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MACROPRUDENTIAL POLICIES AND FINANCIAL STABILITY: THE CASE OF TURKEY

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ABBREVIATIONS

GFC	Global Financial Crisis
CBRT	Central Bank of Republic of Turkey
BRSA	Banking Regulation and Supervision Agency
FSC	Financial Stability Committee
GDP	Gross Domestic Product
EME	Emerging Market Economy
FED	Federal Reserve Bank
NINJA	No Income, No Job, and No Assets Loan
MBS	Mortgage-Backed Securities
AIG	American International Group, Inc
TARP	Troubled Assets Relief Program
LTV	Loan-to-Value
DTI	Debt-to-Income
SIFI	Systemically Important Financial Institutions
BIS	The Bank for International Settlements
CCB	Countercyclical Capital Buffer
ESRB	European Systemic Risk Board
SRB	Systemic Risk Buffer
SCR	Sectoral Capital Requirements
LCR	Liquidity Coverage Ratio
NSFR	Net Stable Funding Ratio
HQLA	High-Quality Liquid Asset
ASF	Available Stable Funds

RSF	Required Stable Funds
LDR	Loan-to-Deposit Ratio
CGFS	Committee on the Global Financial System
FSB	Financial Stability Board
ILA	Israel Land Authority
PBOC	People Bank of China
CBRC	China Banking Regulatory Commission
IMF	International Monetary Fund
MPC	Monetary Policy Committee
ROM	Reserve Option Mechanism
ROC	Reserve Option Coefficient

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ABSTRACT

MACROPRUDENTIAL POLICIES AND FINANCIAL STABILITY:
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Macro-prudential policies were widely used by various countries aftermath of the global financial crisis. The toolkits of the macroprudential policy were designed to prevent systemic risk, to ensure the financial stability and to strength the resilience of the financial system. The main difference of macroprudential policy from other policies is to target the systemic shocks because of the negative externalities such as; interconnectedness, pecuniary and strategic complementarities. This study aims to examine the effects of the macroprudential policies in different countries such as Israel, China, Russia, Germany, and especially Turkey, to describe the advantages and disadvantages of the implementation of the policy and to analyze the institutional structure of the policies. The policy implementation differs between advanced economies and the emerging market economies. Therefore, Turkey will be examined in detail as an example of the emerging market economy.

KEYWORDS: Macroprudential Policy, Financial Stability, Negative Externalities, Financial Crisis**,** Turkey

ÖZET

MAKRO İHTİYATİ POLİTİKALAR VE FİNANSAL İSTİKRAR:

TÜRKİYE ÖRNEĞİ

Makro ihtiyati politikalar, küresel mali krizin ardından çeşitli ülkeler tarafından yaygın olarak kullanılmaya başlandı . Makro ihtiyati politikanın araç kitleri; sistemik riski önlemek, finansal istikrarı sağlamak ve finansal sistemin dayanıklılığını güçlendirmek için tasarlanmıştır. Makro ihtiyati politikanın diğer politikalardan temel farkı; karşılıklı bağımlılıklar, stratejik bütünleşmeler, zararına satış gibi negatif dışsallıklar sebebiyle oluşan sistemik şokları hedef almasıdır. Bu çalışma; İsrail, Çin, Rusya, Almanya ve özellikle Türkiye gibi farklı ülkelerdeki makro ihtiyati politikaların etkilerini incelemeyi, politikanın uygulanmasının avantaj ve dezavantajlarını tanımlamayı ve politikaların kurumsal yapısını incelemeyi amaçlamaktadır. Politika uygulamaları, gelişmiş ekonomiler ile yükselen piyasa ekonomileri arasında farklılık gösterir. Bu nedenle Türkiye, gelişen piyasa ekonomisinin bir örneği olarak detaylı bir şekilde incelenecektir.

ANAHTAR KELİMELER: Makro İhtiyati Politikalar, Finansal İstikrar, Negatif Dışsallıklar, Finansal Kriz, Türkiye

INTRODUCTION

The Global Financial Crisis (GFC) of 2008 draw the attention of the authorities and academic researchers to the fragilities of the financial system. Hence, measuring and avoiding the effects of the systemic risk became a crucial focus area for countries. Systemic risk could be defined as the collapse of financial system as a whole, and the catastrophic effects on the real sector. Many scholars and experts have explored the causes and consequences of GFC with numerous studies available on the subject today. The main causes of GFC were deregulation of the financial system and a disproportionate integration between the financial system and real industry, which created a "chain effect". This led the financial crisis of 2008 to spiral down further to become GFC.

However, the deregulation of the financial system was not just a trending topic of 2008-09. It was discussed in the financial publications, viz. Basel I and Basel II, which were published in 1987 and 2004 respectively. But, the system indicators of these publications were based on micro-prudential measures rather than macro-financial framework. For this reason, the new policy tools have been explored and the available toolkits have started to expand, creating financial resilience from a macro-financial perspective. The macroprudential policies have been deemed necessary to prevent the high cost of the financial crises.

Toolkits are different for emerging markets economies (EMEs) and developed countries but they can be broadly categorized as follows: *Identifying and Monitoring tools and Operational tools.* Identifying and Monitoring tools aim to reveal the risks in the time and cross-sectional dimensions. The main imbalance indicators include macroeconomic data, such as credit to GDP ratio, liquidity ratio, maturity and currency mismatch. Market indicators are based on the risks that can affect the financial markets. For example, the spread index and market risk premium show the

risk appetite. The main goal of the macroprudential policies is measuring the systemic risk using these tools in general. Operational tools aim to choose and calibrate the related measures within a large scale of the macroprudential policies and implement those appropriately.

The policy changes in the advanced economies after GFC, such as quantitative easing and negative interest rates, created a large amount of liquidity towards EMEs, causing the risk of sudden reversal (sudden stop) in capital inflows for EMEs. Volatile external financing increased the risk of sudden stop as a large portion of the external capital was in the form of short-term capital and portfolio.

Firstly, the theoretical framework of the macroprudential approach will be examined in relation with negative externalities, such as interconnectedness, pecuniary and strategic complementarities. Also, the risk of sudden stop of capital inflows in terms of macroprudential approach will be addressed for EMEs in Section 2. Secondly, the implementation of the policy using different tools and the integration and differences between other policies, such as monetary and microprudential policies will also be addressed in Section 2.1 and Section 2.2. Thirdly, the reason why macroprudential policies are important to understand the financial stability and business cycles will be analyzed in Section 2.3. Finally, the policy toolkits will be explained for different countries in section 4. The policy implementation for the selected countries will be analyzed and the efficiency results will be shared, as already obtained by Claessens (2015), Baskaya et al. (2016), Villar (2017). While analyzing the policy implemented in various countries, the difference of the use of the macroprudential measures for advanced markets and EMEs will be compared.

In Section 5 and 6, we will address the evaluation of the macroprudential policies in Turkey. The background of the financial system in Turkey before macroprudential policies and the main reasons behind the necessity of these policies will be

highlighted in detail. Subsequently, we will discuss the regulation and supervision of the macroprudential policies in the Turkish system.

In addition, we will explore the policies implemented by various institutions and their effectiveness and inefficiency. Finally, different opinions about how the macroprudential policies should be applied in Turkey will be compared.

This dissertation suggests that macroprudential policies have balanced the credit to GDP ratio, containing the credit growth and improved the quality of external financing. However, the institutional structure could have been much better. In addition, the lack of coordination between institutions might have created a bigger timing problem and caused the inefficiency of the policy.

1. The Glimpse of Global Financial Crisis (GFC) of 2008

There are numerous researchers by scholars and analyses by experts and government authorities about GFC as this crisis was one of the landmark events of the world economy. The world per capita output growth slowed down to 2 percent in the late 2008, whereas it was around 5 percent between 2003 and 2004, which was the largest recession since World War II (Claessens, Kose, Laeven &Valencia, 2013).

The early signs of the Subprime mortgage crisis go back to the early 2000s, even if the full-blown crisis was seen in the U.S., the biggest economy of the world, in 2007. The stocks of the high-tech companies had gone bust in March 2000, an event popularly known as Dot-Com Bubble, followed by September 11 terror attacks in 2001. The economic recession following those events prompted FED (Federal Reserve Bank) to decrease the interest rates, which led to a decrease in mortgage interest rates. Consequently, cost of housing decreased and the demand for housing market increased.

In addition, the U.S. had relaxed the lending standards by using NINJAs[1] teaser rates and liar loans and mortgage credits was offered without down payment. Therefore, the real-estate market became an important financial instrument, as the increasing real estate prices seemed very attractive for the investors. Real estate prices peaked in 2005, while interest rates were still very low. The market confidence in the real estate increased the risk appetite of the financial institutions toward subprime mortgages. Therefore, risky products created by using securitization of subprime mortgages. In particular, Mortgage-backed securities (MBS) were created, which were debt

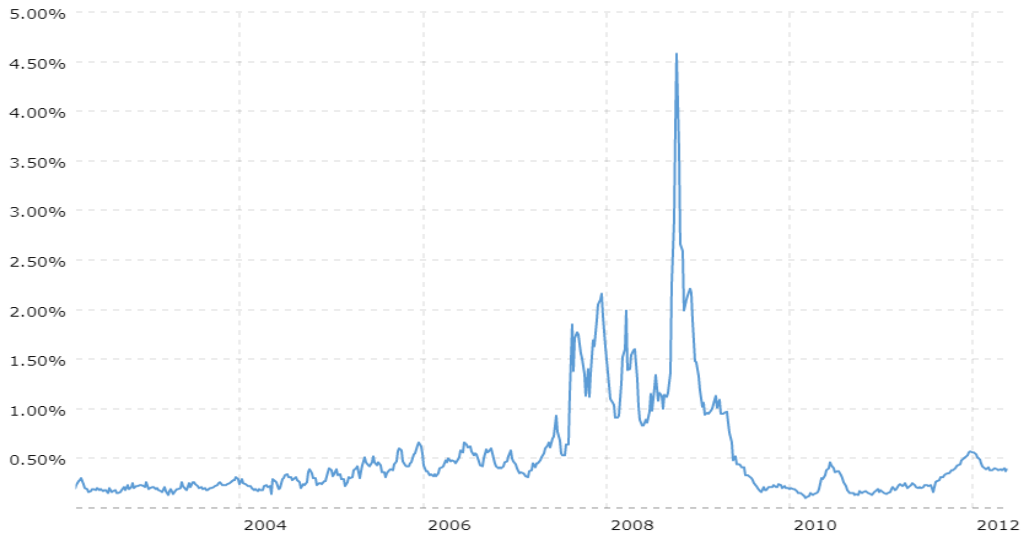
[1] In this type of loan, the lender does not request proof document for the assets of the borrower.

obligations issued by many entities. The biggest issuers of MBS were Fannie Mae and Freddie Mac, which were established with the sponsorship of the U.S.

Government to expand mortgage credit system to increase the house ownership in the U.S. with a lower credit default risk and higher standards.

However, five important investment banks, Bear Stearns, Morgan Stanley, Lehman Brothers, Goldman Sachs and Merrill Lynch, were involved in the system in the early 2000s. They started to issue MBS by subprime mortgages and toxic credits. The cash flows were diversified to “tranches” by using special purpose vehicles and the return was allocated by the waterfall logic. These securities were under the umbrella of the shadow banking system, financial intermediaries, pension funds, factoring companies and consumer financing companies, acting like banks. However, they were not subject to banking regulations and supervision. When the value of MBS declined, the risk and uncertainty increased, which caused increase in sales and decrease in the asset values. Massive losses to the tune of approximately $500 billion in these securities were experienced in the early 2008 (Mishkin, 2011).

Figure 3:TED Spread



Source: Bloomberg

TED Spread is measured as the difference in interest rates between safety instruments, such as T-Bill of US Government, and the riskier instrument, such as interbank loans. It provides information on the market confidence, liquidity of dollar and solvency. If TED Spread increases, it means that default risk on loans also increases and vice versa. As seen in Figure 1, it started to increase in 2006 and peaked up in 2009, following subprime mortgage crisis.

Lehman Brothers, which was the fourth largest investment bank with $639 billion assets and around 25,000 employees, had filed for the largest bankruptcy on 15 September 2008. Many scholars have evaluated that this event turned the subprime mortgage crisis of 2008 to a global financial crisis. As the crisis started to affect to the real sector along with the financial markets, Dow Jones index decreased by -4.4 percent in a single day. This was followed by several important events, such as the bailout of AIG (American International Group, Inc), the largest insurer that insured assets worth trillions of dollars globally. The rejection of TARP (Troubled Assets

Relief Program) by Congress led to the Dow Jones index dropping by -7.7 percent. This was the largest drop since 11 September 2001 terror attacks. President Bush signed off the revised version of TARP. However, the market confidence could not be established again.

