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DOKTORA TEZİ

Meltem TOPALOĞLU ÖNEN



T.C.

ANKARA YILDIRIM BEYAZIT ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ

THE ROLE OF THE CREDIT CHANNEL IN MONETARY POLICY
TRANSMISSION:
A SURVEY BASED ANALYSIS OF TURKEY

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Prof. Dr. Erdal Tanas Karagöl
DANIŞMAN

ANKARA 2019

ONAY SAYFASI

Meltem TOPALOĞLU ÖNEN tarafından hazırlanan “The Role of the Credit Channel in Monetary Policy Transmission: A Survey Based Analysis of Turkey” adlı tez çalışması aşağıdaki jüri tarafından oy birliği / oy çokluğu ile Ankara Yıldırım Beyazıt Üniversitesi Sosyal Bilimler Enstitüsü İktisat Anabilim Dalı’nda Doktora tezi olarak kabul edilmiştir.

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Tez Savunma Tarihi:

Ankara Yıldırım Beyazıt Üniversitesi Sosyal Bilimler Enstitüsü İktisat Anabilim Dalı’nda Doktora tezi olması için şartları yerine getirdiğini onaylıyorum.

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To my family and my husband,



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ABSTRACT

The Role of the Credit Channel in Monetary Policy Transmission: A Survey Based Analysis of Turkey

The amount of loans granted by the financial sector to the real sector can be accelerated beyond the implications of the classical interest channel as a result of external financing premium. This effect is called "credit channel of monetary policy" in the central banking literature. This study analyses the credit channel of monetary policy in Turkey and its effect on inflation and output for the period of 2004Q3-2016Q4. In the study, to identify the sub components of credit channel, Bank Loans Tendency Survey (BLTS) of the Central Bank of the Republic of Turkey on quarterly frequency have benefited. The credit channel is decomposed as the borrower's balance sheet channel and the bank lending channel using the methodology in Ciccarelli et al. (2015). Identification of the sub channels and through which mechanism monetary policy is transferred to financial intermediation and to the real economic activity will contribute to the policy implementation process. The results of the study would be beneficial to determine the appropriate policy mix.

The results of the study of Ciccarelli et al. (2015) imply that credit channel amplifies the impact of monetary policy on production and price level. In Euro Area, all sub channels of credit channel seem important whereas the bank lending channel is more powerful for corporate loans and demand channel is more effective for mortgage loans. In the US, firms' balance sheet is effective in transmission of monetary policy to real economic activity, however, bank lending channel seems ineffective.

In Turkey, credit supply channel is more effective than credit demand channel in terms of monetary policy transmission mechanism. Moreover, monetary policy is transmitted to real activity via firm's balance sheet channel. When monetary policy, real economy and credit developments are considered for Turkey, the result of the study show that borrower's balance sheet channel should be included into the analysis of monetary policy transmission mechanism.

Keywords: Bank lending channel, Borrower's balance-sheet channel, Credit channel, Credit demand, Credit supply, Monetary policy.

ÖZET

Para Politikası Aktarımında Kredi Kanalının Rolü: Türkiye için Ankete Dayalı Bir Analiz

Finansal sektörün reel sektöre verdiği kredilerin miktarı, dış finansman primi neticesinde klasik faiz kanalının yarattığı etkilerin ötesinde olabilir. Bu etki, merkez bankacılığı literatüründe "para politikasının kredi kanalı" olarak adlandırılmaktadır. Bu çalışma, Türkiye'deki para politikasının kredi kanalının enflasyon ve çıktı üzerindeki etkisini 2004Ç3-2016Ç4 dönemini kapsayacak şekilde analiz etmektedir. Çalışmada, kredi kanalının alt bileşenlerini belirlemek için, Türkiye Cumhuriyet Merkez Bankası'nın üç ayda bir yayımladığı Banka Kredileri Eğilim Anketi'nden faydalanılmıştır. Kredi kanalı, borçlu bilanço kanalı ve borçlu bilanço kanalı olarak Ciccarelli vd. (2015) metodolojisi kullanılarak ayrıştırılır. Para politikasının finansal aracılığa ve reel ekonomik faaliyete aktarıldığı alt kanalların ve mekanizmaların tanımlanması politika uygulama sürecine katkıda bulunacaktır. Çalışmanın sonuçları uygun politika uygulamalarını belirlemede faydalı olacaktır.

Ciccarelli vd. (2015), para politikasının üretim ve fiyat seviyesi üzerindeki etkisini kredi kanalının artırdığını göstermektedir. Euro Bölgesi'nde, kredi kanalının tüm alt kanalları önemli görünmekte olup, banka borç verme kanalı firma kredileri için daha güçlü, talep kanalı ise konut kredileri için daha etkilidir. ABD'de, firma bilanço kanalı para politikasının reel iktisadi faaliyete geçişinde etkili olmakla birlikte, banka borç verme kanalı etkisiz görünmektedir.

Türkiye'de kredi arz kanalı, para politikası aktarım mekanizması açısından kredi talebi kanalından daha etkilidir. Ayrıca, para politikası, firmanın bilanço kanalı aracılığıyla reel ekonomiyeye aktarılmaktadır. Çalışmanın sonuçları, Türkiye'de para politikası, reel ekonomi ve kredi gelişmeleri göz önüne alındığında, borçlu bilanço kanalının para politikası aktarım mekanizması analizine dahil edilmesi gerektiğini göstermektedir.

Anahtar Kelimeler: Banka borç verme kanalı, Borçlu bilanço kanalı, Kredi kanalı, Kredi talebi, Kredi arzı, Para politikası

ABBREVIATIONS

- BLS : Bank Lending Survey of Euro Area
BLTS : Bank Loans Tendency Survey of Turkey
BRSA : Banking Regulation and Supervision Agency
CBRT : Central Bank of the Republic of Turkey
SLOS : Senior Loan Officer Opinion Survey



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CHAPTER 1: INTRODUCTION

1.1 Introduction

Monetary policy affects economic activity and the price level through various channels. In the literature, these channels are examined continuously by policymakers and researchers to identify which channel works more efficiently. There are theoretical and empirical studies to test the relevance or impact of the channels. The channels in question are divided into two main groups as traditional interest rate channel and credit channel.

Taylor (1995) claims that about the transmission mechanism of monetary policy to real economic variables, the focus was given to financial market prices, which are short-term interest rates, bond yields, exchange rates, financial market quantities which can be exemplified as the money supply, bank credit, the supply of government bonds. Although the quantities are essential, due to measurement and/or identification problems, researchers turned mostly their attention to prices side. According to Bernanke and Gertler (1995), the credit channel is not a separate one from the interest rate channel. They state that external finance premium is a result of financial imperfection in the market, and endogenous changes in external finance premium is an accelerator mechanism of the monetary policy according to the credit channel. Via the bank lending channel and balance sheet channel, monetary policy affects the external finance premium. But, the identification of these two channels has not been clear yet.

The credit channel of monetary policy can be influential on real economic activity via credit supply and demand conditions. Within this framework, in the literature, the bank lending channel and borrower's balance sheet channel are claimed to be two main transmission mechanisms of the credit channel of monetary policy. However, the identification of these sub-channels is difficult since they are mostly unobserved and there exist endogeneity problems. For example, when policy rates are decreased, the balance sheet of banks are recovered (via asset valuation) or capital liabilities become non-binding; as a result, the tendency of banks to give

credit gets stronger. On the other hand, similarly, borrowing constraints of the firm or consumers loosen and credit demand also increases. For that reason, after monetary policy loosening, increased financial intermediation activities may be a result of increased credit supply of banks or increased credit demand of firms or households.

The aim of this study is to analyze the sub-channels of the credit channel for Turkey and search which one is more effective on real economic activity and inflation. Since Turkey is a developing economy, the search to demonstrate the sub-channels of the credit channel, Bank Loans Tendency Survey (BLTS) conducted by the Central Bank of the Republic of Turkey (CBRT) is used. In BLTS, banks are asked their opinions about loan standards, loan terms and conditions as well as loan demand. Furthermore, banks answer how each of the factors affecting the credit standards contributes. Within this framework, using the methodology in Ciccarelli et al. (2015), factors affecting the loan standards are classified to construct the indicators of bank lending channel and borrower's balance sheet channel. It is the first and only study which studies the monetary policy transmission mechanism study in Turkey utilizing Bank Loans Tendency Survey data and decomposes the credit channel into its sub-channels.

