FINANCIAL VULNERABILITY AND THE EFFECTS OF FINANCIAL OPENNESS ON BANKING SYSTEMS IN EMERGING ECONOMIES

BAHAR KÖSEOĞLU

BOĞAZİÇİ UNIVERSITY

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FINANCIAL VULNERABILITY AND THE EFFECTS OF FINANCIAL OPENNESS ON BANKING SYSTEMS IN EMERGING ECONOMIES

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Bahar Köseoğlu

Boğaziçi University

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DECLARATION OF ORIGINALITY

I, Bahar Köseoğlu, certify that

- I am the sole author of this thesis and I have fully acknowledged and documented in my thesis all sources of ideas and words, including digital resources, which have been produced by another person or institution;
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ABSTRACT

Financial Vulnerability and the Effects of Financial Openness on Banking Systems in Emerging Economies

The main focus of this dissertation is on the dynamic relations between non-core funding, credit growth and soundness of banking systems in emerging markets. In addition to this, the study contributes to the literature by focusing on the effects of international capital flows on non-core financing and leverage. Forty-six countries were considered in the data collection process in line with MSCI (Morgan Stanley Capital International) emerging market and frontier market indices. In order to reach these goals, three sets of analyses were employed. First of all, a panel vector autoregression analysis was employed. The results of this analysis show that bank soundness promotes non-core funding, credit growth and risk premium in emerging markets. By contrast, bank soundness is affected inversely by private sector credits and non-core funding. In the second part of this dissertation, the effect of banking sector external liquidity access along with the financial openness level on none-core funding and growth of credits is investigated. The findings indicate a positive effect of external liquidity access on non-core funding. Findings also show that credits extended by the banking sector are enhanced by foreign asset stock. Finally, in order to test the Turkish banks’ soundness against non-core funding and leverage, CAMELS-type measures were utilized. The results show areducing effect of leverage on bank soundness in the Turkish banking system.

ÖZET

Yükselen Piyasalarda Bankacılık Sisteminin Kırılganlığı ve Finansal Açıklığın Etkileri

Bu tez çekirdek olmayan fonlar, kredi büyümesi ve banka sağlamlığı arasındaki dinamik ilişkileri araştırmayı amaçlamaktadır. Bunun yanında, bu çalışma uluslararası sermaye akımlarının çekirdek olmayan fonlar ve kaldıraç üzerindeki etkisini incelemek suretiyle literatüre katkı sağlamaktadır. Veri toplama sürecinde MSCI (Morgan Stanley Capital International) kurumunun sınır ve yükselen piyasa endeksleri dikkate alınarak 46 ülkenin verisi toplanmıştır. Üç grup analiz düzenlenmiştir. Sonuçlar yükselen piyasalarda banka sağlamlığının çekirdek olmayan fonları, kredi büyümesini ve risk primini arttırdığını göstermektedir. Öte yandan özel sektör kredilerinin büyümesi ve çekirdek olmayan fonlar banka sağlamlığını olumsuz yönde etkilemektedir. Bu tezin ikinci aşamasında finansal açıklık ile beraber bankacılık sektörünün dış likidite erişiminin çekirdek olmayan fonlara ve kredi büyümesine etkisinin incelenmesi amaçlanmıştır. Bulgular dış likidite erişiminin çekirdek olmayan fonlar üzerinde olumlu etkisinin olduğuna işaret etmektedir. Bankacılık sektörü tarafından sağlanan kredilerin yabancı varlık stoğu ile arttığı bulunmuştur. Son olarak Türk bankalarının sağlamlığını çekirdek olmayan fonlar ve kaldıraça karşı test edebilmek için CAMELS tipi ölçütlerden yararlanılmıştır. Elde edilen sonuçlar, kaldıraçın Türk bankacılık sisteminin sağlamlığı üzerindeki zayıflatıcı etkilerini ortaya koymaktadır.

CURRICULUM VITAE

NAME: Bahar Köseoğlu

DEGREES AWARDED

PhD in Management, 2017, Boğaziçi University

MSc in Economics, 2008, Ankara University

BSc in Economics, 2004, Middle East Technical University

AREAS OF SPECIAL INTEREST

Financial economics, behavioral finance, financial econometrics, corporate finance

PROFESSIONAL EXPERIENCE

Research Assistant, Department of Management, Boğaziçi University, 2009-present

Murat Eğitim Kurumları, Ankara, Part-time Instructor, (2005-2008)

PUBLICATIONS

Journal Articles

Bahar Köseoğlu, (2014) "Cross Sectional Variation in Stock Returns due to Leverage in Exchange Istanbul", *International Business Research,* 7 (1).

Conference Proceedings

Bahar Köseoğlu & Nesrin Okay, "Effects of Financial Openness on the Banking Sector Financing and Credit Growth in Emerging Markets", the Business and Social Science Research Conference: Paris 2015, December 21-22, 2015.

Bahar Köseoğlu & Nesrin Okay, "Is the Banking Sector Vulnerability Increasing with the Flooding Non-Core Liability?", 1st International Business Economics Social Sciences Research Association (IBESRA) Conference in Istanbul, December 29-30, 2014.

Bahar Köseoğlu & Nesrin Okay, "Asymmetric Volatility: Evidence from Istanbul Stock Exchange", Euroconference 2011: Crisis and Recovery in Emerging Markets, İzmir, June 27-30, 2011.

Master's Thesis

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDIX TABLES

LIST OF FIGURES

ABBREVIATIONS

ADF	Augmented Dickey Fuller
CBRT	Central Bank of the Republic of Turkey
FSI	Financial Soundness Indicator
GDPGR	Growth rate of gross domestic product
GMM	Generalized Method of Moments
IFS	International Financial Statistics
INTSPRD	Spread between reference lending and deposit rates
IPS	Im Pesaran-Shin Test
LTD	Loan to Deposit Ratio
MSCI	Morgan Stanley Capital International
NCB	Non-core liabilities of banking sector
PVAR	Panel Vector Autoregression
SI	Soundness Index
VaR	Value-at-Risk
VAR	Vector Autoregression

CHAPTER 1

INTRODUCTION

Funding economic activity occurs directly or indirectly, such as sales of securities to lenders or sales of securities through financial system, respectively. Banking system has the central role in channeling funds from lenders to borrowers. Banking system provides several services such as payment and insurance services along with guarantees for pairing providers and users of funds. The crucial role of banking system in pairing demand and supply of funds is matching funds with different maturities. Banks pool funds from depositors and extended credits to borrowers. In order to match the different maturities banks need to lend long and borrow short. This function of banks enables households to enjoy saving by short-term deposits and borrowing long-term mortgages, thus it ensures the consumption smoothing. Transformation of different maturities between the use and sources of funds is a crucial part of bank activities which is also of utmost importance for monetary and financial stability (Beau, Hill, Hussain, and Nixon, 2014; Farag, Harland and Nixon, 2013; Turner et al., 2010).

Banks fund their activities through several sources. We may group these sources into two categories such as core and non-core funds. Deposits are traditional, core sources, of bank funding. Increasing financial integration of emerging markets into global financial markets provides opportunity for banks to fund their activities through non-deposit sources.

This thesis focuses primarily on the meaning of non-deposit funding for bank soundness in emerging markets. Furthermore, the study contributes to the literature by focusing on the effects of international capital flows on non-core financing and leverage by utilizing de facto and de jure financial openness measures. Non-core liabilities, which pile up due to the relaxed liquidity conditions of global banking, are proposed as a financial vulnerability indicator in the recent literature; yet link between non-core liabilities and financial openness is not tested.

Both González-Hermosillo et al. (2013) and Demiralp (2007) state that non-deposit-based funding is rising in both advanced and emerging economies. Increasing non-core funding in emerging economies increases the risk of default and solvency problems due to unreliable funds (Moreno, 2011). Reinhart and Rogoff (2010) investigate emerging economies during 1970-2009 and they point out that the maturity composition of external debt changes in favor of short-term debt just before the banking crises. Hahm, Shin and Shin (2011) focus on the liability side of the bank balance sheet and propose non-core liabilities as an indicator of financial vulnerability. They utilize logistic regression models for a large country set and report significant predictive power of non-core liability measures for credit and currency crises. They also provide the composition of the expansion in the liability side for Korean banks. After the lending boom the contribution of foreign creditors in banking sector increased dramatically in comparison to domestic depositors.

Loan to deposit (LTD) ratios of banking sector in emerging economies has risen through last decade and reached to the 100 percent threshold according to IMF’s Global Financial Stability Report (2015). This phenomenon shows that banks in emerging economies create more credits out of deposits in comparison to earlier decades. This increase in credits increases the interest payment on loans so the profitability of banks in emerging economies. High LTD ratios signals generation of high income, albeit high risk taking in emerging economies’ banking systems. Also interest spread between loan rates and deposit rates may serve as a risk taking indicator for banks in emerging economies. Rojas-Suarez (2002) points out that the low spreads in developing markets have implied high risk-taking in contrast to the developed markets where the low spreads have reflected efficiency. Also, high spreads signals high risk premium in emerging markets.

This research also takes into account interest spreads while focusing on effects of banks funding composition on soundness of banking system in emerging economies. Dynamics between banks' funding composition, leverage and bank soundness is examined by panel autoregressive analysis.

External (cross-border) financing conditions play an important role in credit expansion of financial sector. This phenomenon is widely discussed for US and European banking sector after 2007/2008 global financial crisis. European global banks serve as an intermediary agent for the US dollar funds (Shin, 2011). External financing conditions of banking sector along with the financial openness level of a country may affect the banks' credit creation procedure and reliance on none-core liabilities. We propose a measure for cross-border financing conditions which constitutes of a country's banking sector loans from US banking sector. It is aimed to investigate the effect of banking sector external liquidity access along with financial openness level on none-core funding and growth of credits.

Also this research is aiming to test the Turkish banks' soundness against non-core funding and leverage. Bank soundness is widely studied in both industrialized and developing countries; with this purpose CAMELS-type indicators are widely used in the literature. Bank level examination of procyclical leverage is documented by Binici and Köksal (2012). To the best of our knowledge relation between bank soundness and leverage is remain untested in Turkish banking system.

The following chapter provides the literature on bank soundness, bank funding and financial openness. Chapter Three focuses on the dynamics between bank funding composition, leverage and bank soundness. In order to achieve this purpose panel autoregressive analysis, Granger causality and panel data analysis are utilized. Chapter Four investigates the relation between banking sector external liquidity access, financial openness level and none-core funding along with credits. Banking system soundness is tested against non-core funding and leverage by dynamic panel data analysis for Turkish banking system in Chapter Five. Chapter Six presents discussion of the results and finally Chapter Seven concludes the findings and provides further research suggestions and limitations of the research.

CHAPTER 2

LITERATURE REVIEW

This chapter provides literature related to bank soundness, non-core funding of banking sector, and financial openness. In the first part, a discussion on the effect of distressed banks on economic activity is provided along with the literature on the financial distress measures. The following section discusses the role of non-core liabilities in bank funding. The literature on financial openness is provided in the last part of this chapter.

2.1 Bank soundness

The credit crunch hypothesis suggests that a distressed banking sector may have a serious negative impact on real economic activity. Because of such a sector, firms which have problems of low internal cash flow have difficulty to obtain bank credit and face bankruptcy whereas on the consumer side, the lack of available credits may worsen aggregate demand and unemployment as well. Furthermore, a distressed banking sector may disturb the payment system.

Dell'Ariccia, Detragiache and Rajan (2005) investigate the effect of banking crises on real output. They show that performance of the financially more dependent sectors is worse during banking crises. Their results are robust to other explanations than credit crunch hypothesis, such as flight-to-quality or declining demand for bank credit of more bank-dependent sectors. Furthermore effect on output is more severe in developing economies where the access to alternative financing is more limited.

Hoggarth, Reis and Saporta (2002) state that banking crises have similar negative impacts on output in both developed and developing countries.[1]

According to Cecchetti, Kohler and Upper (2009) the negative impact of systemic banking crises on output is persistent and tends to gradually diminish. Higher risk aversion, increasing long-term risk-free real interest rates and higher inflation - both actual and expected – and causing a higher cost of capital results in a longer negative impact on real economic activity. In addition, low leverage and financial innovation levels after crises may suppress the financing of some projects. They also emphasize the challenges for measuring the impact of systemic banking crises on growth empirically as well as theoretically. To overcome these empirical challenges, one should compute the growth rate accurately in case of no systemic crisis. The statistical methods which are used for estimating growth rates often rely on long time series.

Literature provides evidence about the deterioration in real output during baking crises yet one should decide whether the causality runs from the banking crises to output losses or the other way around. The answer will affect the policy decisions dramatically (Demirgüç-Kunt and Detragiache, 2005; Dell'Ariccia, Detragiache and Rajan, 2005). Bernanke and Lown (1991) provide conflicting evidence for the effect of distressed banking sector on real output. They question whether credit crunch had a significant impact on the deepening of the 1990 recession in the United States. They state that the shortage of bank capital has little effect on available credits. They also report that extended credits other than bank credits were reduced during the recession, which shows that diminishing bank lending was caused by decreasing credit demand.

[1] One may see Demirgüç-Kunt and Detragiache (2005) for brief survey of country level studies on the effect of banking crises on real activity.

Consequences of a distressed banking sector are important for both policy makers and investors needing adequate risk measures. For the last couple of decades, the banking sector has the central role in financial crises (Demirgüç-Kunt and Detragiache, 2005). Although Reinhart and Rogoff (2010) report regular banking crises dating back to the early 19th century, the central role of the banking sector has been gradually increasing in the last decades, Laeven and Valencia (2012) list 147 banking crises, 13 of which were on the decision threshold between 1970-2011; and about one third of these banking crises were preceded by a credit boom. In addition, Cecchetti et al. (2009) conclude that a crisis following a credit boom has a longer duration and also larger output cost.

Reinhart and Rogoff emphasize the prevalence of the “this time is different” syndrome. They state that the root of this syndrome is the belief of learning from the past. Economic agents think that valuation rules changed and fundamentals are sound through technological innovation and structural reforms. Reinhart and Rogoff also document that until World War II serial banking crises had been typical for advanced economies; however in post-World War II episode emerging economies which have developed financial sector also have their share of banking crises. They also report that emerging markets which have high debt intolerance have low safe debt thresholds. Governments of emerging markets use debt to finance spending rather than finance with taxes in order to avoid hard political decisions.

According to Huang, Zhou and Zhu (2012) historical evidence on Asian and Pacific region indicates that the soundness of the banking system plays a key role in financial stability. A weak banking system was one of the factors behind the 1997 Asian crisis; on the other hand, a well-structured banking system provided support to stability in the region during the 2007/8 global crisis. Huang et al. (2012) utilize a systemic risk indicator which is constructed by credit default swap (CDS) spreads and co-movements in the equity price of banks for Asia and the Pacific region. Their findings indicate that the rising risk aversion and liquidity squeeze are the main reasons for the stress on banks in the region. Moreover, their results support the spillover effect and the "too-big-to-fail" phenomenon. Huang et al. (2012) show that the size of a bank mainly determines the marginal contribution of the bank to systemic risk.

Beltratti and Stulz (2012) examine corporate governance effects on the banks' performance which is captured by returns utilizing variables that represent both liability and asset side characteristics of banks' balance-sheet during the 2007-8 crisis. To capture the nature of the liability side of the balance sheet, they use deposits and money market funding; for the asset side, they use loans and liquid assets ratios. They find no evidence to support that better governance lead to better performance during crisis. They conclude that banks' balance sheets and profitability in 2006 are better indicators for performance than governance. They find evidence that banks rely on deposits rather than short-term financing and those which have low leverage performed better during 2007/8 crisis. They also report that banks with more restrictions on activities, strong capital controls and more independent supervisory authority performed better during the crisis.

However there is no universal measure of bank soundness or financial distress, one can classify the soundness measures as accounting-based and market-based. Market related measures tend to be volatile; on the other hand accounting-based measures have low frequency. Carapeto, Moeller, Faelten, Vitkova, and Bortolotto (2010) propose another category of financial distress measures for economic conditions which banks operate in as macroeconomic measures. Also credit rating data can form a category of financial distress measures (Bongini, Laeven and Majnoni, 2002). This study focuses on the accounting-based measures, yet a brief overlook to literature related to financial distress/soundness measures which are related to market, macroeconomic conditions and credit ratings is provided in Table 1.

Gropp, Vesala and Vulpes (2004) propose prices of bank securities as a complement or in some cases substitute for accounting-based measures to assess bank fragility emphasizing the more forward-looking characteristics of the market data than the accounting data. Their findings indicate that distance to default predicts bank failure six to eighteen months earlier than the event itself, on the other hand their second measure, subordinate debt spread cannot predict bank failure earlier than twelve months in advance. They claim that distance to default complements accounting measures, and that the two measures, distance to default and subordinate debt spread, have more predictive power together than alone. Gropp et al. state that Type II errors, classifying a bank as weak when it is sound, would diminish if the two types of measures, namely market and accounting-based, are used together in a model.

Knaup and Wagner (2009) propose market-based measures to assess banks' riskiness while criticizing the accounting based indicators for limited scope and low frequency. They derive a credit risk indicator (CRI), a ratio of high risk loans in the bank holding companies' portfolio, as an indicator for banks' credit portfolio quality. They find that CRI could predict the performance of banks during the crisis 2007-8. Curry, Elmer and Fissel (2003) analyze the predictive power of market-based indicators for CAMEL- rating downgrades and report little support for the explanatory power of market indicators.

Table 1. Literature Summary of Financial Soundness/Distress Measures

Authors	*Measures*	*Methodology*	*Findings*
Market-based Measures			
Huang, Zhou and Zhu (2012)	Credit default swap (CDS) spreads and co-movements in equity price of banks	CoVAR	Rising risk aversion and liquidity squeeze are the main reasons for distress. There exists evidence for TBTF.
Knaup and Wagner (2008)	Credit risk indicator (high and low CDS)	Regression	CRI can predict the performance of banks during subprime crisis.
Gropp, Vesala and Vulpes (2004)	Distance to default and subordinated debt spread	Logit and proportional hazard models	Predictive power of bank failure is 6-18 months prior for distance and 12 months for spread.
Curry, Elmer and Fissel (2003)	CAMEL ratings, market excess return, return volatility, trading activity	Logistic Regression	Stock market data only marginally predict rating downgrades.
Bongini, Laeven and Majnoni, (2002)	Financial ratios, *insurance premium* and credit ratings	Logistic Regression (cross sectional)	Credit ratings have lowest explanatory power for distressed banks in comparison to stock market prices and accounting-based measures.
Credit Ratings			
Bongini, Laeven and Majnoni, (2002)	Financial ratios, insurance premium and *credit ratings*	Logistic Regression (cross sectional)	Credit ratings have lowest explanatory power for distressed banks in comparison to stock market prices and accounting-based measures.
Ferri, Liu and Stiglitz (1999)	Credit ratings based on per capita income, GDP growth, inflation, fiscal balance, external balance, external debt, economic development and default history. Compared with rating agencies grades	Panel data (re)	Credit rating agencies tend to underestimate the sovereign ratings during the East Asian crisis.
Ferri, Liu and Majnoni (2000)	Private sector and sovereign ratings	Error correction model	Bank ratings are dependent on sovereign ratings and procyclical.
Macroeconomic Factors			
Kaminsky and Reinhart (1999)	Indicators for financial sector, current account, capital account, real and fiscal sector along with financial liberalization	Threshold analysis by minimizing the noise-to-signal ratio	Weak economic fundamentals precede banking and currency crises.
Radelet ans Sachs (1998)	Financial and macroeconomic indicators	Probit model	Short-term debt ratio is increasing the probability of East Asian crisis.
Furman and Stiglitz (1998)	Survey of several studies which include several macroeconomic factors and indicators of financial liberalization.	Probit model	Significant predictive power of short-term debt for East Asian crisis.
Honohan (1997)	Loan-to-deposit ratio, foreign borrowing to deposits, growth rate of real bank credit, bank discretion over use of funds (measured by share of reserves to deposits), *government share of lending, central bank refinancing of bank lending, government deficit*	Anova	High loan-to-deposit ratios, high growth rates of credits, government share of lending and refinancing by central bank have identification ability for crisis.