The spillover effects of subprime mortgage crisis to EMEs as well as to other advanced markets, were devastating as most of the global investment banks issued these risky instruments in other countries as well. At that level, financial integration created a chain effect and the annual growth rate of the GDP declined by -6.4 percent in the fourth quarter of 2008 (Mishkin, 2008). European countries, such as Greece, Spain, Ireland and Portugal were faced with serious sovereign debt risks. On the other hand, the data shows that the European countries had warning signals just like the U.S. The debt-to-GDP ratio increased to 100 percent of GDP in the Eurozone while this was 80 percent of GDP in the U.S. between 1997 and 2007. The financial sector leverage was 70 percent of GDP whereas it was 40 percent of GDP in the U.S. (Carmassi, Gros & Micossi, 2009). Therefore, we can assume that European countries were as fragile as the United States when the crisis happened and the effect of the crisis in Eurozone was catastrophic.

As a result of the quick spillover of the crisis to EMEs, the growth rate of GDP decreased by 4% between 2008 and 2009. However, the extent of exposure to the crisis has shown some differences from EMEs to EMEs. The countries that were more integrated with the global financial and trade systems seemed more affected than the countries that adopted a more cautious approach, with some policies against the financial liberalization in the pre-crisis period. Also, some papers claim that the countries with higher FX reserves had more advantage in terms of short-term financing and current account deficit (Llaudes, Salman & Chivakul, 2010).

The impact of the crisis on Turkey was severe as well. It is important to understand how Turkish economy was affected by GFC and what was its consequences.

After the 2001 crisis, capital inflows towards Turkey had sharply increased because of the expansionary monetary policies in global financial markets. In that period, the current account deficit has quickly increased. In early 2003, the external debt of Turkey was $129.6 billion, which jumped to $284.4 in June 2008 and this external debt was issued by private sector.

Table 1:External Debt of Turkey / ($ Billion)

	2002-Q4	2008-Q2	Difference
Gross External Debt	129.6	287.5	157.9
Public Sector	91.5	107.2	15.7
Private Sector- Financial	13.8	50	36.2
Private Sector- Non-Financial	31.2	125.6	94.4
External Debt/ GDP	54.8%	36.9%	

Source: CBRT

As seen in Table 1, Turkey faced the 2008 financial crisis with a large current account deficit and high external debt and the external debt of non-financial private sector was very high. Therefore, the impact of the crisis on real sector occurred quickly as industrial production index decreased sharply by 10% in July 2008 (Yeldan, 2009). The devastating effect of the crisis on Turkey was not just limited to financial markets. There was a direct effect on real economy as well. The unemployment rate was increased from 10.3% in the third quarter of 2007 to the maximum level of 14.7 % on April 2009.

As the key drivers of the national economy of Turkey were the real sector companies and households instead of banking sector, the crucial fragility of Turkish economy in that period was the increasing external debt of these parties via credit channels. In

addition, the auditing of private sector was also limited compared to the auditing of banking sector. The risk appetite of the companies toward cheap borrowing might have increased the external debt so quickly. I will address the background of the Turkish economy in detail in Section 5.

As a result of the GFC, systemic risk and the macroprudential measures were discussed and applied slightly differently in EMEs, such as Turkey in comparison with the advanced markets. The destructive effect of the crisis might be considered even larger in the EMEs comparing the originated advanced country because of the dependence on the external financing. Therefore, the fight against the sudden stop of the capital inflows is the one of the important priorities of the macroprudential policy approach for EME.

2. The Theoretical Framework of Macroprudential Policy

The macroeconomic tools and the policies for the stabilization of the financial system were reconsidered in the aftermath of the GFC. Traditional microprudential measures were revised and the Basel III accord was applied with stronger capital requirements and higher liquidity ratios (Nicolò, Favara, & Ratnovski, 2012).

In addition, macroprudential policies were taken into consideration against the systemic risk, which is defined as a risk for the whole financial system rather than the risk of individual institution. Although many academic researchers (Crockett, 2000 and Borio, 2003) had already mentioned the necessity of the macroprudential measures in their works since early 2000s, the implementation of these measures in different economies began after the crisis.

The rationale behind the macroprudential regulation is based on negative externalities that lead to systemic risk, which are related to the agency problems, such as moral

hazard, asymmetric information and adverse selection. These externalities can be classified as strategic complementarities, interconnectedness and pecuniary externalities (fire sales). Macroprudential regulation was developed to counter these kind of market issues. (Nicolò et al., 2012), (Acemoglu, Ozdaglar, Tahbaz-Salehi, 2012), (Kenc, 2016), (Başçı,2016).

Pecuniary externalities are related to fire sales, which arise in downturns. When the banks or financial institutions are in a difficult position and sell their assets below their fundamental value, the fire sale materializes. This process causes decrease in the prices of identical products in the books of other financial institutions and it triggers the reduction of the capital ratios of these banks and forces the banks to liquidate their assets. The primary goal of banks is to coordinate the funding of illiquid assets with highly liquid liabilities. In case of sudden withdrawal of wholesale funding, the business and maturity model of banks will not be able respond, because of the risk of having to liquidate investments prematurely. Consequently, credit crunch and welfare deterioration may occur due to overborrowing.

There are two crucial issues here. Firstly, in the boom period, agents fail to evaluate the market price of assets with respect to whether it is in general equilibrium and which leads to overborrowing. Secondly, they do not internalize the effects that a generalized fire sale may have on the ex-post borrowing capacity of other agents (Nicolò et al., 2012). As seen in 2008 financial crisis, the speculation on asset values created negative chain effects and deteriorated the balance sheets of the banks. Therefore, Basel III requests strengthening liquidity and stabilizing funding requirements of balance sheets, to avoid the negative outcomes of the fire sales. Also, taxes could be applied to the volatile and unstable funding, as a complementary solution.

Strategic complementarities are related to externalities arising from the correlation of risk-taking between the financial institution and interaction.

In boom phases, the competition and establishing the usual strategy lead the banks to undertake the same risks. Also, the banks loosen up their compliance checks and credit standards in boom periods to increase their outstanding loans, which cause an increase in the low-quality borrowers in the downturn. There is usually less and unreliable background information available about such borrowers. Another aspect of the strategic complementarities is related to reputational expectations of the bank's senior management. The managers can mislead the market by poor reporting to protect the market value of the firm and within this time the bank can tend to fund itself with the risky products. Capital requirements and the restrictions to avoid excessive risk taking have been proposed in Basel III accord against strategic complementarities. In case of the increase in risky lending and loose credit standards, the caps related to the loan-to-value (LTV) and debt-to-income (DTI) ratios could be useful in avoiding the pro-cyclicality of the asset side of the balance sheet.

Third externality is related to the interconnectedness, which arises from the integration and the global connection within the financial system. The structure of the banks interlinks them with their brands, subsidiaries or any other banks via securitization and other related financial products.

When an idiosyncratic shock hits a bank, the spillover effect could be devastating based on its asset size. On the other hand, the complex structure of the financially important banks can indicate the contagion risk towards real economy as seen in the bankruptcy of Lehman Brothers in 2008. Another crucial systemic risk is related to interconnectedness is the expectation of the bailout of the *Systemically Important Financial Institutions* (SIFIs). Since their part in the real economy is massive, the government usually does not allow the bankruptcy of these banks, as seen in 2008 crisis. As a result of their huge size, such banks can easily tend to create their portfolio with riskier products in the boom phase, which is one of the critical threats to the banking system, and the government should regulate it.

Table 2: Externalities and Macroprudential Policies

Externalities due to:	Can be addressed by:			
	Capital Requirements (Surcharges)	Liquidity Requirements	Restrictions on activities, assets, or liabilities	Taxation
Strategic complementarities	X		X	
Fire sales	X	X		X
Interconnectedness	X		X	X

Source: Nicolò et al., 2012

As shown in Table 2, these tools can be used against the systemic risk under the umbrella of the macroprudential regulation. These are focused on the banking system and the lending standards rather than the individual health of the banks and financial institutions. Therefore, the characteristics of the financial institution could be considered as a lesser determinant, because we presume that the joint behavior of the agents create systemic risks with asymmetric information in the market. Therefore, the measures should be developed in this perspective if macroprudential regulation is an option.

In Section 2.1, I will highlight the differences between microprudential and macroprudential policies. In Section 2.2, I will examine the differences between monetary and macroprudential policies. Finally, I will explain the relationship between macroprudential approach and the financial cycles in Section 2.3.

2.1. Differences between Microprudential and Macroprudential Policies

Micro-prudential regulation is targeted toward individual solvency and resilience of the financial institution, covered under Basel I and Basel II, while the macroprudential regulation is aimed at addressing systemic risk with respect to Basel III. After 2008 financial crisis, the integration and the interconnectedness of the financial system was considered as a negative externality. Therefore, different toolkits were created and implemented to stop the chain effects of the financial crises, which were called as macroprudential policies.

Both microprudential and macroprudential policies are focused on restrictions and buffers via capital and liquidity requirements. However, macroprudential policies are adapted to upturns and downturns of the financial cycles, and therefore, those are eased in the bust episodes and tightened in the boom episodes. The interaction of the financial institutions with each other and the real economy generates endogenous risk, which exuberates in the expansionary phases. In those periods, the financial institutions might not be able to identify the increasing risk, as their health indicators might not raise the alarm. Macroprudential policies step in to prevent the negative outcomes of the business cycles. For example, counter-cyclical buffers are aimed to increase the capital of the bank in upturns to stabilize the resilience of the bank in the downturns. Therefore, the nature of the counter-cyclical buffers policy is based on macroprudential regulation. In addition, there are some tools, such as LTV and DTI caps, which serve both microprudential and macroprudential policies. This enables coordination between policies, which is crucial, allowing them to mutually reinforce each other. (Boissay & Cappiello, 2014), (Osiński, Seal, & Hoogduin, 2013)

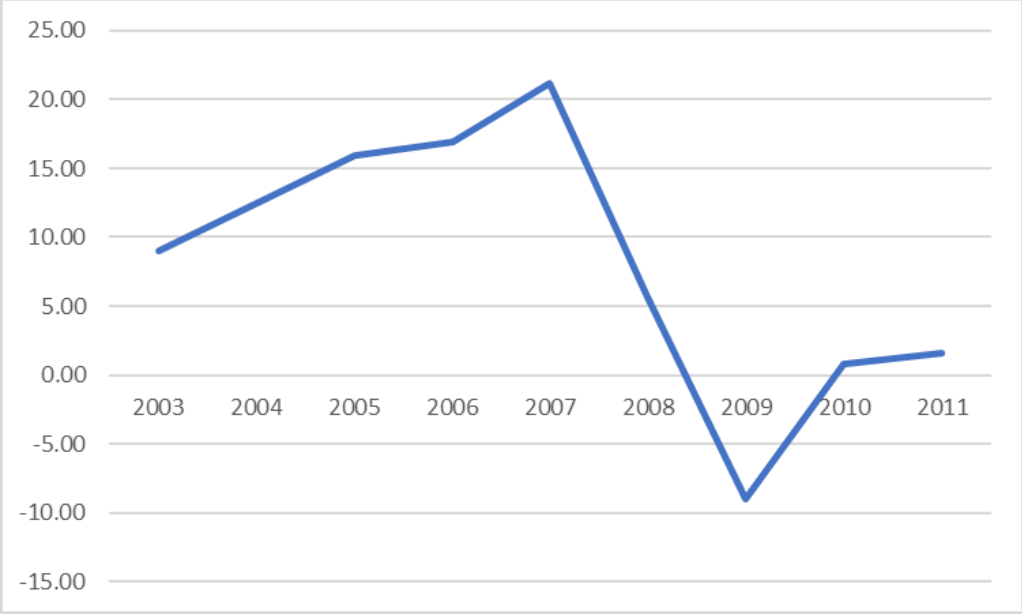
Moreover, the questions about the supervision, timing and the policy toolkits could be similar as the objectives of the both policies mostly overlap. Different supervision for each policy would be more efficient if the transparency, accountability and the

coordination conditions are met. The open dialogue and joint discussion of the microprudential and macroprudential committees can create better atmosphere to evaluate the systemic risk. (Osiński et al., 2013)

The indicators of the macroprudential and microprudential policies can be correlated in the early expansionary period. However, they differ in the peak of the boom phase. The excessive private loans and looseness in the credit standards seem positive in

terms of micro-prudential approach while it raises concerns as systemic risk, in terms of macroprudential, which is called as “paradox of financial instability” (by Borio & Drehmann, 2009) as the financial system seems as strong and vulnerable at the same time. As seen in the Figure 4, the total credits have increased exponentially before 2008 financial crisis.

