

**THE DETERMINANTS AND DYNAMICS OF CROSS-BORDER BANK  
LOANS IN TURKEY**

by

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## The Determinants and Dynamics of Cross Border Bank Loans in Turkey

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## ABSTRACT

### The Determinants and Dynamics of Cross Border Bank Loans in Turkey

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**Keywords** cross-border bank loans, affiliated loans, macroprudential policies, quantitative easing, panel data estimation

In this study, I identify the determinants and dynamics of cross border bank loans in Turkey. The used dataset includes the cross border loans of all banks in Turkey between December 2002 and December 2014. Firstly, I determine the dynamics of cross border bank loans on the basis of bank-specific, national and global liquidity indicators. According to results, banks that have large size, high return on asset ratio, more credit in their portfolio and low deposit ratio are borrowing more. Non-performing loan ratio and capital structure of banks do not have significant effects on cross border bank loans. Only BIST repo o/n interest rate among national variables has significant effect on cross border bank loans. Real credit growth of banks in US and Euro Area, money supply growth rate of four financial centers(US, EA, UK, Japan), and the balance sheet size of Fed are the global determinants of cross border bank loans in Turkey. Secondly, the lender banks' characteristics are important with regards to vulnerability and affiliated loans have less vulnerable structure than non-affiliated loans. Thirdly, I show that the sensitivity of cross border bank loans to some global factors decreased after the last quarter of 2010 and hence macro-prudential policies in Turkey have been successful to increase the resilience of Turkish economy to cross-border bank flows. Lastly, I analyze the effects of Fed's balance sheet, which is the indicator for quantitative easing or expansionary monetary policies, on cross border bank loans in Turkey. Cross border bank loans have increased significantly as a result of Fed's quantitative easing policies. These policies also have significant effect on each cross-border bank loan types. The types of credit, repo, deposits, syndicated and securitization are affected more by quantitative easing policies, respectively. Moreover, banks that have relatively small asset size, weak capital structure, low return on asset ratio and liquid asset ratio have been affected more positively by the Fed's quantitative easing policies. I conclude that they could not borrow at the desired level during illiquid period due to their underwhelming ratios, however they started to search for yield and borrow more easily during liquid period due to the Fed's quantitative easing policies.

## ÖZET

### Türkiye’de Banka Dış Borçlarının Dinamikleri ve Belirleyicileri

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Danışman: Yrd. Doçent Selçuk Özyurt

**Anahtar Kelimeler** yurt dışı banka borçları, iştirak borçları, makro ihtiyati politikalar, nicel genişleme, panel veri tahmini

Bu çalışmada, Türkiye’de faaliyet gösteren bankaların yurt dışından temin ettikleri borçların dinamikleri belirlenmektedir. Kullanılan veri seti, 2002 Aralık ile 2014 Aralık tarihleri arasında dış borcu bulunan tüm bankaları kapsamaktadır. Öncelikle banka bazlı, ülkesel ve küresel göstergeler çerçevesinde banka dış borçlarının belirleyicileri ortaya konmaktadır. Sonuçlara göre büyük bankalar ile yüksek aktif karlılık ve kredi rasyosu ile düşük mevduat rasyosuna sahip bankaların daha fazla borçlandıkları, takip oranı ve sermaye yapılarının ise anlamlı bir etkisinin olmadığı ortaya konmaktadır. Ülkesel değişkenler içerisinde sadece BIST repo gecelik faiz oranı banka dış borçları üzerinde anlamlı bir etkiye sahiptir. ABD ve Euro Bölgesi’ndeki bankaların reel kredi büyüme hızları, dört finansal merkezin (ABD, İngiltere, Euro Bölgesi, Japonya) para arzının büyüme hızı ve Fed’in aktif büyüklüğü banka dış borçlarının küresel belirleyicileridir. İkinci olarak ise borç alan bankanın ortaklık yapısında bulunan yabancı bankadan temin edilen borçların, ortaklık yapısında bulunmayan yabancı bankadan alınan borçlardan daha az kırılğan bir yapıya sahip olduğu gösterilmektedir. Üçüncü olarak ise 2010 yılının son çeyreğinden itibaren Türkiye’de uygulanmaya başlanan makro ihtiyati politikalar ile Türkiye Ekonomisi’nin banka dış borç akımlarına olan duyarlılığının azaldığı ve söz konusu politikaların Türkiye Ekonomisinin banka dış borç akımlarına karşı direncini artırma konusunda başarılı olduğu gösterilmiştir. Son olarak, parasal genişlemenin göstergesi olan ABD Merkez Bankasının bilanço büyüklüğündeki değişimlerin, diğer bir ifade ile parasal genişleme politikalarının Türkiye’de faaliyet gösteren bankaların dış borçlarına ve borç türlerine etkisi incelenmiştir. Parasal genişleme politikalarının dış borçları anlamlı şekilde artırdığı, borç türü bazında en fazla etkinin sırasıyla kredi, repo, mevduat, sendikasyon ve seküritizasyon gruplarında yaşandığı görülmüştür. Ayrıca küresel likiditenin nispeten sınırlı olduğu dönemlerde istediği ölçüde borçlanamayan küçük, sermaye yapısı zayıf, aktif karlılığı ve likit aktif rasyosu görece düşük bankaların nicel genişleme programlarından daha fazla etkilendiği ve parasal genişleme sonucu gevşeyen küresel likidite koşullarında daha fazla borçlanabildikleri sonucuna varılmıştır.



*To my family...*

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# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>Cross-Border Bank Flows and Financial Crisis: A Literature Review</b>	<b>6</b>
<b>3</b>	<b>Stylized Facts on Cross-Border Bank Loans in Turkey</b>	<b>11</b>
<b>4</b>	<b>Data and Methodology</b>	<b>13</b>
4.1	Data Set and Definition of Variables . . . . .	14
4.2	Model and Methodology . . . . .	15
<b>5</b>	<b>The Empirical Results</b>	<b>21</b>
5.1	Determinants of Cross Border Bank Loans in Turkey . . . . .	21
5.2	Are the lender banks' characteristics important with regards to vulnerability? . . . . .	25
5.3	Could Macro-Prudential Policies in Turkey increase the resilience of Turkish economy to cross-border bank flows? . . . . .	29
5.4	The Effect of Fed Policies on Cross Border Bank Loans in Turkey . . . . .	33
<b>6</b>	<b>Conclusion</b>	<b>37</b>



## LIST OF FIGURES

1	Private Capital Flows to Emerging Markets by Regions .....	44
2	Private Capital Flows to Emerging Markets .....	44
3	Composition of Banks' Cross-Border Loans .....	45
4	Banks' Cross-Border Loan Types .....	45
5	Banks' Roll-Over Rate .....	46
6	Currency Distribution of Banks' Cross-Border Loans .....	46
7	The share of regions .....	46
8	Banks' Cross-Border Loans (Total-Affiliated-Non-Affiliated) ....	54
9	Banks' Roll-Over Rate (Total-Affiliated-Non-Affiliated) .....	54
Annex A	Time series charts of the Turkish Economy's macroeconomic and global liquidity indicators .....	62

## LIST OF TABLES

1	Banks included in the analysis .....	47
2	Variable Definitions and Sources .....	47
3	Summary Statistics of Variables .....	48
4	Correlation Matrix .....	49
5	Determinants of Banks' Cross Border Loan (Bank Specific Variables) ...	50
6	Determinants of Banks' Cross Border Loan (Bank + TR Macro Variables) .....	51
7	Determinants of Banks' Cross Border Loan (Bank + TR Macro + Global Variables) .....	52
8	Standardized Beta Coefficients .....	53
9	Fragility of cross border loan types (affiliated or non-affiliated) for pre-crisis and 2008 crisis periods .....	55
10	Effectiveness of macro-prudential policies in Turkey .....	56
11	Quantitative easing programs which were announced by Fed .....	57
12	The balance sheet size of Fed and cross border bank loans in Turkey ...	57
13	The balance sheet size of Fed and cross border bank loans in Turkey ...	58
14	The balance sheet size of Fed and cross border bank loans in Turkey ...	59
15	F-tests for sensitivity to Fed .....	60
16	The balance sheet size of Fed and cross border bank loans in Turkey ...	61

# 1 Introduction

Global banks and financial institutions have significantly increased their international activities for over the last twenty years. After increasing their international activities, financial integration have also deepened and gained strength globally. However, this rising trend was interrupted with the financial crisis in 2008, and the increasing globalization and financial integration resulted in a lot of debates in the banking sector. An important part of the discussion focused on the effects of capital flows from advanced countries to emerging countries. According to the survey, made by Goldberg (2009), until the global financial crisis in 2008, it was accepted that the entry of foreign banks in the local banking system enables a lot of advantages such as the balancing of the national market and more efficient use of resources. Mishkin (2009) stated that globalization and financial integration also provide institutional and regulatory or supervisory improvements, which are the prerequisites for economic development and strong economy. However, this process worked in the opposite direction during the global financial crisis, and vulnerabilities in the international financial markets have spread to the emerging countries due to great changes in capital flows.

The trade linkages between countries, especially for advanced and emerging countries, hold a crucial place in the spread of crisis. However, after increasing financial integration in the last two decades, financial linkages also started to play a crucial role in the contagion of crisis. Especially after 2008 financial crisis, problems experienced in the advanced countries spread out to emerging markets very quickly via those financial linkages. Many emerging countries like Turkey are in need of advanced countries' saving funds to sustain economic growth. Also, capital flows from advanced to emerging countries deleveraged very sharply during global financial crisis. That is, emerging countries try to borrow more on cross border loans but the structure of these loans is very fragile. This situation increases the importance of financial linkages, and hence

the role of cross border capital flows become more crucial in the spread of crisis.

Capital flows to emerging markets, including Turkey, may be in the forms of direct investment, portfolio investment, bank loans and debt securities. Sharp declines were experienced during global financial crisis, in spite of the fact that all types of capital flows that have occurred from advanced countries to emerging countries in Asia, Latin America and Europe had been increasing significantly for over the last twenty years (Graph 1). The most significant decrease was experienced in the cross border bank loans among all types of capital flows (Graph 2). Therefore, the effectiveness of global linkages between banks in the spread of crisis was emphasized in the World Economic Outlook report, prepared by IMF in 2009.

This paper aims to contribute to the literature on the determinants of cross border bank loans in Turkey by using bank level dataset. Most of the studies in the literature are in the cross country level instead. With the help of bank level data, I add bank-specific variables to the regression models and be able to separate the effects of bank-specific, national and global variables. Moreover, my dataset contains loan types (such as credit, deposit, syndicated), and hence I am able to analyze each of the research questions from the loan type perspective. Besides, use of micro level data instead of aggregate data will enable us to derive more powerful and consistent results. Secondly, with the help of bank level dataset, I separate affiliated and non-affiliated cross border bank loans. Affiliated loans are provided by the foreign partner of borrower banks. Foreign partner may have some specific information about borrower bank, and then may continue to extent loans. Moreover, due to financial frictions in the recipient country, there may be some restrictions for intra-bank capital flows. Hence, there are some differences between affiliated and non-affiliated loans especially during financial stress or deleveraging periods. Therefore, I will try to analyze to see whether the lender banks' characteristics are important or not with regards to vulnerability. Thirdly, I analyze whether macro-prudential policies (implemented since late 2010) in Turkey

could increase or not the resilience of Turkish economy to cross-border bank flows. Lastly, I identify the effects of the Fed's quantitative easing programs on cross border bank loans in Turkey.

Turkey has experienced a significant increase in foreign liabilities of the banking sector especially after 2002. The amount of banking sector's foreign liabilities has increased by thirteen times and reached to USD 140 billion during that period. The effects of global crisis were also observed in the cross border bank loans in Turkey and it was contracted by roughly 20 percent from the bankruptcy of Lehman Brothers in September 2008 to April 2009. However, this contraction implies two possible cases. In the first case, banks might not roll over their loans at the desired level during that period, which shows that banks had difficulties to obtain funds from abroad due to deleveraging activities of global banks. Secondly, for the sake of being cautious, those banks might have preferred not to borrow at the previous level on purpose. Although we do not know the actual reasons at this point, it is also a fact that the amount of loans were contracted by roughly 20 percent in a very short time and it was affected from global conditions very quickly. Therefore, in order to understand and assess the vulnerabilities of capital flows more accurately, it is important to identify the dynamics of expansion and contraction experienced in cross border loans. That objective is the main and primary purpose of this thesis. In the framework of aforementioned objective, the determinants and dynamics of cross border bank loans will be identified on the basis of bank-specific, national and global liquidity indicators.

Furthermore, most banks started to operate outside of their country as a result of increased financial integration. Especially, banks from advanced countries have extended their operations to other countries by way of getting into a partnership with local banks, acquiring shares in them or getting license to operate through branches. 37 out of 49 banks that are currently operating in Turkey have a foreign partnership. It is also fact that some of the cross border bank loans were borrowed from foreign partners

of the borrower banks. The changes in cross-border banking loans and affiliated loans, including claims by either branches or subsidiaries operating in the borrower countries, may not have the same path during global financial crisis. Loans may behave differently depending on their types, and it is necessary to separate them in order to examine the details of each loan type. Cerutti and Claessens (2013) stated that affiliated loans behaved differently during global financial crisis. Cerutti, Hale and Minoiu (2014) also analyzed the structure of syndicated loans, one of cross border loan types, and the findings are in line with affiliated loans. Therefore, it is very crucial to divide cross border bank loans in Turkey into two as affiliated and non-affiliated. Then, I will try to analyze to see whether the lender banks' characteristics are important or not with regards to vulnerability. This will be the second objective of this study.

After the beginning and spreading of the global financial crisis in 2008, new policy framework was developed to eliminate systemic risks and thereby to prevent the contagion effects of unfavorable financial conditions to all economies. In order to reduce the negative effects induced from the volatility in capital flows, Turkey has implemented certain macro-prudential policies since the last quarter of 2010. Targeting financial stability with price stability, interest rate corridor and reserve option mechanism are some of the examples of those policies. Therefore, I examine whether macro-prudential policies (implemented since late 2010) in Turkey could increase the resilience of Turkish economy to cross-border bank flows. This will be the third objective of this study.

Central banks in many developed and developing countries primarily decreased interest rates in order to eliminate the negative results of global financial crisis erupted in 2008. However, due to lack of performance of those measures, central banks in developed countries were inclined to launch a quantitative easing process. The effects of Fed's non-traditional expansionary monetary policies on the capital flows and cross border bank loans in emerging countries are within the hot discussion issues in recent years. Therefore, analyzing the effects of Fed's quantitative easing program on the cross

border bank loans are also within the objectives of this study.

I analyzed the determinants of cross border bank loans in Turkey for the 2002 - 2014 period, using monthly data. The main findings can be summarized as follows: The main determinants can be summarized into three groups. Bank specific determinants are banks' credit ratios, deposit ratios, return on asset ratios, non-performing loan ratios, sizes and FX credit and deposit interest spreads. Monthly change in Istanbul Stock Exchange over/night repo interest rate is the only indicator among national variables that affect cross border bank loans. Global determinants are credit growth of banks in US and Euro Area, money supply growth rate of four financial centers, and the balance sheet size of Fed. I also show that there is no significant impact of non-performing loans ratio and capital structure of banks on cross border bank loans as well as monetary policy stance of Fed, global risk appetite, and risk perception towards emerging markets.

Secondly, I compared the vulnerabilities of affiliated and non-affiliated loans for the pre-crisis and 2008 crisis periods. According to the results, the lender banks' characteristics with regards to vulnerability are important and affiliated loans have less vulnerable structure than non-affiliated loans. Thirdly, I test the effectiveness of Turkey's macro-prudential policies in respect of volatility in bank flows. Results show that the impacts of global liquidity indicators on bank flows are diminished and the new policy framework in Turkey has been successful within the frame of protecting Turkish economy from the sharp volatile bank flows. Lastly, I analyze the effects of Fed's quantitative easing programs on the cross border bank loans in Turkey. According to the results, quantitative easing programs increased cross border bank loans in Turkey. The types of credit, repo, deposits, syndication and securitization were affected more from the quantitative easing programs, respectively. Moreover, banks, which have relatively small asset size, weak capital structure, low return on assets and liquid assets ratios were affected more positively from the changes in the Fed's balance sheet size because they could not borrow at the desired level during illiquid periods but they started to

borrow more easily in the liquid environment, which was the result of Fed's quantitative easing programs.

The rest of the paper is organized as follows. Section 2 summarizes the existing literature related with cross border bank flows and financial crisis. Section 3 reviews the stylized facts on cross-border bank flows to Turkey. In this section, some facts are given, such as the distribution and features of all types of cross-border loans over time basis (i.e. maturity, counterparty country distribution, distribution of currency types). Also, the Section 4 gives information about the structure of dataset and specifies the model. Section 5 summarizes the empirical results for each research question. Section 6 concludes.

