

Haselmann, R. and Wachtel, P. (2010). Institutions and bank behavior: legal environment, legal perception, and the composition of bank lending, *Journal of Money, Credit and Banking* **42**: 965–984.

Hauswald, R. and Marquez, R. (2006). Competition and strategic information acquisition in credit markets, *Review of Financial Studies* **19**.

Havrylchyk, O. and Jurzyk, E. (2011). Profitability of foreign banks in central and eastern europe; does the mode of entry matter?, *Economics of Transition* **19**: 443–472.

Hicks, J. (1935). Annual survey of economic theory: the theory of monopoly, *Econometrica* **3**: 1–20.

Ho, T. S. Y. and Saunders, A. (1981). The determinants of bank interest margins: Theory and empirical evidence, *Journal of Financial and Quantitative Analysis* **16**: 581–600.

Houston, J. F., Lin, C. and Ma, Y. (2012). Regulatory arbitrage and international bank flows, *Journal of Finance* **67**: 1845–1895.

Jack, W. and Suri, T. (2011). Mobile money: The economics of m-pesa, *NBER Working Paper* **Nr. 16721**.

Jack, W. and Suri, T. (2014). Risk sharing and transactions costs: Evidence from kenya's mobile money revolution, *American Economic Review* **104**: 183–223.

Jayaratne, J. and Strahan, P. E. (1996). The finance-growth nexusevidence from bank branch deregulation, *Quarterly Journal of Economics* pp. 639–670.

King, R. G. and Levine, R. (1993). Finance and growth: Schumpeter might be right, *Quarterly Journal of Economics* **108**(3): 717–737.

Klein, M. A. (1971). A theory of the banking firm, *Journal of Money, Credit and Banking* **3**: 205–218.

Koetter, M., Kolari, J. W. and Spierdijk, L. (2012). Enjoying the quiet life under deregulation? evidence from adjusted lerner indices for u.s. banks, *Review of Economics and Statistics* **94**: 462–480.

Kosmidou, K., Pasiouras, F. and Tsaklanganos, A. (2007). Domestic and multinational determinants of foreign bank profits: The case of greek banks operating abroad, *Journal of Multinational Financial Management* **17**: 1–15.

La Porta, R., Lopez-de Silanes, F., Shleifer, A. and Vishny, R. (1997). Legal determinants of external finance, *Journal of Finance* **52**: 1131–1150.

La Porta, R., Lopez-de Silanes, F., Shleifer, A. and Vishny, R. (1998). Law and finance, *Journal of Political Economy* **106**: 1113–1155.

Laeven, L. and Levine, R. (2009). Bank governance, regulation and risk taking, *Journal of Financial Economics* **93**: 259–275.

Lanine, G. and Vander Vennet, R. (2007). Microeconomic determinants of acquisitions of eastern european banks by western european banks, *Economics of Transition* **15**(2): 285–308.

Lehner, M. and Schnitzer, M. (2008). Entry of foreign banks and their impact on host countries, *Journal of Comparative Economics* **36**: 430–452.

Lensink, R., Meesters, A. and Naaborg, I. (2008). Bank efficiency and foreign ownership: Do good institutions matter?, *Journal of Banking and Finance* **32**: 834–844.

Levine, R. (1997). Financial development and economic growth: Views and agenda, *Journal of Economic Literature* **35**: 688–726.

Levine, R. (2005). *Finance and growth: Theory and evidence*, Handbook of Economic Growth, Elsevier Science, The Netherlands.

Liberti, J. M. and Mian, A. (2010). Collateral spread and financial development, *Journal of Finance* **65**: 147–177.

Liberti, J. M. and Mian, A. R. (2009). Estimating the effect of hierarchies on information use, *Review of Financial Studies* **22**: 4057–4090.

Love, I. and Martinez Peria, M. S. (2014). How bank competition affects firm's access to finance, *The World Bank Economic Review* **29**.

Marquez, R. (2002). Competition, adverse selection and information dispersion in the banking industry, *Review of Financial Studies* **15**: 901–926.

Martinez Peria, M. S. and Mody, A. (2004). How foreign participation and market concentration impact bank spreads: Evidence from latin america, *Journal of Money, Credit and Banking* **36**: 511–537.

Matutes, C. and Vives, X. (1996). Competition for deposits, fragility and insurance, *Journal of Financial Intermediation* **5**: 184–216.

Maudos, J. and Fernandez de Guevara, J. (2007). The cost of market power in banking: social welfare loss vs. cost inefficiency, *Journal of Banking and Finance* **31**: 2103–2125.

Mayer, C. (1988). New issues in corporate finance, *European Economic Review* **32**.

Mbiti, I. and Weil, D. N. (2011). Mobile banking: The impact of m-pesa in kenya, *NBER Working Paper* **No. 17129**.

Mbiti, I. and Weil, D. N. (2013). The home economics of e-money: Velocity, cash management and discount rates of m-pesa users, *American Economic Review: Papers and Proceedings* **103**: 369–374.