1.2 Research Questions

In this study, the first research question answered is that, in Turkey, whether monetary policy affects the real economic activity and the price level through the credit channel or not. If there is a significant effect, the magnitude of the change in the real economic activity and the price level is vital in respect to monetary policy shock. If there exist signs of the impact of monetary policy on actual economic activity and on the price level via the credit channel, then the research moves one step further.

After the broad credit channel is analyzed and the impact of monetary policy via a broad credit channel is examined, the main point is the identification of the sub-channels of credit channel. In the literature, it is a well-accepted issue that the decomposition of the credit channel is claimed to be a hard issue. The underlying reason is that although quantifying the credit channel is difficult, the identification of its sub-channels is further hard. However, this study

aims to answer the following question: in Turkey, could credit channel of monetary policy be identified and could the sub-channels of credit channel be differentiated?

Once the broad credit channel is decomposed into the bank lending channel and borrower balance sheet channel, it is wondered that which one is relatively important. It gives an idea about how should the policymakers react to the developments in the real sector and/or the credit market. The amplification effect of the monetary policy differs according to which channel works more actively. In that manner, the questions that are needed to be answered are as following: Which sub channel of the credit channel of monetary policy is relatively more effective on the real economic activity, and which sub channel of the credit channel of monetary policy is relatively more effective on the price level?

In the credit market, non-financial firm loans have the highest share, thus they are believed to be the most effective loans in the credit market in Turkey. However, from the experience of the global financial crisis, we know that mortgage loans are also crucial for both the banking sector and the real sector due to linkages between the financial system and the production side. From time to time, the composition of the loan realizations may change slightly in Turkey but when the shares of the loan types are examined historically, loans to non-financial firms has the highest share in Turkey, and among the consumer loans, mortgage loans and personal loans has the highest shares. Considering the different shares of loans in the economy, the next questions that should be examined is that how the effectiveness of monetary policy via the broad credit channel differs according to loan type, and whether the relative importance of sub-channels depend on the loan type, i.e. consumer or firms, or not.

1.3 The Structure of the Thesis

In this study, to quantify the broad credit channel, the bank lending channel and borrower's balance sheet channel, the Bank Loans Tendency Survey conducted by the CBRT is utilized. The second chapter studies the details of the Bank Loans Tendency Survey (BLTS). It explains how credit standards and credit demand evolved historically. Furthermore, the factors affecting the credit standards and loan demand are explained in detail. The credit standards and

the factors effective on credit standards is crucial for this study. The credit standards measure is utilized as a measure of loan supply or in other words as the broad credit channel. More importantly, the factors affecting the credit standards are quantified as measures of bank lending channel and borrower's balance sheet channel.

In the third chapter, the related literature is analyzed concerning the different transmission channels of monetary policy.

The fourth chapter elaborates on the data gathered from the BLTS, identification methods of the sub-channels of the credit channel. Furthermore, it gives information regarding the Bayesian VAR methodology and the model used in the study.

The fifth chapter states the estimation results. The estimation is conducted via the BVAR method and impulse response functions of macro-economic variables and credit variables are examined.

The sixth chapter summarizes the literature, the data and methodology and the estimation results. Moreover, the results are re-considered for policy implementation. Furthermore, future studies are discussed. The results and implications of this study are important for both policymakers and researchers. It is essential for both groups to know how the transmission mechanism of monetary policy operates, through which channel it works more efficiently and what the results of monetary policy are on macro-economic variables.

CHAPTER 2: BANK LOANS TENDENCY SURVEY

2.1 Introduction

Changes in the credit volume is a result of not only the changes in interest rates but also the change of standards and demand respectively. Observed values of loan volume and loan rates are a consequence of the changes in supply and demand factors that makes it challenging to understand which one is more effective on the observed values. Therefore, it is important to differentiate the supply-side and demand-side conditions on the observed loan volume. However, decomposition of loan demand and loan supply is difficult. Bank Loans Tendency Survey (BLTS) is a beneficial source to understand and analyze the demand and supply side of the observed loan values.

BLTS which is conducted by the CBRT, aims to monitor the tendencies of bank loans in terms of supply, demand, and the factors and conditions affecting the supply and demand of loans. It is important to monitor the tendencies of bank loans due to their significance on the growth of the economy. BLTS monitors non-financial firms' and consumer loans quarterly starting from the July-September 2004 and it is publicly released on the CBRT web site. The purpose of the study is claimed as:

“The Bank Loans Tendency Survey (BLTS) aims to give quarterly information about the loans to non-financial enterprises and households extended by banks, to monitor not only the factors affecting credit standards, loan demand and supply, but also the realized or expected changes in the loan demand and the factors causing these changes.”¹

¹ <https://www.tcmb.gov.tr/wps/wcm/connect/4fb46b9b-8bb9-430a-818f-3fe122f85fac/BKEA-Metadata.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-4fb46b9b-8bb9-430a-818f-3fe122f85fac-m5gA06g>

BLTS asks banks how they changed credit standards of the non-financial firms and consumers, how the demand of the non-financial firms and consumers' loan demand changed, and how the conditions and factors affecting the credit standards and credit demand changed in the last quarter. Besides how these are changed in the previous quarter, banks give their predictions related to credit standards and credit demand for the next quarter. For the non-financial firms, loan demand and supply are questioned in terms of the following breakdowns: firm size, currency type and length of loans. Consumer loans are questioned in terms of housing, vehicle and personal loans.

The answers of BLTS which are not qualitative are designed to measure how the lending tendencies of the banks' and borrowing tendencies of the non-financial firms and consumers changed in the last quarter with respect to the previous quarter. For that reason, the answers are not quantitative. The answers to the questions asking the loan standards and conditions are as the following: "tightened considerably, tightened somewhat, remained basically unchanged, eased somewhat, eased considerably"; the answers of the loan demand are as: "decreased considerably, decreased somewhat, remained basically unchanged, increased somewhat, increased considerably"; the answers of the factors affecting loan standards are as: "contributed considerably to tightening of credit standards, contributed somewhat to tightening of credit standards, contributed to basically unchanged credit standards, contributed somewhat to easing of credit standards, contributed considerably to easing of credit standards"; the answers of the factors affecting the demand for loans or credit lines are as: "contributed considerably to lower demand, contributed somewhat to lower demand, contributed to basically unchanged credit demand, contributed somewhat to higher demand, contributed considerably to higher demand". According to the answer chosen by each bank, the answer to each question is quantified.

The banks who attend the survey are chosen to be representative of the loan market and their market share is taken into consideration. The method to quantify the answers is conducted via weighting each bank's answer with the corresponding bank's share of the total amount of loans. Within this method, the market power of the bank who has the highest share in the loan market is reflected to the aggregated answer of each question in the survey. For each survey period, weights are updated on the basis of the credit volume for the last month of the previous

quarter for each survey period. For example, the answers of the banks, which give the answer “considerably tightened” to the credit standards question, are calculated as the share in total.

The resulting calculation of the answers is reported as the net percentage change. For the results of credit standards and credit conditions, net percentage change is calculated as: (Eased Somewhat + Eased Considerably)-(Tightened Somewhat + Tightened Considerably); for the results of credit demand, net percentage change is calculated as (Increase Somewhat + Increase Considerably)-(Decrease Somewhat + Decrease Considerably).

2.2 Credit Standards

Differentiation of credit supply and demand is an important but challenging issue. The value gathered from the BLTS is essential for that reason. Credit standards are seen as a supply-side indicator of observed loan volume. Within the survey, it is defined as: “Credit standards are the regulations and criteria of the banks shaping their credit policy. These are written or unwritten regulations and criteria determining acceptability of the credit, sectoral, regional and geographical preferences, acceptability of the collateral or rate of return for consumer loans and the expected return. Credit standards contain both price and non-price terms and conditions.”