## **2 Cross-Border Bank Flows and Financial Crisis: A Literature Review**

The trade linkages before the increase of financial integration were seen, in the related literature, as the main determinant of how shocks are transmitted from advanced to emerging markets (Glick and Rose, 1998). Eichengreen, Rose and Wyplosz (1996) showed the importance of international trade linkages for the contagion effect using the datasets of 20 developed countries. Following the ever increasing financial integration in the last two decades, the importance of financial linkages was also detected for contagion effects and researchers began to analyze whether financial linkages affect capital flows or not. Kaminski and Reinhart (2000) analyzed the impacts of trade linkages and financial linkages considering the role of cross border bank lending and the potential of cross market hedging. They concluded that financial linkages, which were neglected up to that time, have more important role than trade linkages in explaining the contagion effects across countries. Van Rijckeghem and Weder (2003) also analyzed importance of financial linkages with the panel study for 11 creditor countries and 30



emerging countries. According to their results, common bank lenders had played an important role in transmitting the crises which were occurred in emerging markets such as Mexican, Russian and Asian markets that are especially vulnerable. However, Forbes and Chinn (2009) found that despite the deepening financial integration and growth in global financial flows in the last decades, bilateral trade flows are still significant and robust determinants of how shocks are transmitted from developed to emerging markets. Caramazza, Ricci and Salgado (2004) and Calvo, Izquierdo and Mejia (2008) also supported the importance of financial linkages in contagion of crisis and they stated that financial linkages are also major significant determinants of how shocks are transmitted from advanced to emerging markets as well as trade linkages. Moreover, Hernandez, Mellado and Valds (2001) considered stronger financial integration as a latent cause in explaining why contagion was more crucial during the 1990s than the earlier crises. In summary, not only trade, but also bank lending channel is a crucial factor in explaining the contagion effect.

The classical push and pull factors are the main determinants of cross-border bank flows in the literature. The push factors are related with the external common conditions that mobilize loan flows. The pull factors are related with the country specific or bank specific factors that attract loan flows. According to literature, solid macro-fundamentals (such as strong growth outlook, high interest rate differential, efficient debt management and low and stable inflation) and structural backgrounds (such as benevolent financial system infrastructure, improved governance, transparency and rule of law) determine the pull factors in loan flows. If pull factors are effective to attract loan flows, then potential macro-financial imbalances caused by these loan flows could be limited by an appropriate design of policies in the borrower country. Jeanneau and Micu (2002) showed that push and pull factors determine international bank lending. Garcia-Herrero and Martinez-Peria (2005) and Hernandez et al. (2001) analyzed the cross-country determinants of cross border bank loans and they found that borrower

countries' conditions are the robust and significant determinants of cross border lending. Goldberg (2001) showed the impact of lender countries' conditions on cross-border lending. In addition to lender and borrower countries' conditions, Papaioannou (2008) showed the importance of institutional, geographical and historical drivers.

Despite the shortage of empirical works on the determinants of cross-border bank flows to emerging markets in periods of crises, studies in this area has been increasing in recent years. These empirical works are focused on two basic areas. In the first area, researchers try to analyze changes in international bank activities using BIS data around the periods of financial stress. Cetorelli and Goldberg (2011) found that lending supply in emerging markets was affected through three separate channels which are a contraction in direct cross-border lending by foreign banks; a contraction in local lending by foreign banks' affiliates in emerging markets; and a contraction in lending supply by domestic banks as well as a result of the funding shock to their balance sheet induced by the decline in interbank or cross-border lending. That paper also constitutes the basics of many studies made after crisis. There are other empirical works related with this area, such as McGuire and von Peter (2009), Cull and Martinez Peria (2012), Claessens and van Horen (2013). Cull and Martinez Peria (2012) found that although cross border lending fell by more than domestic private bank credit in Eastern Europe, the opposite is true in Latin America due to regulatory requirements in there. Claessens and van Horen (2013) examined the role of "competitor remoteness", which is the weighted average distance of all competing banks to a host country, on the location decision of a foreign bank.

In the second area, the determinants of cross border lending are analyzed at the micro level. Giannetti and Laeven (2012a) and De Haas and Van Horen (2013) found a robust and significant negative effect of geographical distance on lending stability during the crisis, which was also reported as flight home or flight to core markets. Ongena, Peydro and van Horen (2012) analyzed bank and firm level data, and found that the

lending desires of internationally borrowing banks and foreign banks reduced more than domestically funded banks. And De Haas and Van Horen (2012) found the negative effect of funding shocks on the supply of cross-border lending during the crisis. They also showed that banks affected negatively from these shocks restricted their lending especially to small borrowers. Kapan and Minoiu (2013) also found that banks with strong balance sheets and less dependent to international funding were better able to maintain lending during the crisis.

There are also many studies in order to analyze the dynamics of cross-border lending in the literature. Most of these studies depend on a cross country sample and use the country specific panel method. Although it varies from study to study, in many cases, macroeconomic indicators of borrower and lender countries, global liquidity indicators and bilateral information between borrower and lender countries (such as distance, trade volume, common language and common history) are added to models to determine the dynamics of cross border lending. In addition to these variables, some indexes developed by the World Bank or other institutions, such as regulatory quality or financial openness, are also added. Herrmann and Mihaljek (2010) evaluated the cross border lending within the frame of gravity model, which depends on the bilateral distance between borrower and lender countries. They found that variables related with gravity models such as distance have significant effect on cross border lending. Bremus and Fratzscher (2014) analyzed the effect of quantitative easing programs, implemented by the Fed and ECB after financial crisis, and found that expansionary monetary policies have a positive effect on cross border lending. Cerutti, Hale and Minoiu (2014) examined the drivers of cross border credit flows, distinguishing between syndicated and non-syndicated, and they found that banks with a weak capital structure favor syndicated over other types of cross border bank loans. Cerutti, Claessens and Ratnovski (2014) analyzed the cross border bank loans within the frame of global liquidity indicators. They used the indicators of four financial centers, which are United States, United

Kingdom, Euro Area and Japan. With the help of those indicators, they captured the risk appetite, monetary policy stance and credit conditions of these countries, and then they found that European banks have a dominant role in cross border lending. They also showed that cross border lending is driven primarily by monetary stance of US and credit conditions of Euro Area. Shirota (2015) also examined the determinants of cross border lending, and found that main determinants are heterogeneous across countries.

In the literature, affiliated loans and foreign bank affiliates have become popular in recent years. Cerutti and Claessens (2013) separated cross border loans as affiliated and non-affiliated. They tested whether the affiliated loans are different or not with regards to vulnerability during global financial crisis. According to their findings, affiliated loans decreased by only 5 percent, compared to 23 percent in total cross border bank loans. They also reconfirmed the importance of supply side factors. Although there are many empirical studies in the related literature, the number of theoretical studies, such as Bruno and Shin (2013a), is very few. They developed a model of credit allocation of international banks, centralized funding and global banking, and showed the leverage cycles of global banks' contributions and interactions of borrower country and domestic banks characteristics. Bruno and Shin (2013b) tested their model empirically in order to determine whether macro-prudential policies have been effective in Korea against cross-border capital flows after the end of 2010. Aysan, Fendoglu and Kilinc (2013) applied the model of Bruno and Shin to Turkey and they tested whether macro-prudential policies have been effective in Turkey. They showed the effectiveness of macro prudential policies, implemented by Central Bank of the Republic of Turkey since late 2010.

My paper expands on and complements these papers in four ways. First, although most of the studies in the literature are in cross country level, my study uses bank level dataset. With the help of bank level data, I add bank-specific variables to the regression models and be able to separate the effects of bank-specific, national and global variables. Secondly, I separate affiliated and non-affiliated cross border loans, and by

this way I try to analyze whether the lender banks' characteristics are important or not with regards to vulnerability. Thirdly, my dataset contains different loan types (such as credit, deposit, syndicated), and hence I am able to analyze each of the research questions from the loan type perspective. Lastly, use of micro-level data instead of aggregate data enable me to derive more powerful and consistent results.

### **3 Stylized Facts on Cross-Border Bank Loans in Turkey**

In order to understand and assess the vulnerabilities of capital flows more accurately, I will discuss the components and development of Turkish Banks' cross-border loans in this section. The amount of cross-border loans of Turkish Banks has entered into an increasing trend in the last decade (Graph 3). While the level of this amount was USD 10.79 billion in 2002, the level of loans increased approximately thirteen times and reached to the USD 140.89 billion as of December 2014. When we look at the details of that trend, it is seen the negative effects of the global financial crisis in 2008 and Eurozone debt crisis in 2011 on the amount of cross-border loans. While the level is about USD 68.11 billion at the end of 3rd quarter 2008 (the beginning of the global crisis), it was contracted at the rate of 21.64 percent during the crisis and fell to USD 55.99 billion in April 2009. Similarly, after the Eurozone debt crisis, the level of amount declined from the USD 98.86 billion to USD 95.00 billion. This period was very short time which covers from July 2011 to the end of same year. As a result, cross border bank loans are quite sensitive to global conditions and negative global conditions can lead to sudden capital outflows.

Graph 4 shows the behavior of cross border loan types during the time period of analysis, which are credit, deposit, credit for foreign trade finance, syndicated, securitization, repo and subordinated loans. Syndicated loans are provided by a group of

lenders for a single borrower. The interest rate of syndicated loans can be fixed or floating based on a benchmark rate such as Libor or Euribor. Because syndicated loans are commonly larger than standard bank loans and the default risk of borrower could cripple a single lender, it is provided by a group of lenders. Therefore, the main purpose of syndicated loans is to spread the default risk of borrower across multiple lenders. Securitization loans are provided by third party investors in return for the various types of contractual debt (such as auto loans, residential mortgages, commercial mortgages or credit card debt obligations). Subordinated loans are repayable after other debts have been paid if a bank falls into bankruptcy or liquidation. Therefore, those loans are more risky for the lenders. Since subordinated loans have a higher risky structure, they also have higher yield than other debts.

Furthermore, the increasing trends of banking loan types are very similar to the trend of cumulative loan. The biggest share, which reached to 55.04 percent at the end of 2014, belongs to credit during all period. There are there important points in that graph. First, the shares of repo, syndicated loans and deposits have increased since global financial crisis and the share of repo have become the second largest group after May 2011. Secondly, although the shares of credit and securitization became equal in the June 2007, the share of securitization loans has gradually decreased since that time. Thirdly, after December 2008, the subordinated loans can be used in the calculation of capital adequacy ratio and banks have started borrowing in the form of subordinated loans. The amount of subordinated loans has reached to USD 9.77 billion as of December 2014.

The rollover ratio is also crucial indicator for cross border loans because if that ratio drops below 100 percent, then it implies that the amount of new loans fall behind of the repayment amount. And we can conclude that banks have a difficulty finding new loans to roll over their matured loans. This ratio had last dropped below 100 percent in 2009 but has been above 100 percent since then, showing that even during periods when

banks' conjectural risk perceptions were heightened, they did not have any difficulty rolling over their debts (Graph 5).

Cross-border loans of Turkish Banks are usually in the form of TL, USD, and EUR. The share of these currency types in total loans usually remains unchanged within the 98 percent band. As of January 2005, USD, EUR and TL's shares were 79.85, 12.97 percent, and 5.19 percent, respectively, and these shares were sharply changed up to 2010. In this period, despite the decrease of USD's share, the share of EUR increased. In particular, it is seen that the banks borrow more in EUR after the 2008 global financial crisis. As of October 2014, USD, EUR and TL's shares were 64.02, 25.86, and 8.17 percent, respectively (Graph 6).

Graph 7 shows the loan shares of some important regions, which are Euro Area, USA, United Kingdom, Japan and Gulf countries. Banks operating in Turkish financial system are generally borrowing from global banks based on Euro Area and USA. The total share of those two regions was 59.73 percent as of December 2002 and it reached to 60.97 percent, which is very close the previous one, at the end of 2014. After global financial crisis, the share of Euro Area started to decrease and that part was compensated with banks or financial institutions in United Kingdom.

## 4 Data and Methodology

This chapter presents the dataset, the model and the methodology to analyze determinants and dynamics of cross border bank loans in Turkey. Section 4.1 summarizes the features of used dataset. Definitions of variables are also given in this section. Section 4.2 gives the base model used in this thesis.

## 4.1 Data Set and Definition of Variables

The data about the cross-border loans of banks operating in Turkish banking system are held by the Central Bank of the Republic of Turkey (CBRT). In this study, I use the dataset which includes cross border loans of all banks operating in Turkey. This dataset has a monthly frequency, and covers the period of December 2002 and December 2014. It includes loan details that are borrowed by Turkish banks from approximately 139 countries in forms of credit, deposit, credit for foreign trade finance, syndicated, securitization, repo and subordinated loans. The amount, currency type, interest rate, starting date and maturity date of loans are also available in the dataset. In addition to these, the dataset also includes the information of borrower banks, lender banks and lender country. Furthermore, the amount of loans can be created as flow or stock.

Analysis is based on the data of biggest 19 deposit banks according to their asset size due to the liquidation or merger of various banks during the time period of analysis. The asset share of these banks constituted 96.21 percent of banking sector in Turkey as of December 2014. Therefore, the presentation power of the sample is quite high. The list of selected banks is presented in Table 1.

I categorize variables that have the potential to affect cross border bank loans as bank-specific variables, macroeconomic indicators of Turkish Economy and global liquidity indicators. Table 2 summarizes the definitions and sources of these variables. Table 3 also summarizes the descriptive statistics of these variables such as average, standard deviation, maximum and minimum values. Table 4 provides the correlations between all variables which are used in regressions. Time series charts of the Turkish Economy's macroeconomic and global liquidity indicators are presented in Annex A. However, because of the fact that bank-specific variables change from bank to bank, I do not add their graphs to the annex.



## 4.2 Model and Methodology

I used fixed effects and random effects panel estimation methods in this study due to the structure of my dataset. Fixed effect models have fixed slopes within group, but those fixed values change from group to group. Theoretical structure of the fixed effects model is expressed as follows:

$$y_{i,t} = \alpha_i + \beta_i(X)_{i,t} + e_{i,t} \quad (1)$$

and  $t=1, \dots, T_i$

In the above equation;  $y_{i,t}$  represents dependent variable and  $X_{i,t}$  also represents explanatory variable vector.  $\alpha_i$  represents the fixed effects of banks included into analysis, (and is based on the assumption of there is differences between banks).  $\beta_i$  is the vector of explanatory variables' coefficients.

In order to identify fixed effect, the following null hypothesis which states that there is no difference between banks' fixed effects is tested:

$$H_0 : \alpha_1 = \dots = \alpha_n = \alpha \quad (2)$$

In order to compare fixed and random effect models, I implement Hausman test and could not detect random effects in the model.

In this framework, I analyze the determinants of cross border loans of banks operating in Turkey for the period of December 2002 - December 2014 with the help of fixed effects panel estimation method. The model includes the lagged values of the explanatory variables in order to mitigate the potential endogeneity problem in the analysis. Bruno and Shin (2013) used country specific and global factors in their model as control variables, and they added all independent variables by lagging them one period (they have a quarterly dataset) to reduce endogeneity concerns and maximize the period coverage. Therefore, I aim to mitigate the potential endogeneity problem of the

model by using one period lagged value of independent variables.

Selecting the lag length of independent variables is another issue has to be considered. In economic theory, amount of the loan depends not only the contemporaneous indicators but also on past levels of those indicators. In panel data literature, although various lagged values of dependent variables can be added to regression simultaneously, such use is not common for independent variables. In order to select the optimal lag length, first, the model is regressed with different lag lengths consistent with the economic intuition, and then optimal lag selection is done according to the statistical significance level of the coefficients. Therefore, I add one, two and three period lagged values of independent variables to the model and select the optimal lag length as one, by comparing the statistical significance levels.

$$L_{icb,t} = \beta_0 + \beta_1(Bank)_{i,t-1} + \beta_2(TrMacro)_{t-1} + \beta_3(Global)_{t-1} + \gamma_i + \alpha_c + \delta_b + \varepsilon_{icb,t} \quad (3)$$

where

$L_{icb,t}$ : Logarithmic value of bank  $i$ 's stock cross border loan at time  $t$  borrowed from country  $c$  in loan type  $b$ ,

$(Bank)_{i,t-1}$ : The value of bank specific variables of bank  $i$  at time  $t - 1$ ,

$(TrMacro)_{t-1}$ : The value of Turkish Economy's macroeconomic indicators at time  $t - 1$ ,

$(Global)_{t-1}$ : The value of global liquidity indicators at time  $t - 1$ ,

$\gamma_i$ : Fixed effect for bank  $i$

$\alpha_c$ : Fixed effect for country  $c$

$\delta_b$ : Fixed effect for loan type  $b$

The model above is based on fixed effects panel estimation method. In fact, I use fixed effects and random effects models in my estimations, which are robust to

heteroskedasticity and serial correlation. The result of Hausman test is in favor of fixed effects model, thus I only report fixed effect results except for section 5.2.