Ferri, Liu and Stiglitz (1999) use per capita income, GDP growth, inflation, fiscal balance, external debt, economic development and default history to model ratings based on economic fundamentals which are singled out by rating agencies, especially by Moody's. They compare their model-generated ratings with actual ones announced by rating agencies in order to see whether the qualitative judgment of rating agencies underestimate/overestimate the economic fundamentals. They state that evidence for the existence of idiosyncratic judgment of rating agencies indicates procyclical sovereign ratings which may have aggravated the 1997 crisis in East Asia. Ferri, Liu and Majnoni (2000) make amendments in the previous study by investigating the bank ratings. Ferri et al. (2000) utilize an error correction model in order to estimate the short and long-term relation between sovereign ratings and private sector bank and non-bank ratings for both *high and non-high income* countries as categorized by World Bank. The results of the banking sector ratings show that they are dependent on sovereign ratings both high and non-high income countries (NHIC); yet for NHIC bank ratings short-term dependence on sovereign rating is higher and also asymmetrical. The response of banks' ratings is more sensitive to downgrading than to upgrading, which implies procyclical dynamics in bank capital requirements in developing countries.

Kaminsky and Reinhart (1999) utilize 16 macroeconomic and financial variables in order to analyze the link between banking and currency crises. They also examine the relation between macroeconomic conditions and twin crises. They report that weak economic fundamentals precede banking and currency crises which present bidirectional causality. They conclude that increasing financial liberalization heighten the link between the two types of crises. Radelet and Sachs (1998) and Furman and Stiglitz (1998) investigate the roots of the East Asian crisis which is accepted as hard to foreseen. Both papers focus on both macroeconomic and financial indicators and point out the sound macroeconomic fundamentals on the eve of the crisis. They emphasize the self-fulfilling nature of the crisis due to financial panic. Radelet and Sachs report that increasing short-term debt ratio precedes East Asian crisis contradictorily the ratio of total debt to reserves does not. A detailed literature survey and an examination of several indicators conducted by Furman and Stiglitz confirm the predictive power of short-term debt ratio for East Asian crisis.

Bongini et al. (2002) utilize CAMEL-type balance-sheet ratios, insurance premium and credit ratings for three different categories of soundness measures and they conclude that credit ratings have the lowest explanatory power for distressed banks in comparison to stock market prices and accounting-based measures. Honohan (1997) evaluates several indicators for banking crises for three main groups such as macro-related, micro-related and government-related epidemics. They group countries according to main crisis syndromes and compare with the control group which consists of countries where there is no significant problem. The results of the comparison with the control group indicate that high loan-to-deposit ratios, high growth rates of credits, government share of lending and the central bank's refinancing identify the countries which are prone to crisis. Ioannidis, Pasiouras and Zopounidis (2010) compare several classification methodologies in order to discriminate among strong, adequate and weak banks. They point out the increasing explanatory power of the models after the inclusion of macroeconomic variables.

The CAMEL/CAMELS Rating System, which was adopted by National Credit Union Administration (NCUA) in October 1987, is a method of evaluating the health of credit unions based on accounting data. CAMELS ratings are used to evaluate financial, managerial and operational strength and weaknesses of financial institutions. Rating system consists of indicators for capital adequacy (C), asset quality (A), management quality (M), earnings quality (E), sufficiency of liquidity (L) and sensitivity to market risk (S) (Bongini, Claessens, Ferri, 2001; Kaya, 2001; Bongini, Laeven, Majnoni, 2002; Molina, 2002; Koetter, Bos, Heid, Kolari, Kool and Porath, 2007; Wirnkar, 2009). Literature summary for the accounting-based financial ratios as bank soundness measures is provided in Table 2 and Table 3.

Bongini, Claessens and Ferri (2001) utilize CAMEL-type indicators, along with the ownership structure and size, in order to test the distress and closure of financial institutions in East Asia. Utilizing a cross-sectional regression prevents them using country level time-varying macroeconomic variables. They report most of the CAMEL-type variables explain distress and closure of financial institutions significantly such as loan loss reserves to equity plus loan loss reserves, net interest income to total revenue, loan growth and return on assets. They find evidence for too-big-to-fail. Large financial institutions are less prone to closure when they are distressed.

Molina (2002) utilizes several accounting-based indicators along with an intermediation indicator, total government bonds to total asset ratio, and size measure. He reports significant differences in the mean values of measures for failed and non-failed banks in Venezuela. He reports that during the 1993-95 crises in Venezuela, sounder banks had more liquid assets and also had higher proportions of government bonds which provided extra liquidity during financial turmoil.

Table 2. Literature Summary of Accounting-based Soundness Measures (Part I)

Authors	*Measures*	*Methodology*	*Findings*
Beltratti and Stulz (2012)	Deposits, money market funding, loans, liquid assets ratios and governance indicators	Regression	Banks with more restrictions on activities, strong capital controls, more independent supervisory authority, low leverage and high deposit ratios perform better during the crisis.
Carapeto, Moeller, Faelten, Vitkova, and Bortolotto (2010)	Leverage, no-performing loans, provision of loan losses, tier 1 capital and total capital ratios	"Trigger point" methodology	Measures based on asset quality overestimate the number of distressed banks, and measures of capital adequacy underestimate the number of banks being distress.
Ioannidis, Pasiouras and Zopounidis (2010)	Financial variables compared with proxies for the regulatory environment, institutional development, and macroeconomic conditions	k-Nearest Neighbours (k-NN), UTilite´s Additives DIScriminantes (UTADIS), Artificial Neural Networks (ANN), ordered logistic regression (OLR), multiple discriminant analysis (MDA), stacked generalization	Average classification performance is best for UTADIS and ANN models. Inclusion of country-level variables along with financial variables improves classification performance significantly.
Boyacioglu, Kara and Baykan (2009)	20 financial ratios are grouped according to CAMELS dimensions.	Neural network techniques, support vector machines and multivariate statistical methods	Neural network categories, multi-layer perceptron and learning vector quantization, are reported as the best performers in predicting bank failures.
Wirnkar (2009)	CAMEL indicators	W-score	Proposing weight proportions for each dimension and order as CLEAM.
Arena (2008)	CAMEL –type variables, deposit interest rates and interest rate spreads	Logistic Regression	CAMEL indicators significantly explains bank failure and furthermore systemic macroeconomic and liquidity shocks deteriorate weak banks' conditions
Daley, Matthews and Whitfield (2008)	Financial strength (capital adequacy, asset quality, earnings and liquidity ratios), the quality of management (inefficiency ratios), and variables representing size, audit status, ownership, bank risk and the general macroeconomic state	Trinomial logit model	Earning, inefficiency, size and the proxy for the macroeconomic state significantly discriminate failed and non-failed banks.
Elsas (2007)	Loan, equity, investment, liquidity, core deposits, interbank and income measures along with size	Multinomial logit model	Being in the two highest deciles of loan loss provision in two successive years increase the probability of being a target in a merger.
Koetter, Bos, Heid, Kolari, Kool and Porath (2007)	CAMEL indicators, cash and inter-bank assets, GDP per capita, insolvency ratio	Multinomial logit model	Bad financial profiles are a common characteristic for banks involve in merger.

Table 3. Literature Summary of Accounting-based Soundness Measures (Part II)

Authors	*Measures*	*Methodology*	*Findings*
Gaganis, Pasiouras and Zopounidis (2006)	Financial ratios for capital, asset quality, earnings and liquidity. Type of market (developed/ developing), ownership and franchise power	UTilite´s Additives DIScriminantes (UTADIS)	Loan loss provisions, capitalization, and type of the market classify banks at highest accuracy.
Canbas, Cabuk and Kilic (2005)	49 financial ratios are utilized in the first step, and then 12 of them are selected.	DA, Logit, Probit, and principal component analysis	Three factors are extracted, which are capital adequacy, income-expenditure structure and liquidity.
Bongini, Laeven and Majnoni, (2002)	Financial ratios, insurance premium and credit ratings	Logistic Regression	Credit ratings have lowest explanatory power for distressed banks in comparison to stock market prices and accounting-based measures.
Molina (2002)	Financial ratios, ratio of total government bonds and size	Proportional-hazard model	Sounder banks during 1993-95 crises in Venezuela had more liquid assets and also had higher proportions of government bonds.
Bongini, Claessens and Ferri (2001)	Equity to gross loans, loan loss reserves to capital, loan growth, operational expenses to revenues, return on assets, net interest revenues as a share of total revenues, and loans to borrowings along with ownership structure and size	Logistic regression	Most of the CAMEL-type variables explain distress and closure of financial institution significantly.
Logan (2001)	Financial ratios as proxy for illiquidity, credit risk and balance-sheet concentration, along with size, age and targeted capital ratio (TAR); also proxies for bank's ability to withstand unanticipated losses and capital cushion	Logistic regression	Poor liquidity and profitability along with low loan growth are found as short-term predictors of UK bank failures between years 1991-1994. On the other hand rapid loan growth is found to be a sound long-term indicator.
Wheelock and Wilson (2000)	CAMEL measures focusing on management quality	Competing-risks hazard models with time-varying covariates	Lower capitalization, low equity to asset ratio and low earnings increase the risk of failure.
Honohan (1997)	Loan-to-deposit ratio, foreign borrowing to deposits, growth rate of real bank credit, bank discretion over use of funds (measured by share of reserves to deposits), government share of lending, central bank refinancing of bank lending, government deficit	Anova	High loan-to-deposit ratios, high growth rates of credits, government share of lending and refinancing by central bank have identification ability for crisis.
Hwang, Lee and Liaw (1997)	44 accounting variables	Logistic regression	Most stable contributor to bank failure overtime is the ratio of past due loans to total asset. Equity capital, profitability and liquidity lower the probability of bank failure.

Rojas-Suarez (2002), for emerging economies, stresses the importance of two aspects of bank performance, which are macroeconomic environment and bank specific characteristics. Rojas-Suarez also points out that in emerging economies explanatory power of financial ratios may be limited, in order to overcome this limitation, she suggests monitoring non-CAMEL indicators such as deposit interest rates, the growth rates of credits and the spread between lending and deposit rates in emerging markets.

Daley, Matthews and Whitfield (2008) utilize a trinomial logistic model in order to discriminate between survived, bailed-out and closed banks. They test the effect of financial ratios such as capital adequacy, asset quality, liquidity and earnings ratios along with the macroeconomic variables, ownership structure, audit status and size. They emphasize that larger banks are more likely to be bailed out, despite their inefficiency. Elsas (2007) also utilizes a multinomial logistic regression in order to test the effect of several bank characteristics on being involved in a merger. Several indicators imply involvement in a merger, yet loan loss provision discriminates target and leader in a merger. Carapeto et al. (2010) examine the accounting measures of bank soundness using media information about merger and acquisitions or divestiture deals. Their findings show that the most significant measure of distress is the non-performing loan ratio. Furthermore, measures based on asset quality overestimate the number of distressed banks; on the other hand, measures of capital adequacy underestimate the number of banks being distressed. Koetter, Bos, Heid, Kolari, Kool and Porath (2007) try to distinguish distressed and non-distressed mergers. Their findings indicate that both groups have poor CAMEL profiles, yet the distressed group has the worst ones. They conclude that non-distressed mergers may reflect the desire to prevent future financial distress.

Canbas, Cabuk and Kilic (2005) construct an integrated early warning system for the Turkish banking system. They utilize discriminant analysis, logit and probit models. Their system focuses on three dimensions: capital adequacy, income-expenditure structure and liquidity. Boyacioglu, Kara and Baykan (2009) also utilize multivariate statistical methods along with neural networks analysis in order to detect the model with the best classification performance. They conclude that the neural networks analysis has the best one.[2]

2.2 Bank funding

Banks provide several services such as provision of payments, channeling funds to real economy and insurance services in case of several risks carried by households and investors. The significant role of the banking system, while it balances demand and supply of funds, is matching the funds with different maturities. In order to match the different maturities, banks need to provide long-term loans to firms and households; and accept short-term deposits and wholesale funds. Transformation of different maturities between the use and sources of funds is a crucial part of bank activities which is also of utmost importance for monetary and financial stability (Beau, Hill, Hussain, and Nixon, 2014; Farag, Harland and Nixon, 2013; Turner et al., 2010).

Banks undertake several risks while conducting their activities such as credit risk, liquidity risk, market risk and operational risk. Matching the uses and sources of funds mainly requires managing the credit and liquidity risks. *Credit risk* arises from the inability of a borrower to repay a loan. *Liquidity risk* is being unable to pay to depositors or other investors due to insufficient cash or collateral when the debt falls

[2] Demyanyk and Hasan (2010) provide a survey on neural networks analysis focusing on the bank failures and financial crises.

due (Farag, Harland and Nixon, 2013). Banks finance their activities mostly by borrowed funds which is consist of retail funding and wholesale funding. Bank's equity capital can be considered as *bank's own fund* which does not require repayment and so has the ability to absorb unexpected losses (Beau et al., 2014).

Liability side of a bank's balance sheet provides a picture of source of funds which are used to finance banking activities, mainly credit creation. On the other hand asset side of a bank's balance sheet represents the use of funds. Figure 1 illustrates a simplified balance sheet of a bank. For a traditional deposit-taking bank, deposits are the main source of funds. Demand deposits have the highest liquidity risk theoretically, yet in practice they are rather stable. Customer deposits in emerging markets form at least the 60 percent of funding (González-Hermosillo, Oura, Chan-Lau, Gudmundsson, and Valckx, 2013). Wholesale funding may be short-term such as interbank deposits and repo which is a secured debt instrument; or long-term such as long-term bonds and asset backed securities which is converting illiquid assets into tradable securities. Most popular form of securitization is mortgage-backed securities (Beau et al., 2014). González-Hermosillo et al. report that mortgage-backed securities form the 10 percent of secured debt part of bank funding in emerging economies except Asia. Using these funds banks provide credits to households and firms which can be seen in the asset side of the balance sheet. As an accounting rule assets and liabilities must be equal.

Liquid assets and capital base provide cushion in case of credit and liquidity risks, and prevent *insolvency and default*. In loan business the risk of default always exists. Higher the portion of the riskier loans, higher the probability of the default. In case of default bank should write off the debt which causes a reduction in assets and a corresponding reduction in capital. Capital provides a buffer for defaulted loans.

Combination of high proportion of risky loans and thin capital base may result in liabilities exceeding assets, which poses solvency problem for a bank (Farag et al., 2013). Source of funds side may pose liquidity problems because of flighty funds. Inherently liabilities side of a bank's balance sheet has a higher turnover than assets side which reveals a maturity mismatch problem. One of the main functions of banking system in economy is transforming maturities of funds; yet relying on short-term funds too much makes a bank incur high liquidity risk. When short-term funds are withdrawn due to macroeconomic instability, a bank should utilize its liquid assets. Low liquid assets combined with intense short-term funding may trigger default (González-Hermosillo et al., 2013; Farag et al., 2013; Diamond and Dybvig, 1983).

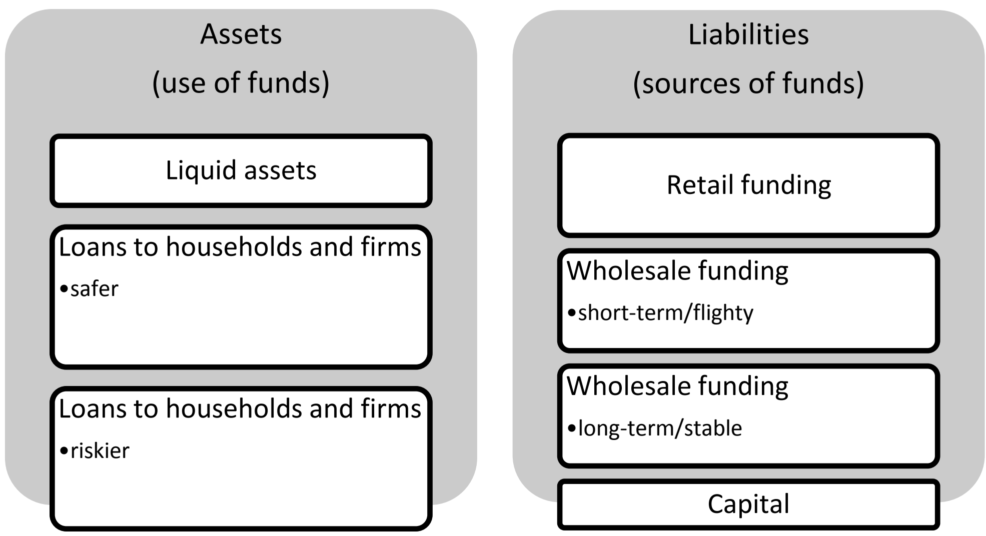

Figure 2. A stylized bank balance sheet

Beau et al. (2014) propose looking from the investors and depositors point of view in order to understand bank's funding costs. Interest rate that bank offers is the return on investment and is consisting of risk-free rate, credit and liquidity risk components and other costs. Because of deposit guarantees retail funding carries less credit risk than wholesale funding; also demand deposits have very low liquidity risks. These make retail funding a cheap source of funding for banks. On the other hand cost of wholesale funding is higher due to bearing credit and liquidity risks.

Banks funding costs translate into loan rates after adding operating costs, mark-up and banks' risk premium due to credit and liquidity risks bank is bearing. Increasing competition in banking sector may result in lower mark-up and so lower loan rates. IMF offers spread between reference lending and deposit rates as a Financial Soundness Indicator (FSI), a gauge of competitiveness within the sector. High competition in the market reduces the transaction costs so lending rates will fall while the deposit rates are increasing. Rojas-Suarez (2002) explains that risk taking is higher in emerging markets due to unsound financial system so the low spreads in developing markets imply high risk taking in contrast to the developed markets where the low spreads reflect efficiency. Also high spreads in emerging markets may indicate increasing risk premium. According to Molina (2002) the interaction results between low operational costs and high financial expenses indicate that banks tried to reduce operating costs and increased the interest on deposits in order to have better accounting reports and lure more depositors during the 1993-95 Venezuelan crises on the eve of the failure. Molina's findings support that low spread may indicate high risk taking especially during financial turmoil.