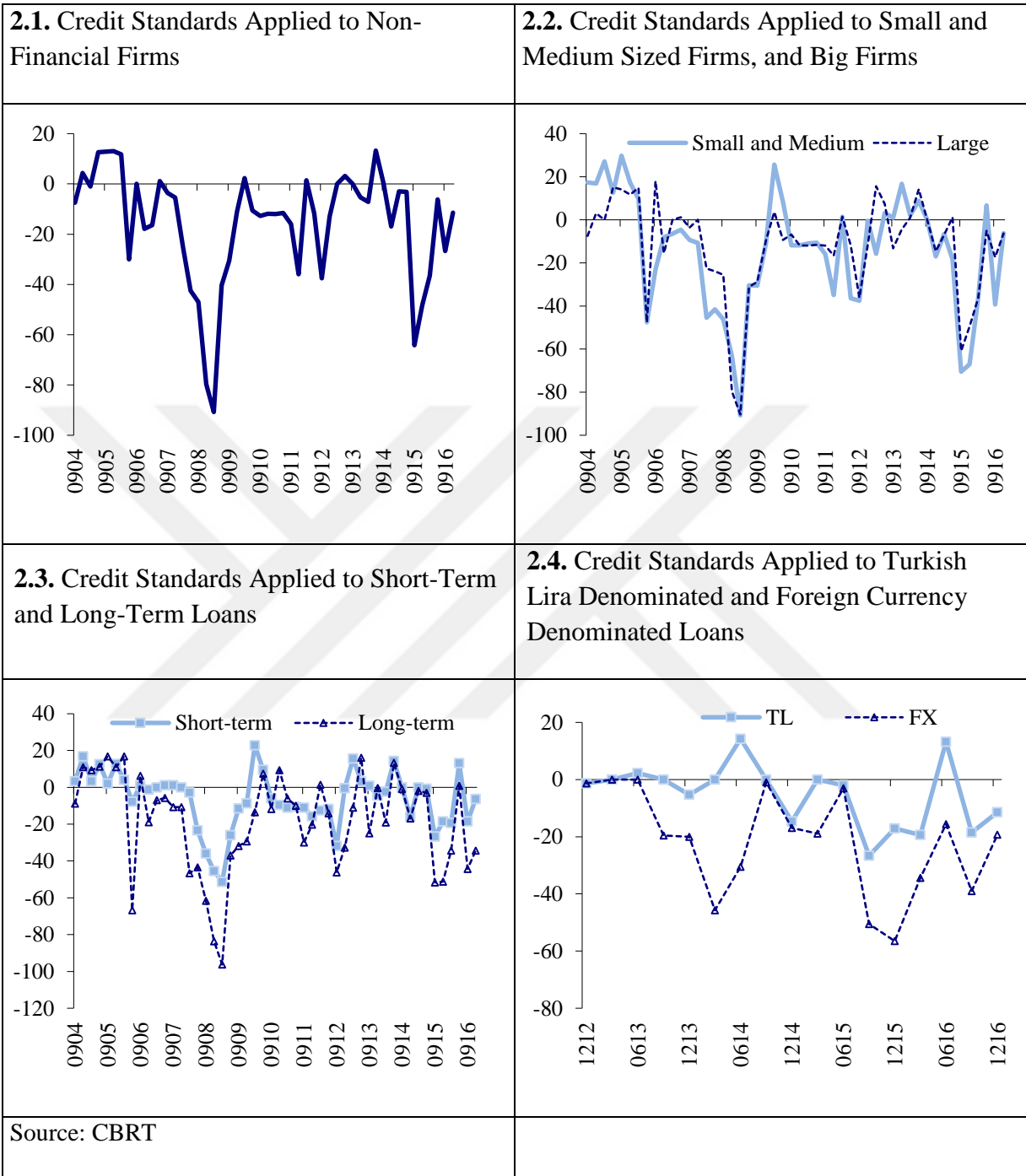
In the literature, the definition of credit standards is made in some different but similar ways. Berlin (2009) defines a change in credit standards as a change in a bank’s loan-granting decisions for some reason other than a difference in the net present value of the loan. It supports what is claimed theoretically if a bank aims to maximize its profits, it lends whenever the net return of the loan is positive. Accordingly, a credit cycle reflects the tendency to ease or tighten loans than which would be justified by changes in borrower risk (Berlin, 2009). For example, in case of an economic downturn, more firms face harder economic conditions and their default probability increase. It reduces the net present value of a given stream of payments, and as a lender the bank would impose new restrictions, decrease credit lines or refuse to make new loan. Although these actions taken by the bank might be seen as tightening of the standards, in fact, credits standards have not been changed according to the definition.

2.2.1 Credit Standards Applied to Non-Financial Enterprises Loans

In the BLTS, banks reply about overall non-financial credit standards reflects their tendencies of lending policy. Furthermore, they respond to how they changed credit standards for the breakdowns of loans to small and medium-sized enterprises, loans to large enterprises, short-term loans, long-term loans, Turkish Lira loans, foreign currency loans.

The answers within the breakdowns give an idea of how bank behave differently according to the loan type. If credit standards are examined how they have been changed historically, banks seem to have the tendency to tighten the standards for the overall non-financial firm loans, and the periods when credit standards are eased seem rarer. Especially after the global financial crisis, banks seem to have the tendency to tighten credit standards and/or reporting credit standards as to have been tightened (Graph 2.1). In the first quarter of 2009, 91 percent of the banks reported that they had tightened overall credit standards. In the following periods, as the economy recovered, the ratio of banks claiming they had tightened credit standards had decreased, however, it is seen that they keep the tendency towards tightening (Graph 2.1).

When credit standards are examined through breakdowns, firm size is essential for the tendency of banks for lending. During the periods of tightening, credit standards applied to small and medium-sized non-financial firms seem more tightened with respect to overall credit standards and big-sized firms (Graph 2.2). This difference is a result of information asymmetry faced by SMEs. In a downturn of the economy, SMEs balance sheet channel seems to be more affected due to external finance premium and they face difficulty in borrowing facility



In terms of loan maturity, long-term loans seem to move more aligned with the overall credit standards. When the overall credit standards are tightened, the net percentage change of long-term loans for tightening seems higher than the net percentage change of short-term loans. It is the similar case for the easing periods, when the credit standards are eased, the net

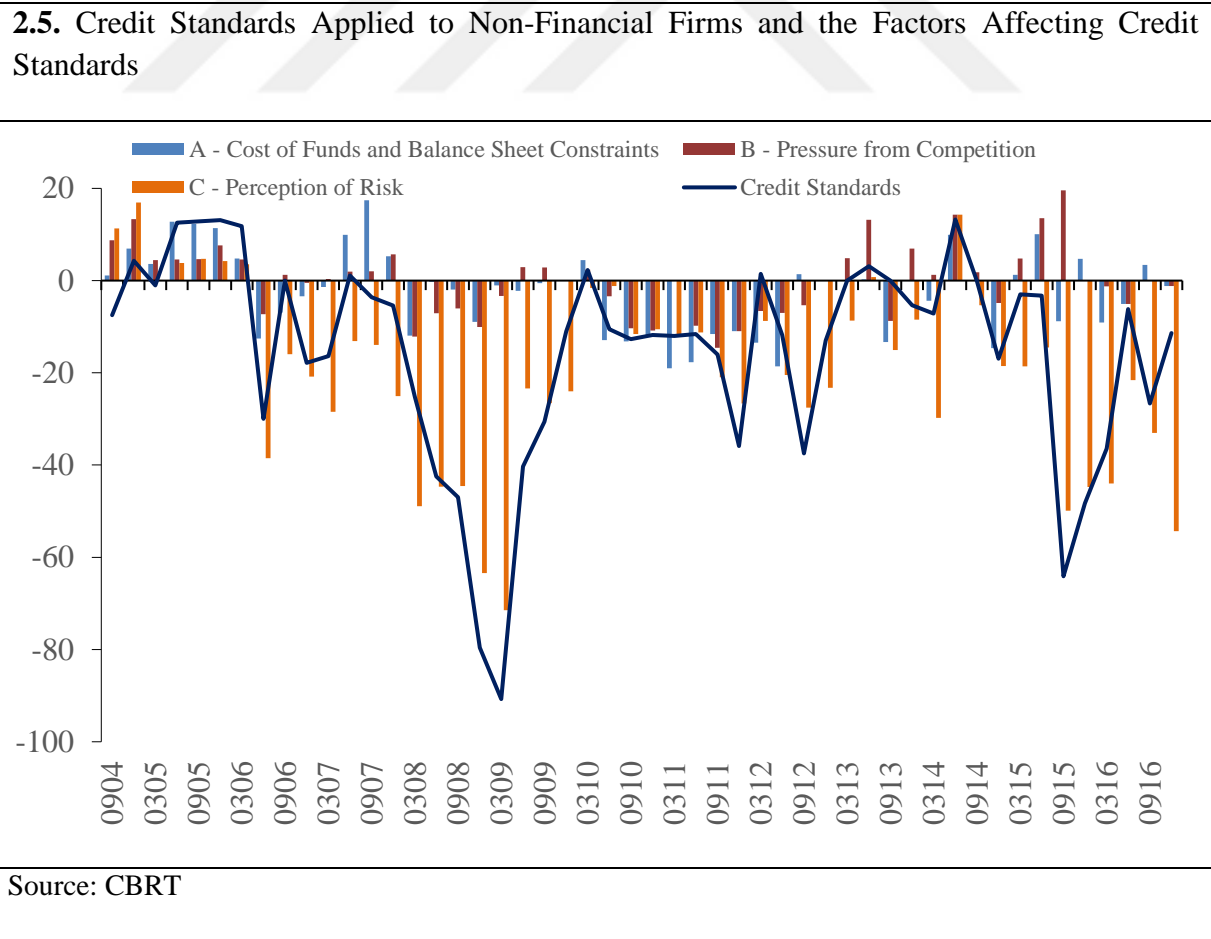
percentage change of long-term loans for easing seem higher than the net percentage change of short-term loans (Graph 2.3). After 2012, the change in credit standards of loans given to non-financial firms is reported in terms of TL and foreign currency denomination. The results show that credit standards applied to TL loans and FX loans move parallel to credit standards of total loans given to firms. However, it is obvious that credit standards applied to FX loans are mostly tightened, and in periods of tightening of standards, FX loan standards tightened more with respect to the total commercial loans (Graph 2.4).