Figure 2: Annual Change in Total Credit - Worldwide (%)



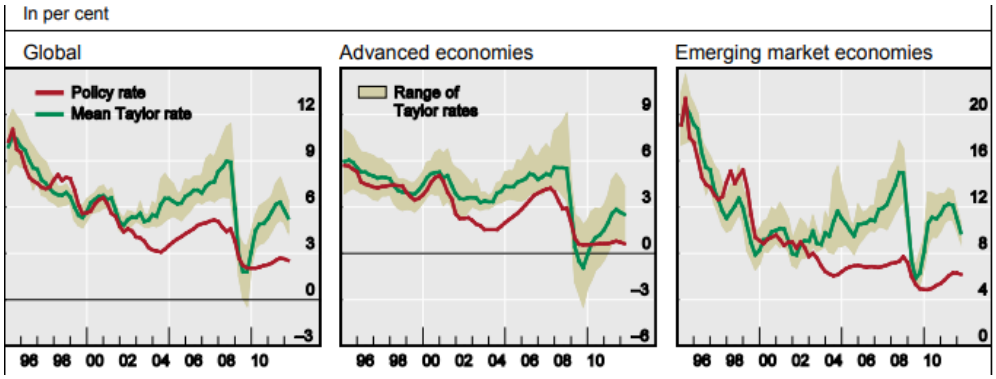
Source: BIS

2.2. Differences between Monetary and Macroprudential Policies

While there are differences between the monetary and macroprudential policies, they have some complementarities and linkages with each other at the same time. For example, both policy measures have an impact on credit demand and credit supply by limiting or inducing the borrowing appetite of the firms and agents. Also, monetary policy tools can also be used as macroprudential policy tools. However, there some differences in terms of the toolkit, regulation and supervision. First of all, macroprudential policies aim to stabilize the procyclicality of the financial system where the monetary policies are primarily focused on the price stability and inflation target. Even if there is a large toolkit of monetary policy, such as open market operations, changing reserve requirements, expansionary and contractionary policies, the key tool is the policy rate of the central banks. Central banks use these tools to achieve price stability, exchange rate stability, full employment and growth. On the contrary, macroprudential measures, as mentioned before, target financial stability, which means that these tools are largely focused on preventing financial crisis or preventing the spillover effect if the financial issues occur. Therefore, the toolkits of the macroprudential policy are based on capital requirements, sufficient level of the liquidity ratio, and the caps on loans and debts. This issue was raised after the GFC because the authorities and academicians observed that the price stability was not a sufficient condition for the financial stability.

Taylor rule is the monetary policy rule that measures the shift in the policy rate. For example, the interest rate should increase when inflation rate rises up to the sufficient level or vice versa. The study of Hofmann & Bogdanova, 2012, shows us the realized policy rate and Taylor rule rate move together until 2003 (see Figure 5). Thereafter, the divergence between these is seen expanding and the Taylor rate is seen above the actual policy rate. Also, this deviation is even larger for the EMEs.

Figure 3:The Taylor Rule and Policy Rates



Source: Hofmann& Bogdanova, 2012

As per Figure 5 (Global), the policy rate is less than the Taylor rule rate because of the appreciation of the exchange rate. Central banks lower the policy rate in comparison to the Taylor rule rate to avoid the appreciation of the exchange rate. (Shin, 2016). Therefore, we can presume that the floating exchange rate regime and open economy conditions in the global financial system could constrain monetary policies, especially for the EMEs. Inflation target is the primary objective of the monetary policy, however, as experienced in the GFC, manipulating the policy rate does not necessarily prevent financial crisis or create financial resilience.

In addition, the policy rate is used to control inflation, exchange rate and the capital flows. This multiple usage of the policy rate weakens the effect on domestic markets if the asset prices and policy rate are closely related. For example, if the contractionary monetary policy is in place to reduce inflation and to control the depreciation of the domestic currency, the domestic market should shrink as a result of the decrease in exports in terms of the trade channel. However, the effect would be opposite on the financial channel. If the contractionary monetary policy is implemented, the capital flows increase through the domestic market and the impact will be opposite to the effect on the trade channel. The easing in the financial markets

could lead to over-borrowing, debt issues, upturn-downturn episodes and the weakness in financial stability. Hence, balancing the economy through policy rate could result in these kinds of problems, especially in the EMEs (BIS Annual Economic Report, 2019).

Basically, monetary policy tries to balance fluctuations in the exchange rate whereas macroprudential policy involves with administrative measures. However, the perspective of traditional transmission mechanism could conflict with this process as explained earlier. Therefore, regulations and non-pricing tools are developed and implemented along with the monetary policy to stabilize the economy in every aspect, and these tools are called as macroprudential tools.

Overall, the dual effect of monetary policy causes some challenges, the tools of macroprudential policies aim to complement monetary policy.

2.3. Financial Cycles and Systemic Risk

Measuring the systemic risk is an important aspect to properly implement the macroprudential policies. Otherwise, it could cause the unnecessary shrinkage in the economy. Therefore, the financial cycles and financial instability should be analyzed appropriately. Recent studies suggest that financial instability arises out of the financial cycles in the macroeconomic perspective. Although the assessment of how the financial cycle begins and finishes is a challenging question, there are some indicators to identify the risk.

The key indicators are increase in asset prices and expansion in loan volume, especially in private loans. Both can be measured by the divergence from their trend, which is called a *gap*. Credit-to-GDP gap can measure excessive credit borrowing in terms of the real growth.

An asset price gap can measure the deviation in the asset prices, especially when the increase rate is too high. (Borio, 2002), (Bario & Lowe, 2004).

Basel III proposes to use *countercyclical capital buffer* (CCB) when the key indicator is credit-to-GDP gap. The rationale behind this tool is to increase the capital when the system is in a boom episode to mitigate the risk of collapse of the financial system in a bust episode.

European Systemic Risk Board (ESRB) named the credit-to GDP gap as 'Basel Gap'. If the gap is lower than 2%, then CCB is zero; if it is between 2% and 10%, CCB varies between 0% and 2.5%; if it is larger than 10%, then the CCB should be at a maximum point, which is 2.5% (BIS, 2019). Although the mechanism seems straightforward, 'Basel Gap' could be misleading in certain cases. For example, Repullo and Saurina (2011) suggest that CCB based on credit gap is not a proper tool to measure the buffer as the credit gap moves in parallel with GDP growth. Also, Lang and Welz (2017) argue that if there is an excessive credit gap, the trend should follow the same pattern. Therefore, the gap would be underestimated. Despite these criticisms, there are other studies (Drehmann & Tsatsaronis, 2014), which suggest that CCB and the measurement of credit-to-GDP gap are useful early warning indicators in determining the long-term trend for the financial crisis.

3. The Tools of the Macroprudential Approach

The usage of the macroprudential tools is related to the types of shocks and turbulences. There are various tools that can be applied. Some of them are close to microprudential policies and monetary policy. Some measures can be used to prevent financial crisis and imbalances. The countercyclical policies can be counted under this category, such as CCB, liquidity buffers, LTV and DTI. The main goal of these

measures is stabilizing the financial system in case of excessive credit growth and a sharp increase in the asset prices. The intention is to prevent the spillover effect of the crisis. Margin and haircut can be considered as the tools similar to monetary policy, which can also be used for restricting banks in the expansionary period. On the asset side, caps and limits on foreign currency and interest rate mismatches can be used along with the reserve requirements. Toolkit can be classified as capital requirement-based tools; Liquidity based tools and balance sheet-based tools.

Capital requirement-based tools are Countercyclical Capital Buffer (CCB), Systemic Risk Buffer (SRB), dynamic provisions and Sectoral Capital Requirements (SCR).

Basel Committee published Countercyclical Capital Buffer (CCB) on Banking Supervision in 2010, to develop the banking standards and strengthen the resilience of the financial system. As mentioned earlier, CCB aims to increase the additional capital in the expansionary phases to prevent the negative outcomes of the downturns. The key role of this policy is to avoid the negative outcomes of the excessive credit growth.[2] However, if it decreases due to tax cuts or restrictions, it is considered as countercyclical. Therefore, the nature of the capital buffer is countercyclical in view of the macroprudential approach. As mentioned before, CCB is based on credit-to-GDP gap.

While there is a limit to CCB based on risk level, there is no limit for systemic risk buffer (SRB). SRB may vary across industries and sectors. The cap is defined as the risk level and size of the institution, which means that the level could be higher for SIFIs. There is a map showing the current rate of SRB for the European countries on ESRB website and it is constantly updated based on data received from the respective countries. Dynamic provisioning is similar to the capital buffer, but a bank makes a

[2] The difference between procyclical and countercyclical variables arises from the negative or positive correlated outcome. It means that if a variable increases in boom episodes, it is considered as procyclical

loss provisioning for loans in the boom period, which should ease their balance sheet in the bust period. This tool has been used for the first time in Spain in mid 2000s. Bank of Spain decided to use dynamic provision as a tool because their economy had more fluctuations compared to the other EU countries. The rationale behind this tool is to calculate statistical probability of the credit losses and keep the assets accordingly. The provision rate reduced between 1999 and 2001. However, it increased since 2004 and it peaked in 2007 credit crunch (Lis & Herrero, 2009). So, we can conclude that this tool had a positive effect on credit crunch. However, it is not possible to consider it as a standalone prevention module regarding the structure of the crisis.

Sectoral Capital Requirements (SCR) address sector-specific risk across the industries. Sectoral data can identify the emerging risk for both microprudential and macroprudential measures. In some cases, SCR would be a more useful and direct tool than CCB as it focuses on risk exposure on sector basis. Both SCR and CCB provide the additional capital increase for the possibility of the financial stress. However, the main difference is that CCB addresses the whole balance sheet exposure where Sectoral capital requirements (SCR) address sector-specific exposure when needed. Therefore, these two policies should be considered as complementary instead of substitute elements (Korhonen, 2016). The assets can be classified as residential, commercial and others, depending on their risk level in terms of SCR. For example, SCR can be adjusted for the complex, risky financial products, such as collateral debt obligation and mortgage-backed securities.

Basel III Committee developed liquidity-based tools, as the major risk of the maturity transformation[3] was noticed in 2008 financial crisis. It could cause negative

[3] "Maturity transformation is the practice by financial institutions of borrowing money on shorter timeframes than they lend money out." (Dybvig, 2012)

externalities of the fire sales in case of speculation or crisis. So, the authorities decided to regulate this area with liquidity-based measures.

Liquidity-based measures can be classified as procyclical liquidity-based tools and the margins and haircuts. Procyclical liquidity-based tools are liquidity coverage ratio (LCR), net stable funding ratio (NSFR) and loan-to-deposit ratios.

LCR means that banks should keep their high-quality liquid asset (HQLA) at the sufficient level for 30 days in case of an urgent need for it to be liquid. LCR should be equal to or greater than 100% when HQLA is divided by total net cash flows for 30 business days. The objective of LCR is to strengthen the risk profile of a bank for the short-term structure. NSFR aims to strengthen the long-term structure of the risk profile of a bank by promoting safer funds for future investments. In the expansionary periods, banks can enjoy cheap financing with more risky funds and the balance sheet can become more fragile. NSFR addresses to prevent the possible negative impact of the excessively risky funds in the period of the crisis by limiting them. NSFR should be equal to or greater than 100% and is calculated when the total available stable funds (ASF) is divided by total required stable funds (RSF). These two liquidity-based tools began to be implemented with Basel III reforms. In addition, Loan-to-deposit ratio (LDR) also indicated liquidity level of a bank. LDR is calculated with the loans are divided by deposit. LDR shows us how the bank manages the balance with their assets and liabilities. Basel III Committee proposes the ideal level of LDR as 80-90 %.

Margin and haircuts are the tools for the regulation of derivative markets. As the nature of margin and haircuts is procyclical, the limitations may be considered under the macroprudential framework. Margins and haircuts are lower during expansionary times promoting leverage, whereas these are higher when the risk is arising in the market for de-leveraging. Therefore, the market can exuberate with the increase of sales in the risky periods. For example, the bailout of AIG was related to their

positioning in the derivatives market during the 2008 financial crisis. The large amount of credit default swaps caused them financial troubles when the margin calls occurred. In the aftermath of GFC, the internal limitations on margin and haircuts started to develop at international level with the support of Committee on the Global Financial System (CGFS), Financial Stability Board (FSB) and the Basel Committee. However, the limitations still do not cover the financial institutions under the shadow banking system if their exposures are below EUR 8 billion. (Constancio, 2016)

Asset-side based tools of the balance sheet are LTV and DTI. LTV assess the risk of the loan and it is calculated by dividing loan amount by the value of the asset purchased. Therefore, higher LTV means that the profile of the loan is riskier than the lower LTV for the financial institution. As seen in mortgage crisis in 2008, the caps on LTV were crucial to avoid the negative effect of the crisis. However, some mortgages were borrowed with no down payment in that period, which is called as NINJA loans. Higher LTVs promote the systemic risk as it could cut the liquidity of the banks in the bust period. In the aftermath of the GFC, policymakers requested caps on LTV, which changes the loan profile of the bank. For example, according to the study by Morgan, Regis & Salike, 2018, LTV cap increased from 22% to 61% for Asian banks, 5% to 33% for Eastern banks, 13% to 20% for Latin America banks, 0% to 12% for Middle Eastern banks, in addition to an overall increase from 8% to 29%.