However in developing economies, deposits are still the main source of bank funding, banks are relying on non-deposit-based funding increasingly in both developed and developing economies (Demiralp, 2007; González-Hermosillo et al., 2013). Increasing non-core funding in emerging economies increases the risk of default and solvency problems due to unreliable funds (Moreno, 2011). Reinhart and

Rogoff (2010) investigate emerging economies during 1970-2009 and they point out that the maturity composition of external debt changes in favor of short-term debt just before the banking crises. Hahm, Shin and Shin (2011) focus on the liability side of the bank balance sheet and propose non-core liabilities as an indicator of financial vulnerability. They utilize logistic regression models for a large country set and report significant predictive power of non-core liability measures for credit and currency crises. They also provide the composition of the expansion in the liability side for Korean banks. After the lending boom the contribution of foreign creditors in banking sector increased dramatically in comparison to domestic depositors.

If the Modigliani-Miller theorem holds, banks should focus on how to finance the asset side of the balance sheet, which are primarily the loans extended to firms and households. Balance sheet capacity is dependent on the size of the available positive net present value projects and should be considered independent from the financing decisions of the bank. Composition of the liability side will change through decreasing equity and increasing debt, vice versa, with fixed assets. With fixed assets leverage level of a bank would depend on the equity level. In practice banking sector leverage fluctuates with the size of the balance sheet while equity is remaining fixed. This means that leverage increases through the size of the debt. Growth of retail funding is dependent on the growth of economy. On the other hand growth of wholesale funding may exceed the growth of economy disproportionately. During tranquil times credit growth accelerates and leverage increases with the balance sheet capacity (Adrian and Shin, 2008a; Adrian and Shin, 2008b; Adrian and Shin, 2010; Hahm et al., 2011; Shin and Shin, 2011). Looking from the asset side of the bank balance sheet Borio (2011) suggests that credit-to-GDP ratios serve as a rough proxy for leverage.

Basel capital requirements suggest that banks should keep enough equity in order to be in line with the Value-at-Risk (VaR) constraint (Basel Committee on Bank Supervision, 2006). Adrian and Shin (2008a) construct a model with pre-determined equity and subject to the VaR constraint which is the equity capital banks should hold in order to stay solvent with a given probability of default of loans. In the model of Adrian and Shin equity is taken as exogenous on the other hand size of assets is determined by the given equity level and maximum leverage level which depends on the VaR constraint. They show that financial institutions; namely Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch and Morgan Stanley; adjust their balance sheet capacity according to changes in the risk environment. Hahm et al. (2011) provide additional evidence for the phenomenon that leverage of bank fluctuates with the risk of environment. They utilize a static model of credit supply in order to show how non-core liabilities fluctuate with perceived risk levels. They show that when the measured risk levels are low, banks need smaller amount of equity capital in order to satisfy the VaR constraint. Decreasing equity requirements leave banks with spare balance sheet capacity and allow them increase leverage through non-core funding.

Bernanke (2005) introduces *global saving glut* as an explanation for United States (US) current account deficit and low world interest rates as an alternative to *excess saving view*. A high current account deficit should match with a high capital account surplus. He focuses on investment-saving balance rather than trade balance for current account deficit. Excess of investment expenditures over savings in US should be financed by borrowing from the rest of the world which creates a positive capital account balance. Excess saving over investment flows into US from rest of the world. This excess saving causes a downward pressure on the world interest rates and blows credit boom and increases risk taking. These are the driving factors behind the 2007/2008 global financial crisis. The excess saving view focuses on net capital flows from surplus countries, mainly emerging economies in the previous decade, to deficit countries. Capital flows have a suppressing effect of high saving rates relative to investment on the world interest rates (Bernanke, 2005, 2007; Clarida, 2006; Krugman, 2009; Economist, 2009; Gruber and Kamin, 2007). On the other hand global banking glut hypothesis focuses on gross flows rather than net flows which conceal the large gross cross-border positions (Borio and Disyatat, 2011; Shin, 2012). Obstfeld (2010) reports that the inflation in the gross foreign asset position is rising for not only developed countries also for developing countries.

Borio and Disyatat (2011) criticize the excess saving view in two aspects. First, net flows reveal less about financing than gross flows. Second, saving-investment framework is suitable for explanation of natural interest rate not for market interest rate, which is affected by cross-border financing opportunities. According to excess saving view as surplus economies emerging economies is the main source of capital inflows to US. Borio and Disyatat analyze gross flows and state that most of the capital inflows to US are originated from Europe, and also the capital outflows to Europe are massive. They report that in comparison to small decline in net capital flows in 2008 decline in gross flows is huge, gross flows dropped by 75 percent from 2007's level. Borio and Disyatat coined the term "excess elasticity" in order to emphasize the tendency of the banking system to expand. This overly stretched balance-sheet phenomenon results from lack of sufficient anchors to prevent unsustainable credit and asset booms during the tranquil times. They emphasize that financial imbalances caused by over expanded balance-sheets of banking sector are the key factors behind the 2007/2008 global banking crises.

Adrian and Shin (2008a, 2010) state bank leverage is strongly procyclical because of active adjustment of balance sheets during booms and busts. Asset price increase strengthens the balance-sheet of banks by increasing collateral value and lower leverage. This increase in collateral value leaves banks with surplus capital. This surplus capital -surplus capacity- motivates banks search for more short-term debt which expands liability side of balance-sheet. Furthermore increasing funding source motives banks to find more borrowers which expand asset side of balance-sheet. Also this surplus capacity increase the demand for assets that's price is rising already.

There is a piling literature which stresses on the procyclical nature of banks' balance-sheets. Leverage level of banks increases in expansionary economic conditions which fuels economy further. This feedback loop increases the surplus capacity in the banks' balance-sheets, thus the risk appetite increase. Diminishing financial borders for capital flows may fuel this risk appetite further and cause over expansion in banks' balance-sheet. Shin (2012) emphasizes that global banking glut which is observed through highly expanded balance sheets of banking sector indicates vulnerability in global financial system. Adrian and Shin (2008b) show that there is a strong correlation between growth rate of banks' balance-sheet and easing-tightening of monetary policy. Yang and Tsatsaronis (2012) state that bank returns are procyclical so exaggerates financial cycle and they propose that prudential tools should give incentives for building capital buffers during booms. Kalemli-Ozcan et. al. (2011) show investment banks increase leverage during booms and decrease during busts. Borio (2011) points out that financial crises overlap with booms. Countercyclical capital buffer propose by BASEL-II and BASEL-III is designed to capture the procyclicality feature of the financial system.

Binici and Köksal (2012) show for Turkey balance-sheet size and profits affect leverage of banks; also leverage cycles overlap with non-deposit funding. Their findings indicate that banks increase their leverage through expansion of balance-sheet by none-deposit liabilities. In the 2011-May Financial Stabilization Report-CBT pointed out capital flows increase the risk in the financial system so more strict regulations could be considered. Also the report emphasizes the role of none-core liabilities on the vulnerability of financial system.

2.3 Financial openness

In the finance literature no typical differentiation exists between the terms “financial openness” and “financial integration”. Financial integration of a country to world markets occurs when the financial sector and the capital account are liberalized. When financial integration is considered as the convergence of asset returns, financial openness differs from the financial integration. Financial openness in fact is a mean for achieving financial integration. Financial integration can be defined as becoming a part of the world financial market. Financial openness is the removal of capital restrictions and implementing regulations for attracting foreign capital. It is necessary yet not sufficient condition for financial integration (Le, 2000; Arestis and Basu, 2003; Nicolo and Juvenal, 2010).

International risk diversification induces the globalization of investments which is one of the main drivers of the financial integration. Many economies have been relaxed their restriction on the capital flows and embraced the deregulation of financial markets. Also developing economies, which have low saving rates and scarce internal resources, may benefit from the integration to the world financial system. Access to global funds via financial integration increases the opportunity of financing high return investments which promotes economic growth. Although financial integration enhances the capital flow to emerging economies, it exaggerates the effects of financial fluctuations on real economic variables and so contributes to the economic instability.

Developing economies can benefit from integration to the world financial system through development of the domestic financial market and access to the international capital market. However past financial disturbances cast doubts on the benefits of financial integration, integrating to world capital markets provide higher risk-adjusted returns through portfolio diversification (Obstfeld, 2010). High dependence on external funds decreases the resilience to sudden stops of funds. By financial integration, developing countries may suffer not only from volatility in their own financial markets but also from the contagion effects of volatility in other markets.

Enhanced macroeconomic discipline, greater stability, promoting development of the domestic financial sector and better corporate governance can be listed as direct and collateral benefits of financial openness (Bailliu, 2000; Agenor, 2003; Prasad et al., 2003; Mendoza et al., 2007; Bekaert, Harvey and Lundblad, 2011). Furthermore access to international financial markets allows borrowing for consumption smoothing to cope with adverse shocks (Agenor, 2003). Most vastly studied benefit of financial openness is the effect on economic growth. The literature related with the effects of financial openness on economic growth exhibit mixed findings. Bekaert, Harvey and Lundblad (2011) show that gains in economic growth override the loss arising from the banking crises due to financial openness. Quinn, Inclan and Toyoda (2001) provide evidence that financial openness enhances economic growth in economies with strong welfare states. On the other hand Rodrik

(1998), Durham (2004), and Mody and Murshid (2005) report mixed effects of financial openness on economic growth.

Concentration of capital flows and lack of access to financing for small countries (Basu and Srinivasan, 2002), inadequate domestic allocation of capital flows (magnifying preexisting distortions), loss of macroeconomic stability (inflationary pressures, high cost of sterilization policies), pro-cyclical movements in short-term capital flows, high degree of volatility of capital flows (herding and contagion effects) can be listed as potential costs. Probably one of the most crucial indirect costs of financial integration is being more prone to severe crises through building up systemic risk in financial systems. Kose, Prasad, Rogoff and Wei (2006) suggests that indirect benefits on growth through enhancing market discipline and deepening the financial sector takes time, this may offer an explanation for why detecting costs of financial integration is easier than benefits for developing economies over relatively short time periods. Table 4 provides a list of costs and benefits of financial openness in the literature.

One of the main research problems while investigating the effects of financial openness is choosing the right measures of financial openness. Measures for financial openness can be examined in two categories such as *de jure* measures and *de facto* measures. Studies on capital account liberalization generally focus on de jure measures which are constructed regarding capital restrictions on capital movements. De jure measures rely on the official regulations. De facto measures on the other hand capture the consequences of the realized regulations. Studies interested in collateral benefits of financial integration may utilize de facto measures. De facto measures may be either priced-based or quantity-based. Quantity-based measures rely on actual flows to measure the country’s integration. Being less volatile is the advantage of gross flows (Edison, Levine, Ricci and Slok, 2002). Table 5 provides the literature related to financial openness measures.

Table 4. Benefits and Costs of Financial Openness

Benefits of Financial Openness	*Costs of Financial Openness*
• Risk sharing for consumption smoothing • Positive impact of capital flows on domestic investment and growth • Efficiency and greater stability • Also we should consider collateral benefits: • Promoting development of the domestic financial sector • Imposing discipline on macroeconomic policies • Better corporate governance	• Concentration of capital flows and lack of access to financing for small countries • Inadequate domestic allocation of capital flows (magnifying preexisting distortions) • Loss of macroeconomic stability (inflationary pressures, high cost of sterilization policies) • Pro-cyclical movements in short-term capital flows • High degree of volatility of capital flows (herding and contagion effects) • Foreign bank penetration (High concentration in banking sector, "too big to fail")
(Bailliu, 2000; Agenor, 2003; Prasad, 2003; Kose et al., 2006; Mendoza, 2007; Bekaert et al., 2011; Basu and Srinivasan, 2002)	

Countries that have strict capital controls on paper may have quite high capital flows. On the other hand there exist countries which have quite open capital accounts contrarily in practice have low capital inflows (Kose, Prasad and Terrones, 2003). Kose et al. (2006) compare de jure and de facto measures for financial integration between years 1970-2004 for both advanced and emerging economies. Results indicate that for advance economies de jure and de facto measures move along together and increase steadily yet for emerging economies de jure measures presents a leap in mid 70s then fall in mid 80s and fairly low level in comparison to de facto measures while de facto measures increase steadily in time.

Table 5. Related Literature for Financial Openness Measures

Authors	*Measures*	*Explanation*
De Jure Measures		
Klein (2003)	SHARE	Based on AREAER (IMF's Annual Report on Exchange Arrangements and Exchange Restrictions)
Beakert et. al. (2005)	EQUITY	Equity market liberalization chronology
Chin and Ito (2008)	KAOPEN	Based on AREAER , known as Chin-Ito index
Schindler (2009)	KA	Average of AREAER sub-indices
De Facto Measures: Price – based		
Karolyi and Stulz (2002)	Asset Price Co-movement	Covariances of asset prices with the world market portfolio
Frankel (1992)	Real interest differentials	Decomposing interest rate parities as country and currency premiums
De Facto Measures: Quantity – based		
Lane and Ferretti (2006)	TOTAL	Total assets and liabilities
Quinn et. al. (2011)	Inward FDI	FDI inflows as percentage of GDP
Dreher (2005)	eGLOBE	FDI, portfolio are blended by de jure measures such as restrictions on imports, taxes on trade and capital account restrictions

CHAPTER 3

EFFECTS OF FUNDING COMPOSITION ON BANK SOUNDNESS

As financial intermediaries banks provide credits to economic agents. They fund their activities through several sources. We may group these sources into two categories such as core or non-core funds. Deposits are traditional, core-sources of bank funding. Increasing financial integration of developing markets to global financial markets provides opportunity for banks to fund their activities through non-deposit sources. Both González-Hermosillo et al. (2013) and Demiralp (2007) state that non-deposit-based funding is rising in both advanced and emerging economies, however in developing economies deposits are still the main source of funding. This chapter focuses primarily on what increasing non-deposit funding means for bank soundness in developing markets.

First section provides an empirical framework for the estimation methodologies. Following section presents model. Then, sample selection and variables are described. Last three sections provide empirical results for dynamic, Granger causality and contemporaneous relations between soundness of banking system and selected variables.

3.1 Empirical framework

In this section we discuss Panel Vector Autoregression analysis, which is suitable for investigation of dynamic relations between endogenous variables in panel data format. For this purpose we first provide an overview of unit-root tests. Then, panel data estimation procedure is discussed.

3.1.1 Unit-root tests

In order to conduct panel vector autoregression analysis and panel data estimation variables should be stationary. Several unit-root tests are adopted for panel data. Unit-root process can be shown simply as first order autoregressive process where the coefficient of the lagged variable, ρ, is equal to 1.

$$y_{it} = \rho_i y_{i,t-1} + z_{it}' \gamma_i + u_{it}$$

$$\Delta y_{it} = \phi_i y_{i,t-1} + z_{it}' \gamma_i + u_{it}$$

Panel unit-root tests are testing the null hypothesis $H_0: \phi_i = 0$ for all i versus the alternative $H_a: \phi_i < 0$.

Levin, Lin and Chu (2002) adopt ADF (Augmented Dickey Fuller) tests which are carried out for each individual, after adjustment for heteroscedasticity; a pooled t-test is carried out under null hypothesis of unit-root process.

$$y_{it} = \rho\, y_{i,t-1} + \sum_{L=1}^{pi} \phi_{iL} \Delta\, y_{i,t-L} + z_{it}' \gamma + u_{it}$$

Different lags are allowed across different cross sections. It is assumed that the ρ is the same for all the cross sections. This implies same convergence rate for each individual. (Maddala and Wu, 1999)

Im Pesaran-Shin Test (IPS) is applied individual unit-root processes instead of assuming a common unit-root process.

$$\Delta y_{it} = \rho\, y_{i,t-1} + \sum_{L=1}^{pi} \phi_{iL} \Delta\, y_{i,t-L} + z_{it}' \gamma + u_{it}$$

The IPS test takes the averages of all the individual ADF test statistics. The null hypothesis is that each series has a unit-root for all i and alternative hypothesis - at least one of the cross section series is stationary. Also the IPS tests are suitable for unbalanced data.

Fisher type tests which assume the individual unit-root process for each cross-section combine the p-values from independent tests to obtain an overall test statistic. Fisher type tests are also suitable for unbalanced panel data (Choi, 2001).

3.1.2 Panel estimation

Most common approaches in panel data analysis are random effects and fixed effects models.

$$Y_{i,t} = \gamma_0 + \delta_1 X_{i,t} + \varepsilon_{i,t}$$

$$\varepsilon_{i,t} = \eta_{i,t} + \mu_i + \lambda_t$$

$\eta_{i,t}$: independently distributed error term, yet cross –sectional heteroscedasticity is allowed.

μ_i: time-invariant individual effect component of error term, fixed effect (firm effect)

λ_t: time fixed effect

Individual effect (μ_i) indicates that residuals of a given individual (firm) may be correlated across time, which means:

$$\text{Corr}(\varepsilon_{i,t}, \varepsilon_{i,s}) \neq 0$$

Time effect (λ_t) indicates that residuals for a given time period may be correlated across different individuals, which means:

$$\text{Corr}(\varepsilon_{i,t}, \varepsilon_{k,t}) \neq 0$$

Correlation between error terms causes biased estimates and standard errors. To include the fixed effects in the model one may include dummy variable for each cross-sectional unit, same procedure can be followed to take into account time variant component.

Fixed Effect Model assumes that individual effects are correlated with regressors. On the other hand Random Effect Model assumes no correlation between regressors and time-invariant and individual-invariant parts of the error term. Autocorrelation in residuals brings about the need for further investigation for suitable estimation method.

Petersen (2009) shows, through several simulations, in the case of fixed firm effect fixed effect models or using firm dummies produce unbiased standard errors, yet in the case of non-fixed firm effect they produce biased standard errors and can't capture the within cluster dependence. In case of temporary firm effect serial correlation of residuals fades way similar to autoregressive process yet more slowly than autoregressive process. Correlation between errors has a fixed and an autoregressive part.

$$\mathrm{Corr}\,(\varepsilon_{i,t}, \varepsilon_{k,t}) = \rho_{\varepsilon} + (1 - \rho_{\varepsilon})\phi^{k}$$

Autocorrelation test results of the incoming analyses expose the need of reevaluation of the estimation methodology. Baltagi et al. (2008) state that cross-sectional dependence constitutes a problem in macro panels with long time series. Elimination of fixed effects through differencing makes impossible to use lagged dependent variable as a regressor. Dynamic models cope with the correlation with the lagged dependent variable in the first difference form. Dynamic panels are modeling a partial adjustment process; the coefficient on the lagged dependent variable measures the speed of adjustment and removes autocorrelation.