The survey is informative in every manner but it should be mentioned that the second question which gives the idea that why credit standards are tightened or eased is asking which factors affected the bank's decision on credit standards. According to this question, for the survey period, it can be inferred that how the banks reacted to the specific changes in the economy and which factor is more effective for their credit policy. The answer to the second question has three main topics: "Cost of Funds and Balance Sheet Constraints", "Pressure From Competition", "Perception of Risk" and they all have sub-components. Regarding the cost of funds and balance sheet constraints, the subcomponents are: "Costs Related to Your Bank's Capital Position", "Your Bank's Ability to Access Money or Bond Market Financing", "Your Bank's Liquidity Position". In order to consider the pressure from the competition, the answers consist of these subcomponents: "Pressure from Other Banks", "Competition from Non-Banks", "Competition from Market Financing". For measuring the perception of risk, the following factors are asked: "Expectation Regarding General Economic Activity", "Industry or Firm-Specific Outlook", "Risk on the Collateral Demanded". If a factor is reported as negative, it means that this factor contributes to credit standards for tightening; if a factor is reported as positive, this factor contributes to credit standards as tightening; and, if a factor is reported as zero, it means that this factor does not affect credit standards for the respective period.

This second question examining the factors which affect the credit standards is essential for this study to identify the broad credit channel, bank lending channel and borrower's balance sheet channel. This study will analyze the sub-channels of the credit channel and search which one is more effective on real economic activity and inflation. To demonstrate the sub-channels of the credit channel, as mentioned, BLTS is used. Furthermore, banks answer how each of the factors affecting the credit standards contributes. Within this framework, using the methodology

of Ciccarelli et al. (2015), factors affecting the loan standards are classified to construct the indicators of the bank lending channel and borrower’s balance sheet channel.

After the second quarter of 2006, banks start to tighten credit standards. According to BLTS, between the second quarter of 2006 and of 2007, the leading reason to tighten the credit standards seem perception of risk, and cost of funds and balance sheet constraints (Graph 2.5). These two factors are important since they give an idea about how banks perceive and/or expect general economic activity and risks related to firms. After the second quarter of 2007, the tightening effect of perception of risk decreased, and the cost of funds and balance sheet constraints started to affect credit standards for easing. In the third quarter of 2007, credit standards started to tighten, during 2008, tightening in credit standards continued, which had deepened in the first quarter of 2009 (Graph 2.5).



Starting from 2008, the factor most affecting credit standards in terms of tightening tendency seems perception of risk. In the first quarter of 2009, the net percentage of tightening of credit standards is 90.7 percent. According to the second question of the survey, the most effective factors were expectations regarding general economic activity, and the industry or firm-specific outlook. Risk on collateral demanded is the next influential factor on credit standards for the mentioned period.

After the first quarter of 2009, the tendency to tighten standards continued but at a decreasing rate, i.e., tightening in credit standards continued but tightening had been less severe in the last three quarters of 2009 compared to the first quarter of 2009. Throughout 2009, the most important factor had been the perception of risk. In the first quarter of 2010, credit standards displayed easing but after this period, credit standards started tightening again. When we examine historically, most of the time, banks tend to tighten credit standards. Within the sample period, the quarters that credit standards displayed easing are the first quarter of 2012, the second quarter of 2013, and the second quarter of 2014. Historical analyses of the factors show that the factor effective on credit standards seem mostly perception of risk, and for some periods, cost of funds and balance sheet constraints is also influential.

In 2015 and 2016, it is observed that perception of risk was the most effective factor for banks to tighten credit standards. In 2016, although the magnitude of the tightening of credit standards decreased, the contribution of perception of risk remains high, especially for the last quarter of 2016.

2.2.2 Credit Standards Applied to Consumer Loans

In BLTS, the questions related to consumer loans are not asked for the overall consumer loans, but in terms of breakdowns of the consumer loans as housing, vehicle and personal loans. Credit cards are not included in the content of the survey.

Calculation of net percentage change in credit standards and calculation of contribution of the factors affecting credit standards are similar to the ones of non-financial firms. However, the sub-components of factors influential on credit standards of consumer loans are not exactly

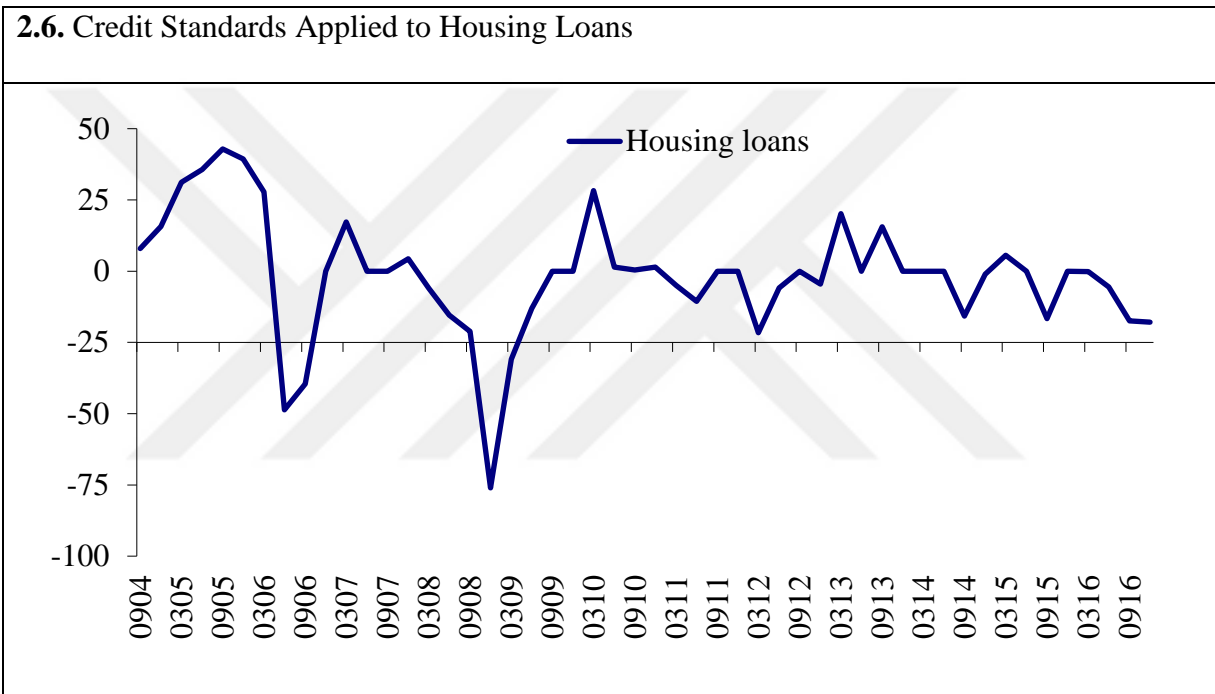
same as the sub-components of factors influential on credit standards of non-financial firm loans.

Factors affecting credit standards may differ for sub-groups of consumer loans. The main topics of the factors are all the same: “Cost of Funds and Balance Sheet Constraints”, “Pressure from Competition”, “Perception of Risk”. Cost of funds and balance sheet constraints for the all household loans has no sub-component. Pressure from competition has two same sub-components for all breakdowns of consumer loans, these are: “Competition from Other Banks”, “Competition from Non-Banks”. However, the factor asking perception of risk has different sub-questions regarding the loan type except the one asking “Expectations Regarding General Economic Activity”. For the housing loans, other question related to perception of risk is “Housing Market Prospects”. For the vehicle and personal loans, there are two questions which ask how “Credit Worthiness of Consumers” and “Risk on the Collateral Demanded” affected the bank’s credit standards.