Dataset covers loan details of all Turkish banks in monthly frequency. In fact, it was possible to aggregate loan amounts in basis of borrower bank or lender country. For example, instead of using the amount of each loan type borrowed by each bank from each country at any given time period, I could use the aggregated amounts on the basis of banks or countries. However, I could not control the shocks occurred during the time period of analysis or separate demand and supply side effects in case of aggregation. Therefore, I use the value of bank  $i$ 's stock cross border loan at time  $t$ , which is borrowed from country  $c$  in loan type  $b$  as a dependent variable. There is a crucial advantage by doing so: I can add fixed effects for borrower bank, lender country and loan types to model and hence control the shocks, which had occurred during the time period of analysis. Especially, controlling the shocks in lender countries enables me to fix supply side effects in cross border loans for Turkey.

In the literature, the classical push and pull factors are the main determinants of the cross-border bank flows. Therefore, I add push and pull factors that can possibly affect loan flows to the model. The push factors are related with the external common conditions mobilizing loan flows. On the other hand, pull factors are more related with the country specific or bank specific factors attracting loan flows. With the help of bank level dataset, I add bank specific and macroeconomic indicators for Turkish economy as pull factors. Moreover, I add global liquidity indicators as push factors.

I estimate the model with three different specifications. In the first specification I analyze the relation between cross border bank loans and bank specific variables. The bank specific variables used in the literature are the size, credit ratio, deposit ratio, capital structure, operating performance (return on asset ratio), credit quality (non-performing loan ratio) of banks. In addition to those variables, I also add the spread between the interest rate of FX credit and FX deposits since it is a crucial indicator

for policy makers.

In the second specification, I add macroeconomic indicators of Turkish Economy as well as bank specific variables. The selected macroeconomic indicators are the real gross domestic product growth rate, consumer price index growth rate (inflation rate), Istanbul Stock Exchange over/night repo interest rate, real effective exchange rate and credit default swap premiums. These variables control especially the demand side for borrower banks.

In the third specification, I add global liquidity variables beside national and bank specific factors. The main global liquidity indicators I used are summarized in the study of Cerutti, Claessens and Ratnovski (2014). They stated that the factors notably identified in the empirical literature are 'uncertainty and risk aversion', 'funding conditions for global banks', 'money aggregates' and 'monetary policies' in the four financial centers (United States, Euro Area, United Kingdom and Japan). According to Bekaert, Hoerova and Lo Duca (2013), the uncertainty and risk aversion are driven by risk attitudes of lenders and borrowers, macroeconomic fundamentals and possibly the monetary stance of the four financial centers. Rey (2013) argued that US VIX, which shows the volatility in 'Standard and Poors 500', gives an idea about the uncertainty and risk aversion, and in the empirical literature, it is commonly used to capture global uncertainty and risk aversion. In addition to VIX, Emerging Markets Bond Index (EMBI) also enables us to track the changes in the risk perception towards emerging markets.

Furthermore, in order to capture the changes in funding conditions for global banks, there are a lot of measures used in the empirical literature. Some of them are real credit growth rate, bank leverage rate and TED spread, which is the difference between government bond rates and short term interbank market. Cerutti, Claessens and Ratnovski (2014) found that the funding conditions of banks in Euro Area play a more crucial role than the US banks in cross border lending. Therefore, I add real credit growth rate of

banks in US and Euro Area to the model in order to capture the changes in funding conditions for global banks. I also add money supply growth rate of aforementioned four financial centers. I use the M2 statistics of United States, European Central Bank and Japan as the money aggregates. Since M2 statistics is not explained in UK, I use M3 statistics instead. Monetary stances of countries include the general level of policy interest rates and the slope of yield curve. In order to capture the changes in monetary stance of the Fed, I use the yield curve slope of US, which is the difference between 10 year and 3 month US Treasury bill yields. In addition to those factors, I also add the balance sheet size of the Fed. To our common knowledge, the quantitative easing policies of US have been one of the main sources of excess global liquidity, especially after the recent global financial crisis. Therefore, controlling the balance sheet size of the Fed is also crucial since the Fed's non-traditional expansionary monetary policies have been one of the main determinants of the last decade.

I use the variable that shows the size of bank in logarithm. The expected sign of banks' sizes is positive since bigger banks might be more inclined to borrow from abroad. Credits require funds for banks, thus the expected sign of banks' credit ratio is positive. However, deposits are the main funding sources for banks, and decrease in the deposits leads bank to obtain more foreign funds. Therefore, the expected sign of banks' deposit ratio is negative. I use the ratio of paid capital to total assets in order to capture the changes in banks' capital structures. Increase in that ratio also decreases the necessity of foreign fund sources, and it is expected that capital ratio is negatively related with cross border bank loans like deposit ratio. Return on asset and non-performing loan ratios show the quality of credits and management performance for each bank. Banks that have high return on assets ratio and low non-performing loan ratio will be more proactive in the sector, and we expect that such banks are growing more rapidly. In order to grow more rapidly, banks require domestic and foreign funds. The expected sign of return on asset ratio and non-performing loan ratio are positive

and negative, respectively. The spread increases when the increase in FX credit interest rate exceeds the increase in FX deposit interest rate. This case also implies an increase in credit risk in the country. The contraction in cross border borrowing in the case of increasing credit risk implies two possibilities. In the first case, banks might not roll over their loans at the desired level during that period, which shows that banks had difficulties to obtain funds from abroad due to deleveraging activities of global banks. On the other hand, for the sake of being cautious, those banks might have preferred not to borrow at the previous level on purpose. Therefore, the expected sign of spread between interest rate of FX credit and FX deposit is ambiguous.

Because gross domestic product(GDP) value of Turkey is explained quarterly and the dataset used in this study has a monthly frequency, I use monthly changes of industrial production index, which is a powerful proxy for GDP, instead of GDP. The expected signs of change in industrial production index and inflation are positive and negative, respectively, since these factors represent the demand side, and improvements in these factors provide a more favorable investment environment. That also leads to increase in the activities of banking sector such as giving more credits. Increase in the change of interest rate as regards to previous month and decrease in the risk premium of Turkey create an incentive for investors to lend more to Turkey. Therefore the expected signs of Istanbul Stock Exchange over/night interest rate and credit default swap premiums are positive and negative, respectively.

VIX and EMBI enable us to capture the changes in uncertainty and risk aversion, thus the expected signs of VIX and EMBI are negative. To our common knowledge, banks lend long term and borrow short term. Hence, when the yield curve becomes flat, their domestic investment opportunities become less profitable, and this may canalize banks to search for yield like cross border bank loans. Therefore, the expected sign of the slope of US yield curve is also negative. The expected signs of credit growth rate of banks in US and Euro Area are positive since those factors reflect the willingness to

take risks in cross border lending. Because the quantitative easing policies of US have been one of the main sources of excess global liquidity especially after the recent global financial crisis and that excess global liquidity has triggered the flows from advanced to emerging countries, the expected sign of the Fed's balance sheet size is also positive.

## **5 The Empirical Results**

### **5.1 Determinants of Cross Border Bank Loans in Turkey**

To begin with, I add the bank specific variables that can possibly affect loan flows to the regressions in Table 5. In the first regression, I add the monthly dummy variables to regression in order to control time shocks. Other models control bank type, lender country type and loan type fixed effects as well as time fixed effects, respectively. For example; the fourth model controls time, borrower bank, lender country and loan type shocks, and could control supply side completely with the help of those fixed effects. In the sixth model, I control time and country fixed effects as a group in order to control shocks stemmed from lender countries in a monthly basis. Therefore, sixth model presents the results in cases where supply side is controlled very strictly.

According to the regression results of fourth model in which all fixed effects are included, the signs of all explanatory variables used in the model appear to be in the expected direction. Large banks and banks that have a high return on asset ratios are borrowing more. In addition, banks that have more credits in their portfolio are borrowing more from abroad. I also find that there is no significant impact of non-performing loan ratio and capital structure of bank on cross border bank loans, and there is a negative relation between deposits and cross border borrowing. Moreover, there is also a negative relation between cross border borrowing and the spread between interest rates of FX credit and FX deposit. The spread increases when the increase in FX credit interest rate exceeds the increase in FX deposit interest rate. That case

also implies an increase in credit risk in the country. The contraction in cross border borrowing in the case of increasing credit risk implies two possibilities. In the first case, banks might not roll over their loans at the desired level during that period, which shows that banks had difficulties to obtain funds from abroad due to deleveraging activities of global banks. Conversely, for the sake of being cautious, those banks might have preferred not to borrow at the previous level on purpose. However, because I control the shocks stemmed from lender countries, I show that negative relation between cross border borrowing and the spread is the result of second case. Therefore, I conclude that banks have preferred not to borrow at the previous level on purpose for the sake of being cautious. All these relations are also significant at 1 percent level.

In Table 6, in addition to bank specific variables, I also add macroeconomic indicators of Turkish economy that can possibly affect loan flows as control variables. All regressions include borrower bank, lender country and loan type fixed effects with a constant term. Because gross domestic product value of Turkey is explained quarterly and the dataset used in this study has a monthly frequency, I used industrial production index instead of GDP, which is a powerful proxy for GDP. According to the results, bank-specific variables have a significant positive impact on the cross border bank loans at 1 percent level, which is similar to the results of Table 5. The changes in Istanbul Stock Exchange over/night repo interest rates and credit default swap(CDS) premiums have also significant effects on cross border bank loans. Increase in the change of interest rates and decrease in the CDS premiums lead to increase in the cross border loans. The explanation might be that increase in the change of interest rate as regards to previous month and decrease in the risk premium of Turkey create an incentive for investors to lend more to Turkey. However, other macroeconomic indicators of Turkish economy do not have significant impact on cross border bank loans. This may be due to the high sensitivity of financial sector to the changes in macroeconomic indicators. Therefore, when I add macroeconomic indicators with bank specific variables to the



model, I can capture the effects of the changes in economy by the way of bank specific variables.

In Table 7, in addition to bank specific variables and macroeconomic indicators of Turkish economy, I also add global liquidity indicators that can possibly affect loan flows as control variables. All regressions include borrower bank, lender country and loan type fixed effects with a constant term. The bank-specific variables have a significant positive impact on the cross border bank loans at 1 percent level, which is similar to the results of Table 5. The signs of all global liquidity indicators used in the model appear to be in the expected direction. Due to high correlation between EMBI and VIX, I add them to the regressions separately. According to seventh regression in which all explanatory variables are added to model, real credit growth of banks in US and Euro Area, the money supply growth rate of aforementioned four financial centers and the balance sheet size of the Fed have significant effects on cross border bank loans in Turkey.

However, monetary stance of the Fed(yield curve slope), global risk appetite(VIX), and risk perception towards emerging markets(EMBI) do not have a significant effect on cross border loans. Especially after global financial crisis, the policy rate of Fed converged to zero level and changes in funding rate of Fed have been limited since global financial crisis. That fact may be the reason of why monetary stance of the Fed does not have a significant effect on cross border loans. On the other hand, VIX and EMBI are the crucial indicators for global risk appetite, and one reason why the risk appetite indicators do not have a significant effect on cross border loans may be that Turkish banks also issue bonds for foreign investors to obtain funds, and the amount of bonds issued by banks for foreign investors are excluded from my analysis. To our common knowledge, the investors of bonds are more sensitive to the changes in VIX and EMBI. However as long as those indicators go around within the narrow interval, they may not have significant effect on cross border bank loans.

The real credit growth of US and Euro Area are also crucial parameters in related literature because these variables describe the funding conditions for global banks. Cerutti, Claessens and Ratnovski (2014) analyzed the cross border bank loans within the frame of global liquidity indicators, and they found that European banks have a dominant role in cross border lending and it is driven primarily by monetary stance of US and credit conditions of Euro Area. Table 7 shows that real credit growth in banks of US and Euro Area have positive effects on cross border bank loan in Turkey, which is also consistent with the related literature. Not to mention the 40 percent of cross border bank loans in Turkey have been borrowed from European banks, and hence Turkish banks are more sensitive to the developments in European banking sector.

Hahm, Shin and Shin (2013) and Chung, Lee, Loukoianova, Park and Shin (2014) state that the growth in some components of broad money measures, such as wholesale or non-financial enterprises' deposits, can complement leverage measures in explaining bank risk as they indicate the relative ease of funding conditions. In the light of that argument, I expect that increase in money supply leads to increase in cross border bank loans, which is also consistent with my results.

The balance sheet size of the Fed is also consequential due to quantitative easing program implemented after the end of 2008. After that expansionary monetary policy, global liquidity increased and moved to especially emerging markets such as Turkey. That relation between the balance sheet size of the Fed and cross border bank loans will be analyzed more deeply in Section 5.4. All these relations are significant at 1 percent level.

As a result, the main determinants can be summarized into three groups. Bank specific determinants are banks' credit ratios, deposit ratios, return on asset ratios, sizes and FX credit and deposit interest spreads. Monthly change in Istanbul Stock Exchange repo interest rate is the only indicator among national variables that affects cross border bank loans. Global determinants are real credit growth of banks in US

and Euro Area, money supply growth rate of four financial centers, and the balance sheet size of the Fed. Results also indicate that there is significant impact of neither non-performing loan ratios and capital structures of banks nor the monetary policy stance of the Fed, global risk appetite, and risk perception towards emerging markets on cross border bank loans in Turkey.

Moreover, I look at the relative economic significance of variables on cross border bank loans by running standardized regression in which the coefficients shows the impact of a one standard deviation change in an explanatory variable on the dependent variable. Therefore, the magnitude of standardized coefficients has become comparable. The second column of Table 8 reports these standardized coefficients and the third and fourth columns sort out these variables according to their economic significance, where the ordering is based on the absolute value of the standardized coefficients, which are statistically significant at 1 percent level. The third column sorts out these coefficients according to their groups. The most economically significant variable is the size of banks, the second one is the credit ratio of banks, third one is the balance sheet size of the Fed, the fourth one is deposit ratio of banks, the fifth one is real credit growth of banks in Euro Area, the sixth one is the spread between the interest rate of FX credit and FX deposit, the seventh one is return on asset ratio of banks, the eighth one is real credit growth of banks in Unites States, and the last one is money supply growth rate of four financial centers.

## **5.2 Are the lender banks' characteristics important with regards to vulnerability?**

37 out of 49 banks that are currently operating in Turkey have a foreign partnership. Banks can borrow from either foreign partners or any other financial institutions from abroad. As I mentioned in the literature review section, Cerutti and Claessens (2013) analyzed the behavior of cross-border bank loans and affiliated loans during financial

crisis and Eurozone debt crisis. They found that while the amount of affiliated loans decreased by 5 percent, the amount of all cross border bank loans decreased by 23 percent during global financial crisis. They concluded that affiliated loans had a more resistant structure than non-affiliated loans during the global financial crisis. In the light of that study, analyzing the lender banks and financial institutions, and separating total cross border loans as affiliated and non-affiliated loans are also crucial.

Firstly, I clarify the partnership structures of banks operated during the time period of analysis in Turkey. In the second step, I separate non-affiliated and affiliated loans that are borrowed from the foreign partners by domestic banks. At the end of that process, I constitute a second dataset, which includes affiliated and non-affiliated loans.

Graph 8 shows the behavior of affiliated and non-affiliated loans with total cross border bank loans. While the total amount of cross border bank loans was USD 10.79 billion, the total amount and share of affiliated loans was USD 0.84 billion and 7.8 percent as of December 2002, respectively. However, the total amount of cross border bank loans and affiliated loans reached to USD 137.35 billion and USD 27.65 billion, respectively. The share of affiliated loans also increased to 20.13 percent during time period of analysis. The amount of total cross border bank loans and the share of affiliated loans increased at the same time. Development and globalization of Turkish banking sector and intense interest of foreign banks to Turkey might lead to such an increase.

Graph 9 shows the roll over rates of affiliated and non-affiliated loans during the time period of analysis. There are two important points to underline: The roll over ratio of affiliated loans is higher than the ratio of non-affiliated loans throughout the period, and the roll over ratio of affiliated loans did not decrease during the global financial crisis whereas the ratio of non-affiliated loans decreased up to 74 percent during that period. Therefore due to this spread between affiliated and non-affiliated loans, I assert that affiliated loans can be more resilient to conjectural risk perceptions.

In order to get an empirical answer to the question of whether the lender banks' characteristics are important with regards to vulnerability or not, I used the following model with the help of random effects panel estimation method instead of fixed effects. Analysis covers the period between December 2002 and December 2009, and I divided this period into pre-crisis and crisis periods. Because of the fact that I separated total loans as affiliated and non-affiliated, loan type  $\alpha$  characterizes the affiliated and non-affiliated loans in the model. Loan type  $\alpha$  is a dummy variable, which is equal to 1 for affiliated loans and 0 for non-affiliated loans.