AR (1) model with individual effect:

$$y_{i,t} = \gamma\, y_{i,t-1} + x'_{i,t}\,\beta + \mu_{i} + \varepsilon_{i,t} \qquad (1)$$

To eliminate the individual effects first difference of equation 1 is taken:

$$y_{i,t} - y_{i,t-1} = \gamma\left(y_{i,t-1} - y_{i,t-2}\right) + \left(x'_{i,t} - x'_{i,t-1}\right)\beta + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \qquad (2)$$

Regressor $(y_{i,t-1} - y_{i,t-2})$ is correlated with the error term$(\varepsilon_{i,t} - \varepsilon_{i,t-1})$. Arellano and Bond (1991) propose using the lag of dependent variable from at least two periods earlier. $y_{i,t-2}$ is not correlated with $(\varepsilon_{i,t} - \varepsilon_{i,t-1})$ and so forth can be used as an instrument for $(y_{i,t-1} - y_{i,t-2})$.

Arellano and Bover (1995) suggest using orthogonal deviations instead of first differences, also suggest differencing the instruments instead of regressors and using a joint estimation of the equation in levels and in first differences by system Generalized Method of Moments (GMM).

3.1.3 Panel vector autoregression analysis

Panel Vector Autoregressive (PVAR) approach combines the panel data estimation with the commonly used Vector Autoregressive (VAR) technique which is suitable for investigation of interrelated time series and their dynamics. It is first proposed by Holtz-Eakin, Newey and Rosen (1988), who introduce a time-stationary VAR model in the panel data context. VAR technique is ideal for assessing dynamic relationships among a set of possibly endogenous variables.

VAR regresses each variable on its own lag(s) as well as the lags of all other variables in the system. Panel VAR allows for VAR Regression Analysis to be conducted over time and across cases (states), yielding better estimates than time-series or single-state analysis. Specification of a p-order PVAR is as follows:

$$Y_{i,t} = \alpha_0 + \sum_{l=1}^{p} \alpha_l Y_{i,t-l} + \sum_{l=1}^{q} \gamma_l X_{i,t-l} + \mu_i + \lambda_t + \eta_{i,t}, \qquad (3)$$

where Y is the set of dependent variables, X is the set of exogenous variables; μi is fixed effect, λ_t is time effect and $\eta_{i,t}$ is the independently distributed error term, which has zero mean across countries yet may display heteroscedasticity across time and countries.

Panel VAR approach presents problem arises from the correlation between the lagged dependent variable and fixed effects. Elimination of fixed effects by differencing creates biased estimates. In the fixed effects estimation regressor $(y_{it-1} - \bar{y}_i)$ will be correlated with the error term $(\varepsilon_{it} - \bar{\varepsilon_i})$. Holtz-Eakin et al. (1988) propose forward mean differencing, which is known as *Helmert procedure*, to overcome this problem.

Forward mean differencing procedure subtracts average of only future observations for each individual; and procedure satisfies the orthogonality conditions between regressors in lagged forms and transformed variables. (Arellano and Bover, 1995) In order to estimate the model by system GMM transformed variables and lagged regressors should satisfy the assumption of orthogonality (Love and Zicchino, 2002).

In the empirical analysis part after conducting unit-root tests, following Love and Zicchino (2002) time-demeaned variables are used; and also impulse-response functions are produced in order to see the response of one variable to the shock in another variable in the system.[3] Moreover variance decompositions of each model are produced to see the effect of each shock of one variable on the variance of the other variable.

3.2 Model

Non-core liabilities and spread between lending and deposits rates capture the both sources of banks' funding. Borio (2011) suggests that credit-to-GDP ratios serve as a rough proxy for leverage. In order to see the dynamic relations between bank

[3] Standard errors are produced by Monte Carlo simulation.

soundness and non-core liabilities along with credits and interest spread a first order Panel Vector Autoregressive (PVAR) model is specified as follows:

$$y_{i,t} = \Gamma_0 + \Gamma_1 y_{i,t-1} + e_{i,t} \,, \tag{4}$$

where $y_{i,t}$ is an m×1 vector of dependent variables.(bank soundness, non-core liabilities, credit extended by banks and interest spread between lending and deposit rates) Γ_1 is an m×m matrix of slope coefficients, and $e_{i,t}$ is an m×1 vector of the composed error term which consists of individual effects, time effect and white noise error term.

Value-at-Risk rule orders keeping enough equity capital in order to stay solvent in case of loan default with a given probability. Hahm et al. (2011) provides a static model of credit supply in order to show how non-core liabilities fluctuate with perceived risk levels. They derive a formula for the ratio of notional liabilities to notional assets (φ(α, ε, ρ)) which depends on default probability on the loan extended by bank to borrowers (ε), exposure of each loan to the common factor that derives credit risk as the systematic risk factor (ρ) and the probability of insolvency (α). Balance sheet identity is defined in the model as:

$$L = E + D + N, \tag{5}$$

where L is loans, E is bank's equity, D is deposits and N is non-core liabilities.

Realized value of bank loans (w) depends on interest rate on loans (r) and probability of default (Pr ($Z_j < 0$)) which depends on ε and ρ. Z_j is the random variable that takes negative values in case of default of borrower. In the model probability of bank insolvency (α) is accepted as smaller than the probability of the default (ε). If realized value of loans (w = (1+r) L. Pr ($Z_j > 0$)) is smaller than the notional liabilities (D + (1+f) N), bank will be insolvent. Bank must keep enough equity capital in order to satisfy VaR constraint:

$$\Pr (w < D + (1+f) N) \leq \alpha , \tag{6}$$

where f is the funding rate for bank.

A profit maximizing bank should maximize the expected return on one dollar loan ((1-ε) (1+r)-1) subject to VaR constraint. Hahm et al. (2011) provide a solution for the maximization problem for loan supply and stock of non-core liabilities. They show that when the measured risk levels (ρ) are low, banks need a smaller amount of equity in order to satisfy the VaR constraint. Banks' low levels of equity requirement for per-loan agreement bring in spare balance sheet capacity for banks. Hence banks become capable of increasing leverage through non-core funding.

CAMELS-type measures are utilized in order to measure the banking system soundness. Rojas-Suarez (2002) suggests that policy makers and rating agencies should focus on two aspects of bank performance in emerging economies, macroeconomic environment and bank specific characteristics. She argues that financial ratios may not have the explanatory power in emerging markets as they do in developed markets, and suggests monitoring also non-CAMEL indicators such as deposit interest rates, growth rates of credits and the spread between lending and deposit rates in emerging markets.

During excessive risk taking periods, rapid growth in the banks' portfolio results in high funding costs yet these costs are not reflected in loan rates. IMF offers spread between reference lending and deposit rates as a Financial Soundness Indicator (FSI), a gauge of competitiveness within the sector. Rojas-Suarez (2002) points out that the low spreads in developing markets have implied high risk-taking in contrast to the developed markets where the low spreads have reflected efficiency.

Moreover, high spreads may indicate an increase in risk premium. Credits are funded mostly by deposits in emerging markets. Banking sector tends to narrow the interest spreads during tight monetary policy periods to enhance the credits. Not only non-core liabilities but also the effect of interest spread between reference lending and deposit rates on bank soundness are investigated in the empirical analysis part.

3.3 Sample and variables

Quarterly data is obtained from World Bank and IMF's International Financial Statistics (IFS) database for period 2008/Q4 – 2012/Q3. The cubic spline interpolation technique is utilized for dealing gaps in the data. Preventing the large swings in the data pairwise interpolation by splines is preferred. Cubic spline interpolation matches slopes and concavities along with data values; hence, it provides a smooth pass through data values (Adams, 2001).

46 countries are considered in data collection process according to MSCI (Morgan Stanley Capital International) emerging market and frontier market indices (Kose et. al., 2009; Calvo et. al., 2008).

MSCI Emerging Markets Index, 21 emerging markets: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey.

MSCI Frontier Markets Index, 25 frontier markets: Argentina, Bahrain, Bangladesh, Bulgaria, Croatia, Estonia, Jordan, Kenya, Kuwait, Lebanon, Lithuania, Kazakhstan, Mauritius, Nigeria, Oman, Pakistan, Qatar, Romania, Serbia, Slovenia, Sri Lanka, Tunisia, Ukraine, United Arab Emirates, and Vietnam.

Due to data availability 18 countries are included in the analysis: Argentina, Brazil, Croatia, Czech Republic, Estonia, Hungary, Indonesia, Korea, Lithuania, Malaysia, Mauritius, Philippines, Poland, Romania, Russia, Slovenia, Turkey, Ukraine.

3.3.1 Bank soundness index

Soundness index (SI) is formed by CAMELS-type indicators. Scope of the six components of CAMELS is as follows:

- Capital Adequacy: Capital's ability to cover bank's risk
- Asset Quality: Ability of asset management
- Management Quality: Performance of implementation of policies, financial performance of bank
- Earnings: Sufficiency of earnings
- Liquidity: Ability of bank to produce cash
- Sensitivity to Market Risk: Sensitivity of bank performance to market conditions.

Table 6 summarizes the measures used for each dimension and indicates whether the attribute is positive or negative.

In order to construct the soundness index CAMELS variables are calculated for each country. Then soundness index (SI) is formed by averaging the CAMELS variables. First a reference value for each measure of CAMELS variable is calculated by taking the trimmean with 80% in each time period. Index value ($IV_{r,c,t}$) for each ratio (r) of each country (c) in each period (i) is calculated as:

Index Value: $IV_{r,c,i,t}$ = (Bank's ratio/ Reference Value)×100

Table 6. Measures for CAMELS Ratios

CAMELS Measures		
C1	Regulatory Capital to Risk Weighted Assets	+
C2	Regulatory Tier 1 Capital to Risk Weighted Assets	+
A1	Non-Performing Loans Net of Provisions to Capital	-
A2	Non-Performing Loans to Gross Loans	-
M1	Non-interest Expenses to Gross Income	-
E1	Return on Assets	+
E2	Return on Equity	+
L1	Liquid Assets to Total Assets	+
L2	Liquid Assets to Short-term Liabilities	+
S1	Net Open Positions in Foreign Exchange to Capital	-

Performance note ($PI_{r,c,i,t}$) for positive attributes which shows greater soundeness are calculated as follows:

$PI^{+}_{r,c,i,t} = IV_{r,c,i,t} - 100$

Performance note for negative attributes are calculated as follows:

$PI^{-}_{r,c,i,t} = 100 - IV_{r,c,i,t}$

Average of performance notes for each CAMELS variable is calculated. Dividing average performance notes by standard deviation of each time period gives CAMELS variable. Rather than calculating CAMELS ratings preserving continuous nature of variables is preferred to capture the effects of moderate changes in explanatory variables. The mean of these CAMELS variables gives the soundness index (SI) value for each bank in a given period. Figure 2 shows the scatter plot of the soundness index.

CAMELS variables are normalized by the standard deviation. Figure indicates that soundness levels of the countries lie in the two standard deviation band.

3.3.2 Explanatory variables

Explanatory variables are designed to indicate the financial conditions of banking system through focusing on both non-core liabilities, which represent funds other than traditional source, and interest spread besides credits extended. Also growth rate of gross domestic production is considered as a control variable.

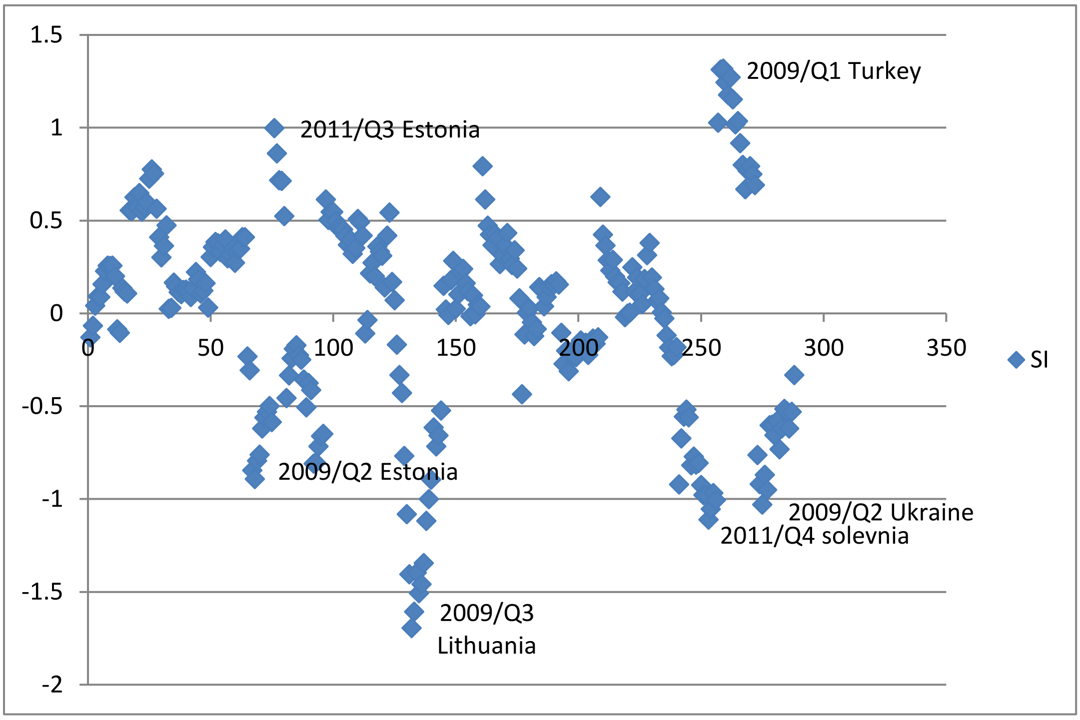

Figure 2. Scatter graph of soundness index

According to the ADF, IPS and Levin-Lin- Chu unit-root tests, growth rate of gross domestic product (GDPGR) is used in the first difference form. Table 7 provides unit-root test results. Descriptions of variables are provided below: [4]

$NCB_{i,t}$: Non-core liabilities of banking sector of country i at time t. It is calculated as the sum liabilities of depository institutions to non-residents and to other financial corporations as percentage of GDP.

[4] Descriptive statistics of variables are presented in Table A.

Table 7. P-values of Unitroot Tests

		GRNCB	GRCR1	GRCR2	IntSprd	SI	GDPGR
ADF	P	0.0000	0.0000	0.0000	0.0091	0.0000	0.9775
	Z	0.0000	0.0000	0.0000	0.4123	0.0029	0.9925
	L	0.0000	0.0000	0.0000	0.2177	0.0000	0.9867
	Pm	0.0000	0.0000	0.0000	0.0028	0.0000	0.9607
IPS		NA	0.0000	0.0000	0.4608	0.0051	0.9787
Levin-Lin-Chu		NA	0.0000	0.0000	0.0004	0.0000	0.9071

P: Inverse chi-squared, Z: Inverse normal, L: Inverse logit t, Pm: Modified inv. chi-squared

GRNCB: growth rate of NCB.

$CR1_{i,t}$: Credits extended to private sector by banking sector of country i at time t. It is measured as claims of depository institutions on private sector as percentage of GDP.

GRCR1: growth rate of CR1.

$CR2_{i,t}$: Domestic credits extended by banking sector of country i at time t. It is measured as domestic claims of depository institutions as percentage of GDP.

GRCR2: growth rate of CR2.

$INTSPRD_{i,t}$: spread between reference lending and deposit rates

$GDPGR_{i,t}$: GDP growth rate

3.4 Investigation of the dynamic relations

In order to model the dynamics between non-core liabilities, growth in credits, interest spread and bank soundness, variables in the model are used as endogenous variables in panel vector autoregressive structure.

Table 8 represents the PVAR results which are the responses of one dependent variable to the lag of another dependent variable. Responses of interest spread to changes in soundness index and non-core liabilities are significant. Both soundness index and non-core liabilities affect interest spread positively. Also the responses of both domestic and private credits growth to interest spread are significant and positive, yet credits extended by banking sector do not affect interest spread. Furthermore shocks to soundness index affect private credits inversely.

Table 8. PVAR Results

Response of	GRNCB (t)	IntSprd (t)	SI (t)
Response to			
SI (t-1)	.02180358	218.56105**	.71778826***
GRNCB (t-1)	-.02655829	99.231586**	-.10886549
IntSprd (t-1)	-.00012951	.69899802***	.00022064
Response of	GRCR1 (t)	IntSprd (t)	SI (t)
Response to			
SI (t-1)	-.03869646*	219.19214**	.7301231***
GRCR1 (t-1)	.13792312	21.545205	.13392005
IntSprd (t-1)	.00004411*	.68581653***	.00022925
Response of	GRCR2 (t)	IntSprd (t)	SI (t)
Response to			
SI (t-1)	-.02585039	211.77569**	.71444818***
GRCR2 (t-1)	-.11871816	118.22701	.22389874
IntSprd (t-1)	.00009573**	.68337681***	.00021626

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 9 provides variance decomposition results; it shows how much of the total variation in one variable is explained by a shock to another variable. Considering the significant PVAR results shocks to soundness index explain approximately 49% of the total variation in interest spread in first two model, models with non-core liabilities and private credits. In the model which includes domestic credits 47.2 % of the total variation in the interest spread is explained by shocks to the soundness index. On the other hand shocks to interest spread don’t explain the variation in the soundness index.

Also shocks to interest spread 1.6 % of the total variation in private credits and 2.79 % of domestic credits. Furthermore shocks to non-core liabilities explain 0.6 % of the total variation in interest spread. These results may be compared with the bidirectional results of Granger causality in the following subsection.

Table 9. Variance Decomposition

s=10	SI	GRNCB	IntSprd
SI	*.88795716*	.00756554	.1044773
GRNCB	.01609386	.97426653	.00963961
IntSprd	*.49927441*	*.00647218*	*.4942534*
s=10	SI	GRCR1	IntSprd
SI	*.89039022*	.00372153	.10588825
GRCR1	*.03108284*	.95284936	*.0160678*
IntSprd	*.49760579*	.03327464	*.46911957*
s=10	SI	GRCR2	IntSprd
SI	*.88090505*	.01492181	.10417314
GRCR2	.0168119	.95526482	*.02792328*
IntSprd	*.4716014*	.01964257	*.50875603*

Percent of variation in the row variable is explained by the column variable (10 periods ahead). Significant PVAR equations are in *italics*.

Impulse response graphs show the reaction of one variable to shocks of other variables. Figures 3-5 represents the impulse response graphs.[5] Results of impulse response analysis are in line with panel VAR results.

Responses of soundness index and interest spread to their own shocks die out slowly. Response of interest spread to a shock in soundness index is positive and persistent. Response slowly decays after 6 periods. Also response of interest spread to a shock in non-core liabilities is positive and yet not persistent. The effect of a shock to non-core liabilities on interest spread immediately dies out after one period. Furthermore the response of both domestic and private credits to a shock in interest spread positive and dies out in 3 periods.