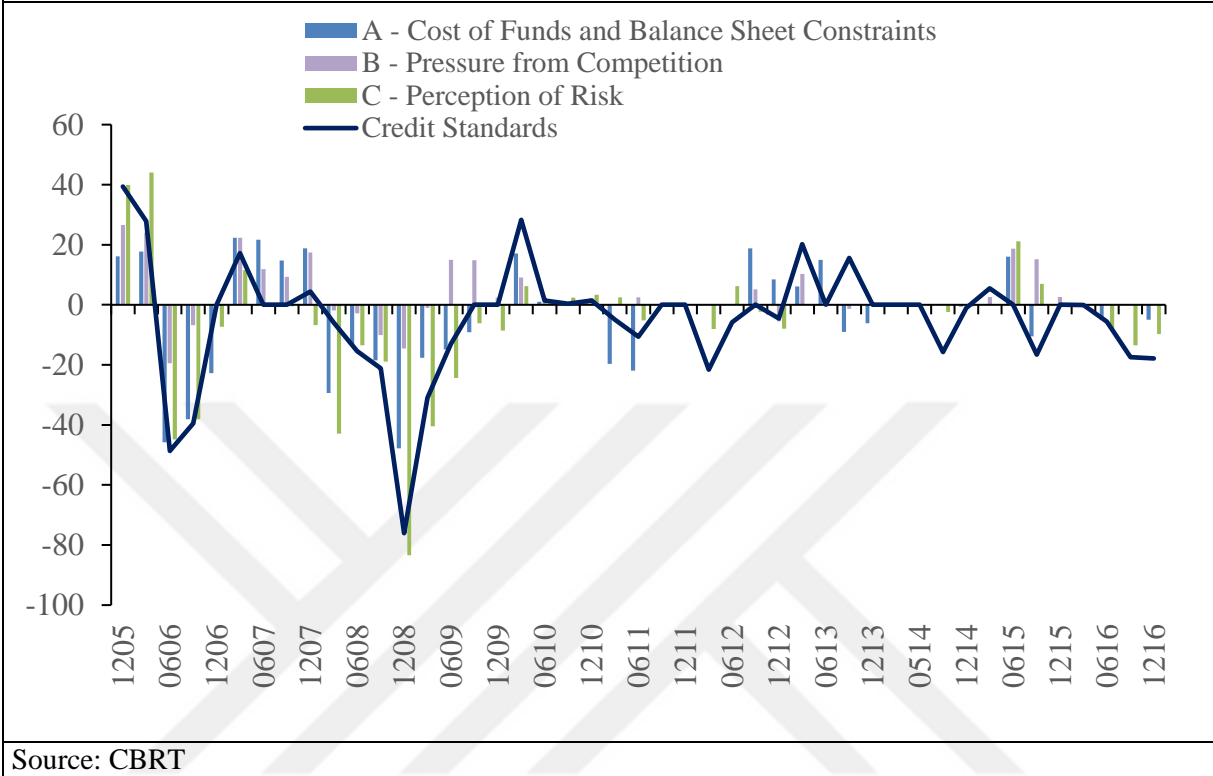
Housing Loans

From the date the survey started, credit standards regarding the housing loans displayed easing until the second quarter of 2006. After that period, credit standards regarding the housing loans reported being tightened till the first quarter of 2010, except the first and fourth quarter of 2007. For the 2006 period, the most effective factor on housing credit standards was expectations regarding general economic activity and it was followed by the cost of funds and balance sheet constraints. In this period, liquidity constraints had been changed due to the monetary policy implementations of developed economies, and this resulted in a deterioration in risk perception. Banks reported that they tightened credit standards regarding housing loans starting from 2008. In the last quarter of 2008, net percentage of banks who mentioned that they tightened housing credit standards was 76 percent. This tight outlook continued at a decreasing pace till the second quarter of 2009, and for the third and fourth quarter of 2009, housing credit standards reported as unchanged. For the global financial crisis period of 2008 and 2009, the most important factor in housing credit standards seems expectations regarding the general economic activity. During this period, the second effective factor on housing credit standards was the cost of fund and balance sheet constraints (Graph 2.6).

From October 2010, reserve requirement policy implemented by the CBRT and until April 2011, Turkish lira nominated reserve requirements increased for four times. These policy-oriented changes affected banks' decisions on credit standards via the cost of funding and balance sheet constraints. For the first half of 2011, banks reported credit standards as they had tightened. For the second half of the year, they claimed credit standards as unchanged.



2.7. Factors Affecting the Credit Standards Applied to Housing Loans



In July 2011, foreign currency nominated reserve requirements had been decreased, and, in September and October 2011, Turkish lira nominated reserve requirements had also been decreased. These changes affected how banks reply to the factors affecting credit standards. For the second half of 2011, as banks reported credit standards to be unchanged, cost of funds and balance sheet constraints seem to play a significant role in determining credit standards of housing. Accordingly, it can be inferred that monetary policy actions have an important impact on banks' willingness to lend, and, via liquidity constraints, their ability to lend.

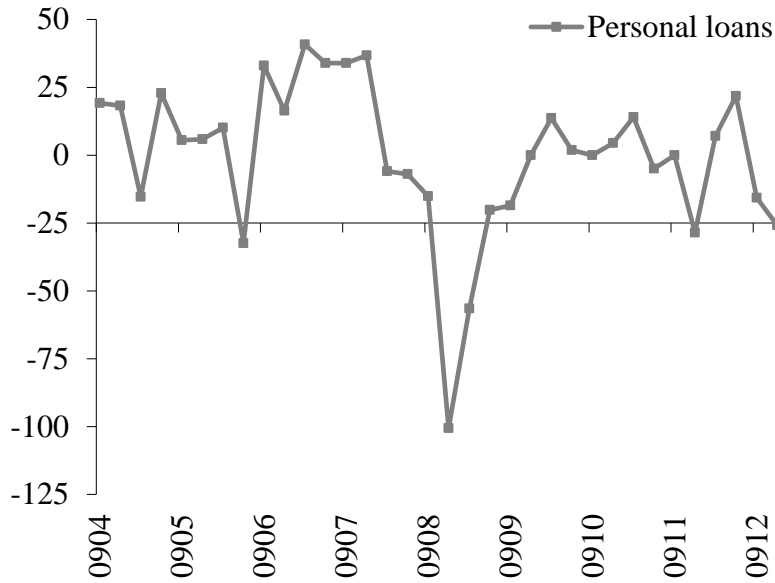
In 2012, except for the third quarter, housing loan standards tightened. After 2012, until the third quarter of 2014, housing loan standards eased. In 2015 and 2016, similar to other loan types, housing loans followed a tight stance as a result of banks' perception of risk regarding the economy and the borrowers (Graph 2.7).