Because the dependent variable is the yearly logarithmic difference of bank  $i$ 's stock loan amount at time  $t$  which is borrowed in type  $\alpha$ , it is not possible to use a dummy variable for loan types with fixed effects method. When I regress with fixed effects, the dummy variable for affiliated loans omits. Thus, since the structure of the dataset is not proper for fixed effects estimation, I used random effects estimation instead. Random effects estimation gives the weighted average 'within' and 'between estimators'. Key point in using random effects estimation is the assumption of fixed effects of each bank are independent from all explanatory variables in all time periods. Therefore, I assume that  $\theta_{i\alpha}$  shown in the model is independent of all explanatory variables in all time periods.

$$\begin{aligned} \Delta L_{i\alpha,t} = & \beta_0 + \beta_1 \Delta(Bank)_{i,t-1} + \beta_2 \Delta(TrMacro)_{t-1} + \beta_3 \Delta(Global)_{t-1} \\ & + \beta_4 D_1 + \beta_5 D_2 + \beta_6 (D_1 * D_2) + \theta_{i\alpha} + \varepsilon_{i\alpha,t} \end{aligned} \quad (4)$$

where

$\Delta L_{i\alpha,t}$ : The yearly logarithmic difference of bank  $i$ 's stock loan amount at time  $t$ , which is borrowed in type  $\alpha$  (affiliated or non-affiliated),

$\Delta(Bank)_{i,t-1}$ : Yearly difference of bank specific variables of bank  $i$  at time  $t - 1$ ,

$\Delta(TrMacro)_{t-1}$ : Yearly difference of Turkish Economy's macroeconomic indicators

at time  $t - 1$ ,

$\Delta(Global)_{t-1}$ : Yearly difference of global liquidity indicators at time  $t - 1$ ,

$D_1$ : Affiliated Loan Dummy,

$D_2$ : 2008 Crisis Dummy (for the period of 2008M09 and 2009M09),

$(D_1 * D_2)$ : Interaction of Affiliated Loan and 2008 Crisis Dummies

Dependent variable is the yearly logarithmic difference of bank  $i$ 's stock loan amount at time  $t$  which is borrowed in type  $\alpha$  (affiliated or non-affiliated) because the yearly logarithmic difference expresses the annual growth approximately. I use yearly logarithmic difference instead of logarithmic value since I compare the effects of global financial crisis on affiliated and non-affiliated loans. If I used logarithmic value of loans, it could give the amount of changes in both types. However it would be biased since the amount of non-affiliated loans is so higher than affiliated loans. Therefore, the percentage changes in both loan types are more meaningful. In the light of that objective, I add the yearly logarithmic difference as a dependent variable to the model. To ensure consistency, I also add the yearly difference of independent variables to the model. Non-affiliated loans represent the control group.

In Table 9,  $\beta_1$  shows the difference between the growth rates of affiliated and non-affiliated loans during pre-crisis period.  $\beta_3$  shows the difference between the growth rates of affiliated and non-affiliated loans during crisis period. According to the fourth regression that includes all the explanatory variables, the growth rate of non-affiliated loans was larger than the growth rate of affiliated loans by 1.85 percent during pre-crisis period. The growth rate of affiliated loans was bigger than non-affiliated loans by 0.74 percent during financial crisis, and this result states that affiliated loans are less affected from 2008 global financial crisis according to non-affiliated loans. Therefore, I conclude that lender banks' characteristics with regards to vulnerability are important and affiliated loans have less vulnerable structure as regards to non-affiliated loans.

### **5.3 Could Macro-Prudential Policies in Turkey increase the resilience of Turkish economy to cross-border bank flows?**

After the beginning and spreading of the global financial crisis in 2008, new policy framework was developed to eliminate systemic risks and thereby to prevent the contagion effects of unfavorable financial conditions to all economies. The importance of giving a quick reaction equipped with macro-prudential policies to financial crisis has become evident with recent studies (Bianchi and Mendoza 2011, Jeanne and Korinek 2010). It was clearly understood that uncontrolled structure of financial system and illegal practices are the main reasons of crisis, and three main results of crisis have led to the search for new policies:

- Contagion effect of unfavorable financial conditions to all economies is more than estimated.
- Costs of financial crisis are very high.
- Price stability does not guarantee the financial stability.

Therefore, in order to reduce the negative effects induced from the volatility in capital flows, Turkey has implemented certain macro-prudential policies and enacted some regulations since the last quarter of 2010. Targeting financial stability with price stability, interest rate corridor and reserve option mechanism are some of the examples of those policies.

Turkey has started to monitor financial stability as well as price stability since the last quarter of 2010. Although price stability has a concrete definition, financial stability does not have such a definition, and hence the definition of financial stability changes from country to country. Therefore, prior and urgent problems of the economy determine the required policies to ensure financial stability. In Turkey, volatile capital flows are one of the main and prior problems that threaten financial stability. In order

to reduce the negative effects induced from the volatility in capital flows, CBRT has implemented certain macro-prudential policies since the last quarter of 2010. These policies can be summarized basically as the interest rate corridor, changes in reserve requirements and Reserve Option Mechanism (ROM).

- Interest rate corridor: Unlike the traditional interest rate policy, the short-term interest rates can be arranged in daily and weekly frequencies instead of a monthly frequency (Basci and Kara, 2011). With the help of interest rate corridor;
  - CBRT can give quick responses to sudden global changes,
  - CBRT can expand interest rate corridor to downward or upward in accordance with the capital flows.
  - CBRT can manage credit supply with increasing uncertainty about corridor and funding amount.
- Required Reserves: CBRT has the option to increase required reserve ratios in order to prevent financial risk stemmed from volatility in capital flows. Under the new monetary policy:
  - Interest payment application for reserve requirements have terminated,
  - Required reserve ratios were differentiated according to the maturity structure of deposits,
  - Financing companies have been included in the reserve requirements system.
- Reserve Option Mechanism (ROM): This mechanism provides an opportunity to banks holding certain percentage of their TL required reserves as FX and gold. Strengthening of foreign exchange reserves, providing more flexibility in liquidity management to banks, and minimizing the volatility risks in exchange rates stem from capital flows are the main objectives of Reserve Option Mechanism (Alper, Kara and Yorukoglu (2012)).



CBRT and Banking Regulation and Supervision Agency (BRSA) also took several macro prudential measures in accordance with the directives of the Financial Stability Committee.

In order to determine whether macro-prudential policies in Turkey could increase or not the resilience of Turkish economy to cross-border bank flows, I use the following model. It is based on the fixed effect panel estimation method and covers the period of December 2002 - December 2014. The model below is very close to Model 3, and it aims to separate demand and supply side shocks with the help of fixed effects for borrower bank, lender country and loan type. However, the source of shocks is not important in this model, and there is no need to separate demand and supply side shocks since I only analyze the sensitivity of capital flows to global factors without noticing demand or supply side. Therefore, I add the fixed effects for each loan type borrowed by each bank from each country together instead of separating them, which are represented by  $\gamma_{icb}$  in the model.

The sensitivity of cross border bank loans to the behavior of global indicators shows that any change in global liquidity indicators will lead to volatility in bank flows. Sharp volatility in bank flows also threaten financial stability. My research question arises at this point because macro-prudential policies have been applied since late 2010 in order to ensure financial stability and decrease the magnitude of volatility in capital flows. Thus, I analyze whether the sensitivity of bank flows to changes in global indicators have decreased or not since late 2010. Therefore, I add the global liquidity indicators to the model such as EMBI, US yield curve slope, real credit growth of banks in US and Euro Area, money supply growth rate of four financial centers, and balance sheet size of Fed. Since the macro-prudential policies have been implemented since the last quarter of 2010, I also add a dummy variable, which represent the period of 2010M09 and 2014M12. I then interact dummy variable with each global factor. My focus is on the double interaction terms given by

$$Global\ factor * Post2010 \tag{5}$$

which give the incremental sensitivity of cross border bank loans to the global factors from June 2010.

$$L_{icb,t} = \beta_0 + \beta_1(Global)_{t-1} + \beta_2 D_1 + \beta_3((Global)_{t-1} * D_1) + \gamma_{icb} + \varepsilon_{icb,t} \tag{6}$$

where

$L_{icb,t}$ : Logarithmic value of bank  $i$ 's stock cross border loan at time  $t$ , which is borrowed from country  $c$  in loan type  $b$ ,

$(Global)_{i,t-1}$ : The value of global liquidity indicators at time  $t - 1$ ,

$D_1$ : *Post2010* dummy variable (for the period of 2010M09 and 2014M12)

$((Global)_{t-1} * D_1)$ : The interaction of global liquidity indicators at time  $t - 1$  and *Post2010* dummy variable

$\gamma_{icb}$ : The fixed effect for cross border loan of bank  $i$  borrowed from country  $c$  in loan type  $b$

Table 10 shows the estimation results. In the first regression, I add global liquidity indicators to the analysis as control variables. In the other regressions, I add the *post2010* dummy variable and interactions of global liquidity variable with *post2010* dummy variable to the model, respectively. The coefficients of  $\beta_1 - \beta_6$  show the incremental sensitivity of cross border bank loans to the global factors from June 2010. According to the results in Table 10, the effects of emerging market risk perception (EMBI), monetary stance of Fed and real credit growth of banks in US and Euro Area on cross border bank loans have decreased since the last quarter of 2010. However, there is no significant change in the effects of money supply growth rate and the Fed's balance sheet size on cross border bank loans.

As a result, I conclude that the impacts of global liquidity indicators on cross border loans diminished and the new policy framework in Turkey has been successful within the frame of protecting Turkish economy from the volatile bank flows. The results show that after the implementation of macro-prudential policies, cross-border bank flows in Turkey have been less sensitive to global factors.

## **5.4 The Effect of Fed Policies on Cross Border Bank Loans in Turkey**

In order to eliminate the negative results of global financial crisis erupted in 2008, central banks primarily decreased interest rate, but then due to lack of performance of those measures, central banks in advanced countries were inclined to launch a quantitative easing process. The main actor in this period was the US Federal Reserve(Fed) and it provided large amounts of liquidity to the market by using unconventional monetary policy measures. It also supported markets with various asset purchase program (Table 11). After aforementioned measures, the balance sheet size of Fed, which is the best indicator of monetary expansion, has reached record levels (last graph of Annex A).

In summary, the effects of Fed's non-traditional expansionary monetary policies on the capital flows and cross border bank loans in emerging countries have been among the hot discussion issues in recent years. In this section, I analyze the effects of Fed's balance sheet size, which has changed substantially as a result of quantitative easing program, on cross border bank loans in Turkey.

In order to determine the effects of Fed policies on cross border bank loans in Turkey, I use the following model. It is based on the fixed effect panel estimation method and covers the period of December 2002 - December 2014. The model below is very close to Model 3, which aims to separate demand and supply side shocks with the help of fixed effects for borrower bank, lender country and loan type. Adding fixed effects for lender country to the model enables us to control shocks stemmed from lender country.

However, it is also fact that the share of US lender banks in total bank loans in Turkey is so high, and I aim to identify the the effects of US Federal Reserve's(Fed) policies. Therefore, I do not add the country fixed effects to the model below as a different from Model 3. I only control the fixed effects of borrower bank and loan type.

Furthermore, Model 3 identifies the dynamics of cross border bank loans on the basis of bank-specific, national and global factors. However, the model below aims to analyze the effects of Fed's quantitative easing policies on bank flows. Hence, the first and main explanatory variable of model is the balance sheet size of Fed, which represents the quantitative easing policies. In addition to that variable, I also add the national and bank specific factors to model.

$$L_{icb,t} = \beta_0 + \beta_1(\text{Log}(FEDAsset))_{t-1} + \beta_2(\text{TrMacro})_{t-1} + \beta_3(\text{Bank})_{i,t-1} + \gamma_i + \delta_b + \varepsilon_{ib,t} \quad (7)$$

where

$L_{icb,t}$ : Logarithmic value of bank  $i$ 's stock cross border loan at time  $t$  borrowed from country  $c$  in loan type  $b$ ,

$(\text{Log}(FEDAsset))_{t-1}$ : Logarithmic value of the balance sheet size of Fed at time  $t - 1$ ,

$(\text{TrMacro})_{t-1}$ : The value of Turkish Economy's macroeconomic indicators at time  $t - 1$ ,

$(\text{Bank})_{i,t-1}$ : The value of bank specific variables of bank  $i$  at time  $t - 1$ ,

$\gamma_i$ : Fixed effect for bank  $i$

$\delta_b$ : Fixed effect for loan type  $b$

First, I add the balance sheet size of Fed as a basic explanatory variable to the all regressions in Table 12. The first regression does not include any fixed effects, but other regressions control time, bank, lender country and loan type fixed effects, respectively.

In the fifth regression, which includes all those fixed effects, country specific supply shocks and loan type shocks are controlled fully. In the sixth model, time and country fixed effects were controlled as a group in order to control lender country shock in monthly basis. Therefore, sixth model presents the results in cases where supply side effects are controlled very strictly. The increase in balance sheet size of Fed increases the cross border bank loans strongly. That impact is significant at the 1 percent level.

In Table 13, in addition to the balance sheet size of Fed, I add the macroeconomic indicators of Turkish economy and bank specific variables. All regressions include borrower bank and loan type fixed effects with a constant term. Similarly, the balance sheet size of Fed has a significant positive impact on the cross border bank loans at 1 percent level which is similar to the results of Table 12. The signs of all macroeconomic indicators and all global liquidity indicators used in the model appear to be in the expected direction. According to the result of eighth regression in which all explanatory variables are added, the real effective exchange rate also affect cross border bank loans as well as the balance sheet size of Fed. Banks increase their cross border loans as a result of appreciation of TL. Large banks and banks that have strong capital structure and high return on asset ratio are borrowing more. In addition, banks that have more credit in their portfolio are borrowing more from the abroad. I find that banks have low non-performing loan ratio and high deposit ratio are also borrowing more. Such all relationships are significant at 1 percent level.

Although Table 13 shows the positive effect of Fed's balance sheet size on cross border bank loan, it does not offer a solution to the question of which type of loans is more affected from the quantitative easing program. Therefore, I add dummy variables for each loan type to eighth regression in Table 13. Moreover, in order to see the marginal effects of Fed's balance sheet size on loan types, I also add the interactions of balance sheet size of Fed with loan type dummy variables to the model (Table 14). In the first and second regressions, credits and repo are excluded as a control group,

respectively. In the first regression, the coefficients of  $\beta_7 - \beta_{10}$  show the marginal effect of balance sheet size of Fed on deposits, syndication, securitization and repo according to credit, respectively. In the second regression, the coefficients of  $\beta_6 - \beta_9$  show the marginal effect of balance sheet size of Fed on credit, deposits, syndication and securitization according to repo, respectively. The Fed's balance sheet size has a significant effect on cross border loan types. Credit, repo, deposits, syndication and securitization types are affected more from the increase in the Fed's balance sheet size, respectively.

I test those results statistically in Table 15a and 15b, respectively. In the first test, I test interacted variables jointly. According to test results, the null hypothesis is rejected, and the changes in balance sheet size of Fed affect loan types at the different levels. In the other tests, I test the effects of Fed's asset size on each loan types. According to test results, the null hypotheses are rejected, and the effects of the changes in Fed's balance sheet size on each loan types are statistically significant. Moreover, the results of Table 15b are also similar to Table 15a.

In Table 16, I analyze the channels in which Fed's asset size affects cross border bank loans. Therefore, I add the interactions of balance sheet size of Fed with bank specific variables to the eighth model in Table 13. Table 16 shows that banks that have relatively small asset sizes, weak capital structures, low return on assets and liquid assets ratios are affected more from the changes in the Fed's balance sheet size. I interpret that case as following: The banks, which could not borrow at the desired level during illiquid periods due to underwhelming ratios and indicators, started to search for yield and borrow more with the help of increasing liquidity as a result of Fed's quantitative easing process. Therefore, those banks are affected more from the quantitative easing process.

As a result, I analyze the channels in which Fed's asset size affects cross border bank loans and loan types in Turkey. Cross border bank loans have increased as a result of

quantitative easing programs. Credit, repo, deposits, syndication and securitization types are affected more from the increase in the Fed's balance sheet size, respectively. Moreover, the banks, which have relatively small asset sizes, weak capital structures, low return on assets and liquid assets ratios, are affected more positively from the changes in the Fed's balance sheet size because they could not borrow at the desired level during illiquid periods but they started to borrow more easily in the liquid environment, which is the result of Fed's quantitative easing programs.