[5] Legends show the shock variable.

Results of impulse-response analysis are consistent with the results of variance decomposition. Soundness of banking system significantly explains variation in interest spread by approximately 49 % and response of interest spread persist for consecutive periods. Explanatory power of non-core liabilities on interest spread is limited in comparison to soundness yet significant. Also the interest spread between reference lending and deposit rates explains variation in both domestic and private credits extended by banks. Credits react positively to an increase in interest spread according to panel VAR results.

According to results of panel VAR analysis most robust effect of a shock in soundness is on interest spreads. Improvements in bank soundness increase risk premium for more than a year.

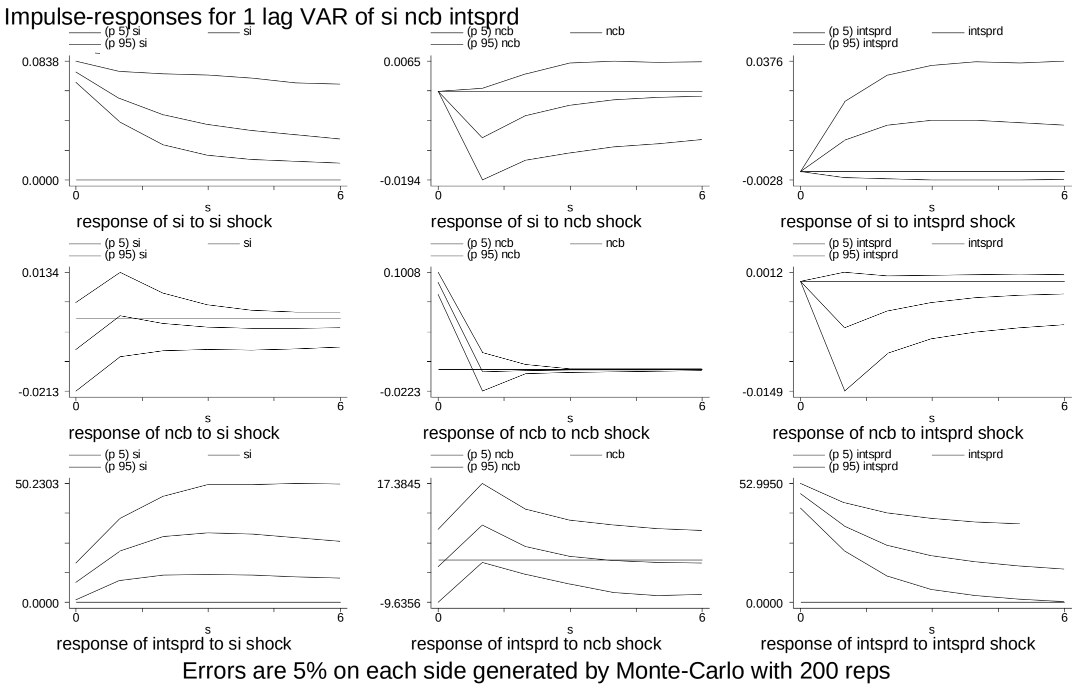

Figure 3. Impulse response graphs for SI, GRNCB and IntSprd

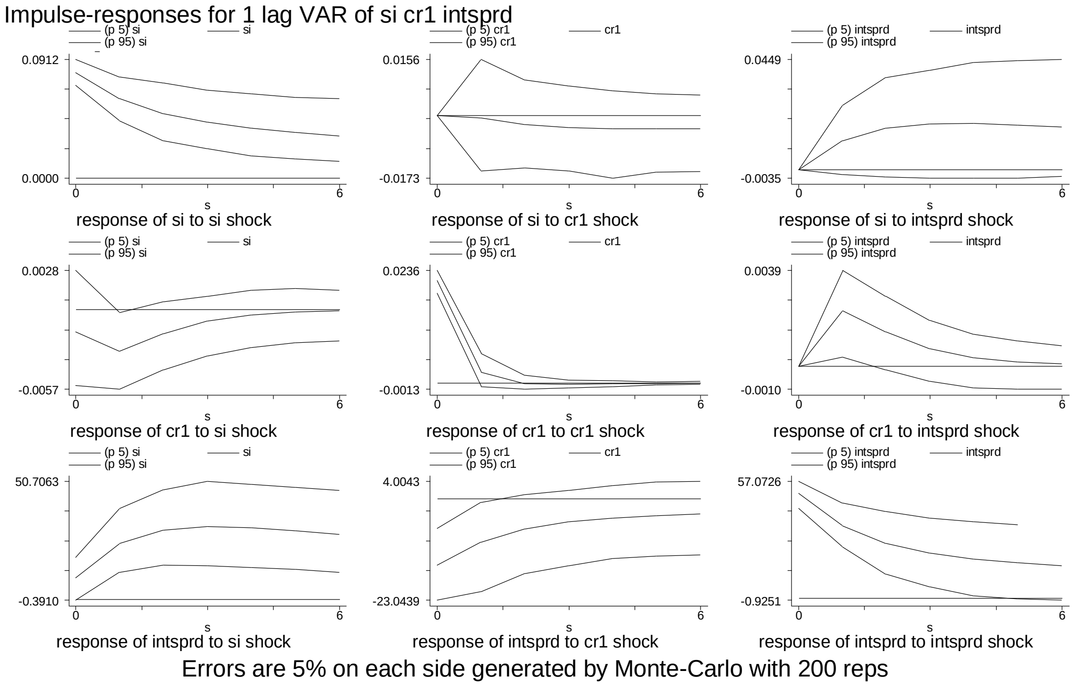

Figure 4. Impulse response graphs for SI, GRCR1 and IntSprd

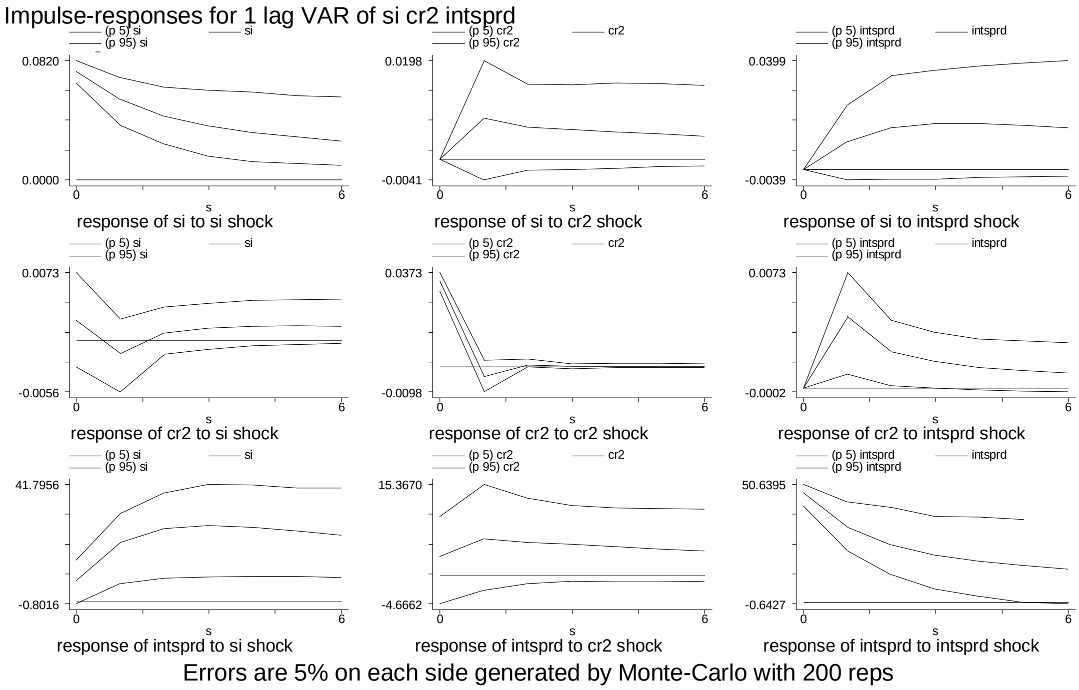

Figure 5. Impulse response graphs for SI, GRCR2 and IntSprd

3.5 Granger causality

Bidirectional Granger causality between soundness index and other variables are also examined as complementary analysis with panel autoregressive analysis. If variable Y can be better predicted using all available histories of both X and Y than using the history of Y alone, one can say that variable X Granger causes variable Y. (Granger, 1969)

After estimating following panel data specification by system GMM, we may test the significance of coefficients of X (γ) by help of Wald test in order to see whether variable X is a Granger cause for Y.

$$Y_{i,t} = \alpha_0 + \sum_{l=1}^{n} \gamma_l X_{i,t-l} + \sum_{l=1}^{n} \beta_l Y_{i,t-l} + \mu_i + \eta_{i,t}$$

One should remember that Granger causality does not represent any conditional causal relation between variables while interpreting the results. We may conclude on which variable precedes other variable. Lag structure should be specified. Following Hartwig (2010) lag length selection is done according to Schwarz information criterion along with Akaike information criterion. Results are presented in Table 10.

Table 10. Lag Length Criteria

SI		1	2	3
GRNCB	AIC	-346.4867	-323.0951	-295.5839
	BIC	-337.0796	-307.8139	-274.7952
GRCR1	AIC	-285.6556	-267.1624	-244.7737
	BIC	-276.8307	-252.8247	-225.2612
GRCR2	AIC	-376.9148	-355.8925	-331.5496
	BIC	-367.3028	-340.243	-310.2006
IntSprd	AIC	-162.8683	-151.7146	-153.5009
	BIC	-153.0493	-135.6946	-131.5916

AIC = Akaike Information Criterion. BIC = Schwarz's Bayesian Information Criterion.

Arellano-Bover/Blundell-Bond system GMM results for Granger causality are reported in Table 11 and Table 12.

Causality runs from soundness index to non-core liabilities, credits and interest spread with a positive sign; however causality in the direction of soundness index only runs from non-core liabilities and private credits with a negative sign.

According to these results a positive shock to bank soundness improves non-core funding and extended credits, yet either piling non-core liabilities or increasing private credits worsen soundness. Also high soundness implies high risk premium.

Table 11. Estimation Results for Granger Causality-Causality from SI
One-step System GMM

	GRNCB	GRCR1	GRCR2	IntSprd
GRNCB (-1)	-.05797098			
GRCR1 (-1)		-.15195124		
GRCR2 (-1)			-.21712473**	
IntSprd (-1)				.71348608***
SI (-1)	.107438***	.03774682**	.03904819***	42.121173***
AB test	0.9163	0.0490	0.4100	0.9394

GRNCB, GRCR1, GRCR2 and IntSprd are dependent variables in each model. Lag of SI is independent variable along with the lag of dependent variable. Estimates for constant terms are not shown. Standard errors are robust. AB test = p-value of Arellano-Bond test for AR (2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

Table 12. Estimation Results for Granger Causality-Causality to SI
One-step System GMM

SI	(1)	(2)	(3)	(4)
GRNCB (-1)	-.26608574***			
GRCR1 (-1)		-.64507361**		
GRCR2 (-1)			-.06176407	
IntSprd (-1)				.00016399
SI (-1)	.68983495***	.80097341***	.7267219***	.90402129***
AB test	0.3519	0.7617	0.2750	0.3025

SI is dependent variable, and lags of GRNCB, GRCR1, GRCR2 and IntSprd are independent variables in each model along with the lag of SI. Estimates for constant terms are not shown. Standard errors are robust. AB test = p-value of Arellano-Bond test for AR (2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

Both Granger causality and panel VAR results indicate that higher soundness precedes higher risk premium. Panel VAR analysis does not imply any explanatory power of non-core liabilities and private sector credits on soundness index; yet

Granger analysis exhibit negative causality runs from non-core liabilities and private credits to soundness.

3.6 Contemporaneous effects on soundness index

In order to examine how funding schema of banks and extended credits affect the banking system soundness contemporaneously panel data analysis is utilized. Following model is specified in longitudinal form:

$$SI_{i,t} = \delta_0 + \delta_1 X_{i,t} + \varepsilon_{i,t}$$

$SI_{i,t}$:measure for soundness (Bank Soundness Index)

$X_{i,t}$: NCB, CR1, CR2 and IntSprd

$\varepsilon_{i,t}$: error term, $\varepsilon_{i,t} = \eta_{i,t} + \mu_i + \lambda_t$

Cross-sectional correlations between independent variables should be less than 0.2 in order to avoid multi-correlation problem.[6] Soundness index components (CAMELS) are normalized by standard deviations so units of variables are not suitable to compare the magnitude of the impact. Dynamic panel data estimation proposed by Arellano and Bover (1995) is utilized for estimation purpose. Arellano and Bover use lags of dependent variables and right hand side variables as instruments as in difference form and utilize system GMM estimator.

Table 13 present the results of panel regressions where soundness of banking system is dependent variable and explained by non-core liabilities and credits extended besides interest spread.

Estimation results indicate that both private and domestic credits have significant positive impact on bank soundness. Interest spread between reference lending and deposit rates also has a significant positive effect on bank soundness.

[6] Correlation matrices are presenten in Table B.

There exists no evidence for the contemporaneous effect of non-core liabilities on soundness.

Table 13. Results explaining Soundness Index (SI)

	Arellano-Bond-One-step GMM			
SI	(1)	(2)	(3)	(4)
IntSprd	.00080516***			
GRNCB		.70994888		
GRCR1			7.3986981**	
GRCR2				2.92939**
AB test	0.203	0.256	0.144	0.438
	Arellano-Bond-Two-step GMM			
SI	(1)	(2)	(3)	(4)
IntSprd	.00079515**			
GRNCB		.39039603		
GRCR1			5.7757436**	
GRCR2				1.8122105
AB test	0.200	0.143	0.248	0.857

SI is the dependent variable, and regressed on IntSprd , GRNCB, GRCR1 and GRCR2 respectively. Estimates for constant terms and lag of dependent variable are not shown.. Standard errors are robust. AB test = p-value of Arellano-Bond test for AR(2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

Furthermore results are replicated by the inclusion of gross domestic product as a control variable. Table 14 provides results for robustness check. Positive effects of private credits and interest spread on soundness index are robust to the inclusion of gross domestic product as control variable.

Table 14. Robustness test: GDP growth as a control variable

		IntSprd	GRNCB	GRCR1	GRCR2
AB_One-step GMM	Coefficient	.00083463***	.71149596***	7.583353***	3.0918306***
	DGDPGR	.03804515**	.01529054	.08412097***	.06063739***
	AB test	0.388	0.125	0.011	0.429
AB_One-step GMM-robust errors	Coefficient	.00083463**	.71149596	7.583353**	3.0918306*
	DGDPGR	.03804515	.01529054	.08412097	.06063739
	AB test	0.080	0.251	0.159	0.433
AB_Two-step GMM	Coefficient	.00087275**	.42826787	6.033893**	1.8250412
	DGDPGR	.02773877	-.09194472	.07216144	.07530233
	AB test	0.086	0.197	0.259	0.696

SI is dependent variable, and regressed on GRNCB, GRCR1, GRCR2 and IntSprd seperately with DGDPGR as a control variable. Estimates for constant terms are not shown. Standard errors are robust. AB test = Arellano-Bond test for AR(2) in first differences. * p<0.1; ** p<0.05; *** p<0.01.

CHAPTER 4

EFFECTS OF VANISHING FINANCIAL BORDERS ON NON-CORE FINANCING AND CREDIT GROWTH

The objective of this chapter is testing the effect of financial openness in emerging markets on non-core financing and credit growth of banking system. Non-core liabilities, which pile up due to the relaxed liquidity conditions of global banking, are proposed as a financial vulnerability indicator in the recent literature; yet link between non-core liabilities and financial openness is not tested. Also the effect of financial openness on credits extended by banks is investigated in this chapter.

External (cross-border) financing conditions play an important role in credit expansion of financial sector. This phenomenon is widely discussed for US and European banking sector after 2007/2008 global financial crisis. European global banks serve as an intermediary agent for the US dollar funds. (Shin, 2011) External financing conditions of banking sector along with the financial openness level of a country may affect the banks' credit creation procedure and reliance on none-core liabilities. It is aimed to investigate the relation between banking sector external liquidity access, financial openness level and none-core funding along with credits.

4.1 Methodology

To test the effect of financial openness and cross-border liquidity access of banking system on non-core financing and extended credits following model is specified in longitudinal form.

$$DV_{i,t} = \delta_0 + \delta_1 FO_{i,t} + \delta_2 BEF_{i,t} + \delta_3 X_{i,t} + \varepsilon_{i,t}$$

$DV_{i,t}$: dependent variables

$FO_{i,t}$: measures for financial openness

$BEF_{i,t}$: banking sector external financing

$X_{i,t}$: control variables

$\varepsilon_{i,t}$: error term

In addition to de facto measures of financial openness de jure measure of financial openness KAOPEN proposed by Chinn-Ito is included into analysis in order to see whether there exist differences in the effects of the actual realization of financial openness via de facto measures and financial account regulations of the country via de jure measures on financial conditions.

4.2 Data

Quarterly Data is obtained from the World Bank databank WDI 2012, IMF's International Financial Statistics (IFS), Lane –and Milesi-Feretti database and Chin-Ito Index. 46 countries are considered in data collection process according to MSCI emerging market and frontier market indices.

MSCI Emerging Markets Index, 21 emerging markets: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Morocco, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, and Turkey.

*MSCI Frontier Markets Index***,** 25 frontier markets: Argentina, Bahrain, Bangladesh, Bulgaria, Croatia, Estonia, Jordan, Kenya, Kuwait, Lebanon, Lithuania, Kazakhstan, Mauritius, Nigeria, Oman, Pakistan, Qatar, Romania, Serbia, Slovenia, Sri Lanka, Tunisia, Ukraine, United Arab Emirates, and Vietnam.

Due to data availability for each model countries included in estimation vary between 14 and 23. Data span is 2000 – 2012 and data frequency is quarterly.

Descriptive statistics of variables are provided in Table C.

Also variable for banking sector liquidity access is constructed by using *Federal Financial Institutions Examination Council E-16 reports* which is constructed by country exposure lending survey.

4.2.1 Measures

Dependent variables of the analysis are designed to indicate the financing conditions of banking system through focusing on non-core liabilities, which represents funds other than traditional source, deposits, besides credits extended. Data is obtained from IMF's International Financial Statistics (IFS).

$NCB_{i,t}$: None-core liabilities of banking sector of country i at time t.

It is calculated as the sum of liability of banks to foreign sector and non-banking financial sector. Liability of banks to foreign sector is measured as the percentage of liabilities of depository institutions to non-residents in GDP. Liability of banks to non-banking sector is measured as the percentage of liabilities of depository institutions to other financial corporations in GDP.

$CR1_{i,t}$: Credits extended to private sector by banking sector of country i at time t.

It is measured as the percentage of claims of depository institutions on private sector in GDP.

$CR2_{i,t}$: Domestic credits extended by banking sector of country i at time t.