DTI measures the gross monthly income of an individual over their monthly debt payments. Debt payments can include the commercial card payments, mortgage debt or their loan paybacks. This ratio reflects the financial position of the individuals once they request loans from the financial institutions. Overall, the highest DTI should be 43% for the borrowers to provide a loan from a bank with the maximum threshold. However, the lenders usually prefer that DTI ratio is not higher than 36%. Besides, tightening and loosening DTI ratio seems to be an effective measure from the macroprudential perspective. For example, it is found that tightening DTI decreases the mortgage loans between 4% and 7%, whereas tightening LTV

decreases this by around 1% (Kuttner & Shim, 2013). Also, it is found that the effect of the LTV and DTI is different during the bust period. LTV cap reduces banks' assets and makes the bust period worse. However, DTI cap improves bank's financials during this period (Classaens et al., 2013).

Overall, many studies suggest that the tools of the macroprudential framework are efficient in dealing with the times of the financial stress. However, some studies reveal that certain tools may not be as efficient because of the supervision and timing issues, shadow banking system and auditing standards.

4. Macroprudential Policy Implementation in Different Countries

As the macroprudential toolkit is large and varied, the implementation can vary from country to country, especially the supervision, regulator and framework differ between EMEs and advanced economies. Moreover, the governments and the political structure of the country are closely related to whether the country can establish specific committee, which can independently decide and determine the policies. In most cases, the central banks have a significant role in macroprudential measures, whereas in some cases there are external financial committees as policymaker (Villar, 2016).

In this chapter, we will examine the examples of the policy implementation in the following countries: Israel, Germany, China, and Russia. The countries that have a different economic structure have been selected for a better analysis of how the efficiency of the macroprudential policies is related to the implementation. For example, there is a solid bureaucracy of the government in mortgage market of Israel that may affect the macroprudential policies. Germany would be a different example to see if being in a member of monetary union has an effect on macroprudential

decisions. On the other hand, China has some restrictions for the capital outflows, but the capital inflows were allowed. Finally, the volatility of oil prices and dollarization could create a fragility in term of macroprudential approach. I chose these countries due to the above-mentioned unique conditions.

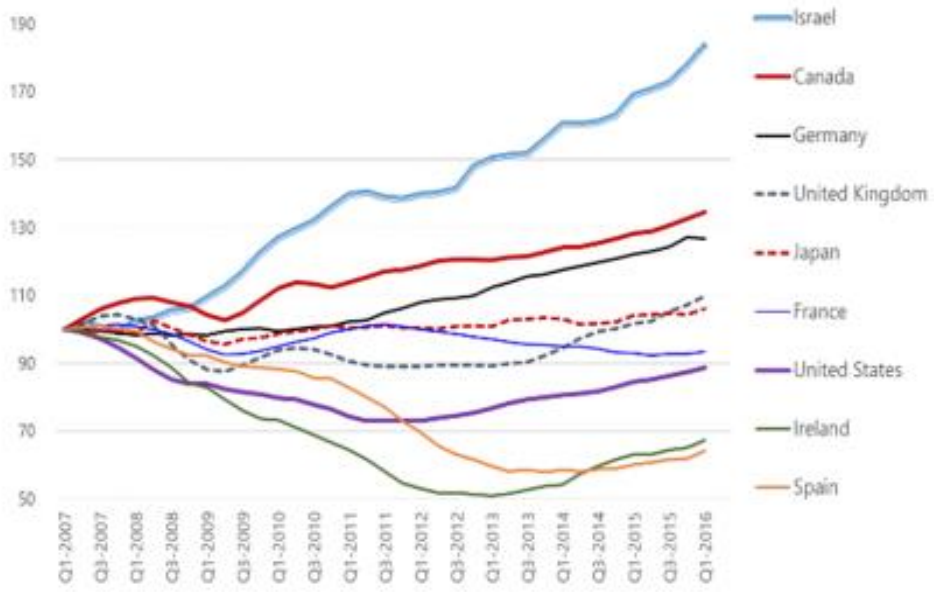
4.1. Israel

Analyzing the case of Israel in macroprudential framework could be useful for the following reasons: Firstly, macroprudential toolkit of Israel is quite larger in comparison with other advanced countries such as additional capital requirements, LTV and DTI limits and additional provisions. Secondly, they have a large dataset on the residential and loan market to implement appropriate macroprudential tools and to measure its efficiency. Thirdly, Israel Central Bank plays a significant role of a decision maker in the implementation of the monetary and macroprudential policies at the institutional level, similar to the other countries.

According to the study by (Tzur-Ilan, 2018), the financial market's dynamics of Israel could be described as follows. The leverage ratio of Israel seems to be lower than the United States (92%) and United Kingdom (89%) with 42% between 2007 and 2014. Also, LTV and DTI ratios are less as compared to the other advanced economies. Borrowers should declare their assets to the lenders requesting the mortgage. Mortgage market is dominated by four big banks with a market share of 85 % with only 7% percent share of the other financial institutions. Therefore, shadow-banking system can also be considered as limited in residential market. Default rates are low, and the homeownership is high in comparison with European countries. Israel's bureaucracy has a strong focus on housing supply and construction. The only decision-maker is Israeli government and Israel Land Authority (ILA) for the building construction, which can cause slow housing supply as a result of the

bureaucracy. Consequently, the increase in the house prices could be even larger when the demand shocks occur. The effects of the GFC on GDP growth were not as devastating as in other developed countries.

Figure 4: Housing Prices in Israel



Source: Tzur-Ilan,2019

Israeli economy was also affected by the low global interest during this period, which increased the demand in the housing market, but the housing supply was not sufficient to meet this demand. Therefore, the house prices continued to increase exponentially, especially between 2009 and 2010.

However, Israel's household debt of GDP was much lower than many of the advanced economies. Israel's household GDP debt was 37.6% in 2008, whereas it

was 59.8% for Germany and 98% for the US. Furthermore, LTV ratios of Israel were again lower than Germany and USA with an average of 53% (Fischer, 2014).

In early 2010, Israel started to implement macroprudential policies along with the monetary policies. The policy rate raised by 1.75% in 2010 and LTV ratio increased to 75% while dealing with a sharp increase of the housing prices.

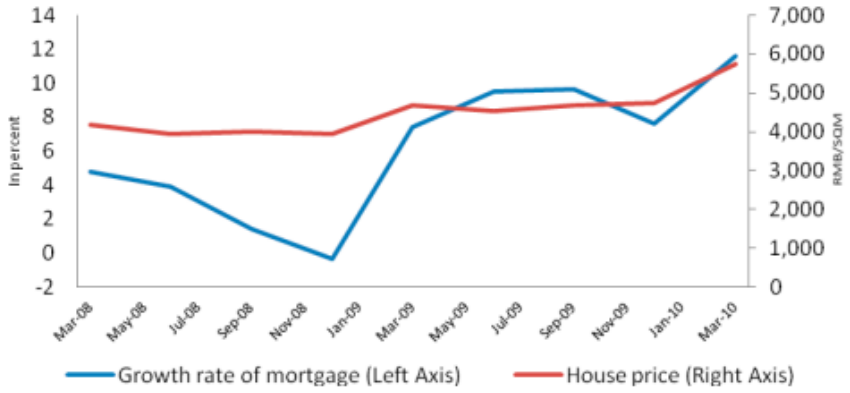
Also, Aggregate common equity Tier 1 ratio rose from 8% to 9%, according to their internal macroprudential policy implementation and Basel III requirements. In addition, banks increased the RWA coefficient from 47% to 53% to create an additional cost on loan demand. (Trajtenberg, Tzur-Ilan & Frayberg,2018)

It is not easy to measure the sole efficiency of the macroprudential measures as they were implemented with the monetary policy. However, the studies of (Trajtenberg, Tzur-Ilan & Frayberg,2018) show that higher LTV reduced the housing prices and cut down the demand of housing. But, they had to limit LTV to 60% because of the political and social concerns in 2014.

4.2. China

Systemic risk increased in China due to the unprecedented rapid growth, which was 10.37% on an average, between 2000 and 2010. Also, balance of payment surplus during this period caused the appreciation of the domestic currency, which further encouraged capital inflows. However, the capital outflows were subject to some restrictions by the authorities. So, this situation encouraged the excessive credit growth in the domestic market.

Figure 5: Housing Prices and Mortgages in China



Source: CEIC

Moreover, Chinese Government promoted a credit package between 2008 and 2010, to balance the slowing credit market. Some scholars suggest that this expansion deteriorated the quality of the financing and created systemic risk. Credit boom and increase in housing market occurred as a result of the capital inflows, restriction on capital outflows, low interest rates, and the expansion of the domestic market. Chinese Government used some macroprudential tools to avoid the negative impact of the increase in asset prices. People Bank of China (PBOC) implemented differentiated reserve requirement, which addressed the decline in credit volume and strengthened the banking reserves. China Banking Regulatory Commission (CBRC) increased the capital adequacy ratios, including the Tier 1 ratio. Also, they started to implement countercyclical capital buffer period. In addition, they increased LTV ratio to 70% approximately for first-time homebuyers. Moreover, since 2009, they started to closely observe the NSFR and LCR to keep them above 100%.

Also, China made a few changes in reserve requirements starting from 2008. Initial reserve requirement was the simplest; a default rate was applied to all the banks regardless of the maturity or the size of the banks. In 2008, PBOC started to apply two different ratios. Reserve requirement ratio was higher for the big commercial banks, which was approximately 1-2% higher than the small banks.

In 2011, they differed the reserve requirement case-by-case on a quarterly basis. The main target was to identify the SIFIs and implement different regulations. (Klingelhöfer & Sun, 2017)

Another tool termed as *window guidance* was used by China, which may be considered as a macroprudential measure. It is a method that a central bank uses to control the credit growth by directing the banks to issue loans to certain industries or companies. For example, PBOC advised the banks on excessive credit expansion, maturity mismatching, increasing risk in credit channel in the window guidance meetings of 2001, 2004 and 2009. These meetings are considered as macroprudential tightening. However, their guidance eased between 2013 and 2015. The window guidance stated in PBOC's monetary policy reports is straightforward in this regard, supporting versus restrictive.

Supervisory pressure can be also listed as a macroprudential tool with the aim to regulate the financial system and restrain systemic risks. PBOC applied various regulations jointly with other important institutions, such as CBRC and SIFIs to control the financial market. Financial regulations were particularly tightened in 2001. Between 2003 and 2005 and 2007 and 2010, there were regulations on the financial market, such as prohibition of the unauthorized consumption loans, regulations on collaterals and closure of failed financial institutions. (Klingelhöfer & Sun, 2017)

To measure the effectiveness of these tools, Wang & Sun, 2013, had conducted a panel regression with the available data, including 171 banks between 2000 and 2011. Based on their results, it is found that increasing reserve requirement ratio is the most effective tool in decreasing the credit volume and housing prices. The study states that longer period is needed to measure the efficiency of LTV.

Liquidity ratio was found insignificant in all samples. Besides, interest rate and housing prices had a positive relationship in all banking samples, which reflects that the monetary policy tools could be inefficient in case of financial stress.

4.3. Russia

The main breakpoints of the Russian economy have been observed in 2008, with excessive capital inflows and external financing. Subsequently, household debt increased massively in 2013, and dollarization started to become an issue in 2016. Also, the economy was exposed to the volatility of the oil prices and it affected the solvency of the financial system.

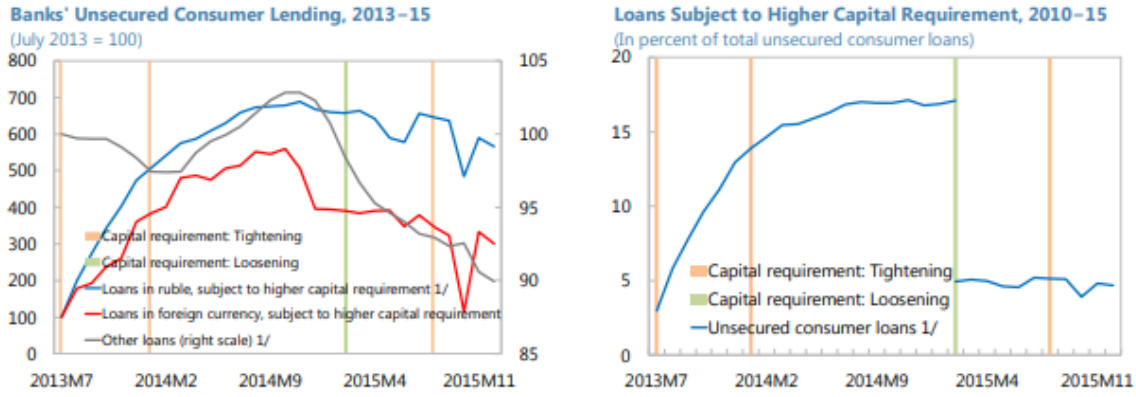
During these periods, the Russian Government observed that the systemic risk was arising, so they developed some tools and formed some institutions. National Council on Ensuring Financial Stability (FSC) was established to measure and assess the systemic risk. However, their role was not of a decision maker. Therefore, Central Bank of Russia (CBR) could be considered as the only decision maker in case of the macroprudential policies and monetary policies, whereas the role of FSC is limited to recommendations to the CBR. Considering these developments, CBR recommended the increase in reserve requirements in 2008, right after the collapse of the Lehman Brothers.