## **6 Conclusion**

This paper contribute to the literature on the determinants of cross border bank loans in Turkey by using bank level dataset. I analyze the determinants of cross border bank loans in Turkey for the period of December 2002 and December 2014. The main findings can be summarized as follows: I categorize the main determinants as bank specific, national and global. Bank specific determinants are banks' credit ratios, deposit ratios, return on asset ratios, sizes and FX credit and deposit interest spreads. Monthly change in Istanbul Stock Exchange repo interest rate is the only indicator among national variables that affect cross border bank loans. Global determinants are real credit growth of banks in US and Euro Area, money supply growth rate of four financial centers, and the balance sheet size of Fed. I also show that there is no significant impact of non-performing loan ratio and capital structure of banks on cross border bank loans as well as monetary policy stance of Fed, global risk appetite, and risk perception towards emerging markets. That is, banks that large size, high return on asset ratio, more credit in their portfolio and low deposit ratio are borrowing more, and only change in BIST over/night repo interest rate among national variables has significant impact on cross border bank loans.

Secondly, I compare the vulnerabilities of affiliated and non-affiliated loans for the

pre-crisis and global financial crisis periods. According to the results, the lender banks' characteristics are important with regards to vulnerability and affiliated loans have less vulnerable structure than non-affiliated loans.

Thirdly, I analyze whether macro-prudential policies in Turkey could increase or not the resilience of Turkish economy to cross-border bank flows. According to results, the impacts of global liquidity indicators on cross border bank loans diminished and the new policy framework in Turkey has been successful with regards to sharp volatile bank flows. The results show that after the implementation of macro-prudential policies, cross-border bank flows in Turkey have been less sensitive to global factors.

Fourth question is about the effects of Fed's balance sheet size, which is the indicator for quantitative easing programs, on cross border bank loans in Turkey. I also analyze the channels in which Fed's balance sheet size affects cross border bank loans and loan types in Turkey. Cross border bank loans have increased as a result of quantitative easing programs. Credit, repo, deposits, syndication and securitization types are affected more from the quantitative easing programs, respectively. Moreover, the banks, which have relatively small asset sizes, weak capital structures, low return on assets and liquid assets ratios, are affected more positively from the quantitative easing programs because they could not borrow at the desired level during illiquid periods due to their underwhelming ratios but they started to borrow more easily in the liquid environment, which was the result of Fed's quantitative easing programs.



## References

Alper K., Kara A. H. and Yorukoglu M., 2012. Reserve Option Mechanism, Central Bank of Turkey Research Notes in Economics No: 12/28.

Aysan A. F., Fendoglu S. and Kilinc, M., 2014. Macroprudential policies as buffer against volatile cross-border capital flows. Singapore Economic Review, 2015, Vol.60(1).

Basci E. and Kara A. H., 2011. Financial Stability and Monetary Policy, Central Bank of Turkey Working Papers No: 11/08.

Bekaert, G., M. Hoerova, M., and M. Lo Duca. 2013. Risk, uncertainty and monetary policy, Journal of Monetary Economics, 60 (7), pp. 771-788.

Bianchi J. and Mendoza E. G., 2011. Overborrowing, Financial Crises and 'Macroprudential' Taxes, IMF Working Paper 11/24.

Bremus F. and Fratzscher M., 2014. Drivers of structural change in cross-border banking since the Global Crisis, Journal of International Money and Finance, forthcoming.

Calvo, G., Izquierdo, A. and Mejia L. F., 2008, Systemic Sudden Stops: The Relevance of Balance Sheet Effects and Financial Integration, Working Paper 637, Inter-American Development Bank, New York.

Caramazza, F., Ricci, L. and Salgado R., 2004. International Financial Contagion in Currency Crisis, Journal of International Money and Finance 23, 51-70.

Cerutti E., Galina H., and Minoiu C., 2013. Financial Crises and the Composition of Cross-Border Lending." Journal of International Money and Finance, 52, 6081.

Cerutti, E., Claessens S., and Ratnovski L., 2014. Global Liquidity and Drivers of Cross-Border Bank Flows, IMF working paper.

Cerutti, E. and Claessens S., 2014. The Great Cross-Border Bank Deleveraging: Supply Side Characteristics, Paper presented at the PSE/BdF/NYFed/CEPR Workshop on the Economics of Cross-Border Banking, Paris (December 13-14, 2013), IMF Working Paper, forthcoming

Cetorelli, N. and Goldberg L., 2011. Global Banks and International Shock Transmission: Evidence from the Crisis. IMF Economic Review, 59, 41-76.

Chung, K., J. E. Lee, E. Loukoianova, E., M. Park, and H. S, Shin, 2014. Global liquidity through the lens of monetary aggregates, IMF Working Paper, 14/9.

Claessens, S., and van Horen N., 2013a. Foreign banks: trends and impact, Journal of Money, Credit and Banking, 46(S1), 295326.

Claessens, S., and van Horen N., 2013b. Location decisions of foreign banks and competitor remoteness, Journal of Money, Credit and Banking, 46, 145-170.

Cull, R., and Martinez Peria M. S., 2012. Bank ownership and lending patterns during the 2008-2009 financial crisis: evidence from Latin America and Eastern Europe, World Bank Policy Research Working Paper, No. 6195

De Haas, R., and van Horen N., 2012. International shock transmission after the Lehman Brothers collapse: evidence from syndicated lending, American Economic Review Papers Proceedings, 102, 231-237

De Haas, R., and van Horen N., 2013. Running for the exit? International bank lending during a financial crisis, Review of Financial Studies, 26, 24485.

Eichengreen, B., Rose, A.K. and Wyplosz C., 1996. Contagious Currency Crisis. Working Paper 5681. National Bureau of Economic Research. Cambridge, MA.

Forbes, K.J. and Chinn M.D., 2009. The Decomposition of Global Linkages in Financial Markets Over Time. *The Review of Economics and Statistics* 86(3), 705-722.

Garcia-Herrero, A. and Martinez-Peria M.S., 2005. The Mix of International Banks Foreign Claims: Determinants and Implications for Financial Stability. Working Paper 525, Bank of Spain.

Giannetti, M., and Laeven L., 2012. The Flight Home Effect: Evidence from Syndicated Loan Market during Financial Crises, *Journal of Financial Economics*, vol. 104(1), pp 23-43.

Glick, R. and Rose A.K., 1998. International Financial Contagion, *World Economic Outlook*, Chapter 3, 66-87.

Goldberg, L., 2001. When is US lending to Emerging Markets Volatile? Working Paper 8209, National Bureau of Economic Research. Cambridge, Massachusetts.

Goldberg, L., 2009. Understanding Banking Sector Globalization International Monetary Fund Staff Papers, 56, 1, 171-197.

Hahm, J. H., H. S. Shin, and K. Shin, 2013, Noncore bank liabilities and financial vulnerability, *Journal of Money, Credit and Banking*, 45(s1), 3-36.

Hernandez, L., Mellado, P. and Valds R., 2001. Determinants of Private Capital Flows in the 1970s and 1990s: Is There Evidence of Contagion? Working Paper 64. International Monetary Fund, Washington.

Herrmann, S. and Mihaljek D., 2013. The Determinants of Cross-Border Bank Flows to Emerging Markets. *Economics of Transition* 21, no. 3: 479-508.

Jeanne O. and Korinek A., (2010). Managing Credit Booms and Busts: A Pigouvian Taxation, NBER Working Paper 16377.

Jeanneau, S. and Micu M., 2002. Determinants of International Bank Lending to Emerging Market Economies. Working Paper 112. Bank for International Settlements, Basel.

Kaminski, G. and Reinhart C.M., 2000. On Crisis, Contagion and Confusion. *Journal of International Economics* 51, 145-168.

Kapan, T., and Miniou C., 2013. Balance Sheet Strength and Bank Lending During the Global Financial Crisis, mimeo, IMF.

McGuire, P., and von Peter G., 2009. The US Dollar Shortage in Global Banking, *BIS Quarterly Review*, March.

Mishkin, F., 2009. Why We Shouldn't Turn Our Backs on Financial Globalization, *International Monetary Fund Staff Papers*, 56, 1, 139-170.

Ongena, S., Peydro J. L., and van Horen N., 2013. Shocks abroad, pain at home? Bank-firm level evidence on financial contagion during the 2007-2009 crisis, *De Nederlandsche Bank*, Working Paper.

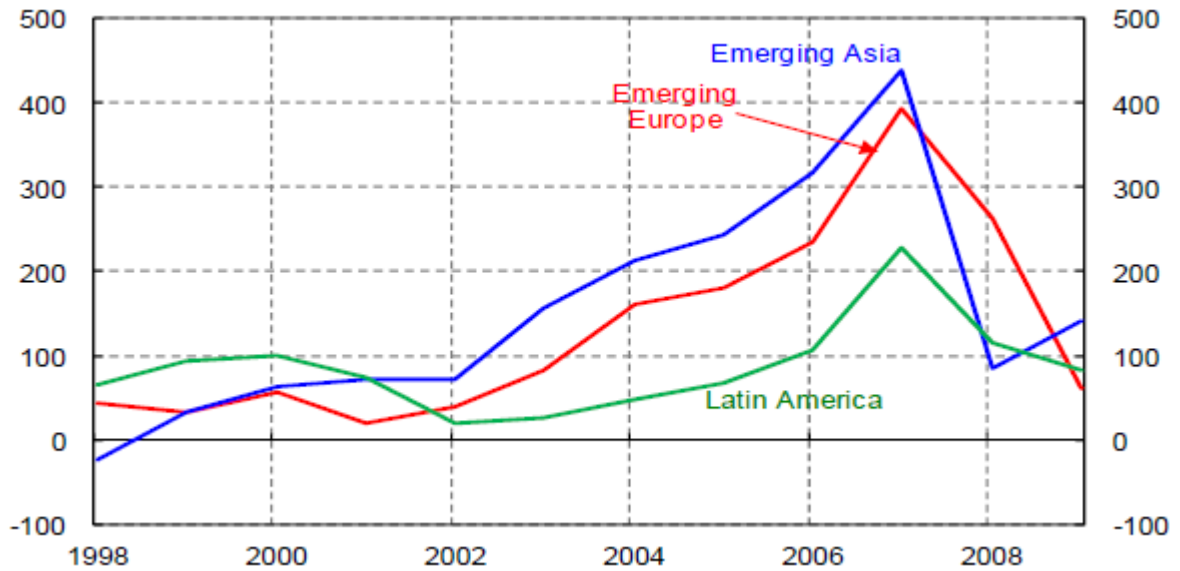
Papaioannou, E., 2008. What Drives International Bank Flows? Politics, Institutions and other Determinants. *Journal of Development Economics* 88, 269-281.

Rey, H., 2013, Dilemma not Trilemma: The global financial cycle and monetary policy independence, in Proceedings of the Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole.

Shirota T., 2015. What is the major determinant of cross-border banking flows? *Journal of International Money and Finance*, 53, 137-147.

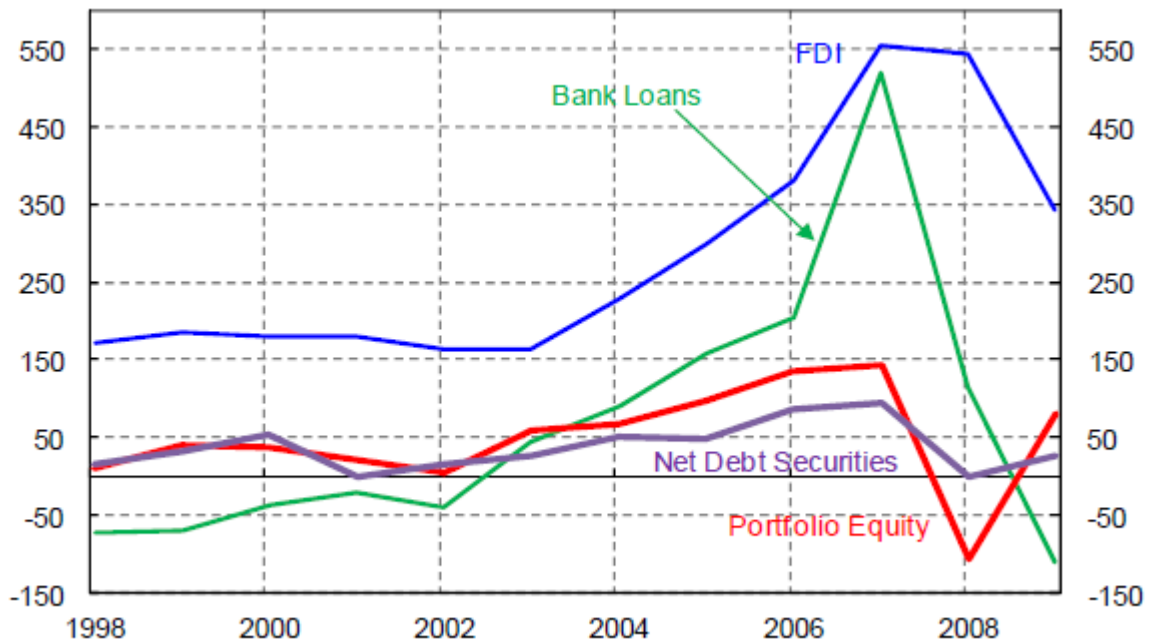
Van Rijckeghem, C. and Weder B., 2003. Spillovers through Banking Centers: A Panel Data Analysis of Bank Flows. *Journal of International Money and Finance* 22, 483-509.

Graph 1: Private Capital Flows to Emerging Markets by Regions (USD Billion)



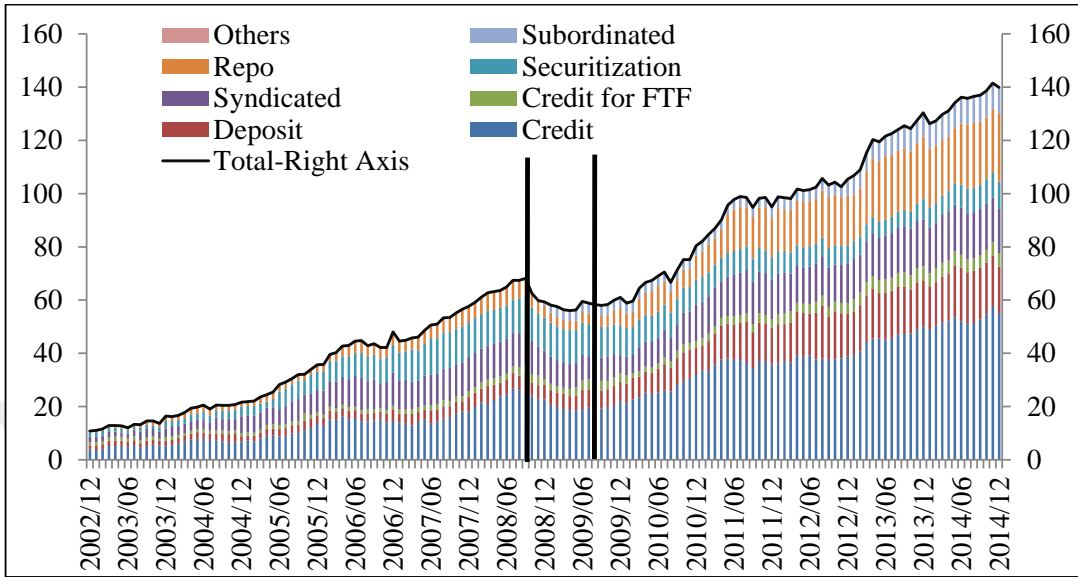
Source: Cetorelli and Goldberg (2011).