It is measured as the percentage of domestic claims of depository institutions in GDP.

Financial Openness Measures:

Financial openness measures are selected considering two aspects of financial openness. Considering the advantage in practice de facto measures are primarily preferred in this analysis.

A de jure measure of financial openness is also included in the analysis aiming to compare the effects of two types of financial openness. Chinn- Ito financial openness index[7] which relies on the data from IMF database, the *Annual Report on Exchange Arrangements and Exchange Restrictions* (*AREAER*) that tracks exchange and trade arrangements, is used.

NFA: Net Foreign Assets

GFA: Gross Position (sum of total foreign assets and liabilities)

FDI: Gross Position of Foreign Direct Investment (sum of inflows and outflows)

All de facto financial openness measures are as percentage of GDP, obtained from World Bank database and cubic spline interpolation is used to construct quarterly data.

KAOPEN: Chinn-Ito index

KAOPEN is constructed by binary dummy variables which are the tabulation of restrictions on cross-border financial transactions in four major categories- the presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account transactions, requirement of the surrender of export proceeds- reported in AREAER.

Banking Sector External Financing:

BEF: Banking Sector External (Cross-border) Financing Access

[7] Chinn, M. D. and Ito H. (2008). "A new Measure of the Financial Openness". Journal of Comparative Policy Analysis, 10(3), 309-322.

BEF shows the country's banking sector credits from US banking sector which is measured as US banks' adjusted cross-border claims for guarantees and indirect borrowing on banking sector of the country, including derivative products.

Control Variables:

In order to capture country characteristics GDP levels of countries are considered to use as control variable yet because of the unit-root process in GDP series growth rate of GDP is preferred.

GDPGR: GDP growth rate

GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.

Correlation between variables is presented in Table D.

4.2.2 Unit-root tests

Augmented Dickey Fuller and IPS unit-root tests which are suitable for unbalanced panel data are conducted and also Levin-Lin-Chu unit-root test results are reported in the Table 15. Variables with unit-root are (NFA, GFA and FDI) used in the first differences form.

4.3 Empirical results

Dynamic panel data estimation is utilized for the purpose of testing the effect of financial openness on non-core liability reliance and credit creation of banking system in emerging economies. To test the stationary condition of variables for estimation purposes IPS and Dickey Fuller (Fisher and Phillips Perron) unit-root tests which are suitable for unbalanced panel data are conducted and variables with unit-root are (NFA, GFA, FDI) used in the first differences form.

Table 15. P-values of Unit-root Tests

		NCB	GRCR1	GRCR2	DNFA	DGFA	DFDI	BEF
ADF	P	0.0000	0.0000	0.0000	0.0182	0.0015	0.0000	0.0000
	Z	0.0051	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000
	L	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000
	Pm	0.0000	0.0000	0.0000	0.0119	0.0004	0.0000	0.0000
IPS		0.0399	0.0000	0.0000	0.0205	0.0000	0.0000	0.0000
Levin-Lin-Chu		NA	NA	NA	0.0000	0.0000	0.0000	NA

P: Inverse chi-squared, Z: Inverse normal, L: Inverse logit t, Pm: Modified inv. chi-squared

Estimation results, are presented in Table 16, indicate strong relation between financial openness and credits extended by banking sector. A measure for net foreign assets of monetary sector (NFAMON[8]) is used as a control variable in order to test the robustness of results. Results are presented in Table 17. Multi-correlation problem may arise from high cross-sectional correlations between independent variables. Correlation matrix, which is presented in Table D, shows that net financial assets of monetary sectors have low correlation with the countries' net financial assets, and other explanatory variables. Hence, it is a suitable control variable to include in regression analysis.

Both net and gross stock variables of financial openness indicate pronounced effects on the lending of baking sector. Growth rate of both domestic and private credits accelerate with an increase in foreign assets. In contrast, external financing

[8] NFAMON is used in first difference form due to unit-root process.

access of banks, which is a flow measure, has an insignificant effect on credits extended. Findings imply that foreign asset formation of a country brings about more funding opportunity and incentive for banks to enlarge their credit supply than cross-border funding access.

Table 16. Effects of Financial Openness on Non-core Liabilities and Credit Growth of Banking Sector

	NCB	GRCR1	GRCR2
BEF	.68244617*	-.00210648	.00331441
DNFA	.03751183	.00047992**	.0008094***
DGFA	-.00155311	.00040751***	.00056055***
DFDI	-.05248093***	.00025332	.00019209**
KAOPEN	.40359297*	-.00186814	-.00199634
DGDPGR	.06016338	-.00506293**	-.00902494***
AB test	0.6482	0.7399	0.3649

None-core liabilities of banking sector (NCB) besides growth of private and domestic credits (GRCR1 and GRCR2) are dependent variables in each model. Estimates for constant terms and lag of dependent variables are not shown. Detailed estimation results are available in appendix E, F and G. 1 lag is specified for NCB and 2 lag is specified for credit growth variables. Growth of gross domestic product is utilized as a control variable. AB test = p-value of Arellano-Bond test for AR(2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

Effects of financial openness on none-core funding of banking sector is rather limited to external funding access of banks. One may conclude that higher the access to global baking funds higher the non-core funding portion of banks' funding schema in emerging economies. Furthermore de jure financial openness measure, KAOPEN, has a significant positive effect on non-core liabilities of banks. Deregulation of financial boundaries positively affects banks' reliance on non-core funds.

Table 17. Effects of Financial Openness with Net Financial Assets of Monetary Sector as Control Variable

	NCB	GRCR1	GRCR2
BEF	.67165679*	-.00212204	.00332652
DNFA	.03724092	.00048346**	.00081096***
DGFA	-.00037474	.00040545***	.0005601***
DFDI	-.0531145***	.00026049	.00019037**
KAOPEN	.40389159*	-.00186199	-.00199363
DNFAMON	.00203769*	-3.383e-06**	-2.114e-06
DGDPGR	.07325582	-.00507545**	-.00901228***
AB test	0.6464	0.7302	0.3600

None-core liabilities of banking sector (NCB) besides growth of private and domestic credits (GRCR1 and GRCR2) are dependent variables in each model. Estimates for constant terms and lag of dependent variables are not shown. 1 lag is specified for NCB and 2 lag is specified for credit growth variables. Growth of gross domestic product is utilized as a control variable. AB test = p-value of Arellano-Bond test for AR(2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

CHAPTER 5

HOW DO NON-CORE FINANCING AND LEVERAGE AFFECT THE SOUNDNESS OF THE TURKISH BANKING SYSTEM?

Bank riskiness is widely studied in both industrialized and developing countries; regarding this purpose CAMELS-type indicators are widely used in the literature. Bank efficiency and ownership structure are common examples of researches on bank soundness in the literature. To the best of our knowledge relation between bank soundness and non-core financing is remain untested. The main focus of this chapter is testing the effects of non-core financing conditions on the soundness of banks in Turkish banking system. Bank level examination of procyclical leverage is documented by Binici and Köksal (2012), however the relation of financial soundness with leverage is left unexamined. Another objective of this chapter is testing the Turkish banks' soundness against leverage along with the external and non-core financing sources.

5.1 Model

Soundness index is formed by CAMELS -type indicators to test whether the external and non-core financing affect banks' soundness. Due to autocorrelation in the errors dynamic panel data estimation is utilized.

Descriptive statistics for variables are presented in Table E.

$$BS_{i,t} = \delta_0 + \delta_1 LEV_{i,t} + \delta_{i,t} NCF_{i,t} + \delta_3 X_{i,t} + \varepsilon_{i,t}$$

$BS_{i,t}$:measure for soundness (Bank Soundness Index)

$LEV_{i,t}$: measures for leverage

$NCF_{i,t}$: measures for non-core and FX funds

$X_{i,t}$: control variables

$\varepsilon_{i,t}$: error term

$\varepsilon_{i,t} = \eta_{i,t} + \mu_i + \lambda_t$

$\eta_{i,t}$: independently distributed error term, yet cross –sectional heteroscedasticity is allowed

μ_i: time-invariant individual effect component of error term, fixed effect (firm effect)

λ_t: time fixed effect

Panel data estimation requires stationary variables. IPS and Dickey Fuller (Fisher and Phillips Perron) unit-root tests which are suitable for unbalanced panel data are conducted. Results of test show no evidence for unit-root. Results are provided in Table F. Correlation matrices, which are presented in Table G, show that cross-sectional correlations between independent variables are less than 0.2.

5.2 Data

The quarterly balance sheets of banks in Turkey between 2002Q3-2013Q3 are obtained from Bank Association of Turkey. By using CAMELS[9] measures soundness index is constructed in six dimensions. Scope of the six components of CAMELS is as follows:

- Capital Adequacy: Capital's ability to cover banks' risk
- Asset Quality: Ability of asset management
- Management Quality: Performance of implementation of policies, Financial performance of bank
- Earnings: Sufficiency of earnings

[9] Bongini, Claessens and Ferri, 2001; 1998; Kaya, 2001; Bongini, Laeven, Majnoni, 2002; Molina, 2002; Wirnkar and Tanko, 2008

- Liquidity: Ability of bank to produce cash
- Sensitivity to Market Risk: Sensitivity of bank performance to market conditions such as fluctuations in interest rates, commodity prices, foreign exchange rate.

Table 18 summarizes the calculation of measures used for each dimension and indicates whether the attribute is positive or negative.

Table 18. Measures Used for CAMELS Ratios

CAMELS Measures		
C1	Equity/ ((Required Capital for Credit + Market + Operational Risk)*12.5)*100	+
C2	Equity / Total Assets	+
A1	Loans Under Follow-up (gross) / Total Loans and Receviables	-
A2	Specific Provisions / Loans Under Follow-up	+
M1	Net Interest Income After Specific Provisions/ Total Operational Revenue	+
M2	Operational Profit (Loss) Before Tax / Total Assets	+
E1	Return on Assets	+
E2	Return on Equity	+
L1	Liquid Assets / Total Assets	+
L2	Liquid Assets / Short-term Liabilities	+
S1	FX Assets/ FX Liabilities	+

5.2.1 Soundness Index

Each CAMELS variable is the average of measures in each category. For each measure first a reference value is constructed by taking the average of each measure in each time period. Then index value is calculated as:

$IV_{r,c,i,t}$ = (Bank's ratio/ Reference Value)*100 for ratio r, variable c, bank i, time t

Performance note ($PI_{r,c,i,t}$) for positive attributes which shows greater soundeness calculated by subtraction 100 from index value.

$PI^{+}_{r,c,i,t} = IV_{r,c,i,t} - 100$

Performance note for negative attributes are calculated by subtracting index value from 100.

$PI^{-}_{r,c,i,t} = 100 - IV_{r,c,i,t}$

Average of performance notes from each ratio assigned to that dimesion (CAMELS variable) gives the CAMELS variables, and the mean of these variables gives the soundness index value for each bank in a given period ($BS_{i,t}$).

5.2.2 Explanatory variables

None-core Financing: Traditional source of funds for banks is deposit of homeowners yet through loans from financial intemediaries and foreign creditors banks may raise fund for their lending activity. Three measures of none-core financing and one measure for credits are utilized.

LN: Loans/Total Liabilities

NCR: Non-core Liabilities/Core Liabilities

[Non-core Liabilities = Non-deposit Liabilities (Credits Received + Loans from Money Market + Securities issued + Funds)+ Other Foreign Liabilities]

FXNC: FX Non-core Liabilities/ Total Liabilities

Leverage: In order to see the effect of leverage on bank soundness level two leverage measures are utilized.

LEV1: Total Assets/Equity

LEV2: (Total Liabilities+ off B/S items)/ Equity

Credits: Credits extended by bank

GRCR: Growth of extended credits (Total Credits and Receviables)/ Total Assets

Control Variables:

Balance sheet expansion is calculated as sum of total assets and liabilities.

GRBS: Growth of balance sheet, Δ (TA+TL) / (TA+TL)

FXBS: FX balance sheet ratio, (FX TA+ FX TL) / (TA+TL)

Control variables are utilized according to correlation restrictions required for panel data.

5.3 Empirical results

Dynamic panel data analysis is used to test bank soundness level against non-core funds used by banks and credits extended by banks along with leverage. Two sets of analyses for two aspects of leverage, from asset side and from liabilities side, are presented in Table 19 and Table 20. In order to capture different aspects of non-core funding of banks loans used by banks, non-core liabilities and foreign exchange non-core liabilities are utilized.

In both sets of analyses explanatory power of non-core funding measures on bank soundness is found insignificant. On the other hand leverage measures have significant negative impact on bank soundness. Furthermore, FX balance sheet expansion enhances bank soundness according to the results.

For only one set of analyses which includes non-core ratio foreign ownership dummy has a significant negative impact on bank soundness. However it is not a robust finding, it implies a lower soundness level for foreign banks in Turkey.

Table 19. Effects on Soundness: NC, Loans, Credits, Total Asset-to-Equity

SI	(1)	(2)	(3)	(4)
NCR	-.00082364			
DLN		-.00287139		
GRCR			-.26660579	
DFXNC				-.00365999
LEV1	-.02501253**	-.02894824***	-.02987728***	-.02886073***
GRBS	-.1403601			
FXBS		.00751638*	.00684561*	.00760926*
DF	-.10569421*	-.10488018	-.10816555	-.10561457
AB test	0.6915	0.6913	0.6786	0.6910

Soundness index (SI) is dependent variables in each model. Estimates for constant terms and lag of dependent variable are not shown. FX balance sheet and growth of balance sheet are utilized as control variables. DF is foreign ownership dummy variable. AB test = p-value of Arellano-Bond test for AR(2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

Table 20. Effects on Soundness: NC, Loans, Credits, Total Liability-to-Equity

SI	(1)	(2)	(3)	(4)
NCR	-.00087487			
DLN		-.00364661		
GRCR			-.21472958	
DFXNC				-.00389032
DLEV2	-.0049217**	-.00534349**	-.00535131**	-.00530426**
GRBS	-.77162492			
FXBS		.00659761**	.00594405*	.00664701**
DF	-.08326108*	-.08042489	-.08223715	-.08135028
AB test	0.6974	0.7063	0.7145	0.7126

Soundness index (SI) is dependent variables in each model. Estimates for constant terms and lag of dependent variable are not shown. FX balance sheet and growth of balance sheet are utilized as control variables. DF is foreign ownership dummy variable. AB test = p-value of Arellano-Bond test for AR (2) in first differences with null hypothesis of no autocorrelation. * p<0.1; ** p<0.05; *** p<0.01.

CHAPTER 6

DISCUSSION OF THE RESULTS

The first battery of the results on relation between bank funding composition, leverage and bank soundness imply that an increase in bank soundness raises the risk premium of bank lending interest spread. Also high non-core funding increases the risk premium. Narrow deposit-lending spreads, which is an efficiency indicator in developed financial markets, may be an excessive risk taking indicator for banking sector in emerging economies. Parallel to these findings, Rojas-Suarez (2002) proposed interest spreads as an indicator for risk taking behavior, stating that increasing spreads indicate high risk premium and decreasing spreads indicate high risk taking in emerging markets.

Moreover interest spread between reference lending rate and deposit rates has a significant positive impact on domestic and private sector credits extended by banking sector. Thus it shows that credit supply is affected by risk premium favourably.

Looking from the other end of the story these results also indicate that sound banks impose high interest spreads. Interest spread between reference lending rate and deposit rates may serve as a proxy for profit margin. We may conclude that higher the soundness, higher the profit margins in emerging economies. High profit margins of banking sector in emerging economies stem from high capitalization and low interest rates in the developing economies. Costa et al. (2014) predict that profit margins in emerging economies will tend to decrease due to tighter regulations, increasing competitiveness and consumer sophistication; nevertheless profit margins in emerging economies will remain over developed economies' levels.

Uncovered interest rate parity condition[10] states that expected returns on domestic and foreign assets should be equal after taking into account exchange rates when capital mobility is perfect. Any arbitrage opportunity will be exploited until the rates of returns are equal. According to Mundell-Fleming model with perfect capital mobility and flexible exchange rate policy, central banks are not free to set interest rates. Mundellian trilemma suggests that perfect capital mobility, flexible exchange rates and monetary autonomy cannot coexist. Recent literature discusses that because of high capital mobility trilemma turned into dilemma. National monetary policies, even under flexible exchange rate regimes, are restricted by large gross capital flows which arise from financial integration (Rey, 2015).

In the last decade in order to prevent stagnation and foster the economic activity, quantitative easing approach in monetary policies is utilized in developed economies. These policies reached a peak and further unconventional monetary policies are needed to prevent hoarding money. Hence this situation causes breeching the zero lower boundaries in interest rates, once a theoretical phenomenon. These unconventional monetary policies also increase the capital flows to emerging markets where the returns on financial assets are still high in comparison to developed markets. Even for economies with a flexible exchange rate policy, monetary autonomy is a hard goal to achieve with large capital inflows (Rey, 2015; Blanchard, 2016; Borio and Disyatat, 2016; Borio and Zabai, 2016).

One may expect that increasing capital flows, which translate into increasing non-core funding and leverage in banking sector, may lead low interest rates on loans and high risk taking in emerging economies. Findings of this research indicate that an increase in soundness of banking system increases credit growth and non-core

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[10] $1 + i_d = \frac{S.(1+i_f)}{F}$, where i_d is domestic interest rates, i_f is foreign interest fate, S is spot exchange rate and F is forward exchange rate

funding; on the other hand results suggest that increasing non-core funding or an acceleration in credits extended to private sector may lessen bank soundness.

In the second part of the thesis our focus shifts to the effects of financial openness on bank funding and credit growth. Also the results of this part help us to understand the relation between external financing access and non-core funding of banking sector. Our findings imply that relaxing the capital account restrictions enhance non-core funding of banking sector in emerging markets. Contrarily, foreign asset stocks have no significant impact on non-core financing of banking sector. Financial openness analysis also shows that credit growth of banking sector is affected positively by foreign assets of a country. Policy suggestions drawn from this set of analyses are mainly on capital controls. IMF's Global Financial Stability Report (2015) evaluates transmission channels for quantitative easing policies. In the report it is stated that one of these channels is portfolio outflow from countries which conduct unconventional monetary policies, especially US. These outflows take the form of capital deluge to emerging markets.

Banks rely on mainly deposits while funding their activities in emerging markets, though there is a significant rise in non-deposit funding access in the last decades (González-Hermosillo et al., 2013; Demiralp, 2007). Bank level analysis in Turkish banking system is performed in order to see the effects of leverage and non-core funding on bank soundness.

The results of the last part of the research indicate no significant effect of non-core funding on bank soundness which may be due to high portion of deposits in banks' funding sources. Considering improving effect of foreign exchange balance sheet expansion on bank soundness one may conclude that sound banks are capable of raising foreign funds. On the other hand increasing mobility of cross-border funds does not affect Turkish banking system soundness negatively. Also these results are limited by the soundness measures’ capability to capture the true nature of banks’ risk appetite. Leverage measures may serve better in order to assess the risk appetite of banks. Findings indicate a consistent negative impact on bank soundness by increasing leverage in banks’ balance sheets.