Personal Loans

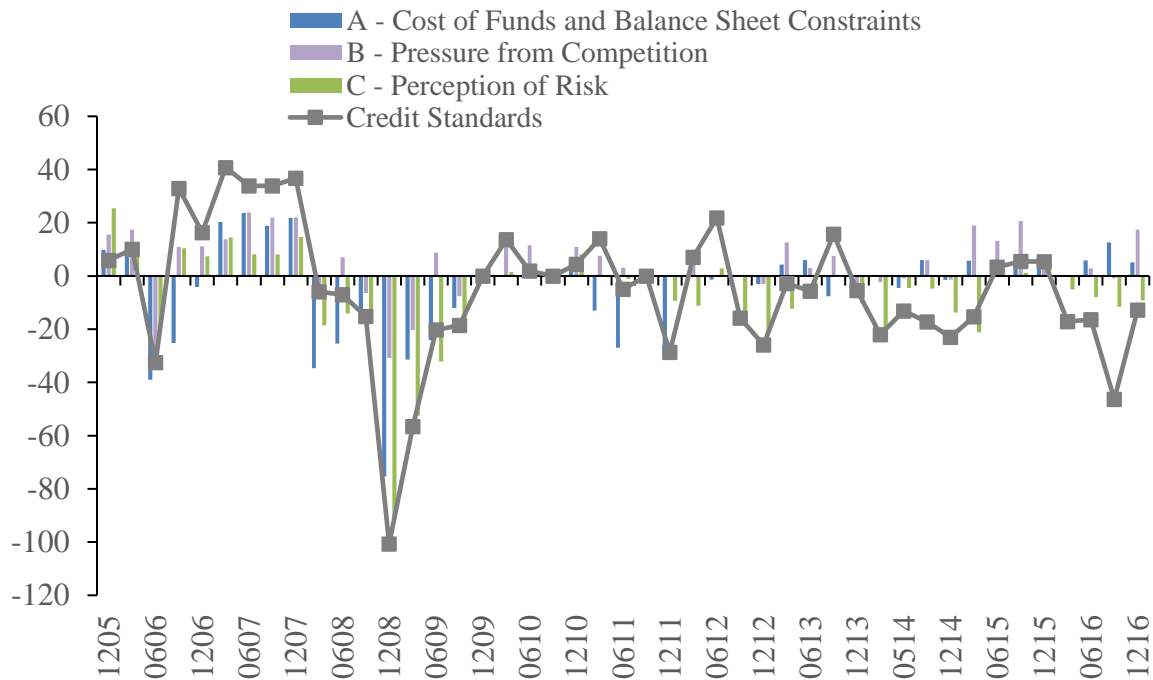
Personal loan standards displayed similar movements to housing and vehicle loan standards. Personal loan standards were in an easing period till 2008 except the second quarter of 2006. However, easing speed of the personal loan standards differs from housing and vehicle loan standards since personal loan standards were eased very quickly with respect to the credit standards of housing and vehicle loans. The underlying reason was reported as risk perception of banks for this loan type. For the period between the third quarter of 2006 and the beginning of 2008, collateral demanded was not reported as influencing credit standards of personal loans, however, this factor reported as effecting housing and vehicle loans.

Starting from 2008, personal loan standards had been tightened until the third quarter of 2009 (Graph 2.8). In 2010, personal loan standards reported as unchanged for the third quarter of the year, and as ease for the other quarters. For the first quarter of 2010, cost of funds and balance sheet constraints, and competition from other banks play a significant role in the easing of personal loan standards. In the second and fourth quarter of 2010, credit standards of personal loans displayed a slight easing. In the first quarter of 2011, the tendency of banks to ease personal loan standards continued due to competition from other banks factor although in this period cost of funds and balance sheet constraints contributed to credit standards in terms of tightening. However, in the second quarter of 2011, due to deterioration in risk perception, personal loan standards tightened slightly, and tightening impact of cost of funds and balance sheet constraints continued (Graph 2.9).

2.8. Credit Standards Applied to Personal Loans



2.9. Factors Affecting the Credit Standards Applied to Vehicle Loans



Source: CBRT

Although at the end of 2010, tightening monetary policy increased the cost of banks, as a result of competitive pressure from other banks, banks continued easing credit standards regarding personal loans. For that reason, at the beginning of the second quarter of 2011, BRSA put some regulations related to personal loans to prevent banks from behaving imprudently. In the second quarter of 2011, cost of funds and balance sheet constraints persisted having pressure on personal loan standards in terms of tightening and pressure from other banks decreased. Accordingly, banks tightened personal loan standards. In the third quarter of 2011, personal loan standards were unchanged, but, in the last quarter of the year, personal loan standards tightened.

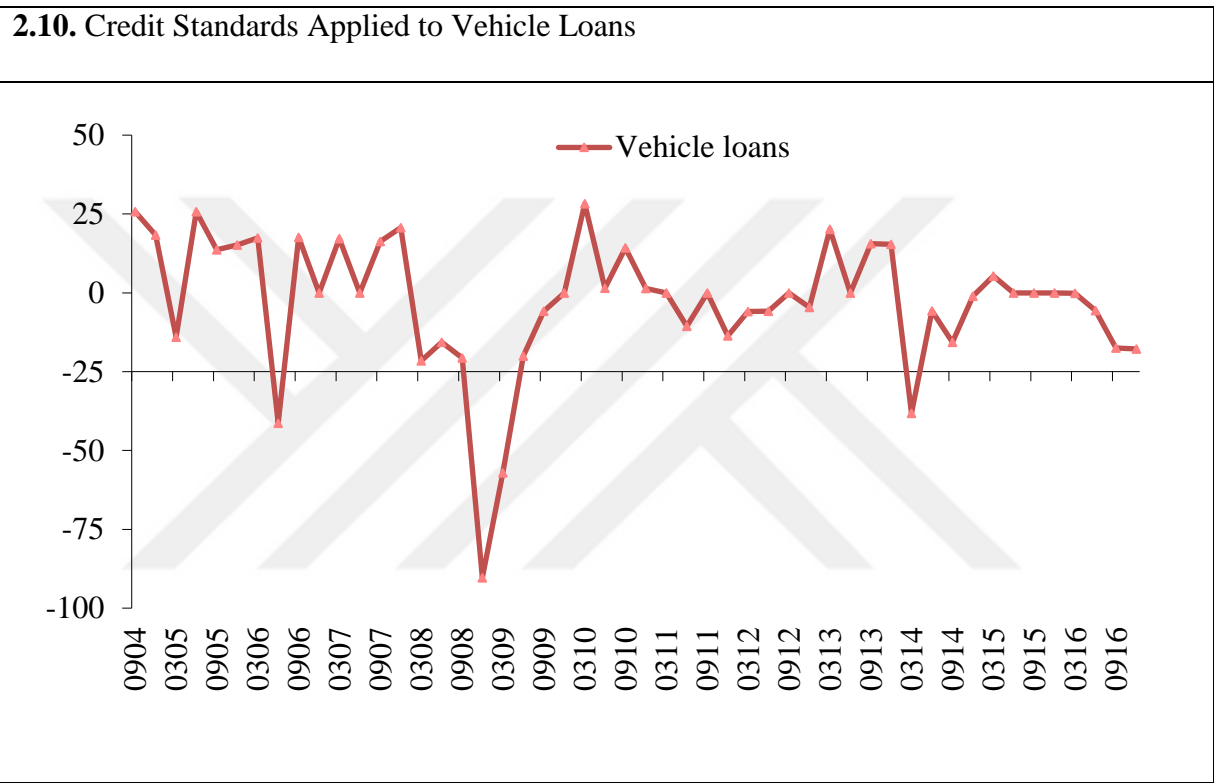
In the first half of 2012, personal loan standards eased. In the first quarter, competition from other banks was effective within this development, although expectations regarding general economic activity were influential on personal loan standards in terms of tightening. In the second quarter of the year, expectations regarding the general economic activity were more influential in terms of easing of the personal loan standards in spite of slightly tightening effect of cost of funds and balance sheet constraints. After the third quarter of 2012, personal loan standards had a tight stance except for the third quarter of 2013 and the last three quarters of 2015. In the third quarter of 2013, competition pressure from other banks plays a role in easing personal loan standards. It was the case on the last three quarters of 2015 whereas, in this period, cost of funds and balance sheet constraints were also effective in easing of personal credit standards.