Also, CBR took some measures against the massive increase of the private credits, which is considered as the augmentation of the household credits. Basically, they increased the capital adequacy ratio. The reserve requirements were differentiated based on bank's liabilities, which increased from 3.5% to 8.5% in 2008. Additional provisioning requirements and higher capital risk weights were used to control the excessive increase in unsecured loans and NPLs, and strengthen the financial stability, which increased risk weights of the unsecured loans.

CBR augmented the capital risk weight from 1% to 1.5% for mortgage loans of more than RUB 50 million and LTV ratios to 80%.

Based on empirical study of Danilova & Morozov, 2017, it seems to reduce the systemic risk in Russian economy between 2013 and 2016. However, the Russian banking system was highly exposed to the risks of currency mismatch because of the massive dollarization, with 31% foreign currency loans in 2016. (IMF Country Report No.16/307, 2016). Therefore, CBR increased reserve requirements for borrowing in foreign currencies as well, to counter dollarization. This was applied for households and investors at different levels.

Figure 6: Russian Banks' Unsecured Consumer Lending



Source: IMF

Reserve requirements increased from 100% to 110% for companies holding foreign exchange, whereas it was raised from 100% to 130% for the real estate purchasers (Danilova & Morozov, 2017). They managed to control unsecured loans with higher capital requirements during 2013-15. However, it is noteworthy that credits in subjected to higher capital risk weights continued to rise up more strongly than credits are not subject to the measures.

As result of the study, increase in risk weights was necessary and helped during that period. However, the prevailing low interest rates encouraged the individuals to over-borrow. Therefore, implementing DTI was suggested by some scholars, and there are ongoing studies for the macroprudential policies in this regard.

4.4. Germany

Considering EU as a single market, the macroprudential policies should be harmonized among EU countries to maximize the benefits of the measures.

In the aftermath of the GFC, Germany started to implement some macroprudential policies, starting from 2013, on the recommendation of the ESRB.

At institutional level, there are three important parties, which are Federal Ministry of Finance, Federal Financial Supervisory Authority (BaFin) and the Bundesbank. They analyzed and assessed systemic risk and developed such tools in coordination with each other.

The available toolkit of Germany was CCB and capital surcharge to SIFIs was capital-related tool. Also, they implemented systemic risk capital buffer and sectoral reserve requirements. However, they did not initially apply demand-side tools, such as LTV and DTI. These were applied in 2017. Overall, (Deutsche Bundesbank Monthly Report April, 2013) shows that the macroprudential tools generally seemed to improve their financial resilience. However, the country-based analysis for a European Union member country could be misleading as the decisions of the monetary policy affect all member countries.

5. The Macroprudential Regulation and Supervision in Turkey

5.1. Overview of Turkish Economy

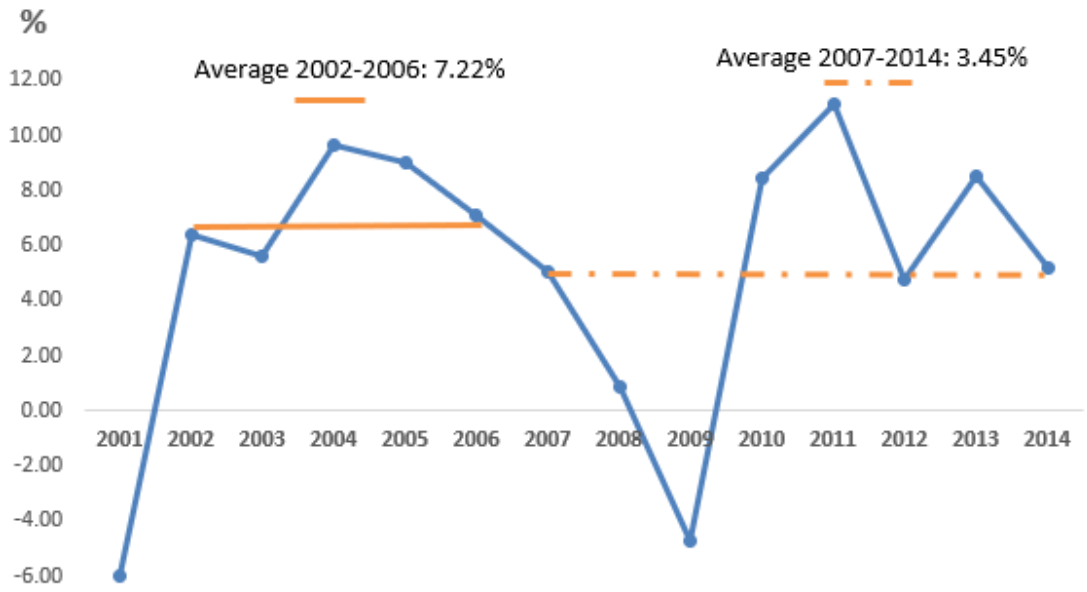
In this part of the study, I will examine the macroprudential regulations and implementations in Turkey. Beforehand, I will provide the brief summary of the Turkish economic history starting from the crisis period in 2001. I will focus on two crucial periods of Turkey. I will consider 2001 to 2009, as a *success story* or the expansionary period of the 2008 crisis, and 2009 until today as a *breakdown phase*. First, we should underline the milestones of the Turkish economy to be able to explain better how and why Turkish economy began to use macroprudential tools.

From import substitution industrialization to export-oriented growth, and from fixed-exchange regime to managed-float regime, Turkey tried numerous economic policies and failed in some of these in the course of time. Every unsuccessful economic program shook the confidence in the economic policies and the crisis in 2001 occurred under this narrative. After 2001 crisis, the floating exchange rate regime was adopted, and the inflation targeting was the main feature of the monetary policy.

Post 2001 stabilization program consisted of budget control, re-capitalization of banking system and the steps towards the independence of Central Bank of Republic of Turkey (CBRT). Controlling the budget deficit was the main objective of the stabilization program. The crisis proved that massive budget deficit affected all the macroeconomic outcomes and finally twin deficit crisis hit the economy. In 1990s, the banks did not provide funds to the private sector and CBRT was manipulating the interest rate to meet the borrowing needs of government. Therefore, inflation targeting, budget control and using inflation targeting framework improved the economic performance of Turkey.

Growth rate increased within this period, but it did not last long. It began to decline from 2007 and crashed with the GFC. The decline in GDP between 2008 and 2009 was almost similar to 2001 crisis, and the recovery time was too short, as the average GDP growth of 2012-2014 declined to around 3%. (Gürkaynak, Kantur, Tas & Yildirim, 2015)

Figure 7: Annual GDP Growth Rate of Turkey



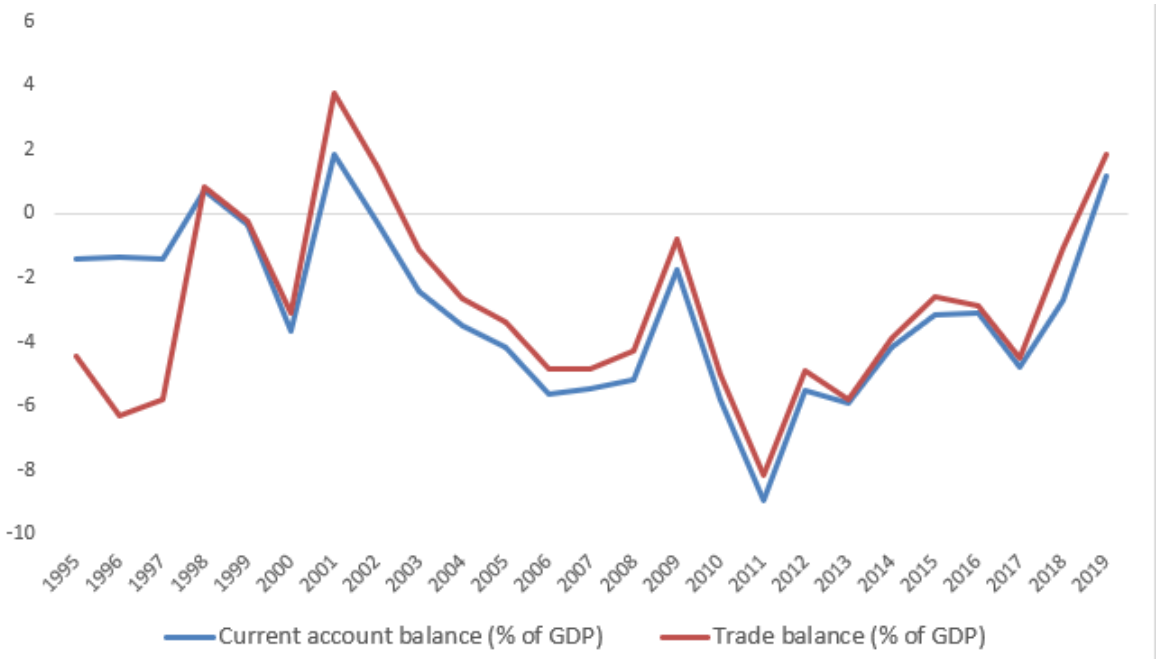
Source: Worldbank

There are two breakdown points in terms of current account deficit (CAD). The budget deficit was the main component of the CAD until the crisis of 2001 But, the correlation between budget deficit and the CAD became negative with the success of the stabilization program. However, the private leverage started to increase from 2006 and household debt augmented dramatically from 2% in 2002 to around 20% in 2013.

Therefore, CAD was not much more sustainable compared to twin deficit period, even if the budget was under the control.

The second breakdown point is shown in Figure 10. The trade balance deficit to GDP has converged to the current account balance to GDP, starting 2006 and those are increasing with positive correlation. We should underline that the CAD of 2009 is higher than the pre-2001 period. We should also note that 2009 crisis was a global crisis unlike 2001 crisis, and the shrinking external demand caused the decline in the exports.

Figure 8: Current Account Balance and Trade Balance to GDP / Turkey (%)



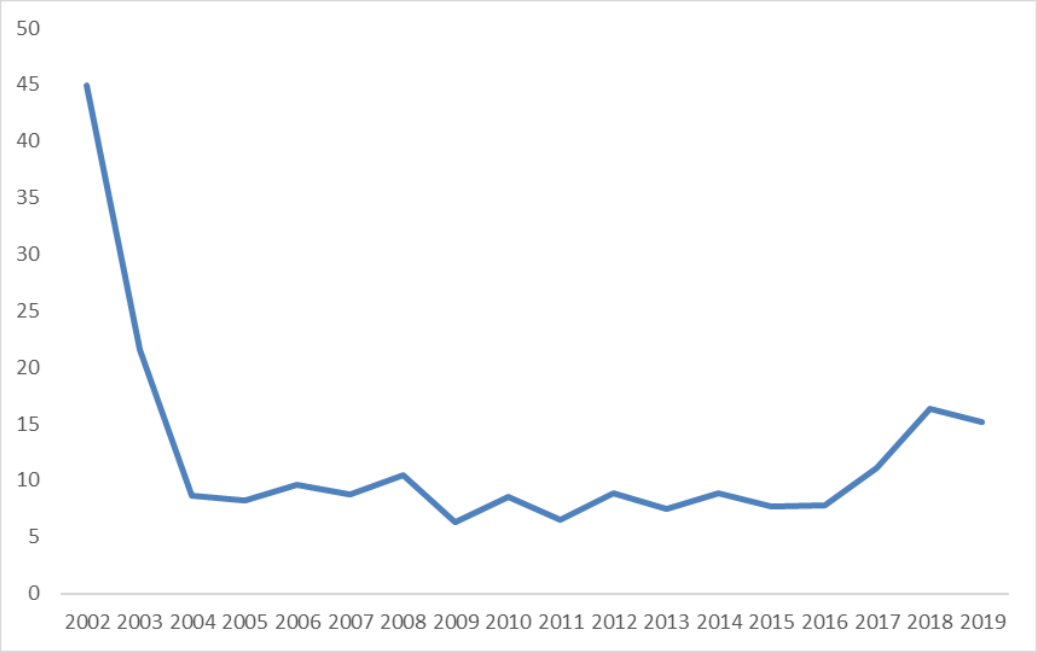
Source: Worldbank

One of the main concerns in the sharp increase in private leverage is that the identity of the debtors is unknown. There is lack of information about the debtor and the flow of funds. Therefore, we are unable to analyze if debtor companies have difficulty in repayment, how/which banks will be affected. These are the questions we should be worried about for the increase of private borrowing.

Monetary policy in this period should also be explained to understand how and why the macroprudential policies were implemented in Turkey. After 2001 crisis, CBRT gained its independency and inflation targeting framework was established. Implicit inflation targeting was implemented under the IMF stabilization program until 2006. As the program had multiple objectives, inflation targeting was not the only mission. Inflation targeting was implemented as a primary goal in 2006.

CBRT always mentions that inflation targeting was successful in this period. The inflation rate dropped to single digit from double-digit rates.