McShane, R. W. and Sharpe, I. G. (1985). A time series-cross section analysis of the determinants of australian trading bank loan-deposit interest margins: 1962-1981, *Journal of Banking and Finance* **9**: 115–136.

Mian, A. (2006). Distance constraints: The limits of foreign lending in poor economies, *Journal of Finance* **61**: 1465–1505.

Morawczynski, O. (2009). Exploring the usage and impact of "transformational" mobile financial services: the case of m-pesa in kenya, *Journal of Eastern African Studies* **3**(3): 509–525.

Ongena, S., Popov, A. and Udell, G. F. (2013). "when the cat's away the mice will play": Does regulation at home affect bank risk taking abroad?, *Journal of Financial Economics* **108**: 727–750.

Peek, J. and Rosengren, E. S. (1997). The international transmission of financial shocks: The case of japan, *American Economic Review* **87**: 495–505.

Peek, J. and Rosengren, E. S. (1998). Bank consolidation and small business lending: it's not just bank size that matters, *Journal of Banking and Finance* **22**: 799–819.

Perry, P. (1992). Do banks gain or lose from inflation?, *Journal of Retail Banking* **16**: 25–30.

Petersen, M. A. and Rajan, R. G. (1994). The benefits of lending relationships: Evidence from small business data, *Journal of Finance* **49**.

Petersen, M. A. and Rajan, R. G. (1995). The effect of credit market competition on lending relationships, *Quarterly Journal of Economics* **110**.

Petersen, M. A. and Rajan, R. G. (2002). Does distance still matter? the information revolution in small business lending, *Journal of Finance* **57**: 2533–2570.

Poghosyan, T. (2013). Financial intermediation costs in low income countries: The role of regulatory, institutional and macroeconomic factors, *Economic Systems* **37**: 92–110.

Poghosyan, T. and de Haan, J. (2010). Determinants of cross-border bank acquisitions in transition economies, *Economics of Transition* **18**(4): 671–696.

Popov, A. and Udell, G. F. (2012). Cross-border banking, credit access, and the financial crisis, *Journal of International Economics* **87**: 147–161.

Qian, J. and Strahan, P. E. (2007). How laws and institutions shape financial contracts: the case of bank loans, *Journal of Finance* **62**: 2803–2834.

Qian, J., Strahan, P. E. and Yang, Z. (2015). The impact of incentives and communication costs on information production and use: evidence from bank lending, *Journal of Finance* **70**: 1457–1493.

Quandt, R. (1960). Tests of the hypothesis that a linear regression system obeys two separate regimes, *Journal of the American Statistical Association* **55**: 324–330.

Radner, R. (1993). The organization of decentralized information processing, *Econometrica* **61**: 1109–1146.

Ramakrishnan, R. T. S. and Thakor, A. V. (1984). Information reliability and a theory of financial intermediation, *Review of Economic Studies* **51**: 415–432.

Sapienza, P. (2002). The effects of banking mergers on loan contracts, *Journal of Finance* **57**: 329–367.

Saunders, A. and Schumacher, L. (2000). The determinants of bank interest rate margins: an international study, *Journal of International Money and Finance* **19**: 813–832.

Schaeck, K. and Cihak, M. (2008). How does competition affect efficiency and soundness in banking? new empirical evidence, *European Central Bank Working Paper* **No. 932**.

Schnabl, P. (2012). The international transmission of bank liquidity shocks: evidence from an emerging market, *Journal of Finance* **67**: 897–932.

Schumpeter, J. A. (1912). *The theory of economic development*, Harvard University Press, Cambridge, MA.

Scott, J. A. (2004). Small business and the value of community financial institutions, *Journal of Financial Services Research* **25**: 207–230.

Sharpe, S. A. (1990). Asymmetric information, bank lending and implicit contracts: a stylized model of customer relationships, *Journal of Finance* **45**: 1069–1087.

Skrastins, J. and Vig, V. (2014). How organizational hierarchy affects information production, *Working Paper, London Business School* .

Stein, J. C. (2002). Information production and capital allocation: Decentralized versus hierarchical firms, *Journal of Finance* **57**: 1891–1921.

Stock, J. and Watson, M. (2012). *Introduction to econometrics*, third edition edn, Pearson Education Limited.

Stock, J. and Yogo, M. (2005). *Testing for weak instruments in linear IV regression*, Cambridge University Press, New York, pp. 80–108.

Strahan, P. E. and Weston, J. P. (1998). Small business lending and the changing structure of the banking industry, *Journal of Banking and Finance* **22**: 821–845.

Van Tassel, E. and Vishwasrao, S. (2007). Asymmetric information and the mode of entry in foreign credit markets, *Journal of Banking and Finance* **31**: 3742–3760.

Williams, B. (2003). Domestic and international determinants of bank profits: Foreign banks in australia, *Journal of Banking and Finance* **27**: 1185–1210.

Williamson, O. E. (1967). Hierarchical control and optimum firm size, *Journal of Political Economy* **75**: 123–138.