Graph 2: Private Capital Flows to Emerging Markets (USD Billion)

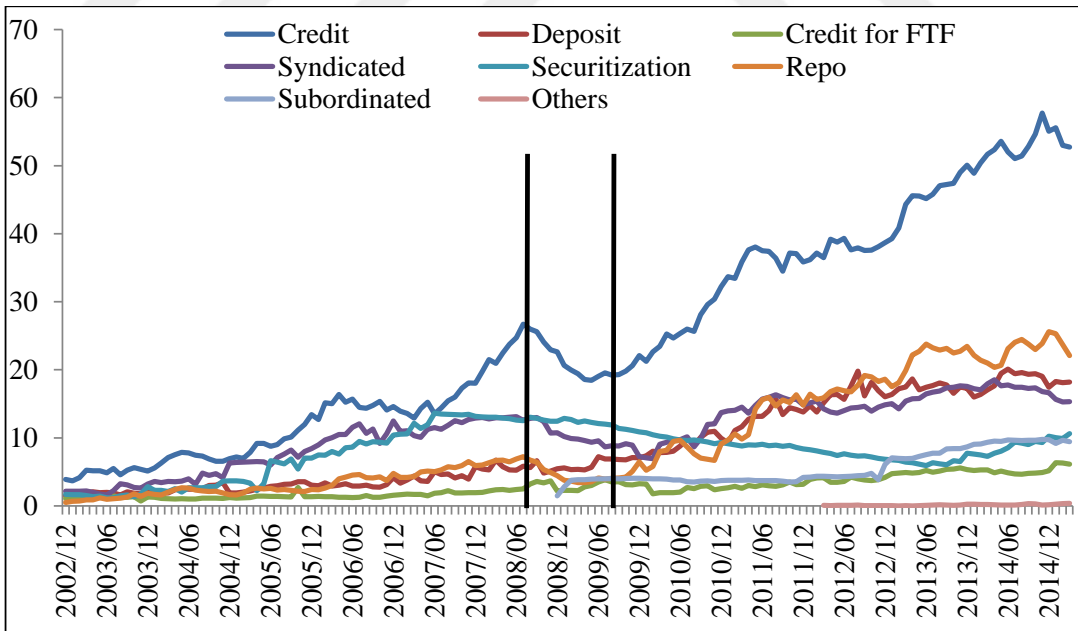


Source: Cetorelli and Goldberg (2011). Their data sources: BIS Loactional Banking Statistics, Bank Loans (Table 7c), Net Bond Issues (Table 11); Foreign Direct Investment from the Global Development Fund; Portfolio equity data from CEIC

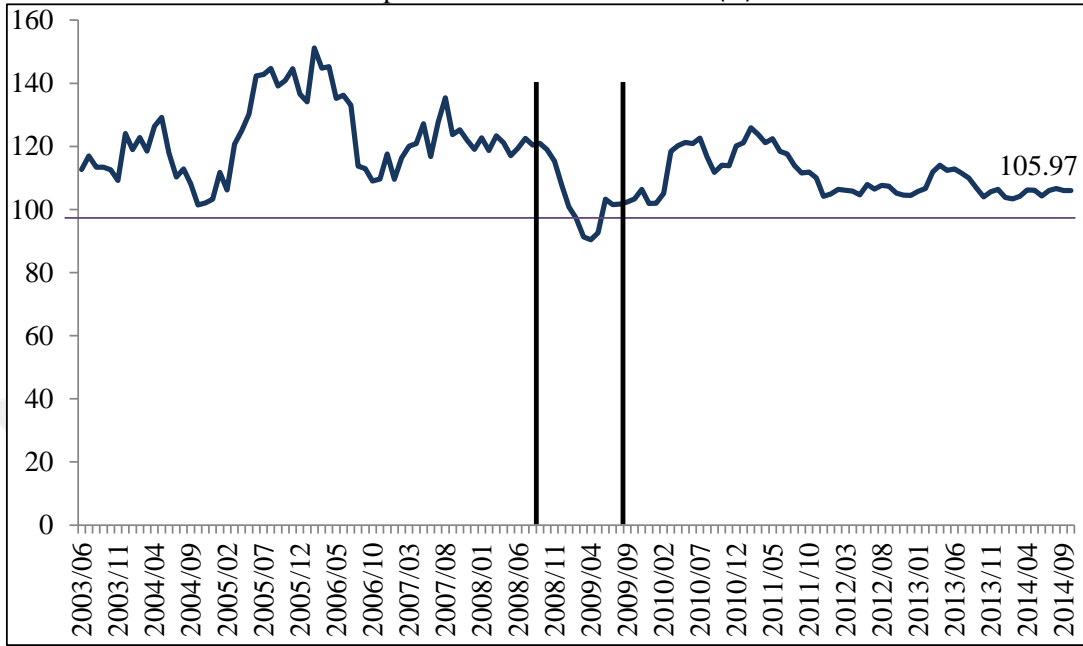
Graph 3: Composition of Banks' Cross-Border Loans (Billion US Dollar)



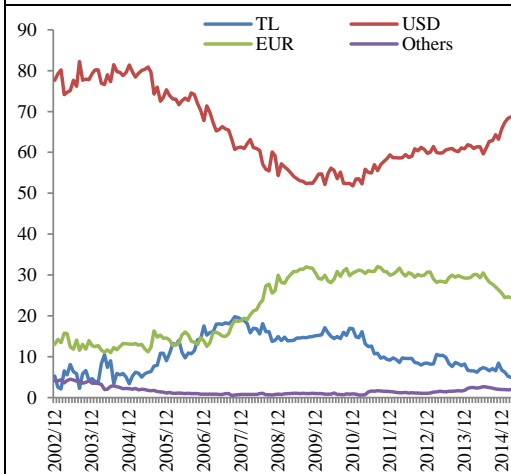
Graph 4: Banks' Cross-Border Loan Typess (Billion US Dollar)



Graph 5: Banks' Roll-Over Rate (%)



Graph 6: Currency Distribution of Banks' Cross-Border Loans (%)



Graph 7: The share of regions (%)

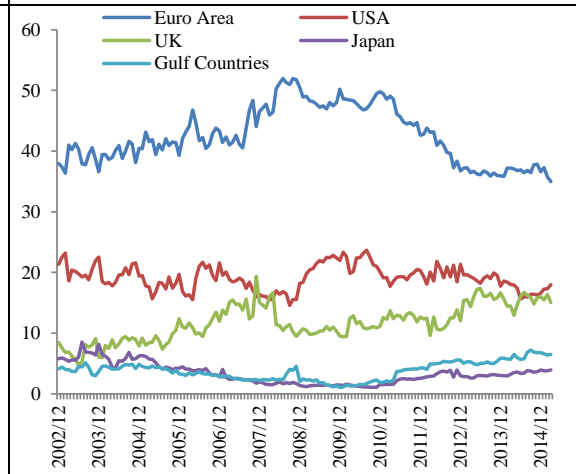




Table 1: Banks included in the analysis

Bank Code	Bank Name	Bank Code	Bank Name	Bank Code	Bank Name
10	Ziraat Bankası	64	İş Bankası	111	Finansbank
12	Halk Bankası	67	YKB	123	Hsbc Bank
15	Vakıfbank	99	İng Bank	124	Alternatifbank
32	TEB	103	Fibabanka	125	Burgan Bank
46	Akbank	108	Turkland	134	Denizbank
59	Şekerbank	109	Tekstil	135	Anadolubank
62	Garanti Bankası				

Table 2: Variable Definitions and Sources

Variables	Definition	Sources
<b>Dependent Variable</b>		
Log cross-border bank loans	Log of bank <i>i</i> 's loan at time <i>t</i> which is borrowed from country <i>c</i> in loan type <i>b</i>	BRSA-CBRT
<b>Bank-Specific Variables</b>		
Log(real asset)	Logarithmic value of banks' real asset size	BRSA-CBRT
Credit over asset	Credits/Total Asset	BRSA-CBRT
Deposit Over asset	Deposits/Total Assets	BRSA-CBRT
Capital over asset	Paid Capital / Total Assets	BRSA-CBRT
Return on Asset (ROA)	Return / Total Assets	BRSA-CBRT
NPL Ratio	Non-performing loans / Total credits	BRSA-CBRT
Spread	Difference between interest rate of FX credit and FX deposit	BRSA-CBRT
Liquid assets over Assets	Selected FX Liquid Assets: Cash+ Foreign Banks (free)+ Required reserves kept in line with the ROM. Liquid assets over Assets = Selected FX Liquid Assets/Total assets	BRSA-CBRT
<b>TR Macro Variables</b>		
▲ Industrial Production	Monthly Change in Industrial Production, used instead of GDP due to discrepancy of frequencies	Turkstat
CPI Growth	Inflation based on CPI	Turkstat
▲ BIST o/n Interest Rate	Monthly Change in Istanbul Stock Exchange Over/night interest rate	Bloomberg
REER	Real effective exchange rate based on CPI	CBRT
CDS	Credit default swap	Bloomberg
<b>Global Liquidity Variables</b>		
EMBI	Emerging market bond index which is prepared by JP Morgan	Bloomberg
VIX	CBOE S&P500 Volatility VIX	Bloomberg
US yield curve slope	10 year/3 month US Treasury yield spread	Bloomberg
US real credit growth	Real private credit	Bloomberg
EA real credit growth	Real private credit	Bloomberg
Total M2 growth	Growth rate of US, ECB, United Kingdom and Japan's total M2 in USD currency	Bloomberg

Table 3: Summary Statistics of Variables

	Obs	Mean	Std. Dev.	Min	Max
Log(real asset)	114795	11.72	1.67	2.80	13.80
Credit over asset	114795	0.51	0.15	0.00	0.95
Deposit Over asset	114795	0.51	0.20	0.00	1.02
Capital over asset	114795	0.06	0.08	0.00	5.47
ROA	108797	1.87	2.03	-112.41	50.41
NPL	114465	1.24	4.80	0.00	100.00
Spread	102980	2.68	1.20	-2.03	17.34
Liquid assets over Assets	114795	35.13	15.01	0.00	99.00
Monthly Change in Industrial Production	113862	0.83	8.45	-25.07	25.08
CPI Growth	114795	9.26	4.09	4.00	31.70
Monthly Change in BIST o/n Interest Rate	114740	0.00	10.80	-43.92	43.92
REER	114330	114.41	8.40	89.00	132.00
CDS	114795	170.09	151.22	52.60	1217.86
EMBI	114795	333.50	119.94	157.88	774.32
VIX	114795	19.54	8.59	10.42	59.89
US yield curve slope	114795	2.04	1.10	-0.50	3.67
US real credit growth	114795	5.60	4.00	-5.60	12.31
EA real credit growth	114177	0.00	0.01	-0.07	0.31
Total M2 growth	114177	0.00	0.01	-0.06	0.45
Log(Fed Asset)	114795	14.38	0.66	13.49	15.32

Table 4: Correlation Matrix

	Log(real asset)	Credit over asset	Deposit Over asset	Capital over asset	ROA	NPL	Spread	Liquid assets/Assets	▲Industrial Production	CPI Growth	▲BIST o/n Interest	REER	CDS	EMBI	VIX	US YC slope	US real credit g.	EA real credit g.	M2 growth	Log(Fed Asset)		
Log(real asset)	1.00																					
Credit over asset	0.09	1.00																				
Deposit Over asset	0.33	0.18	1.00																			
Capital over asset	-0.59	0.08	-0.31	1.00																		
ROA	0.15	-0.14	-0.03	-0.11	1.00																	
NPL	-0.29	0.03	0.08	0.18	-0.27	1.00																
Spread	-0.24	-0.09	-0.05	0.19	-0.07	0.17	1.00															
Liquid assets/Assets	-0.12	-0.94	-0.17	-0.06	0.19	-0.09	0.06	1.00														
▲Industrial Production	-0.01	-0.03	-0.01	0.00	0.01	0.01	-0.03	0.02	1.00													
CPI Growth	-0.08	-0.04	0.02	0.03	-0.01	-0.04	0.06	0.02	-0.03	1.00												
▲BIST o/n Interest	-0.12	-0.18	0.08	0.03	0.05	-0.04	0.08	0.15	0.00	0.28	1.00											
REER	0.00	0.10	0.06	0.11	0.15	-0.04	-0.11	0.01	-0.04	-0.01	-0.06	1.00										
CDS	-0.06	-0.12	0.04	0.07	0.01	0.08	0.31	0.11	-0.06	0.23	0.16	-0.22	1.00									
EMBI	-0.01	-0.11	0.02	0.02	-0.03	0.13	0.41	0.06	-0.04	0.09	0.07	-0.37	0.80	1.00								
VIX	0.02	0.03	0.06	0.10	0.06	0.05	0.32	0.07	-0.07	0.05	0.00	0.18	0.66	0.60	1.00							
US yield curve slope	0.11	0.02	-0.01	-0.03	0.01	0.16	0.03	-0.04	0.02	-0.27	-0.18	-0.15	0.43	0.54	0.34	1.00						
US real credit growth	-0.20	-0.18	0.02	0.06	0.02	-0.10	0.03	0.11	-0.01	0.40	0.37	-0.01	-0.10	-0.19	-0.30	-0.73	1.00					
EA real credit growth	-0.23	-0.16	-0.06	0.14	0.01	0.03	0.07	0.16	-0.18	0.11	0.12	0.08	0.03	-0.02	0.02	-0.19	0.22	1.00				
Total M2 growth	-0.21	-0.13	-0.08	0.17	-0.02	0.05	0.05	0.14	-0.03	-0.03	0.07	-0.02	-0.02	-0.03	-0.02	-0.06	0.09	0.26	1.00			
Log(Fed Asset)	0.28	0.39	-0.13	-0.17	-0.14	0.05	-0.06	-0.37	-0.02	-0.25	-0.42	-0.11	-0.05	0.16	0.10	0.52	-0.71	-0.27	-0.16	1.00		

Table 5: Determinants of Banks' Cross Border Loan (Bank Specific Variables)

Dependent Variable	Log of bank <i>i</i> 's total loans from country <i>c</i> in loan type <i>b</i> at time <i>t</i>					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Log(Real Assets) <sub><i>t</i>-1</sub>	0.38*** (0.01)	0.26*** (0.06)	0.30*** (0.05)	0.33*** (0.05)	0.49*** (0.02)	0.31** (0.16)
Credit over asset <sub><i>t</i>-1</sub>	3.18*** (0.17)	1.34*** (0.22)	1.16*** (0.18)	0.97*** (0.16)	1.57*** (0.11)	0.56 (0.62)
Deposit over asset <sub><i>t</i>-1</sub>	-2.40*** (0.17)	-1.55*** (0.21)	-1.29*** (0.19)	-0.95*** (0.16)	-1.23*** (0.15)	-0.78 (0.54)
Capital over asset <sub><i>t</i>-1</sub>	1.53*** (0.47)	-0.23 (0.56)	-1.09** (0.50)	0.15 (0.42)	-0.24 (0.39)	0.57 (1.52)
Return on asset <sub><i>t</i>-1</sub>	0.10*** (0.01)	0.08*** (0.01)	0.07*** (0.01)	0.03*** (0.01)	0.02*** (0.01)	0.03* (0.02)
Npl ratio <sub><i>t</i>-1</sub>	-0.30*** (0.02)	-0.00 (0.02)	-0.02 (0.02)	-0.03* (0.02)	-0.02 (0.02)	-0.05 (0.06)
Spread <sub><i>t</i>-1</sub>	-0.15*** (0.01)	-0.07*** (0.01)	-0.06*** (0.01)	-0.06*** (0.01)	-0.04*** (0.01)	-0.05** (0.02)
Constant Term	4.90*** (0.28)	4.88*** (0.78)	6.80*** (0.69)	6.76*** (0.58)	4.95*** (0.33)	6.01*** (1.78)
Fixed Effect	Time FE	Time and Bank FE	Time, Bank and Country FE	Time, Bank, Country and Loan Type FE	Bank, Country and Loan Type FE	Time, Bank, Country and Loan Type FE
Observations	81,232	81,232	81,232	81,232	81,232	81,232
R-squared	0.05	0.09	0.41	0.57	0.57	0.62

Notes: The table reports the estimates of panel regressions with different fixed effects and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank *i*'s total loans from country *c* in loan type *b* at time *t*. All are reported in two decimal places. † winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 6: Determinants of Banks' Cross Border Loan (Bank + TR Macro Variables)

Dependent Variable	Log of bank i's total loans from country c in loan type b at time t				
Independent Variables	(1)	(2)	(3)	(4)	(5)
<b>Bank-Specific Variables</b>					
Log(Real Assets) <sub>{t-1}</sub>	0.49*** (0.02)	0.49*** (0.02)	0.50*** (0.02)	0.50*** (0.02)	0.50*** (0.02)
Credit over asset <sub>{t-1}</sub>	1.57*** (0.11)	1.56*** (0.11)	1.59*** (0.11)	1.59*** (0.12)	1.59*** (0.12)
Deposit over asset <sub>{t-1}</sub>	-1.23*** (0.15)	-1.24*** (0.15)	-1.24*** (0.15)	-1.23*** (0.15)	-1.20*** (0.15)
Capital over asset <sub>{t-1}</sub>	-0.24 (0.39)	-0.23 (0.39)	-0.21 (0.39)	-0.18 (0.40)	-0.05 (0.40)
Return on asset <sub>{t-1}</sub>	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)
Npl ratio <sub>{t-1}</sub>	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)
Spread <sub>{t-1}</sub>	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)
<b>TR Macro Variables</b>					
Industrial Production Growth <sub>{t-1}</sub>	-0.04 (0.08)	-0.04 (0.08)	-0.04 (0.08)	-0.04 (0.08)	-0.05 (0.08)
CPI Growth <sub>{t-1}</sub>		0.38 (0.42)	0.18 (0.43)	0.18 (0.43)	0.41 (0.44)
BIST o/n <sub>{t-1}</sub>			0.17** (0.08)	0.17** (0.08)	0.18** (0.08)
REER <sub>{t-1}</sub>				-0.04 (0.10)	-0.09 (0.10)
CDS <sub>{t-1}</sub>					-0.02** (0.01)
Constant Term	4.95*** (0.33)	4.88*** (0.34)	4.75*** (0.34)	4.78*** (0.35)	4.80*** (0.35)
Fixed Effect	ICB FE	ICB FE	ICB FE	ICB FE	ICB FE
Observations	81,232	81,232	81,214	81,214	81,214
R-squared	0.57	0.57	0.57	0.57	0.57