Figure 9: Inflation Rate / Turkey (%)

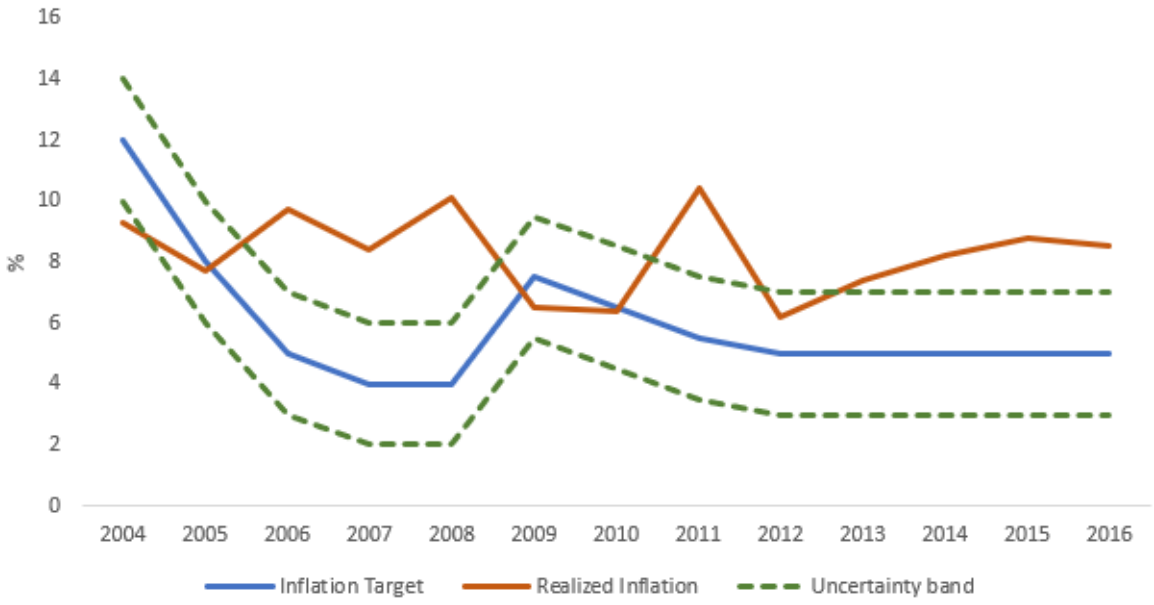


Source: Worldbank

However, the CBRT started to focus on many other issues in Turkish economy, such as growth rate, increase in loan volume and CAD, since 2010. Therefore, the textbook monetary applications of CBRT were no longer valid (Gurkaynak et al, 2015).

The monetary policies have differed since 2010. They started to use reserve requirements to control the increase in loan growth, and overnight rate to decrease risk ratio and interbank rate to tighten the back-door policy. We will elaborate these non-standard monetary policy tools in section 5.1. I would like to point out here that the realized inflation rate was constantly above the inflation target rate. It was even higher than the uncertainty band since 2010, due to manipulation of the policy rate with these kinds of unusual monetary tools, as shown in Figure 12.

Figure 10: Inflation Target – Realized Inflation / Turkey (%)



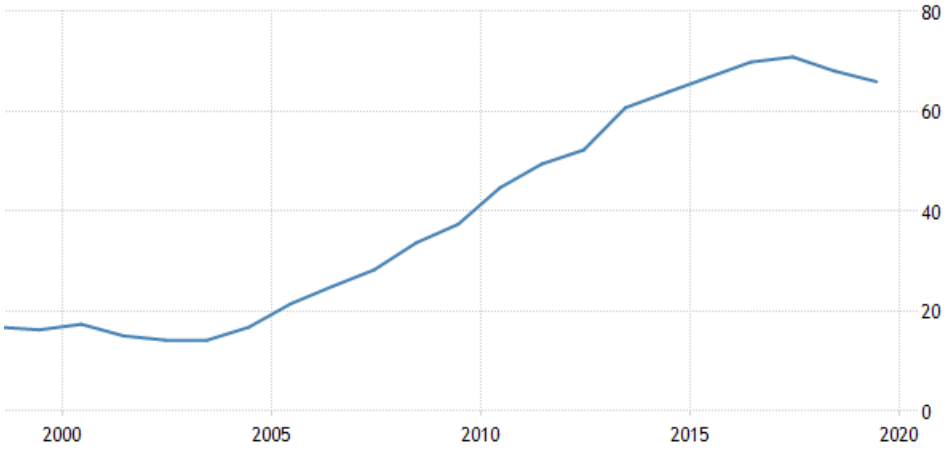
Source: CBRT

Also, policy rate was not functional in the given period due to the trials of the different monetary policy tools as mentioned before. For example, despite the fact that the policy rate remained constant, the inflation rate increased by 4% from 2010 to 2011. The noteworthy increase in policy rate occurred in 2014, due to the sharp increase in exchange rate when the political corruption news came out.

5.2 Background of the Macroprudential policy

The advanced economies began to apply low interest rate policy and the expansionary monetary policy after the GFC, which led to a massive amount of the capital flows toward developing economies. These capital flows were formed of especially short-term investments that led to financial volatility, which caused the real economic costs in developing countries. Turkey was the one of the important attraction centers among the developing countries in terms of capital flows in the late 2010. Massive capital flows caused the over-appreciation of TRY and increase of the loan growth. Even though the macroprudential policy was in focus after GFC, Turkey has had some experience since 2001. Turkish economy seemed to have a risky macroeconomic structure in early 2002. Therefore, the fiscal and monetary measures were applied to cope with financial fragility. Prudential policies of Turkey were mostly implemented throughout the banking sector. It was because the banks dominate the market as financial intermediary.

Figure 11: Private Credit to GDP Ratio / Turkey (%)

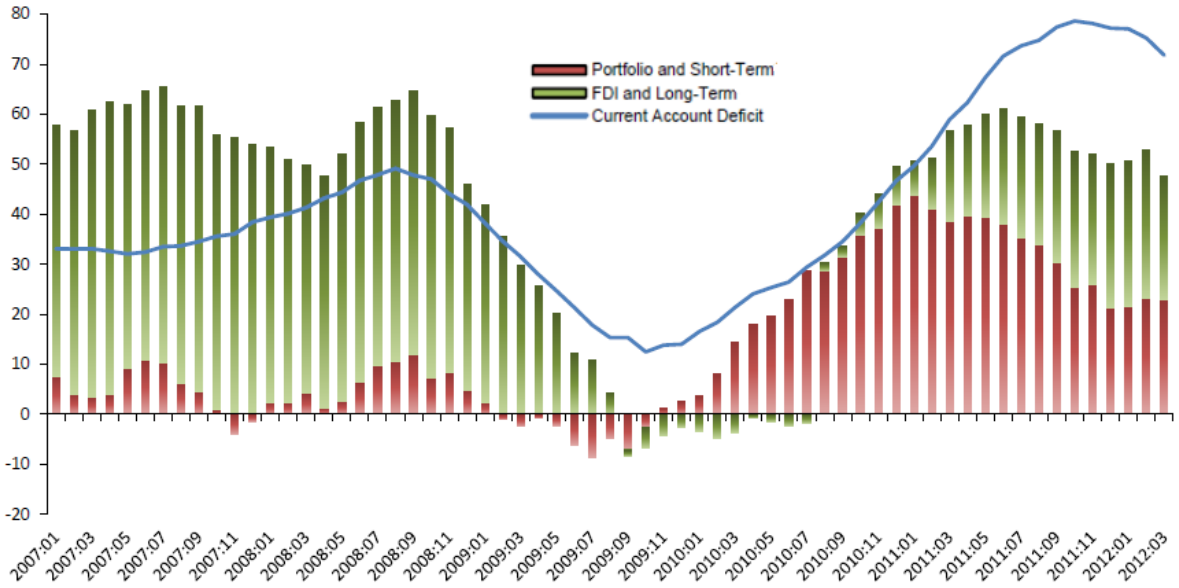


Source: Worldbank

Therefore, Banking Regulation and Supervision Agency (BRSA) was established in 1999, but it became operational in 2000. The aim of BRSA as an independent agency was to reform the banking sector and minimize the risks of banks through regulations. For instance, BRSA had determined the capital adequacy ratio and liquidity ratio of banks above the international standards to strengthen balance sheets of banks. Since BRSA is interested in individual health of banks, the nature and effects of this institution could be defined as micro-prudential.

Despite the micro-prudential measures, the capital flows from developed countries to developing countries increased due to expansionary monetary policies. Hence, the private credit to GDP ratio sharply rose up to 45% in 2010-2011, which also increased the growth rate and created an inflationist pressure. In addition, the financial instruments of banking sector deteriorated due to increase in loan volume and created systemic risk. Also, quick appreciation of TRY with high growth rate led to the overheated economy (Gurkaynak et al, 2015), (Kara, 2016).

Figure 12: Current Account Deficit Financing Sources of Turkey



Source: CBRT

In addition, the quality of the external borrowing began to deteriorate, starting from 2010. The risk of the *sudden stop* occurred, as the large portion of the capital inflows was in the form of short term-capital and portfolio. As shown in Figure 14, the main driver of the capital inflows consists of portfolio and short-term investments instead of FDI and long-term investments. As mentioned in previous sections, the risk of *sudden stop* is a crucial systemic risk for EMEs. The business cycles of Turkey do not differ from other EMEs in terms of financial fragility due to the net capital outflows in the period of bust. Turkey had experienced the crises due to massive capital outflows in 1994, 2001 and 2009. The main trigger of each crisis was the *sudden stop*, and the lack of the external financing, which led to further deepening of the crises.

Although the prompt policy response was required in 2010, due to increasing systemic risk in Turkey, timely response would be a crucial deciding factor in dealing with the crisis.

6.The Main Institutions and Tools of Macroprudential Policy in Turkey

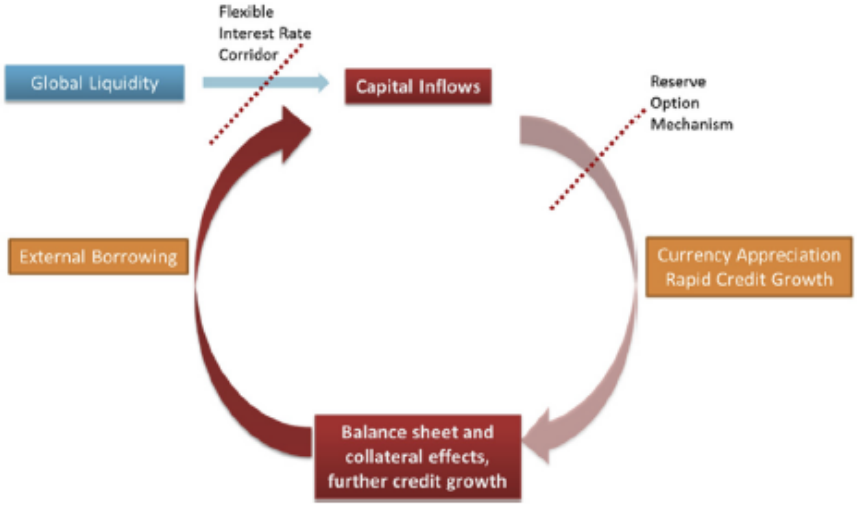
Turkish government had noticed that there was no responsible institution to implement the macroprudential policies in 2010. The content of the macroprudential policies was also not clear at that time. Therefore, defining the requirements and implementation of the policy took some time and created some challenges.

The issue was the negative externalities due to massive credit growth and there was an optimal policy to increase the related tax to eliminate this externality. However, the first institution that attempted to deal with this situation was CBRT, which did not have any direct policy tool. Therefore, CBRT used the available policy tool, which was to increase the cost of the credit growth via reserve requirement instead of directly increasing the price of issuing the credit.

The prevention of volatility of the capital flows became a supplementary objective of CBRT along with the inflation targeting. The new strategy was based on the amelioration of the quality of financing, decreasing the risk of the *sudden stop* and reducing exchange rate misalignments (Kara, 2015).

Figure 13: The Policy Objectives of CBRT

	Previous approach	New approach
Objectives	Price Stability	Price Stability Financial Stability
Policy tool(s)	Policy Rate	Policy Rate Interest Rate Corridor Reserve Req. Policy



Source: CBRT

We will review the tools used under macroprudential measures and their efficiencies in detail in section 6. However, as seen in the formal figure of CBRT, new tools designed by CBRT, such as *asymmetric interest rate corridor* and *reserve option mechanism* were a quick reaction due to the lack of the defined institutions to implement such policies. The aim was to improve the quality of external borrowing, controlling the currency mismatches and preventing excessive credit growth.

CBRT decided to use these tools to ensure financial stability. In the traditional approach of CBRT, inflation targeting was the only objective and policy rate was the only tool. Hence, different policy tools were needed to strengthen financial stability. Increasing policy rate to decrease the inflation rate might result in the appreciation of the domestic currency under a conventional inflation-targeting regime and this might

contravene the financial stability targets. Therefore, CBRT has diversified the tools of monetary policy via credit and exchange rate channels since 2010.