CHAPTER 7

CONCLUSION

This thesis aims to investigate the dynamics between non-core funding and bank soundness in emerging markets. Moreover the present study contributes to the literature by focusing on the effects of international capital flows on non-core financing and leverage by utilizing de facto and de jure financial openness measures. In this regard, we propose also an additional measure for external financing conditions of banking sectors in emerging markets. Furthermore, with bank level data, Turkish banks' soundness is tested against non-core funding and leverage. To the best of our knowledge this study contributes to the literature on Turkish banking sytem by utilizing soundness index to test the effect of leverage and non-core funding on soundness for the first time.

In the first part of this thesis relation between bank funding composition, leverage and bank soundness is examined by panel autoregressive analysis, Granger causality and panel data analysis.

Bank soundness index and spread between lending and deposit rates moving in the same direction suggest that high risk taking behavior (narrowing spreads) in developing markets results in low bank soundness. Both domestic and private credits extended by banking system are affected positively by the interest spread between reference lending and deposit rates. High risk premium also improves credit supply in emerging markets.

Furthermore, the results show converse bidirectional relation between soundness of banking system in emerging economies with credit growth and non-core funding. According to the results bank soundness improves domestic and private credits and non-core funding, on the other hand increasing private credits and non-core funding mitigate bank soundness.

These findings constitute an important point for banking system in emerging economies by pointing out that a sound banking system gives rise to high leverage and non-core funding; but in turn this increase in non-core funding sources makes banking system more vulnerable. Increasing capital flows and decreasing monetary autonomy make the regulation of banking funding schema an urgent and important subject. Considering the results of this research on bank funding composition reliance on non-core funds such as short-term wholesale funding should be limited in order to promote soundness. Although regulating leverage and funding sources of banks may limit the credit creation capacity of banks, these regulations increase the resilience of banks to credit and liquidity risks. Liquidity risk arises from maturity transformation role of banks which promotes efficient resource allocation in economy and consumption smoothing. Credit risks banks bearing increase with the rapid balance-sheet growth initiated by whaling short-term wholesale funds. Basel III reforms, liquidity coverage ratio and net stable funding ratio, aim to regulate the reliance level on short-term funds and also aim to mitigate long-term risks.

This research is limited by aggregated data of banking sector. Bank level analysis in emerging markets may provide futher insight on non-core reliance of banks for funding their activities. Also another further research suggestion is to investigate the impacts of Basel III reforms on bank soundness which is a fruitfull research area in the upcoming decade.

Increasing globalization culminates in high capital mobility. Banking sector as the intermediary agent of funds both locally and globally is affected by the capital movement trends at first hand. The second part of this research focuses on the consequences of financial openness for non-core liability reliance and credit creation of banking system in emerging economies in a dynamic panel data setting. For this purpose, both de jure and de facto financial openness measures are utilized. It is aimed to capture the effects of both restrictions on capital account and realized capital movements. Furthermore financial openness measures can be grouped into two categories such as stock and flow measures. Foreign asset measures constitute stock measures. On the other hand cross-border financing access and foreign direct investments are flow measures of de facto financial openness.

According to the significant results, non-core liabilities of banking sectors in emerging economies grow in line with diminishing restrictions on cross-border financial transactions. Also non-core funding increases by higher access to the global banking liquidity. The stock measures of de facto financial openness have no significant effects on non-core liabilities, except foreign assets of monetary sector. Also foreign direct investment has a negative impact on non-core reliance of the banking sector in emerging markets. The results regarding the effects of financial openness on non-core liability imply that foreign asset stocks of a country have no impact on the banking system for drawing short-term capital from the rest of the world. On the other hand global liquidity access of banking system enhances the non-core funding of banking system in emerging economies. Quantitative easing policies of advanced economies mark the last decade. Fairly large capital flows to emerging markets constitute a problem for policy makers. Rey (2015) explains that in a world with a highly mobile capital, it becomes impossible for policy makers to have monetary autonomy even with flexible exchange rates. If foreign exchange rate and monetary policies are not sufficient tools for coping with insurgence of capital flow, policy makers should begin to consider capital account controls in order to cope with the consequences of high capital flows on financial system in emerging economies.

Second battery of findings on credit growth shows that both gross and net foreign assets affect credit creation process of banking sector positively. These findings imply that increasing foreign asset stock in a country may provide higher guarantee for securitization; as a consequence, banks will be capable of exercising higher leverage in order to extend credits. The link between credit growth and cross-border financing access seems insignificant.

Analysis on the access of banks to short-term foreign funds at bank level may provide more insight about the effect of global liquidity access on credits extended by banking sector in emerging economies. Also spread of monetary polices of advanced economies on emerging banks balance-sheets constitutes a further research area. Employment of more de jure measures may serve a better understanding of the effects of capital regulations on banking system.

Bank level analysis for Turkish banking system is carried out in purpose of understanding the effects of non-core funding and leverage on bank soundness in the last part of this study. This part of research aims to shed light on the effects of non-core funds, leverage levels and balance-sheet expansion on soundness of Turkish banks. Non-core funding has no significant effect on bank soundness according to our data set. Analysis on the non-core funding may be improved by employing additional financial ratios such as loan-to-deposit ratio and money market loans.

We aim to capture the risk taking behavior of banks in Turkish system by focusing on leverage ratios. Leverage represents the bank's asset creation ability out of its capital. IMF's Global Financial Stability Report (2015) indicates that Turkey is one of the emerging economies that have high loan-to-deposit ratio, over 100 percent along with Russia, China and South Africa. High loan-to-deposit ratios imply high risk taking by generating more credits out of deposits. Loan-to-deposit ratios may serve as a complementary measure in the further research. Leverage measures serve as an indicator for risk appetite of banks. Findings indicate a consistent negative impact of leverage level on bank soundness.

Moreover, results indicate an improving effect of foreign exchange balance sheet expansion on bank soundness. When we look from the other end of the relation we may conclude that sound banks are capable of raising more foreign funds. Shin (2012) emphasizes that global banking glut observed through highly expanded balance sheets of global banks create great vulnerabilities in global financial system. Remembering the 2007 global crisis caused by over expanded banks in developed markets in last decade, emerging market banks should be aware of leverage induced growth of balance-sheet.

We should also keep in mind soundness of a banking system is a vast subject with various dimensions, although we may propose some important points to focus on for both policy purposes and further research ideas. For a fast growing banking sector loss-absorbing buffers[11] are crucial when a credit crisis occurs. Furthermore risky corporate debt should be monitored by a regulatory authority. According to IMF's Global Financial Stability Report (2015) Turkey's loss-absorbing buffers are diminishing since 2010. The combination of this fact with the increasing loan-to-deposit ratios is alarming for Turkish banking system. Furthermore corporate debt-at-risk data of IMF for Turkish banking system has an increasing trend. Loan structure of banking system needs close supervision in order to avoid vulnerabilities that arise from credit and liquidity risks.

[11] Loss-absorbing buffer = (tier1 capital + loan loss reserves – non-performing loans)/ risk weighted assets

APPENDIX A

DESCRIPTIVE STATISTICS-I

Table A. Descriptive Statistics-I

Variable		Mean	Std. Dev.	Min	Max	Observations
SI	overall	9.72e-10	.5546845	-1.694794	1.318204	N = 288
	between		.5171871	-1.112367	.9962589	n = 18
	within		.2327495	-.7168479	1.173254	T = 16
IntSprd	overall	584.0855	311.2814	123	1289.495	N = 208
	between		308.1199	176.6599	1154.607	n = 13
	within		94.00947	316.379	925.9605	T = 16
GRNCB	overall	.0045265	.090386	-.4895182	.2981392	N = 182
	between		.0369876	-.0461183	.1098989	n = 13
	within		.0869105	-.4778398	.2817741	T = 14
GRCR1	overall	.0077466	.026672	-.0783859	.0714593	N = 150
	between		.0143547	-.0255325	.0300121	n = 10
	within		.0229063	-.0602355	.0656124	T = 15
GRCR2	overall	.0073003	.0347429	-.0889068	.1589225	N = 195
	between		.0123532	-.0140123	.0323165	n = 13
	within		.0326417	-.0949523	.1339063	T = 15
DGDPGR	overall	.0005973	.4954249	-1.553157	1.638706	N = 270
	between		.0966518	-.1832737	.2619016	n = 18
	within		.4864056	-1.588599	1.580856	T = 15

APPENDIX B

CORRELATION BETWEEN VARIABLES-I

Table B. Correlation Between Explanatory Variables-I

(obs=122)	GRNCB	IntSprd	DGDPGR
GRNCB	1.0000		
IntSprd	-0.0046	1.0000	
DGDPGR	-0.0719	-0.1007	1.0000
(obs=105)	GRCR1	IntSprd	DGDPGR
GRCR1	1.0000		
IntSprd	0.1897	1.0000	
DGDPGR	-0.1066	-0.1204	1.0000
(obs=135)	GRCR2	IntSprd	DGDPGR
GRCR2	1.0000		
IntSprd	0.1789	1.0000	
DGDPGR	-0.2235	-0.1014	1.0000

APPENDIX C

DESCRIPTIVE STATISTICS-II

Table C. Descriptive Statistics-II

Variable		Mean	Std. Dev.	Min	Max	Observations
NCB	overall	15.4173	19.14822	0	168.3701	N = 1370
	between		16.0121	.2563691	92.24537	n = 30
	within		11.05726	-75.00529	94.58897	T-bar = 45.6667
DCR1	overall	.0028622	.0186326	-.2084147	.1906493	N = 1140
	between		.0041463	-.0056515	.0095137	n = 26
	within		.0181834	-.2086776	.1839979	T = 43.8462
DCR2	overall	.0029208	.0252482	-.2342575	.2576004	N = 1263
	between		.0049242	-.0091801	.0111393	n = 29
	within		.0247799	-.2357609	.2517635	T-bar = 43.5517
DNFA	overall	-.1383939	19.43425	-325.6576	205.401	N = 2107
	between		1.538369	-8.476195	1.3379	n = 43
	within		19.37466	-323.3992	207.6594	T = 49
DGFA	overall	2.916897	69.0562	-278.9815	1970	N = 2107
	between		23.96518	-34.83418	152.0226	n = 43
	within		64.8654	-249.0452	1820.894	T = 49
PCAPF	overall	1.440178	16.9591	-327.8178	53.85496	N = 2100
	between		8.015978	-39.52484	10.0528	n = 42
	within		14.99517	-286.8527	65.15576	T = 50
PINV	overall	-2.807801	23.83173	-473.1403	43.11002	N = 2100
	between		11.25708	-67.3495	2.414796	n = 42
	within		21.07576	-408.5986	74.03324	T = 50
DFDI	overall	.1044996	3.219023	-30.41611	73.12162	N = 2156
	between		.7242881	-.5657723	4.368789	n = 44
	within		3.138344	-32.07309	68.85733	T = 49
KAOPEN	overall	.6011747	1.418338	-1.863972	2.439009	N = 1978
	between		1.347388	-1.35017	2.439009	n = 43
	within		.4873924	-2.391114	2.579398	T = 46
BEF	overall	.6408796	3.119335	-22.04442	66.10601	N = 1715
	between		1.984374	-.8670859	11.83317	n = 35
	within		2.429937	-20.53645	54.91372	T-bar = 49

APPENDIX D

CORRELATION BETWEEN VARIABLES-II

Table D. Correlation Between Explanatory Variables-II

(obs=1473)

	BEF	DNFA	DGFA	DFDI	KAOPEN	DGDPGR
BEF	1.0000					
DNFA	0.0092	1.0000				
DGFA	0.0172	0.1815	1.0000			
DFDI	0.0346	0.0774	-0.0015	1.0000		
KAOPEN	0.1435	-0.1024	-0.0605	0.0022	1.0000	
DGDPGR	0.0128	-0.0846	-0.1298	0.0304	0.0162	1.0000

APPENDIX E

DESCRIPTIVE STATISTICS-III

Table E. Descriptive Statistics-III

Variable		Mean	Std. Dev.	Min	Max	Observations
SI	overall	4.92e-17	.571776	-1.544168	1.379921	N = 559
	between		.4758294	-.6328512	.9243544	n = 13
	within		.3428645	-1.250973	1.103235	T = 43
NCR	overall	28.44353	13.08729	4.509519	81.99087	N = 559
	between		8.351885	12.92361	39.57512	n = 13
	within		10.33313	-1.480016	80.73181	T = 43
DLN	overall	.1276858	2.115148	-11.51398	8.496208	N = 546
	between		.240259	-.1170123	.6281523	n = 13
	within		2.102491	-11.99304	7.995742	T = 42
GRCR	overall	.8598261	2.533793	-11.43873	9.6282	N = 546
	between		.2767845	.1942487	1.344175	n = 13
	within		2.519774	-11.34984	9.505321	T = 42
DFXNC	overall	.146784	1.99729	-11.24031	8.577727	N = 546
	between		.1888835	-.0879754	.6136462	n = 13
	within		1.989014	-11.318	8.500043	T = 42
LEV1	overall	8.976542	2.276077	3.670149	21.10515	N = 559
	between		1.386504	6.538974	11.38618	n = 13
	within		1.844676	5.097279	20.03919	T = 43
DLEV2	overall	1.114175	6.431739	-66.28149	45.44208	N = 546
	between		.8108719	.2544729	3.084991	n = 13
	within		6.384295	-65.93897	43.47126	T = 42
GRBS	overall	.0049185	.0061759	-.0106217	.0505153	N = 546
	between		.0011479	.0031191	.0073529	n = 13
	within		.0060765	-.013056	.0513322	T = 42
FXBS	overall	34.85285	10.69574	13.51054	68.59882	N = 559
	between		7.718759	18.29655	44.59665	n = 13
	within		7.700912	19.67458	67.0307	T = 43

APPENDIX F

P-VALUES OF UNIROOT TESTS

Table F. P-Values of Unit-root Tests

		SI	GRCR	DLN	NCR	DFXNC	FXLR
ADF	P	0.0000	0.0000	0.0000	0.0028	0.0000	0.0000
	Z	0.0000	0.0000	0.0000	0.0026	0.0000	0.0000
	L	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000
	Pm	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000
IPS		0.0000	0.0000	0.0000	0.0055	0.0000	0.0000
Levin-Lin-Chu		0.0003	0.0000	0.0000	0.0000	0.0000	0.1645
		FXBS	LEV1	DLEV2	GRA	GRBS	CORE
ADF	P	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003
	Z	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
	L	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002
	Pm	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
IPS		0.0000	0.0004	0.0000	0.0000	0.0000	0.0007
Levin-Lin-Chu		0.2147	0.0001	0.0000	0.0000	0.0000	0.0000

P: Inverse chi-squared, Z: Inverse normal, L: Inverse logit t, Pm: Modified inv. chi-squared

APPENDIX G

CORRELATION BETWEEN VARIABLES-III

Table G. Correlation Between Explanatory Variables-III

(obs=533)							
	NCR	LEV1	LEV2	GRBS	GRBS.L	FXBS	CORE
NCR	1.0000						
LEV1	-0.1452	1.0000					
LEV2	0.1437	0.2923	1.0000				
GRBS	0.1122	0.1086	-0.0070	1.0000			
GRBS.L	0.1494	0.0894	-0.0105	0.0183	1.0000		
FXBS	0.3242	-0.1791	-0.2256	0.1483	0.1198	1.0000	
CORE	-0.8794	0.4420	-0.0196	-0.0656	-0.0956	-0.4281	1.0000
(obs=533)							
	DLN	LEV1	LEV2	GRBS	GRBS.L	FXBS	CORE
DLN	1.0000						
LEV1	0.0431	1.0000					
LEV2	0.0313	0.2923	1.0000				
GRBS	0.2205	0.1086	-0.0070	1.0000			
GRBS.L	0.0722	0.0894	-0.0105	0.0183	1.0000		
FXBS	0.0152	-0.1791	-0.2256	0.1483	0.1198	1.0000	
CORE	-0.1147	0.4420	-0.0196	-0.0656	-0.0956	-0.4281	1.0000
(obs=533)							
	DCR	LEV1	LEV2	GRBS	GRBS.L	FXBS	CORE
DCR	1.0000						
LEV1	0.0030	1.0000					
LEV2	-0.0428	0.2923	1.0000				
GRBS	-0.2553	0.1086	-0.0070	1.0000			
GRBS.L	0.0947	0.0894	-0.0105	0.0183	1.0000		
FXBS	0.0558	-0.1791	-0.2256	0.1483	0.1198	1.0000	
CORE	0.1677	0.4420	-0.0196	-0.0656	-0.0956	-0.4281	1.0000
(obs=533)							
	DFXNC	LEV1	LEV2	GRBS	GRBS.L	FXBS	CORE
DFXNC	1.0000						
LEV1	0.0319	1.0000					
LEV2	0.0371	0.2923	1.0000				
GRBS	0.2740	0.1086	-0.0070	1.0000			
GRBS.L	0.0152	0.0894	-0.0105	0.0183	1.0000		
FXBS	0.0194	-0.1791	-0.2256	0.1483	0.1198	1.0000	
CORE	-0.1129	0.4420	-0.0196	-0.0656	-0.0956	-0.4281	1.0000

REFERENCES

Adams, K. (2001). Smooth interpolation of zero curves. *Algo Research Quarterly, 4*(1/2), 11-22.

Adrian, T. & Shin, H. S. (2010). Liquidity and leverage. *Journal of Financial Intermediation 19*, 418–437. doi:10.1016/j.jfi.2008.12.002.

Adrian, T. & Shin, H. S. (2008a). *Procyclical leverage and value-at-risk* (Staff Report No. 338). New York: Federal Reserve Bank.

Adrian, T. & Shin, H. S. (2008b). Liquidity, monetary policy, and financial cycles. *Federal Reserve Bank of New York - Current Issues in Economics and Finance, 14*(1). Retrieved from http://ssrn.com/abstract=1090550

Agenor, P-R. (2003). Benefits and costs of international financial integration: Theory and facts. *World Economy, 26*, 1089-1118. doi: 10.1111/1467-9701.00564.

Arellano, M. & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68,* 29-51.

Arellano, M. & Bond, S. (1991). Some tests of specification for panel data: Monte-Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277-297. Retrieved from http://www.jstor.org/stable/2297968

Arena, M. (2008). Bank failures and bank fundamentals: A comparative analysis of Latin America and East Asia during the nineties using bank-level data. *Journal of Banking & Finance, 32,* 299–310. doi:10.1016/j.jbankfin.2007.03.011

Arestis, P. & Basu, S. (2003). Financial globalization and regulation. *The Levy Economics Institute Working Paper,* (397).

Bailliu, J. (2000). Private capital flows, financial development, and economic growth in developing countries. *Bank of Canada Working Paper,* (2000–15).