Notes: The table reports the estimates of panel regressions with bank, lender country and loan type fixed effects (ICB FE) and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank i's total loans from country c in loan type b at time t. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 7: Determinants of Banks' Cross Border Loan (Bank + TR Macro + Global Variables)

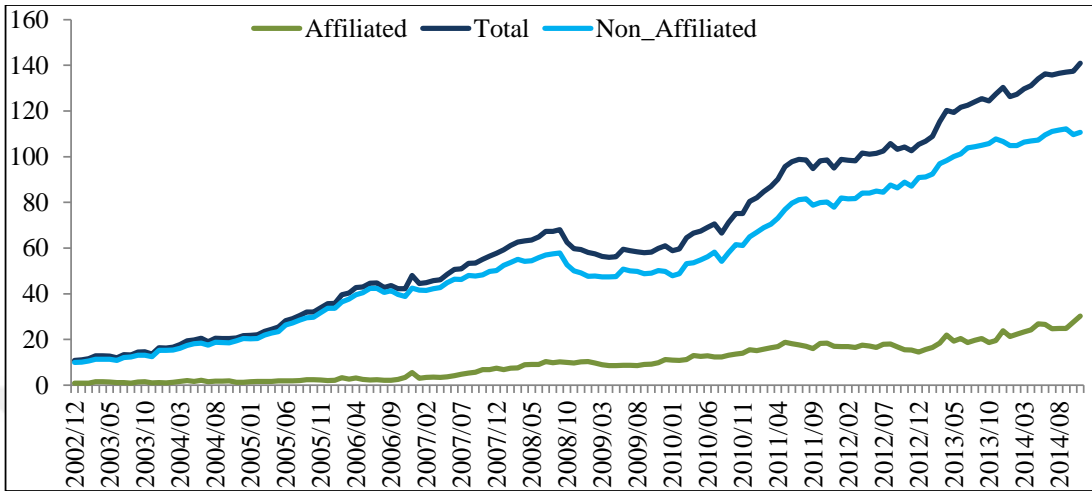
Dependent Variable	Logarithmic value of bank i's total loans from country c in loan type b at time t							
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<b>Bank-Specific Variables</b>								
Log(Real Assets) <sub>t-1</sub>	0.50*** (0.02)	0.51*** (0.03)	0.50*** (0.03)	0.52*** (0.03)	0.53*** (0.03)	0.53*** (0.03)	0.43*** (0.04)	0.44*** (0.04)
Credit over asset <sub>t-1</sub>	1.59*** (0.12)	1.59*** (0.12)	1.59*** (0.12)	1.61*** (0.12)	1.63*** (0.12)	1.64*** (0.12)	1.41*** (0.13)	1.41*** (0.13)
Deposit over asset <sub>t-1</sub>	-1.20*** (0.15)	-1.19*** (0.15)	-1.21*** (0.15)	-1.19*** (0.15)	-1.19*** (0.15)	-1.20*** (0.15)	-1.04*** (0.16)	-1.03*** (0.15)
Capital over asset <sub>t-1</sub>	-0.06 (0.40)	0.03 (0.41)	-0.03 (0.40)	0.08 (0.40)	0.10 (0.40)	0.04 (0.40)	0.18 (0.41)	0.22 (0.41)
Return on asset <sub>t-1</sub>	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.02*** (0.01)	0.03*** (0.01)	0.03*** (0.01)
Npl ratio <sub>t-1</sub>	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.02 (0.02)	-0.01 (0.02)	-0.01 (0.02)	-0.02 (0.02)	-0.02 (0.02)
Spread <sub>t-1</sub>	-0.04*** (0.01)	-0.04*** (0.01)	-0.05*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)
<b>TR Macro Variables</b>								
Industrial Production								
Growth <sub>t-1</sub>	-0.05 (0.08)	-0.05 (0.08)	-0.05 (0.08)	-0.04 (0.08)	0.02 (0.08)	0.02 (0.08)	0.03 (0.08)	0.03 (0.08)
CPI Growth <sub>t-1</sub>	0.46 (0.44)	0.35 (0.44)	0.23 (0.47)	0.05 (0.48)	0.04 (0.48)	0.14 (0.48)	-0.03 (0.48)	-0.05 (0.48)
BIST o/n <sub>t-1</sub>	0.19** (0.08)	0.18** (0.08)	0.18** (0.08)	0.15* (0.08)	0.15* (0.08)	0.14* (0.08)	0.19** (0.09)	0.19** (0.09)
REER <sub>t-1</sub>	-0.05 (0.10)	-0.03 (0.11)	-0.04 (0.10)	-0.04 (0.10)	-0.07 (0.10)	-0.06 (0.10)	0.02 (0.11)	0.05 (0.11)
CDS <sub>t-1</sub>	-0.37*** (0.14)	-0.11 (0.13)	-0.34** (0.15)	-0.33** (0.15)	-0.33** (0.15)	-0.32** (0.15)	-0.14 (0.15)	-0.08 (0.15)
<b>Global Liquidity Variables</b>								
EMBI <sub>t-1</sub>	0.02 (0.01)		0.02* (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	-0.00 (0.02)	
VIX <sub>t-1</sub>		-0.16 (0.13)						-0.10 (0.14)
US yield curve slope <sub>t-1</sub>			-1.37 (0.94)	0.22 (1.21)	0.58 (1.21)	0.52 (1.21)	-0.54 (1.24)	-0.72 (1.20)
US real credit growth <sub>t-1</sub>				0.65** (0.34)	0.67** (0.34)	0.64** (0.34)	1.18*** (0.36)	1.10*** (0.36)
EA real credit growth <sub>t-1</sub>					5.94*** (2.07)	5.42*** (2.06)	5.68*** (2.06)	5.73*** (2.06)
M2 growth <sub>t-1</sub>						2.47** (0.98)	2.64*** (0.98)	2.67*** (0.98)
Log(FED asset) <sub>t-1</sub>							0.15*** (0.04)	0.14*** (0.03)
Constant	4.78*** (0.35)	4.63*** (0.38)	4.70*** (0.36)	4.39*** (0.39)	4.29*** (0.39)	4.24*** (0.39)	3.35*** (0.46)	3.29*** (0.46)
Fixed Effect	ICB FE	ICB FE	ICB FE	ICB FE	ICB FE	ICB FE	ICB FE	ICB FE
Observations	81,214	81,214	81,214	81,214	81,214	81,214	81,214	81,214
R-squared	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57

Notes: The table reports the estimates of panel regressions with bank, lender country and loan type fixed effects(ICB FE) and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank i's total loans from country c in loan type b at time t. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 8: Standardized Beta Coefficients

Dependent Variable		Log of bank <i>i</i> 's total loans from country <i>c</i> in loan type <i>b</i> at time <i>t</i>		
Independent Variables		Standardized Coefficients	Rankings	
<b>Bank-Specific Variables</b>				
Log(Real Assets) <sub>{t-1}</sub>	0.44*** (0.04)	0.1876	1	1
Credit over asset <sub>{t-1}</sub>	1.41*** (0.13)	0.0514	2	2
Deposit over asset <sub>{t-1}</sub>	-1.03*** (0.15)	-0.0239	3	4
Paid Capital over asset <sub>{t-1}</sub>	0.22 (0.41)	0.0023	-	-
Return on asset <sub>{t-1}</sub>	0.03*** (0.01)	0.0120	5	7
Npl ratio <sub>{t-1}</sub>	-0.02 (0.02)	-0.0052	-	-
Spread btw YP deposit and credit <sub>{t-1}</sub>	-0.04*** (0.01)	-0.0146	4	6
<b>TR Macro Variables</b>				
Industrial Production Growth <sub>{t-1}</sub>	0.03 (0.08)	0.0009	-	-
CPI Growth <sub>{t-1}</sub>	-0.05 (0.48)	-0.0003	-	-
BIST o/n <sub>{t-1}</sub>	0.19** (0.09)	0.0059	-	-
REER <sub>{t-1}</sub>	0.05 (0.11)	0.0014	-	-
CDS <sub>{t-1}</sub>	-0.08 (0.15)	-0.0024	-	-
<b>Global Liquidity Variables</b>				
VIX <sub>{t-1}</sub>	-0.10 (0.14)	-0.0030	-	-
US yield curve slope <sub>{t-1}</sub>	-0.72 (1.20)	-0.0027	-	-
EA real credit growth <sub>{t-1}</sub>	1.10*** (0.36)	0.0149	2	5
US real credit growth <sub>{t-1}</sub>	5.73*** (2.06)	0.0079	3	8
M2 growth <sub>{t-1}</sub>	2.67*** (0.98)	0.0077	4	9
Log(FED asset) <sub>{t-1}</sub>	0.14*** (0.03)	0.0312	1	3
Constant	3.29*** (0.46)			
Fixed Effects	ICB FE			
Observations	81,214			
R-squared	0.57			

Graph 8: Banks' Cross-Border Loans (Total-Affiliated-Non-Affiliated)



Graph 9: Banks' Roll-Over Rate(%)

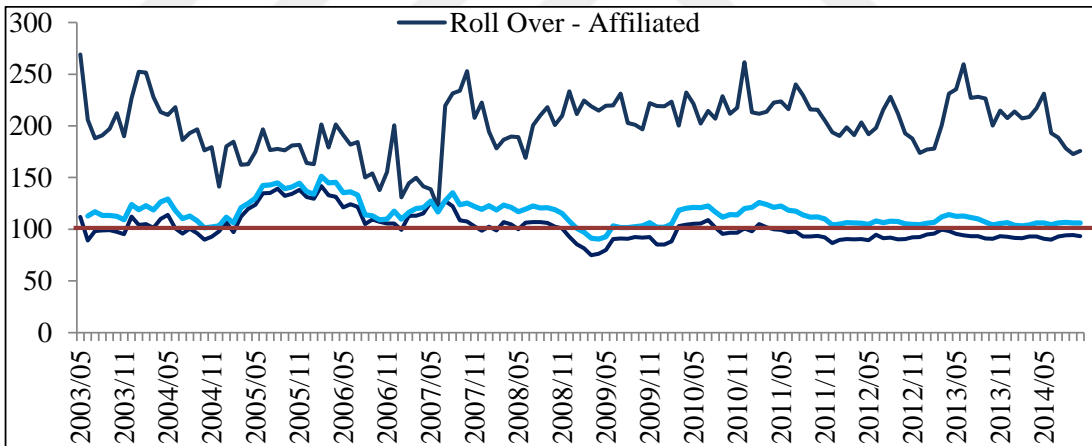




Table 9: Fragility of cross border loan types (affiliated or non-affiliated)  
for pre-crisis and 2008 crisis periods

Dependent Variable		Yearly log difference of bank <i>i</i> 's loan in type <i>a</i> at time <i>t</i>			
		(1)	(2)	(3)	(4)
Independent Variables		Random Effects	Random Effects	Random Effects	Random Effects
<b>Bank-Specific Variables</b>					
	Real asset growth_{t-1}		-0.05 (0.03)	-0.04 (0.04)	-0.04 (0.04)
	Credit over asset_{t-1}		-0.28 (0.53)	-0.47 (0.58)	-0.63 (0.59)
	Deposit over asset_{t-1}		-1.01** (0.47)	-1.14** (0.53)	-1.06** (0.54)
	Asset over equity_{t-1}		0.03* (0.02)	0.03* (0.02)	0.03* (0.02)
	Return on asset_{t-1}		-0.01 (0.01)	0.00 (0.02)	-0.00 (0.02)
	Npl ratio_{t-1}		-0.00 (0.01)	-0.00 (0.02)	-0.00 (0.02)
<b>TR Macro Variables</b>					
	Industrial Production growth_{t-1}			1.80* (1.00)	1.67 (1.09)
	CPI Growth_{t-1}			-1.33 (1.12)	-1.33 (1.09)
	REER_{t-1}			0.26 (0.43)	0.46 (0.41)
	BIST o/n interest_{t-1}			0.24 (0.65)	0.41 (0.64)
<b>Global Variables</b>					
	EMBI_{t-1}				-0.40** (0.36)
	US yield curve slope_{t-1}				-1.93 (8.46)
	US real credit growth_{t-1}				2.11 (1.85)
	EA real credit growth_{t-1}				-3.93 (2.76)
	M2 growth_{t-1}				-0.24 (0.94)
<i>B</i> <sub>1</sub>	Affiliated Loan dummy	-1.38*** (0.37)	-1.85*** (0.39)	-1.84*** (0.38)	-1.85*** (0.38)
<i>B</i> <sub>2</sub>	2008 crisis dummy	-0.46*** (0.17)	-0.40** (0.17)	-0.42** (0.18)	-0.38** (0.19)
<i>B</i> <sub>3</sub>	Affiliated Loan*2008 crisis	0.70*** (0.23)	0.71*** (0.25)	0.74*** (0.25)	0.74*** (0.25)
	Constant	0.06 (0.19)	0.23 (0.17)	0.26 (0.18)	0.23 (0.18)
	Fixed Effect	No	No	No	No
	Observations	4,485	3,577	3,249	3,247
	Number of y	87	77	77	77

Notes: The table reports the estimates of panel regressions with random effects and clustered standard errors at the borrower bank level. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 10: Effectiveness of macro-prudential policies in Turkey

Dependent Variable	Logarithmic value of bank i's loan from country c in loan type b at time t								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EMBL <sub>t-1</sub>	-0.10*** (0.01)	-0.10*** (0.01)	-0.10*** (0.01)	-0.11*** (0.01)	-0.10*** (0.01)	-0.11*** (0.01)	-0.10*** (0.01)	-0.12*** (0.01)	-0.12*** (0.01)
US yield curve slope <sub>t-1</sub>	-6.64*** (1.71)	-7.29*** (1.80)	-7.29*** (1.80)	-5.77*** (1.64)	-6.24*** (1.67)	-6.25*** (1.67)	-6.29*** (1.67)	-4.74*** (1.84)	-4.74*** (1.84)
US real credit growth <sub>t-1</sub>	1.98*** (0.61)	2.49*** (0.57)	2.49*** (0.57)	3.85*** (0.68)	2.52*** (0.57)	2.50*** (0.57)	2.56*** (0.56)	4.06*** (0.68)	4.06*** (0.68)
EA real credit growth <sub>t-1</sub>	5.31* (3.19)	4.59 (3.15)	4.59 (3.15)	4.39 (3.15)	8.28* (4.35)	4.61 (3.09)	4.69 (3.14)	7.53* (4.29)	7.53* (4.29)
M2 growth <sub>t-1</sub>	2.22* (1.19)	2.28* (1.20)	2.28* (1.20)	2.14* (1.20)	2.37** (1.18)	3.04* (1.55)	2.37** (1.19)	2.95** (1.53)	2.95** (1.53)
Log(FED asset) <sub>t-1</sub>	0.68*** (0.05)	0.78*** (0.07)	0.78*** (0.07)	0.88*** (0.07)	0.78*** (0.07)	0.78*** (0.07)	0.78*** (0.07)	0.90*** (0.07)	0.90*** (0.07)
post2010 dummy		-0.22*** (0.08)	-0.22*** (0.08)	-0.08 (0.06)	-0.12*** (0.06)	-0.12*** (0.06)	-0.10 (0.06)	-0.11* (0.07)	-0.11* (0.07)
<i>Interacted Variables</i>									
B <sub>1</sub> (EMBI*post2010) <sub>t-1</sub>		4.40** (2.10)						-3.76 (3.24)	
B <sub>2</sub> (YC of US*post2010) <sub>t-1</sub>			4.40** (2.10)						
B <sub>3</sub> (US Credit Growth*post2010) <sub>t-1</sub>				-3.44*** (0.81)				-3.30*** (0.86)	-3.30*** (0.86)
B <sub>4</sub> (EA Credit Growth*post2010) <sub>t-1</sub>					-6.50*** (3.92)			-5.73*** (3.91)	-5.73*** (3.91)
B <sub>5</sub> (M2 Growth*post2010) <sub>t-1</sub>						-2.01 (2.09)		-2.47** (2.00)	-2.47** (2.00)
B <sub>6</sub> (Log(FED asset)*post2010) <sub>t-1</sub>							-0.00 (0.00)	0.01 (0.01)	0.01 (0.01)
Constant	-0.49 (0.78)	-1.89** (0.91)	-1.89** (0.91)	-3.38*** (1.01)	-1.91** (0.91)	-1.85** (0.91)	-1.91** (0.92)	-3.56*** (1.00)	-3.56*** (1.00)
Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	84,755	84,755	84,755	84,755	84,755	84,755	84,755	84,755	84,755
R-squared	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Number of y	1,996	1,996	1,996	1,996	1,996	1,996	1,996	1,996	1,996

Notes: The table reports the estimates of panel regressions with bank, lender country and loan type fixed effects and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank i's loan from country c in loan type b at time t. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 11: Quantitative easing programs which were announced by Fed