Vehicle Loans

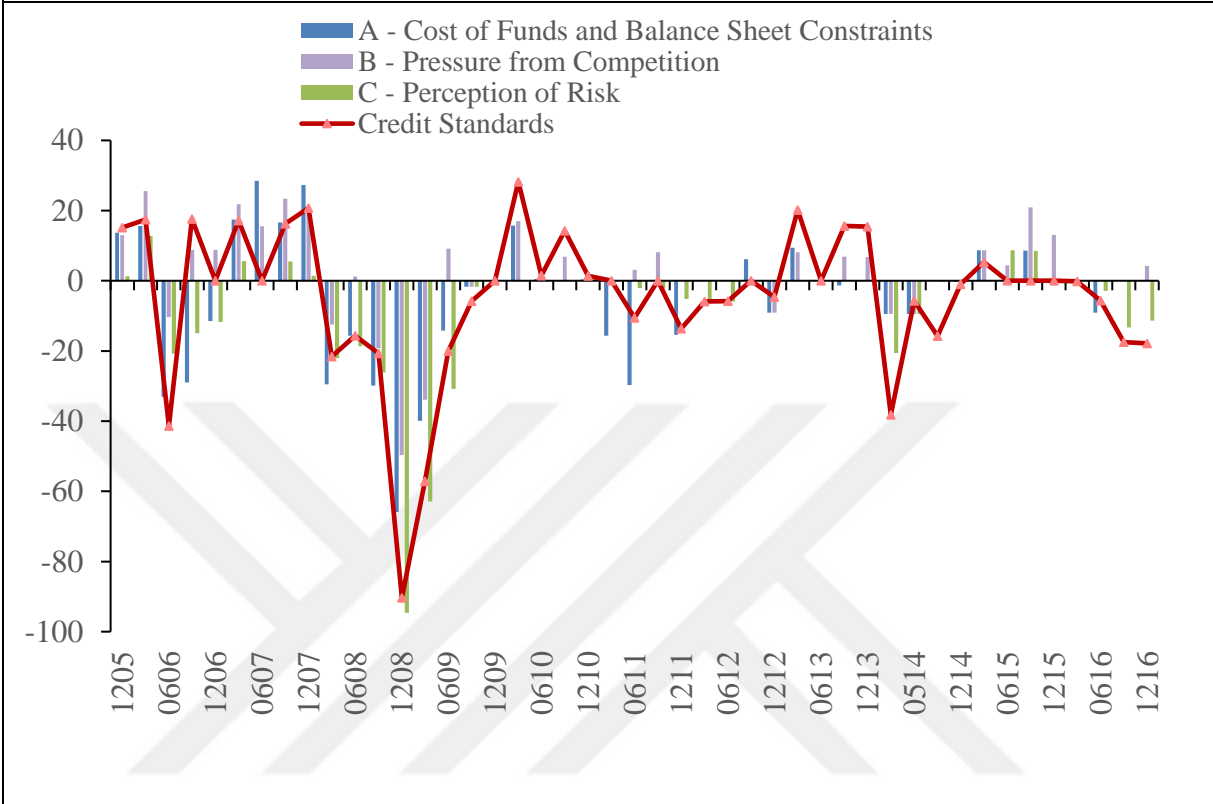
Credit standards regarding vehicle loans displayed easing till 2008 except few periods, these are the first quarter of 2005 and the second quarter of 2006. In the second quarter of 2006, credit standards of all types of loans tightened. The underlying factor claimed for vehicle loan standards was expectations regarding the general economic activity. Furthermore, the cost of funds was effective in tightening vehicle loan standards for that period (Graph 2.10 and 2.11).

It is observed that credit standards regarding vehicle loans eased or kept unchanged due to competitive pressure in the periods when the cost of funds affected credit standards in terms of tightening. However, in the first quarter of 2008, vehicle loan standards were the one that was mostly tightened. For this period, all of the banks participating in the survey reported that

expectations regarding general economic activity was effective in tightening of vehicle loan standards. Moreover, risks on collateral demanded and credit worthiness of consumers were other most influential factors on vehicle loan standards for that period.



2.11. Factors Affecting the Credit Standards Applied to Vehicle Loans



Source: CBRT

From the third quarter of 2008, creditworthiness and collateral demanded had an effect on the risk attitude of banks, whereas before this period, expectations regarding general economic activity shaped their risk perception. During 2008 and 2009, vehicle loan standards kept tight till the last quarter of 2009 when it was reported as unchanged (Graph 2.10).

From the first quarter of 2010, vehicle loan standards started to be eased and this trend continued for the yearlong. Cost of funds and balance sheet constraints play a role in this slightly easing period (Graph 2.11). Furthermore, reserve requirement policy implemented by the CBRT starting form 2010 was effective on credits since it reduces risks associated with the economic outlook.

In 2011, vehicle loan standards were kept unchanged in the first and third quarters, tightened in the second and fourth quarters. In the first quarter, although the cost of funds and balance sheet constraints contributed to vehicle loan standards for tightening, due to unchanged

factors such as competitive pressure from other banks and expectations regarding the general economic activity, vehicle loan standards were kept constant. In the third quarter, cost of funds and expectations regarding general economic activity were effective for banks to keep vehicle loan standards unchanged.

After 2011, vehicle loan standards eased in 2013 and 2015. In 2013, competition pressure from other banks was influential on banks to ease vehicle loan standards whereas in 2015, in the first and third quarters, cost of funds and balance sheet constraints: in the second and third quarters of the year, expectations regarding general economic activity were also influential.

2.3 Credit Demand

Bank Loans Tendency Survey collects information not only about credit standards as an indicator of credit supply but also about credit demand. The survey asks how credit demand of borrowers' change, which factor/s affect and how its effect. The questions regarding the credit demand is asked in terms of non-financial enterprises loans, housing loans, vehicle loans, and personal loans.

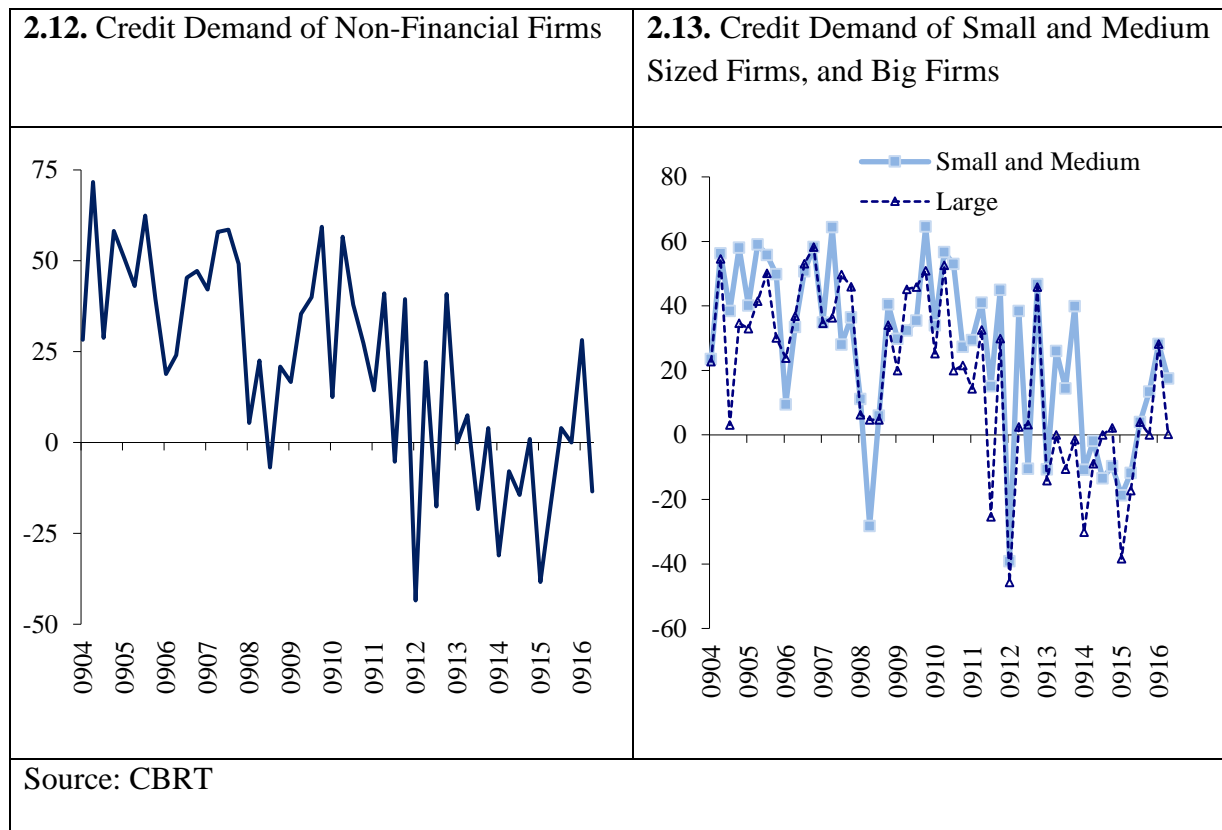
2.3.1 Credit Demand of Non-Financial Enterprises Loans

Within the survey, questions regarding the credit demand of non-financial firms are asked in terms of different breakdowns. Change of credit demand with respect to the previous quarter are asked in terms of maturity of loan demanded (short-term/long-term), in terms of firm size (Small and Medium-Sized Enterprises/Large Enterprises), and in terms of currency type of loan demanded (Turkish lira/Foreign currency) are answered by the banks.