Baltagi, B. H., Demetriades, P. O., & Law, S.H. (2009). Financial development and openness: Evidence from panel data. *Journal of Development Economics, 89*, 285–296. doi:10.1016/j.jdeveco.2008.06.006.

Basel Committee on Banking Supervision. (2006). International convergence of capital measurement and capital standards: A revised framework. *Bank for International Settlements.* Retrieved from http://www.bis.org/publ/bcbs128.pdf.

Basu, A. & Srinivasan, K. (2002). Foreign direct investment in Africa – Some case studies. *IMF Working Paper,* WP/02/61, 1-40.

Beau, E., Hill, J., Hussain, T., & Nixon, D. (2014). Bank funding costs: What are they, what determines them and why do they matter*? Bank Of England Quarterly Bulletin, 54*(4), 370-384. Retrieved from http://www.bankofengland.co.uk/publications/quarterlybulletin/index.htm

Bekaert, G., Harvey, C. R:, & Lundblad, C. (2011). Financial openness and productivity. *World Development, 39*(1), 1-19. doi:10.1016/j.worlddev.2010.06.016.

Beltratti, A. & Stulz, R. M. (2012). The credit crisis around the globe: Why did some banks perform better? *Journal of Financial Economics, 105*(1), 1-17. http://dx.doi.org/10.1016/j.jfineco.2011.12.005.

Bernanke, B.S. (2005). The global saving glut and the U.S. current account deficit. *Sandridge Lecture, Virginia Association of Economists,* Richmond, Virginia, March 10.

Bernanke, B. S. (2007). Global imbalances: Recent developments and prospects. *Speech at the Bundesbank Lecture*, Berlin, Germany at September 11, 2007.

Bernanke, B.S. & Lown, C.S. (1991). The credit crunch. *Brookings Papers on Economic Activity* (2), 205-239.

Binici, M. & Köksal, B. (2012). Is the leverage of Turkish banks procyclical? *Central Bank Review, 12,* 11-24.

Blanchard, O. (2016). Currency wars, coordination, and capital controls. *NBER Working Paper,* (22388), 1-20.

Bongini, P., Claessens, S., & Ferri, G. (2001). The political economy of distress in East Asian financial institutions. *Journal of Financial Services Research, 19*(1), 5-25.

Bongini, P., Laeven, L., & Majnoni, G. (2002). How good is the market at assessing bank fragility? A horse race between different indicators. *Journal of Banking & Finance, 26,* 1011–1028.

Borio, C. (2011). Reconciling sovereignty and effective supervision: Basel III's countercyclical capital buffer. Bank for International Settlements, Basel INET Conference *"Crisis and renewal: International political economy at the crossroad"*.

Borio, C. & Disyatat, P. (2016). "Helicopter money" - reality bites. *BIS Management Speeches,* published on 4 September 2016.

Borio, C. & Zabai, A. (2016). Unconventional monetary policies: A reappraisal. *BIS Working Papers,* No. 570, 1-43

Borio, C. & Disyatat, P. (2011). Global imbalances and the financial crisis: Link or no link? *BIS Working Papers,* (346).

Boyacioglu, M. A., Kara, Y., & Baykan, O. K. (2009). Predicting bank financial failures using neural networks, support vector machines and multivariate statistical methods: A comparative analysis in the sample of savings deposit insurance fund (SDIF) transferred banks in Turkey. *Expert Systems with Applications*, *36*, 3355–3366. doi:10.1016/j.eswa.2008.01.003.

Calvo, G. A., Izquierdo, A., & Mejía, L. F. (2008). Systemic sudden stops: The relevance of balance-sheet effects and financial integration. *NBER Working Paper*, (14026). Retrieved from http://www.nber.org/papers/w14026

Canbas, S., Cabuk, A., & Kilic, S. B. (2005). Prediction of commercial bank failure via multivariate statistical analysis of financial structures: The Turkish case. *European Journal of Operational Research, 166,* 528–546. doi:10.1016/j.ejor.2004.03.023.

Carapeto, M., Moeller, S., Faelten, A., Vitkova, V., & Bortolotto, L. (2010). *Distress classification measures in the banking sector* (Mergers and Acquisitions Research Centre Working Paper, January 14). London: Cass Business School, City University of London**.**

Cecchetti, S. G., Kohler, M., & Upper, C. (2009). Financial crises and economic activity. *NBER Working Paper,* (15379). Retrieved from http://www.nber.org/papers/w15379

Chinn, M.D. & Ito, H. (2008). A new measure of financial openness. *Journal of Comparative Policy Analysis: Research and Practice,* 10(3), 309-322. http://dx.doi.org/10.1080/13876980802231123

Choi, I. (2001). Unit root tests for panel data. *Journal of International Money and Finance*, 20, 249–272.

Clarida, R. H. (2006). G7 current account imbalances: Sustainability and adjustment. *NBER Working Paper,* (w12194). doi: 10.3386/w12194

Costa, O., Khan, J., Levy, C., Natale, A., & Tanrıkulu, Ö. (2014). Risk in emerging markets: The way forward for leading banks. *McKinsey Working Papers on Risk,* 56, 1-13.

Curry, T. J., Fissel, G. S., & Elmer, P. J. (2003). Using Market Information to Help Identify Distressed Institutions: A Regulatory Perspective. *FDIC Banking Review*, *15*(3), 1 – 16. http://ssrn.com/abstract=883643.

Daley, J., Matthews, K., & Whitfield, K. (2008). Too-big-to-fail: Bank failure and banking policy, *Journal of International Financial Markets, Institutions and Money, 18*, 290–303. doi:10.1016/j.intfin.2006.12.002

Dell'Ariccia, G., Detragiache, E. and Rajan, R. (2005), 'The real effect of banking crises', *Journal of Financial Intermediation,* 17(1), 89-112.

Demiralp, S. (2007). Parasal aktarım mekanizmasında para'nın yeri: Türkiye için bir analiz. *TÜSİAD-KOÇ University Economic Research Ekonomik Araştırma Forumu Çalışma Raporları Serisi*, Aralık Çalışma Raporu 0712.

Demirgüç-Kunt, A. & Detragiache, E. (2005). Cross-country empirical studies of systemic bank distress: A survey. *National Institute Economic Review, 192*(68). doi: 10.1177/002795010519200108.

Diamond, D. & Dybvig, P. (1983). Bank runs, deposit insurance, and liquidity. *Journal of Political Economy, 91*(3), 401-419. http://links.jstor.org/sici?sici=0022-3808%28198306%2991%3A3%3C401%3ABRDIAL%3E2.0.CO%3B2-Z.

Dreher, A. (2005). Does globalization affect growth? Evidence from a new index of globalization. *Research Paper Series, No. 6*, 1-32.

Durham, J. B. (2004) Absorptive capacity and the effects of foreign direct investment and equity foreign portfolio investment on economic growth. *European Economic Review, 48*(2), 285–306.

Economist (2009, January 22). Briefing Global Economic Imbalances: When a flow becomes a flood. Retrieved from: http://www.economist.com/node/12972083.

Edison, H., Levine, R., Ricci, L., & Slok, T. (2002). International financial integration and economic growth. *Journal of International Monetary and Finance*, 21(6), 749–76.

Elsas, R. (2007). Preemptive distress resolution through bank mergers. *Ludwig Maximilian University of Munich, Working Paper.* http://dx.doi.org/10.2139/ssrn.967306.

Farag, M., Harland, D., & Nixon, D. (2013). Bank capital and liquidity. *Bank o f England Quarterly Bulletin*, *53*(3), 201-15. Available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130302.pdf.

Ferri, G., Liu, L. G., & Majnoni, G. (2000). How the proposed Basel guidelines on rating agency assessments would affect developing countries. *Policy Research Working Paper* 2369, World Bank. http://dx.doi.org/10.1596/1813-9450-2369.

Ferri, G., Liu, L. G., & Stiglitz, J.E. (/1999). The pro-cyclical role of credit rating agencies: Evidence from the East Asian crisis. *Banca Monte dei Paschi di Siena SpA, Economic Notes 28* (3), 335–355. doi: 10.1111/1468-0300.00016.

Frankel, J. A. (1992). Measuring international mobility: A review. *The American Economic Review, 82*(2), 197-202. http://www.jstor.org/stable/2117400.

Furman, J. & Stiglitz, J.E. (1998). Economic crises: Evidence and insights from East Asia. In *Brookings Papers on Economic Activity 2*, 1-135. Washington, DC: Brookings Institution.

Gaganis, C., Pasiouras, F., & Zopounidis, F. (2006). A multicriteria decision framework for measuring banks' soundness around the world. *Journal of Multi-Criteria Decision Analysis, 14*(1-3), 103-11. doi: 10.1002/mcda.405.

González-Hermosillo, B., Oura, H. Chan-Lau, J., Gudmundsson, T. & Valckx, N. (2013). Changes in bank funding patterns and financial stability risks. In *Global Financial Stability Report: Transition Challenges to Stability* (pp. 105-148). Washington DC: International Monetary Fund.

Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, *37*(0), 424-438. Retrieved from http://links.jstor.org/sici?sici=0012-9682%28196908%2937%3A3%3C424%3AICRBEM%3E2.0.CO%3B2-L

Gropp, R., Vesala, J., & Vulpes, G. (2004). Market indicators, bank fragility, and indirect market discipline. *FRBNY Economic Policy Review / September 2004.*

Gruber, J. W. & Kamin, S. B. (2007). Explaining the global pattern of current account imbalances. *Journal of International Money and Finance, 26*, 500-522. doi:10.1016/j.jimonfin.2007.03.003

Hahm, J-H., Shin, H. S., & Shin, K. (2011). Non-core bank liabilities and financial vulnerability. *Preliminary draft of paper for the Federal Reserve Board and JMCB conference on "Regulation of Systemic Risk"*, Washington, DC.

Hartwig, J. (2010). Is health capital formation good for long-term economic growth? - Panel Granger-causality evidence for OECD countries. *Journal of Macroeconomics, 32*, 314–325. doi:10.1016/j.jmacro.2009.06.003

Hoggarth, G., Reis, R., & Saporta, V. (2002). Output costs of banking system instability: Some empirical evidence', *Journal of Banking and Finance, 26*, 825–55.

Holtz-Eakin, D., Newey, W., & Rosen, H. S. (1988). Estimating vector autoregressions with panel data. *Econometrica*, *56*(6), 1371-1395. http://www.jstor.org/stable/1913103.

Honohan , P. (1997). Banking system failures in developing and transition countries: Diagnosis and prediction. *BIS. Working Papers,* (39).

Huang, X., Zhou, H., & Zhu, H. (2012). Assessing the systemic risk of a heterogeneous portfolio of banks during the recent financial crisis. *Journal of Financial Stability, 8*(3), 193-205. http://dx.doi.org/10.1016/j.jfs.2011.10.004.

Hwang, D. Y., Lee, C. F., & Liaw, K. T. (1997). Forecasting bank failures and deposit insurance premium. *International Review of Economics & Finance, 6*(3), 317-334. http://dx.doi.org/10.1016/S1059-0560(97)90041-1.

Im, K., Pesaran, M. H., & Shin, Y. (2003). Testingfor unit roots in heterogeneous panels. *Journal of Econometrics, 115*, 53-74. doi:10.1016/S0304-4076(03)00092-7.

International Monetary Fund (2015). Enhancing policy tractionand reducing risks. *In Global Financial Stability Report: Navigating Monetary Policy Challenges and Managing Risks* (pp. 1-54).Washington DC: Author

Ioannidis, C., Pasiouras, F., & Zopounidis, C. (2010). Assessing bank soundness with classification techniques. *Omega, 38*, 345–357. doi:10.1016/j.omega.2009.10.009

Kalemli-Ozcan, S., Sorensen, B., & Yesiltas, S. (2011). Leverage across firms, banks, and countries. *NBER Working Paper,* (17354). http://www.nber.org/papers/w17354.

Kaminsky, G. & Reinhart, C., (1999). The twin crises: The causes of banking and balance-of-payments problems. *American Economic Review, 89* (3), 473–500.

Karolyi, G. A. & Stulz, R. M. (2002). Are financial assets priced locally or globally?. *NBER Working Paper,* (8994). http://www.nber.org/papers/w8994.

Kaya, Y. T. (2001). Türk bankacılık sektöründe CAMELS analizi. *BDDK-MSPD Çalışma Raporları*, 2001/6.

Klein, M. W.(2003). Capital account openness and the varieties of growth experience. *NBER Working Paper,* (w9500). doi: 10.3386/w9500.

Knaup, M. & Wagner, W. (2009). A market-based measure of credit portfolio quality and banks' performance during the subprime crisis. *European Banking Center Discussion Paper,* 2009-06S. http://dx.doi.org/10.2139/ssrn.1274815.

Koetter, M., Bos, J.W.B., Heid, F., Kolari, J.W., Kool, C.J.M., & Porath, D. (2007). Accounting for distress in bank mergers, *Journal of Banking & Finance, 31(*10), 3200-3217. http://dx.doi.org/10.1016/j.jbankfin.2006.12.009.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2009). Does openness to international financial flows raise productivity growth. *Journal of International Money and Finance, 28,* 554–580. doi:10.1016/j.jimonfin.2009.01.005

Kose, M. A., Prasad, E. S., Rogoff, K., & Wei, S-J. (2006). Financial globalization: A reappraisal. *IMF Working Paper*, (w12484), 1-92. http://www.nber.org/papers/w12484.pdf.

Kose, M. A., Prasad, E. S., & Terrones, M. E. (2003). How does globalization affect the synchronization of business cycles?. *The Institute for the Study of Labor (IZA) Discussion Paper*, (702).

Krugman, P. (2009, March, 1). Revenge of the glut. *The Newyoek Times.* Retrieved from http://www.nytimes.com/2009/03/02/opinion/02krugman.html?_r=0.

Laeven, L. & Valencia, F. (2012). Systemic banking crises database: An update. *IMF Working Paper*, WP/12/163.

Lane, P. R. & Milesi-Ferretti, G. M. (2006). The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004. *IMF Discussion Paper*, (5644), 1-47.

Le, H. G. (2000). Financial openness and fianncial integration. *Asia Pacific School of Economics and Management Working Papers*, DI00-4, 1-24.

Levin, A., Lin, C.-F., & Chu, C.-S. (2002). Unit root tests in panel data:asymptotic and finite-sample properties. *Journal of Econometrics*, *108*. 1–24.

Logan, A. (2001). The United Kingdom's small banks' crisis of the early 1990s: What were the leading indicators of failure*? Bank of England Working Paper,* (139). http://dx.doi.org/10.2139/ssrn.282171.

Love, I. & Zicchino, L. (2002). Financial development and dynamic investment behavior evidence from panel vector autoregression. *World Bank Policy Research Working Paper*, (2913).

Maddala, G. S. & Wu, S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics, Special Issue,* 0305-9049, 631-652.

Mendoza, E. G., Quadrini, V., & Rios-Rull J.-V. (2007). Financial integration, financial deepness and global imbalances. *NBER Working Paper*, (12909). http://www.nber.org/papers/w12909

Mody, A. & Murshid, A. P. (2005). Growing up with capital flows. *Journal of International Economics, 65*(1), 249-266.

Molina, C. A. (2002). Predicting bank failures using a hazard model: the Venezuelan banking crisis. *Emerging Markets Review, 3*, 31-50.

Moreno, R. (2011). Policymaking from a "macroprudential" perspective in emerging market economies. *BIS Working Papers*, (336).

Nicolo, G. & Juvenal, L. (2010). Financial integration, globalization, risk-adjusted growth and systemic risk. *FED of St. Louis Working Paper*, (2010-012D), 1-33. http://research.stlouisfed.org/wp/2010/2010-012.pdf.

Obstfeld, M. (2010). Expanding gross asset positions and the international monetary system. Remarks at *the Federal Reserve Bank of Kansas City symposium on "Macroeconomic Challenges: The Decade Ahead."* Jackson Hole, Wyoming.

Petersen, M. A. (2009). Estimating standard errors in finance panel data sets: Comparing approaches. *The Review of Financial Studies, 22*(1), 435-480.

Prasad, E., Rogoff, K., Wei, S.-J., & Kose, M. A. (2003). Effects of financial globalisation on developing countries: Some empirical evidence. *Economic and Political Weekly, 38*(41), 4319-4330. http://www.jstor.org/stable/4414133 .

Quinn, D., Schindler, M., & Toyoda, M. (2011). Assessing measures of financial openness and integration. *IMF Economic Review, 59*(3), 488-522.

Quinn, D. Inclan, C., & Toyoda, A. M. (2001). How and where capital account liberalization leads to economic growth. *Presentation at the 2001 Annual APSA Convention*, San Francisco, California.

Radelet, S. & Sachs, J. (1998). The East Asian financial crisis: Diagnosis, remedies, prospects. *Brooking Papers on Economic Activity, 1*, 1-90.

Reinhart, C. M. & Rogoff, K. S. (2010). From financial crash to debt crisis. *NBER Working Paper*, (15795). http://www.nber.org/papers/w15795.

Rey, H. (2015). Dilemma not trilemma: The global financial cycle and monetary policy independence. *NBER Working Paper*, (21162), 1-34.

Rodrik, D. (1998). Who needs capital account convertibility?. *Essays in International Finance (No. 207),* 55-65, Princeton University.

Rojas-Suarez, L. (2002). Rating banks in emerging markets: What credit rating agencies should learn from financial indicators. *Institute for International Economics Working Paper*, 1-29. http://dx.doi.org/10.2139/ssrn.300891.

Schindler, M. (2009). Measuring financial integration: A new data set. *IMF Staff Papers: Frontiers of Research on Financial Globalization, 56*(1), 222-238. http://www.jstor.org/stable/40377804.

Shin, H. S. (2012). Global banking glut and loan risk premium. Mundell-Fleming Lecture, presented at *the 2011 IMF Annual Research Conference*.

Shin, H. S. & Shin, K. (2011). Procyclicality and monetary aggregates. *NBER Working Paper*, (16836). http://www.nber.org/papers/w16836.

Turner, A., Haldane, A., Woolley, P., Wadhwani, S., Goodhart, C., Smithers, A., Large, A., Kay, J., Wolf, M., Boone, P., Johnson, S., & Layard, R. (2010). What do banks do? Why do credit booms and busts occur and what can public policy do about it? In *The Future of Finance: The LSE Report*. London: London School of Economics and Political Science.

Wirnkar, D. (2009). CAMEL based derived W-score function for banks performance evaluation: An urgent necessity. *Gombe State University Working Paper*. http://dx.doi.org/10.2139/ssrn.1355043.

Wheelock, D. & Wilson, P. (2000). Why do banks disappear? The determinants of U.S. bank failures and acquisitions. *The Review of Economics and Statistics, 82*(1), 127-138. http://www.jstor.org/stable/2646678.

Yang, J. & Tsatsaronis, K. (2012). Bank stock returns, leverage and the business cycle. *BIS Quarterly Review*, March 2012.