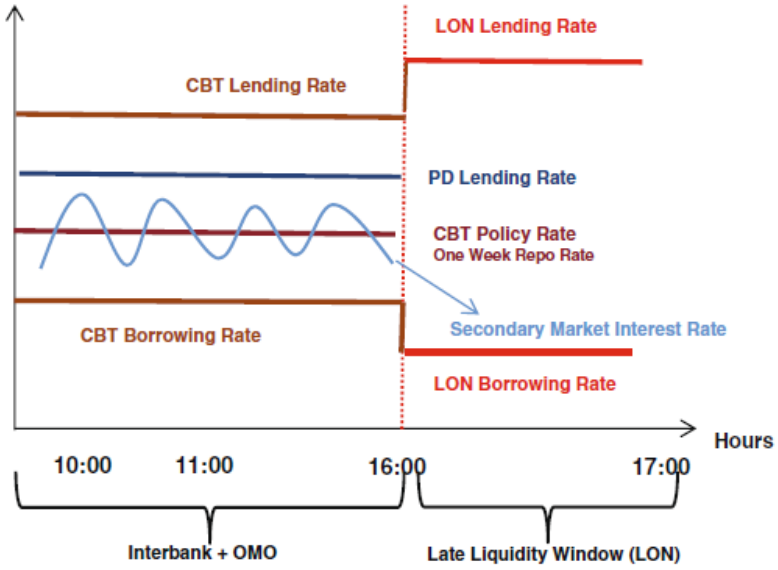
Firstly, I will examine the use of asymmetric interest rate corridor and reserve option mechanism in section 6.1 and 6.2 respectively. Secondly, I will highlight the institutional structure of Turkey in terms of macroprudential approach in section 6.3. Finally, I will represent the use of macroprudential tools containing excessive credit growth and increasing the quality of external borrowing in section 6.4 and 6.5 respectively.

6.1 Asymmetric Interest Rate Corridor

CBRT can use the interest rate corridor as a macroprudential policy tool to affect the market interest rate and its liquidity in the interbank money market. Also, it can lend or borrow at an overnight rate. The space between overnight lending rate and borrowing rate is called as an *interest rate corridor* (Kara, 2013).

Monetary Policy Committee (MPC) defines *policy rate* as one-week repo rate, which should be within interest rate corridor. The effects of the new interest rate corridor can be observed on the liquidity channel, credit channel and exchange rate channel.

Figure 14: Operational Framework of Interest Rate Corridor



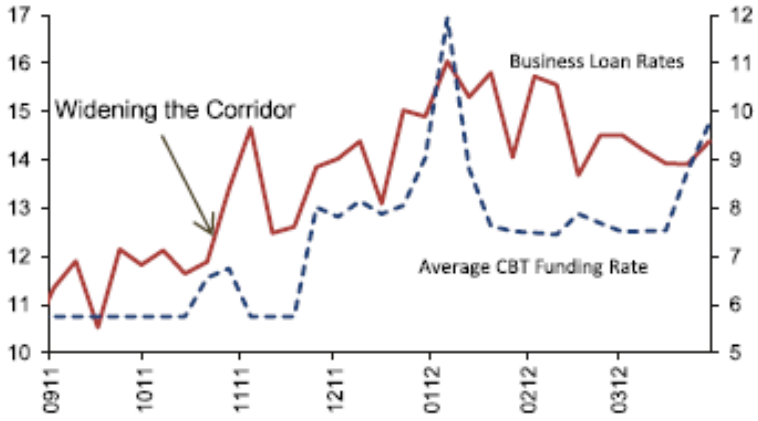
Source: Kara, 2013

In the traditional monetary policy system, the policy rate was announced by MPC on a monthly basis and the fluctuation of short-term money market rate was almost negligible. This means that CBRT kept the policy rate steady. The gap between short-term money market rates and the expected market interest rates could be considered as negligible. CBRT was unable to change the rates until next month's MPC meeting. However, in the new system, the overnight rate could be changed inside the interest rate corridor. It might be close to lower or higher bound based on the change of the market interest rates on a daily or weekly basis by adjusting the quantity of funds in the one-week repo auctions (Kara, 2013).

So, the daily adjustments became possible for the liquidity operations as a timely response to the volatility of global risk appetite. Briefly, the new framework aimed to differentiate short money market rates from interbank interest rate when needed.

On the credit channel, the aim of the new corridor system was to control the marginal cost of credit supply by manipulating the policy rate. Earlier, CBRT had a single policy rate, but now multiple rates could affect the yield curve. The variance of the policy rate is used as control variable as policy mix of the liquidity channel. Başçı Kara (2011), support that corridor system is a unique opportunity for CBRT to control massive credit increase or decrease. They claimed that the uncertainty also could be used to control credit supply. For example, if the uncertainty rises by the increase of the short-term funding rate through interest rate corridor, the duration and amount of this tightening will be unknown. Therefore, the business loan rates will consequently increase as well. The higher bound of the corridor is important for the banks when they estimate interest rate risk. Figure 17 supports their suggestion for the given period with regard to the increase in loan rates.

Figure 15:Business Loan Rate / Average CBT Funding Rate



Source: Kara, 2013

However, some scholars (Akkaya & Gurkaynak, 2012) did not agree that the interest rate corridor system is the optimal policy to cope with the credit supply. If the issue is nightly external capital flows and its risk externality, the best policy option here is direct taxation of external capital flows. Although the implementation of this taxation is still an open debate, Shin (2010) suggests that the limit for the leverage ratio of the foreign exchange derivatives provided a successful result. Also, the effects of the monetary tools will not be different for both domestic market and external markets. Therefore, raising the variance and increasing the risk will deter the foreign investor as well as the domestic investors. Besides, the negative outcomes of the uncertainty shocks are studied and analyzed by (Basu & Bundick, 2012), (Akkaya, 2014), and (Villaverde & Guerrón-Quintana, 2020).

Overall, the main conclusion in the literature is that the uncertainty created by CBRT with the interest rate corridor not only affects the external flows, but also has almost the same impact on the domestic market.

On the exchange rate channel, the new corridor system can also control the appreciation or depreciation of the domestic currency. Short-term interest rates can be changed on a daily basis by the overnight rates to balance the volatility of the capital outflows. CBRT can cope with the depreciation of Turkish Lira by increasing the upper bound of the corridor in times of the capital outflows and the downward corridor rates will ease the control of the massive capital inflows and appreciation of domestic currency. (Kara, 2013)

The short-term interest rates move together with the announced policy rates. However, this close relationship was over in 2010 with the new corridor system. The policy rate announced on a monthly basis by MPC became meaningless and the targeting of the policy rate was no longer a valid objective for CBRT.

Besides, the volatility in the short-term interest rate is closely correlated with the changes in the exchange rates. Therefore, we can presume that the tools of

intervention in exchange rate had changed and the MPC decisions didn't cover it. The intervention in fluctuation of the exchange rates was made by the MPC as committee's decisions, starting from 2006. This was a progressive move in terms of the quality of the institutions as the committee instead of a unit or a person made the decisions about exchange rate policy. However, we regressed to the system in 2006 with the new corridor system, and it can be considered as unexpected side effect of the interest rate corridor system. (Akkaya & Gurkaynak, 2012)

Overall, there are different opinions on the success of the new interest rate corridor system. The uncertainty and the flexibility seemed as an advantage to control the credit supply and the exchange rate appreciation or depreciation by some scholars. (Başçı, 2012 and Kara, 2013). Some scholars (Akkaya & Gurkaynak, 2012) support that the new system was not as transparent as the system in 2006. Therefore, the credibility of policy rate is no longer valid due the huge gap between the announced policy rate and realized policy rate.

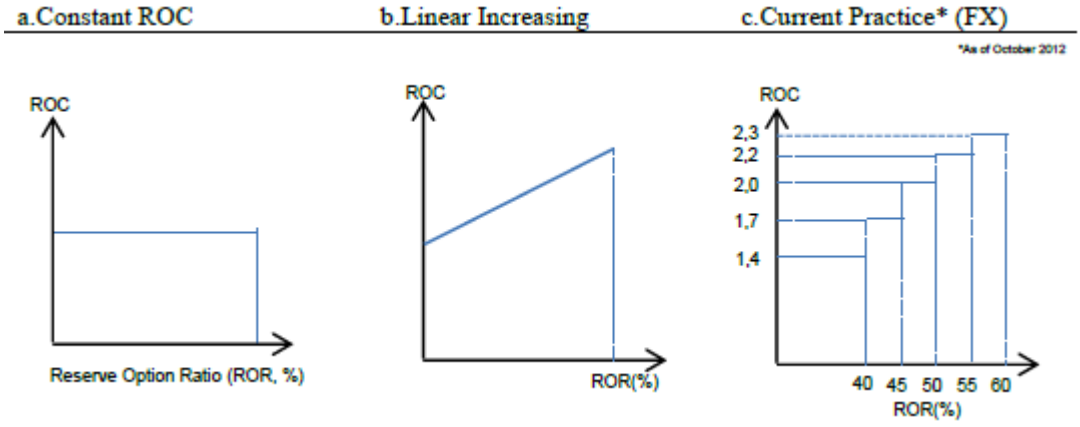
6.2 Reserve Option Mechanism

CBRT used the reserve requirement (RR) ratio since 2008-09 to strengthen the banks' health indicators and meet liabilities in case of sudden withdrawals. CBRT defines a minimum amount of reserves every two weeks that banks must hold. CBRT increased the reserve requirements by 10% in several steps in mid-2010, to cope with excessive credit growth along with the asymmetric interest rate corridor. Also, they took some measures, increasing the effectiveness of the reserve requirements after 2010. For example, the remuneration to RR was cut; the maturities were differentiated, promoting to lengthen the maturities in deposits. Finally, CBRT designed a new framework, which was called *Reserve Option Mechanism* (ROM).

ROM allowed banks to hold their TL reserve requirement in a certain portion of FX or gold. The portion of the reserve requirement in FX or gold is called as Reserve Option Coefficient (ROC). For example, if ROC is 3, banks must keep 3 TL worth of FX or gold for 1 TL RR as per ROM usage rule. The following example will help to comprehend the process. Assume that banks must maintain a total of 100 TL reserve requirements for their TL liabilities and ROM allows the banks to maintain their TL RR in FX up to 90%, of which ROC will be equal to 1. Let's further assume that USD/TL becomes 1.8, the bank will hold USD 50 (90/1.8), which is 90 TL equivalent of USD plus 10 TL to make it 100 TL of total RR. (Alper, Binici, Demiralp, Kara & Ozlu, 2014).

As per CBRT design, ROC rises up in line with the reserve option, but the facility is classified into tranches and ROC remains constant in each tranche in practice, as seen in Figure 18.

Figure 16: Examples of ROC Adjustments



Source: Kara, et al., 2013

Therefore, the banks may not prefer to use ROM fully (when ROR is 60%), depending on the current situation, because the total amount of RR in TL will be higher compared to other tranches.

The aim of the reserve option mechanism was to smoothen the fluctuation in the exchange rate, strengthen the financial stability and constrain the excessive credit growth. Considering these targets, ROM might be an indirect tool to control the banks' balance sheet. Reserve requirement is a burden on the banks' overall liabilities, regardless of their credit growth. The main objective of this policy was to levy more tax on the banks that have a higher liability, but not necessarily higher credits. Therefore, this encouraged banks to borrow with off-balance sheet instruments, i.e. foreign currency swap. If banks are able to substitute their liabilities with FX swaps, the policy will not change behavior of banks to provide the credit. It will only change their assets or liabilities ratio and will not constrain the credit growth. (Akkaya & Gurkaynak, 2012)

Overall, both ROM and asymmetric interest rate corridor were the quick intervention measures of CBRT to sustain the financial stability after 2008 crisis. Comparing the two policies, while asymmetric interest rate corridor had a direct effect on credit, exchange rate and liquidity channel, ROM decreases the need for asymmetric interest rate corridor with the borrowing with off-balance sheet items.

6.3 The Role of CBRT, BRSA and FSC

Establishing different institutions and structures were discussed in Turkey as well as many other countries in terms of macroprudential measures. The Bank for International Settlements (BIS) had Central Bank Governance Forum, which addressed the issue of *"Central Bank Governance and Financial Stability"* in the Central Bank Governance and Financial Stability Report, 2011.

They underlined four options. First, the kind of arrangements needed when the responsibility of implementing macroprudential policies is given to different organizations. Second, they discussed to form a new managing authority of macroprudential policy. Third, they examined giving the responsibility of implementing macroprudential policy to central banks but micro-prudential policy to another institution. Fourth, giving all responsibility of the micro and macroprudential measures to central banks. Besides, the necessity of the legal arrangement was clear, regardless of the options. While the tools and institutions of price stability were so precise, there was no clear definition of financial stability.