Date	Fed	Explanation
November 2008	QE 1	First Quantitative Easing Pack including 600 billion US dollars of bond purchases
March 2009	QE 1 Extension	As a continuation of QE 1, purchasing mortgage-based securities and bond in the amount of 750 and 300 billion US dollars, respectively.
November 2010	QE 2	Second Quantitative Easing Pack including 600 billion US dollars of bond purchases
September 2011	Operation Twist	Changing short term bond(less than 3 years) with long term bond(6-30 years). Total amount of program is 400 billion USD dollars
June 2012	Operation Twist Extension	Within the frame of Operation Twist, additional bond exchange in the amount of 267 billion USD dollars
September 2012	QE 3	Third Quantitative Easing Pack including 40 billion US dollars of mortgage-backed bonds and 45 billion US dollars of treasury bond in monthly
May 2013	QE 3	Fed Tapering Announcements was made by Ben Bernanke
October 2014	QE 3	End of QE 3

Table 12: The balance sheet size of Fed and cross border bank loans in Turkey

Dependent Variable	Log of bank i's loan from country c in loan type b at time t					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Log(FED Asset) <sub>{t-1}</sub>	0.81*** (0.13)	1.40*** (0.19)	1.66*** (0.19)	1.93*** (0.18)	2.03*** (0.17)	0.23 (0.28)
Constant	3.97*** (0.81)	0.11 (1.24)	-2.46* (1.29)	-1.81 (1.23)	-1.79 (1.16)	7.38*** (1.75)
Fixed Effect	No	Time	Time and Bank	Time, Bank and Country	Time, Bank, Country and Loan Type	Time, Bank, Country and Loan Type
Observations	89,636	89,636	89,636	89,636	89,636	89,636
R-squared	0.01	0.01	0.09	0.38	0.55	0.59

Notes: The table reports the estimates of panel regressions with different fixed effects and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank i's loan from country c in loan type b at time t. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 13: The balance sheet size of Fed and cross border bank loans in Turkey

Dependent Variable	Log of bank <i>i</i> 's loan in loan type <i>b</i> at time <i>t</i>							
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log(FED asset) <sub>{t-1}</sub>	1.03*** (0.03)	0.42*** (0.05)	0.15*** (0.06)	0.09 (0.06)	0.09 (0.06)	0.14** (0.06)	0.14** (0.06)	0.14** (0.06)
<b>TR Macro Variables</b>								
Industrial Production Growth <sub>{t-1}</sub>	-0.08 (0.09)	-0.05 (0.09)	-0.03 (0.09)	-0.04 (0.09)	-0.03 (0.09)	-0.03 (0.09)	-0.04 (0.09)	-0.04 (0.09)
CPI Growth <sub>{t-1}</sub>	0.13 (0.33)	0.03 (0.33)	0.15 (0.33)	0.13 (0.33)	0.02 (0.49)	-0.03 (0.49)	0.24 (0.49)	0.36 (0.49)
REER <sub>{t-1}</sub>	1.13*** (0.10)	0.91*** (0.10)	0.65*** (0.11)	0.71*** (0.11)	0.63*** (0.11)	0.66*** (0.11)	0.48*** (0.12)	0.39*** (0.12)
BIST o/n <sub>{t-1}</sub>	2.53*** (0.58)	1.58*** (0.59)	0.97 (0.59)	0.90 (0.59)	0.99 (0.61)	0.94 (0.61)	0.80 (0.61)	0.78 (0.61)
CDS <sub>{t-1}</sub>	-0.47*** (0.08)	-0.22*** (0.08)	-0.09 (0.08)	-0.04 (0.08)	-0.04 (0.10)	-0.04 (0.10)	-0.09 (0.10)	-0.15 (0.10)
<b>Bank-Specific Variables</b>								
Log(Real Assets) <sub>{t-1}</sub>		0.45*** (0.03)	0.43*** (0.03)	0.45*** (0.03)	0.45*** (0.03)	0.44*** (0.03)	0.44*** (0.03)	0.49*** (0.04)
Credit over asset <sub>{t-1}</sub>			1.18*** (0.12)	1.10*** (0.12)	1.22*** (0.13)	1.14*** (0.13)	2.08*** (0.25)	1.93*** (0.25)
Deposit over asset <sub>{t-1}</sub>				-0.79*** (0.14)	-0.73*** (0.15)	-0.67*** (0.15)	-0.78*** (0.15)	-0.64*** (0.16)
Return on asset <sub>{t-1}</sub>					0.03*** (0.01)	0.03*** (0.01)	0.02*** (0.01)	0.02*** (0.01)
Npl ratio <sub>{t-1}</sub>						-0.04*** (0.02)	-0.03 (0.02)	-0.05** (0.02)
Liquid Asset over Total Asset <sub>{t-1}</sub>							0.01*** (0.00)	0.01*** (0.00)
Capital over asset <sub>{t-1}</sub>								-2.06*** (0.39)
Constant	2.19*** (0.25)	0.15 (0.28)	2.21*** (0.33)	2.75*** (0.34)	2.73*** (0.35)	2.56*** (0.36)	1.89*** (0.40)	1.33*** (0.42)
<b>Fixed Effect</b>	<b>IB FE</b>	<b>IB FE</b>	<b>IB FE</b>	<b>IB FE</b>	<b>IB FE</b>	<b>IB FE</b>	<b>IB FE</b>	<b>IB FE</b>
Observations	88,693	88,693	87,821	87,821	84,500	84,500	84,500	84,500
R-squared	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39

Notes: The table reports the estimates of panel regressions with bank and loan type fixed effects (IB FE) and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank *i*'s loan in loan type *b* at time *t*. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Table 14: The balance sheet size of Fed and cross border bank loans in Turkey

Dependent Variable	Log of bank i's loan in loan type b at time t	
Independent Variables	(1)	(2)
Log(FED asset) <sub>{t-1}</sub>	0.78*** (0.07)	0.48*** (0.14)
<b>TR Macro Variables</b>		
Industrial Production Growth <sub>{t-1}</sub>	-0.04 (0.09)	-0.04 (0.09)
CPI Growth <sub>{t-1}</sub>	0.36 (0.49)	0.36 (0.49)
REER <sub>{t-1}</sub>	0.23* (0.12)	0.23* (0.12)
BIST o/n <sub>{t-1}</sub>	0.73 (0.62)	0.73 (0.62)
CDS <sub>{t-1}</sub>	-0.22** (0.10)	-0.22** (0.10)
<b>Bank-Specific Variables</b>		
Log(Real Assets) <sub>{t-1}</sub>	0.38*** (0.04)	0.38*** (0.04)
Credit over asset <sub>{t-1}</sub>	2.41*** (0.25)	2.41*** (0.25)
Deposit over asset <sub>{t-1}</sub>	-0.59*** (0.16)	-0.59*** (0.16)
Return on asset <sub>{t-1}</sub>	0.03*** (0.01)	0.03*** (0.01)
Npl ratio <sub>{t-1}</sub>	-0.05** (0.02)	-0.05** (0.02)
Liquid Asset over Total Asset <sub>{t-1}</sub>	0.01*** (0.00)	0.01*** (0.00)
Paid Capital over asset <sub>{t-1}</sub>	1.48*** (0.39)	1.48*** (0.39)
<b>Dummy Variables for Loan Types</b>		
$B_1$ Credit dummy		-3.41*** (0.86)
$B_2$ Deposit dummy	2.48*** (0.51)	-0.93 (0.92)
$B_3$ Syndicated dummy	5.40*** (0.34)	1.98** (0.84)
$B_4$ Securitization dummy	6.62*** (0.97)	3.21*** (1.24)
$B_5$ Repo dummy	3.41*** (0.86)	
<b>Interacted Variables</b>		
$B_6$ Log(FED asset)*Credit dummy		0.30** (0.13)
$B_7$ Log(FED asset)*Deposit dummy	-0.92*** (0.08)	-0.61*** (0.14)
$B_8$ Log(FED asset)*Syndicated dummy	-0.89*** (0.05)	-0.59*** (0.13)
$B_9$ Log(FED asset)*Securitization dummy	-0.77*** (0.15)	-0.47** (0.19)
$B_{10}$ Log(FED asset)*Repo dummy	-0.30* (0.13)	
Constant	-1.28*** (0.47)	2.13** (0.90)
<b>Fixed Effect</b>	ICB FE	
Observations	82,929	82,929
R-squared	0.40	0.40

Notes: The table reports the estimates of panel regressions with bank and loan type fixed effects (IB FE) and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank i's loan from country c in loan type b at time t. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Tablo 15a: F-tests for sensitivity to FED (For the first regression in Table 13)

<b>Null Hypothesis</b>	<b>F Value</b>	<b>p-value</b>
$B_7 + B_8 + B_9 + B_{10} = 0$	113.73	0.0000
$B_2 + B_7 = 0$	13.23	0.0003
$B_3 + B_8 = 0$	248.04	0.0000
$B_4 + B_9 = 0$	50.70	0.0000
$B_5 + B_{10} = 0$	18.60	0.0000

Tablo 15b: F-tests for sensitivity to FED (For the second regression in Table 13)

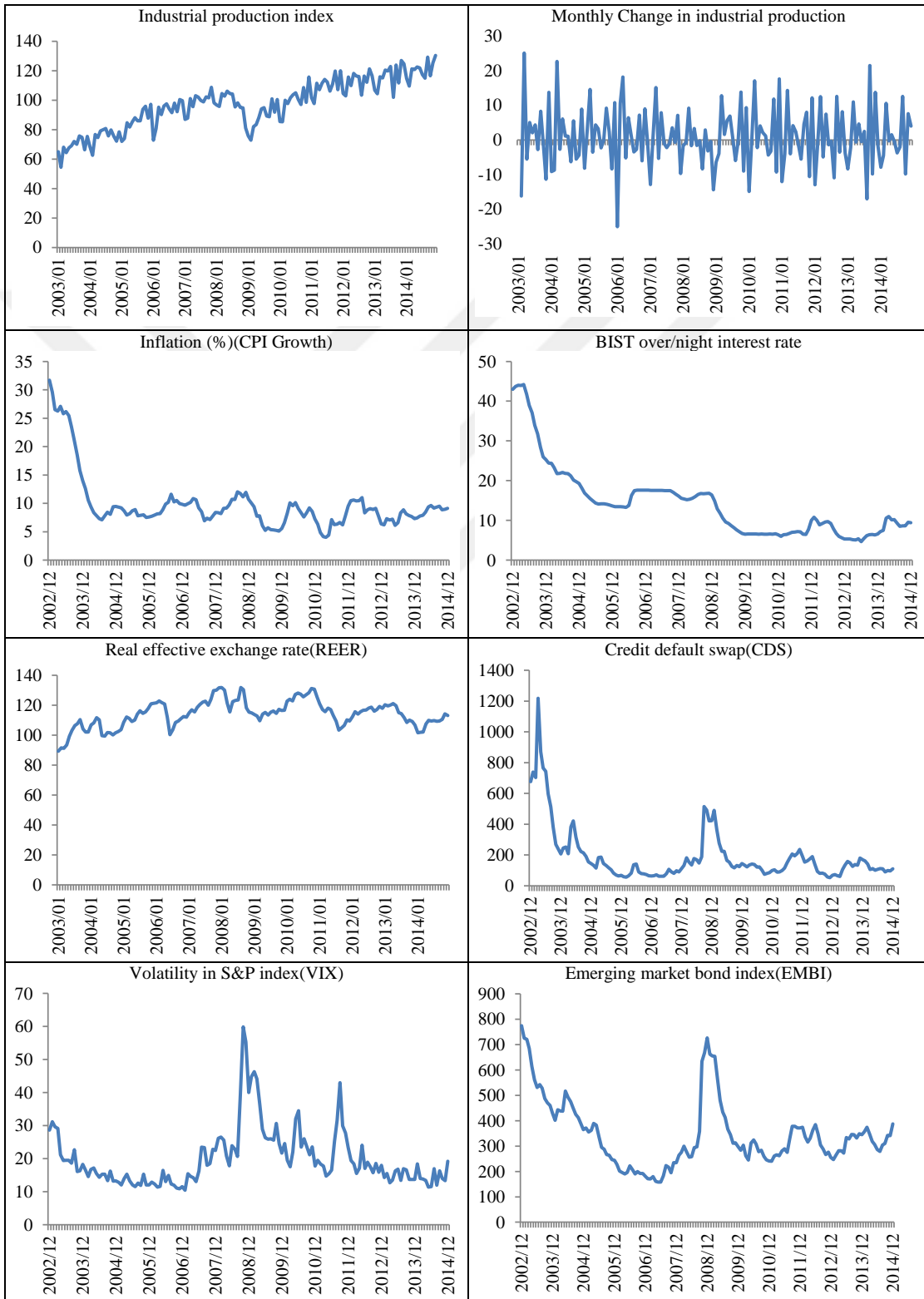
<b>Null Hypothesis</b>	<b>F Value</b>	<b>p-value</b>
$B_6 + B_7 + B_8 + B_9 = 0$	6.43	0.0112
$B_1 + B_6 = 0$	18.60	0.0000
$B_2 + B_7 = 0$	3.98	0.0461
$B_3 + B_8 = 0$	3.87	0.0492
$B_4 + B_9 = 0$	6.88	0.0087

Table 16: The balance sheet size of Fed and cross border bank loans in Turkey

Dependent Variable	Log of bank <i>i</i> 's loan in loan type <i>b</i> at time <i>t</i>			
	(1)	(2)	(3)	(4)
<b>Explanatory Variables</b>				
Log(FED asset) <sub>{t-1}</sub>	0.59** (0.25)	1.06*** (0.34)	0.87** (0.35)	1.89*** (0.37)
<b>TR Macro Variables</b>				
Industrial Production Growth <sub>{t-1}</sub>	-0.05 (0.09)	-0.05 (0.09)	-0.04 (0.09)	-0.05 (0.09)
CPI Growth <sub>{t-1}</sub>	0.15 (0.47)	0.12 (0.47)	-0.16 (0.47)	-0.35 (0.47)
REER <sub>{t-1}</sub>	0.47*** (0.11)	0.46*** (0.11)	0.60*** (0.11)	0.66*** (0.11)
BIST o/n <sub>{t-1}</sub>	0.85 (0.60)	0.84 (0.60)	0.93 (0.60)	0.97 (0.60)
CDS <sub>{t-1}</sub>	-0.19** (0.09)	-0.19** (0.09)	-0.18* (0.09)	-0.15 (0.09)
<b>Bank Specific Variables</b>				
Log(Real Assets) <sub>{t-1}</sub>	0.66*** (0.13)	0.83*** (0.15)	0.58*** (0.16)	0.85*** (0.17)
Credit over asset <sub>{t-1}</sub>	2.08*** (0.22)	2.17*** (0.23)	2.19*** (0.23)	2.52*** (0.24)
Deposit over asset <sub>{t-1}</sub>	-0.90*** (0.14)	-0.86*** (0.14)	-0.73*** (0.14)	-0.83*** (0.14)
Return on asset <sub>{t-1}</sub>	0.02*** (0.01)	0.02*** (0.01)	1.00*** (0.18)	0.66*** (0.20)
Npl ratio <sub>{t-1}</sub>	-0.02*** (0.01)	-0.02*** (0.00)	-0.02*** (0.00)	-0.02*** (0.00)
Liquid Asset over Total Asset <sub>{t-1}</sub>	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.10*** (0.02)
Paid Capital over asset <sub>{t-1}</sub>	-0.03 (0.28)	10.89** (4.73)	8.22* (4.79)	12.20** (4.81)
<b>Interacted Variables</b>				
Log(FED asset)*Log(Real Assets) <sub>{t-1}</sub>	-0.04** (0.02)	-0.07*** (0.03)	-0.03 (0.03)	-0.08*** (0.03)
Log(FED asset)*Paid Capital over asset <sub>{t-1}</sub>		-1.76** (0.77)	-1.32* (0.78)	-1.96** (0.79)
Log(FED asset)*Return on asset <sub>{t-1}</sub>			-0.16*** (0.03)	-0.11*** (0.03)
Log(FED asset)*Liquid Asset over Total Asset <sub>{t-1}</sub>				-0.01*** (0.00)
Constant	0.08 (1.47)	-2.68 (2.01)	-1.50 (2.03)	-7.75*** (2.20)
Fixed Effect	IB FE	IB FE	IB FE	IB FE
Observations	94,861	94,861	94,861	94,861
R-squared	0.40	0.40	0.40	0.40

Notes: The table reports the estimates of panel regressions with bank and loan type fixed effects (IB FE) and clustered standard errors at the borrower bank level. The dependent variable is logarithmic value of bank *i*'s loan in loan type *b* at time *t*. All are reported in two decimal places. I winsorized all variables at the 1% level in both tails of the distribution. Heteroskedasticity robust standard errors are reported in parentheses. \*\*\* indicates significance at 1 percent, \*\* at 5 percent, and \* at 10 percent, respectively.

Annex A: Time series charts of the Turkish Economy's macroeconomic and global liquidity indicators





Annex A: (continued)