Turkey constituted a Financial Stability Committee (FSC) in 2011. FSC consisted of CBRT, BRSA, Capital Markets Board, and Saving Deposit Insurance Fund, which were chaired by Deputy Prime Minister who was in charge of economy. This Committee was formed on the basis of the additional fourth article of *the Decree Law on the Organization and Duties of the Ministry of Economy*.

The additional article was very short, consisting of only the duties of the Committee and members of the Committee. However, the following questions were not answered:

- Would FSC be a decision maker? If so, would it be independent and publicly known?
- If FSC would be an advisor and not the policymaker, what would happen if the responsible institution ignores its recommendations? Would there be any consequences?
- Would the responsible institution publicly announce why it ignored the recommendations?

Although these are not easy questions for any committee, FSC would be required to respond to these for building a solid structure of financial stability. (Ozatay, 2012)

FSC doesn't have its own tools as a separate organization; each institution involved could develop or use their own organizational tools. FSC made policy recommendations and its main duties were assessing the systemic risk and identifying the policy tools to ensure financial stability.

As discussed in previous sections 6.1 and 6.2, CBRT had stepped in quickly despite the lack of the optimal policy tools. Therefore, the efficiency of the macroprudential policies implemented by CBRT was limited in comparison to the macroprudential measures implemented in collaboration with FSC and BRSA (Kara, 2016). The main aim of FSC was to contain excessive credit growth and improve the quality of financing.

6.4 The Tools for Excessive Credit Growth

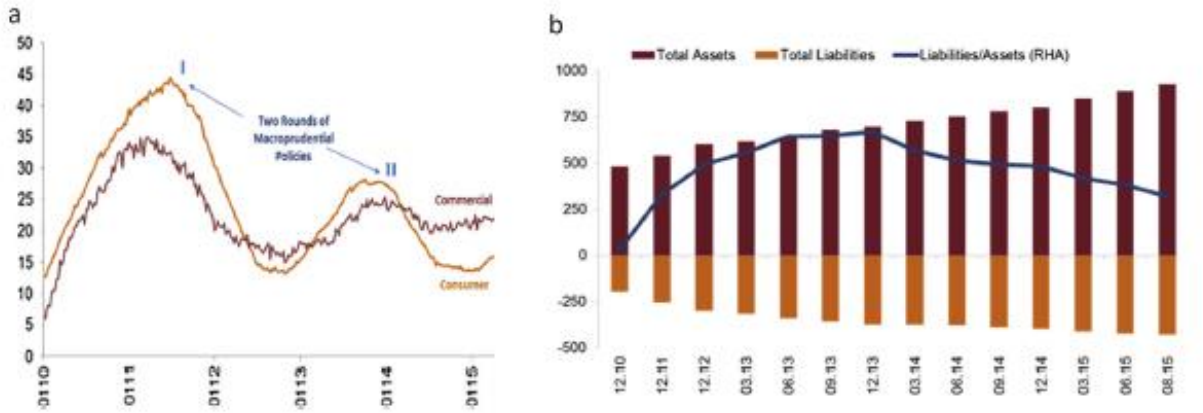
The linkage between credit growth and the systemic risk is a well-known fact, which is also discussed in the economic literature and described in previous sections. The negative impact of the credit growth is particularly higher in EMEs, such as Turkey due to sudden withdrawal of capital. Therefore, containing the credit growth was the one of top priorities of FSC and BRSA. The annual loan growth to GDP increased up to 45% in the late 2010. Thus, some additional measures were applied by BRSA with the recommendations of FSC.

The restrictions and limit to credit growth were implemented in two phases. First package was in mid-2010 and second one became valid in early 2013. First, the minimum payment for credit cards was increased reducing the debt ratio. The credit card limits were restricted by personal income level to reduce NPLs in bank accounts

and control the credit supply. In credit demand channel, the installment period was limited to decrease the household indebtedness. For consumer loans, LTV caps were applied on housing and vehicle loans, along with the higher risk weight and general provisions in 2010-11. Also, maturity restrictions were implemented for consumer loans except housing loans to limit the credit demand and reduce NPLs. (Uysal, 2017, Kara, 2016)

With the second package, they tightened the caps, limits and higher risk weights on credit cards and consumer loans in early 2013. Figure 19 (Kara, 2016) below supports that these measures showed a significant decrease in credit growth in each package phase. The annual change in credit growth decreased from 45% to around 15% with first package in 2011, and the downward trend continued with second package in 2013. In addition, the household indebtedness ratio also had a downward trend in the given period.

Figure 17: a) Annual Credit Growth (% change) b) Household Assets and Liabilities (Billion, TRY)

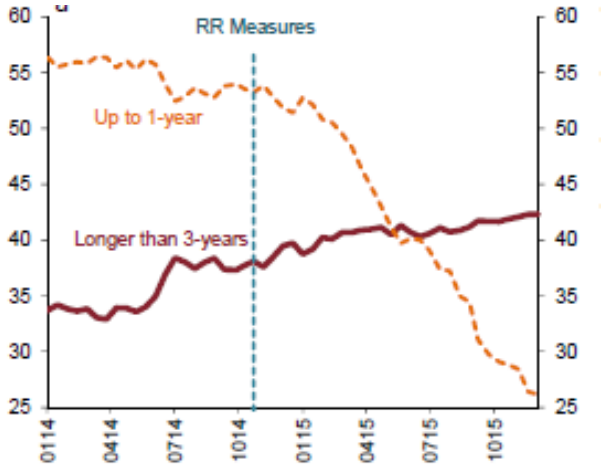


Source: Kara,2016

6.5 The Tools for Quality of Financing

Another important target of the FSC was to increase the resilience the financial system through improving the quality of financing. As mentioned in previous sections, containing the risks of "sudden stop" is crucial to ensuring a solid financial system. Therefore, certain measures were applied for the banks' liabilities to control the current account deficit. First, RR policies were implemented by CBRT in early 2011, as discussed in section 6.2. But, the main impact of RR policies was cyclical instead of changes on the liability side. In this regard, the aim was to increase the portion of FDI over short-term portfolio, TRY over FX liabilities and core liabilities over non-core liabilities. Considering these targets, longer maturity of external borrowing and more domestic currency in our financial markets could absorb the negative outcomes of systemic risks for Turkish economy. The first step of CBRT for liability side was taken in 2014-15, with increase in RR ratios from 13% to 20% for short-term investments. Consequently, the ratio of short-term liabilities over total liabilities in external financing decreased from 53% to 28% in 2015.

Figure 18: Maturity Structure of Non-core Bank Liability

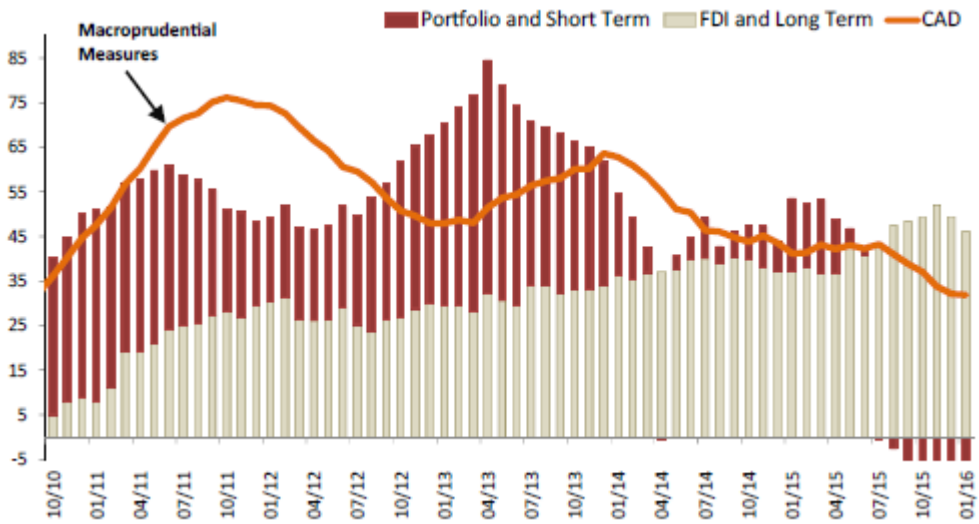


Source: Kara,2016

In terms of bank's balance sheet, increasing RR ratios seemed to slightly improve the maturity structure of bank's liabilities. On the other hand, macroeconomic perspective of the macroprudential measures is equally important. Increasing quality of the external financing, which means more FDI and long-term inflows instead of short-term capital inflows, was the one of the main goals of macroprudential policies. Kara, 2016 and Başçı, 2012 suggested that the portion of FDI markedly increased in current account balance and the current account deficit slightly improved since the inception of the implementation of the macroprudential policies.

Although the below figure supports their argument, Fed tapering process and decrease in commodity prices in 2013 would also contribute to this improvement in current account balance.

Figure 20: Current Account Deficit and Net Capital Inflows, (Billion USD)



Source: CBRT

Regarding the cyclical purposes, Başçı and certain CBRT scholars support that macroprudential policies might have had some positive impact on credit channel. The effect of the capital inflows on credit growth and GDP might have decreased with the macroprudential policies. However, more quantitative research is needed to be able to observe the exact impact of macroprudential measures on cyclical purposes.

CONCLUSION

Throughout this thesis, we have examined the macroprudential policies in relation with the financial crises. Although Crockett (2000) and Borio (2003) developed the theoretical approach behind macroprudential adjustments in late 2000, the implementation began after 2008 financial crisis. The devastating effect of GFC led the academics and experts to research new policy mix, which is called as *macroprudential policies*. The rationale behind the macroprudential regulation is twofold. First is based on eliminating the systemic risk created by negative externalities, which can be classified as strategic complementarities, pecuniary externalities and interconnectedness. Second aims to prevent the negative outcomes of the sudden stop for EMEs.

In this regard, the toolkits and implementation of macroprudential adjustments differed from the microprudential and monetary policies. While micro-prudential measures are focused on individual health of the financial institutions, macroprudential measures identify the cyclical risks in whole financial system and develop their toolkits accordingly. The main aim of the monetary policies is to stabilize the inflation rate as well as exchange rate in terms of price stability. Even if the macroprudential policies and monetary policies were complementary, their objectives and tools differ.

In the aftermath of 2008 crisis, U.S. Federal Reserve and other central banks in developed countries applied quantitative easing program by releasing the massive amount of liquidity to the market to rebalance their economy. Consequently, the different macroprudential policies were implemented in various countries. In this thesis, we covered Israel, China, Russia and Germany to analyze how the economies differentiate their policy toolkits according their current economic structure.

Israel's household debt of GDP was much lower than many advanced economies during GFC. Also, five banks dominated the mortgage market and the shadow banking system was limited. However, their economy was hit by the sharp increase in housing prices due to low global interest rates. So they implemented some macroprudential measures, such as capital requirements and LTV caps along with the monetary policy tools. The housing prices increased, and the mortgage market also expanded in China between 2008-2010, due to excessive capital inflows and restrictions on capital outflows. They used the capital adequacy ratio, reserve requirements, window guidance, and supervisory pressure in dealing with financial instability. On the other hand, the Russian economy was also affected by the volatility of oil prices and over-borrowing in 2008. They took macroprudential measures similar to Israel and China. However, Germany did not initially apply the demand-side tools, such as LTV caps and DTI. They preferred to use systemic risk capital buffer and sectoral reserve requirement to target SIFIs.

In Section 6 and 5, the macroprudential policy in Turkey was covered in detail as an example of an EME. The development in Turkish economy can be divided to two phases viz., boom period (2001 to 2007) and bust period (2007 till today). Scholars have noticed this cyclical behavior of Turkish economy. The experts and government had taken several measures under macroprudential policies in early 2010.

While in the traditional approach of CBRT, inflation targeting was the only objective and the policy rate was the only tool, the new strategy was based on the amelioration of the quality of financing, decreasing the risk of *sudden stop* and reducing exchange rate misalignments. In 2010, CBRT began to use an asymmetric interest rate corridor system to control the credit supply. An asymmetric interest rate corridor system could affect the financial system through the liquidity channel, credit channel and the exchange rate channel. However, the efficiency of the new corridor system is controversial. Reserve Option Mechanism (ROM) was also implemented by CBRT in 2010, increasing the reserve requirements of banks to strengthen the bank's balance

sheet in case of sudden withdrawal of capital. The aim of the reserve option mechanism was to balance exchange rate and constrain the excessive credit growth. However, ROM promotes the banks to keep off-balance sheet items and not necessarily restrict the banks, which have a higher credit supply.

On the other hand, direct credit restrictions were applied with the establishment of FSC in 2011. BRSA in collaboration with FCS took severe measures to control excessive credit and they generally managed to control the credit growth with much more direct tools as compared to the ones used by CBRT. However, the institutional structure of FSC is still an ongoing debate.

Overall, Turkey's involvement in macroprudential policy affirms that there is no single formula for the macroprudential arrangements. The structure and primary attributes matter for decision making and use of specific instruments. The efficiency of the implemented policies also varies. This study supports that macroprudential policy could be useful in terms of administrative measures to ensure financial stability. However, the institutional form of FSC and its duties should be clearly framed to increase the efficiency of the policies.

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