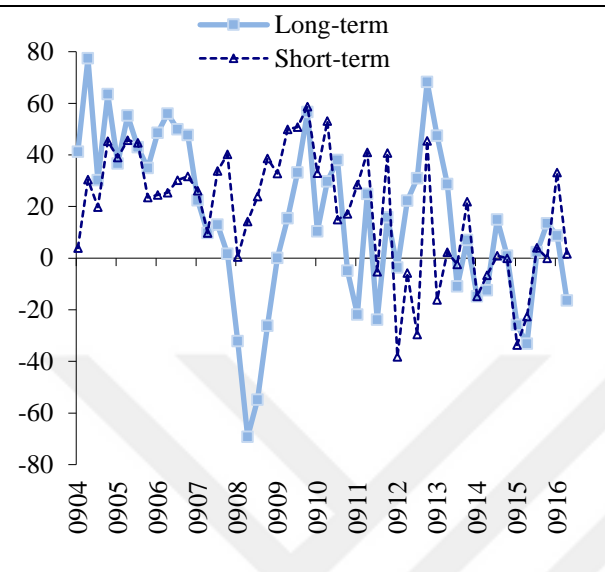
In the survey, to what extent the factors affect the commercial loan demand is also asked. Financing needs have the subcategories such as “fixed investment”, “inventories and working capital”, “mergers/acquisitions and corporate restructuring” and “debt restructuring”. The second factor affecting on loan demand is the use of alternative finance. The components of this factor are “internal financing”, “loans from other banks”, “loans from non-banks”, “issuance of

debt securities” and “issuance of equity”. Other factors that affect loan demand of firms are the tax and similar burdens on loans and the discounts and facilities for cash payments.

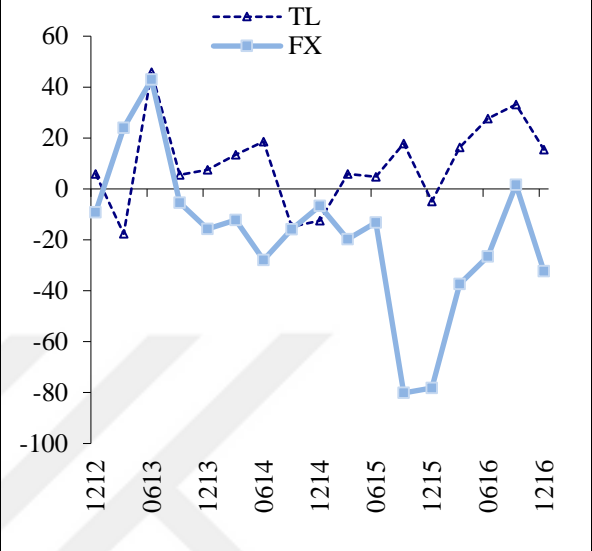
Credit demand of non-financial enterprises reported more rarely as decreased with respect to credit standards. Since the beginning of the survey period, credit demand claimed firstly to decrease in the first quarter of 2009 and the reported decrease seems a slight slowdown (Graph 2.12). Afterward, the first decline in loan demand of firms is observed in the third quarter of 2012. Within the decline in the third quarter of 2012, the effective factor was fixed investment. In the first quarter of 2013, the decline in the demand was claimed to be resulting from the inventories and fixed capital. In the first and third quarter of 2014, credit demand is reported to decrease. The underlying factors were fixed investment for the two periods. In the first quarter of 2014, mergers/acquisitions and corporate restructuring were also effective. Inventories and working capital, and internal financing was effective in the third quarter of 2014 in the decline of loan demand of firms.



2.14. Credit Demand of Short-Term and Long-Term Loans

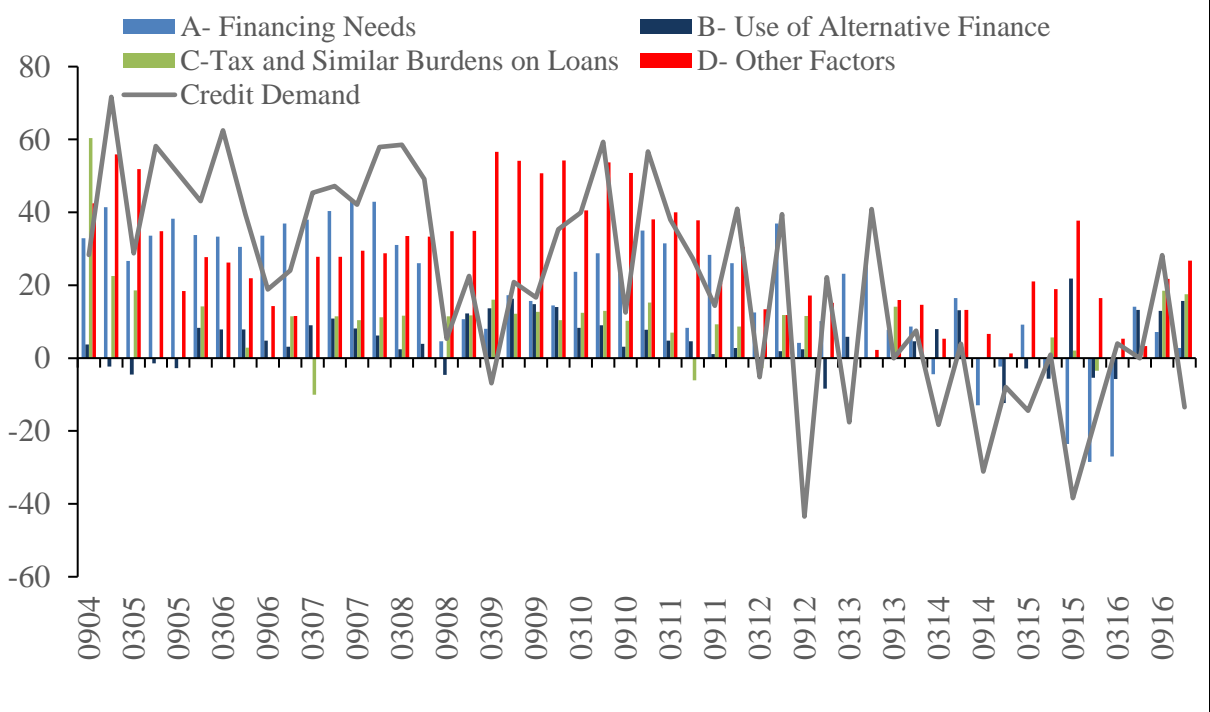


2.15. Credit Demand of Turkish Lira Denominated and Foreign Currency Denominated Loans



Source: CBRT

2.16. Credit Demand of Non-Financial Firms and the Factors Affecting Credit Demand



Source: CBRT

Afterward, till the first quarter of 2016, loan demand of firms displayed decline. Almost in all periods, financing needs was the most effective headline factor in the decline of loan demand. Among financing needs, fixed investment has a depressing impact on loan demand of firms (Graph 2.16).

In the third quarter of 2016, loan demand displayed a sharp increase. In this period, the only factor contributing in terms of declining the loan demand of firms was fixed investment, and all other factors contributed to loan demand in the direction of increasing the loan demand. The most efficient factor was debt restructuring in the mentioned period. In the last quarter of 2016, because of the decline in fixed investment, and mergers/acquisitions and corporate restructuring, loan demand of firms displayed a reduction.

When different breakdowns of loan demand is analyzed, the increase and decrease of the subgroups mostly behave parallel to the all loan demand of firms (Graph 2.13, 2.14, 2.15). However, it is observed that a decline in the demand of large firms and long-term loan demand was deeper in the periods of decrease of loan demand. After the fourth quarter of 2012, loan demand of firms in terms of different currency denomination has been reported. The demand for TL and FX denominated loans displayed similar movements to total loan demand of firms. However, it is observed that decline in FX loans was sharper, and the banks reported FX loans as declining most of the time from the beginning of the reporting the FX loan demand.

2.3.2 Credit Demand of Consumer Loans

Within BLTS, the change in demand of consumer loans, which factors affect consumer loan demand and how they affect are asked to the participating banks of the survey. For the consumer loans, the questions are asked for the subgroups of consumer loans, which are housing, vehicle and personal loans. Furthermore, banks' expectations regarding the subgroups of consumer loan demand are asked.

Since the demand of housing, vehicle and personal loans are asked separately, the factors affecting the corresponding loan demand also differs. The main issues affecting consumer loan demand are financing needs, use of alternative finance, and, tax and similar burdens on loans. The sub-components regarding tax and similar burdens on loans is the same for all loan types

of consumer loans. Underuse of alternative finance factor, in terms of sub-components of this factor, there is a slight difference for personal loans. Use of alternative finance factor has three sub-components for all types of consumer loans. The first two components of the use of alternative finance factor are household savings and loans from other banks. These components examine how they contribute to the change in the relevant loan type's demand. The third component of the use of alternative finance is other sources of finance for housing and vehicle loan demand, but it is securities purchases for personal loan demand.

The components regarding the financing needs issue differ according to the loan type. For that reason, the factors influencing the loan demand are examined within following separate sections.

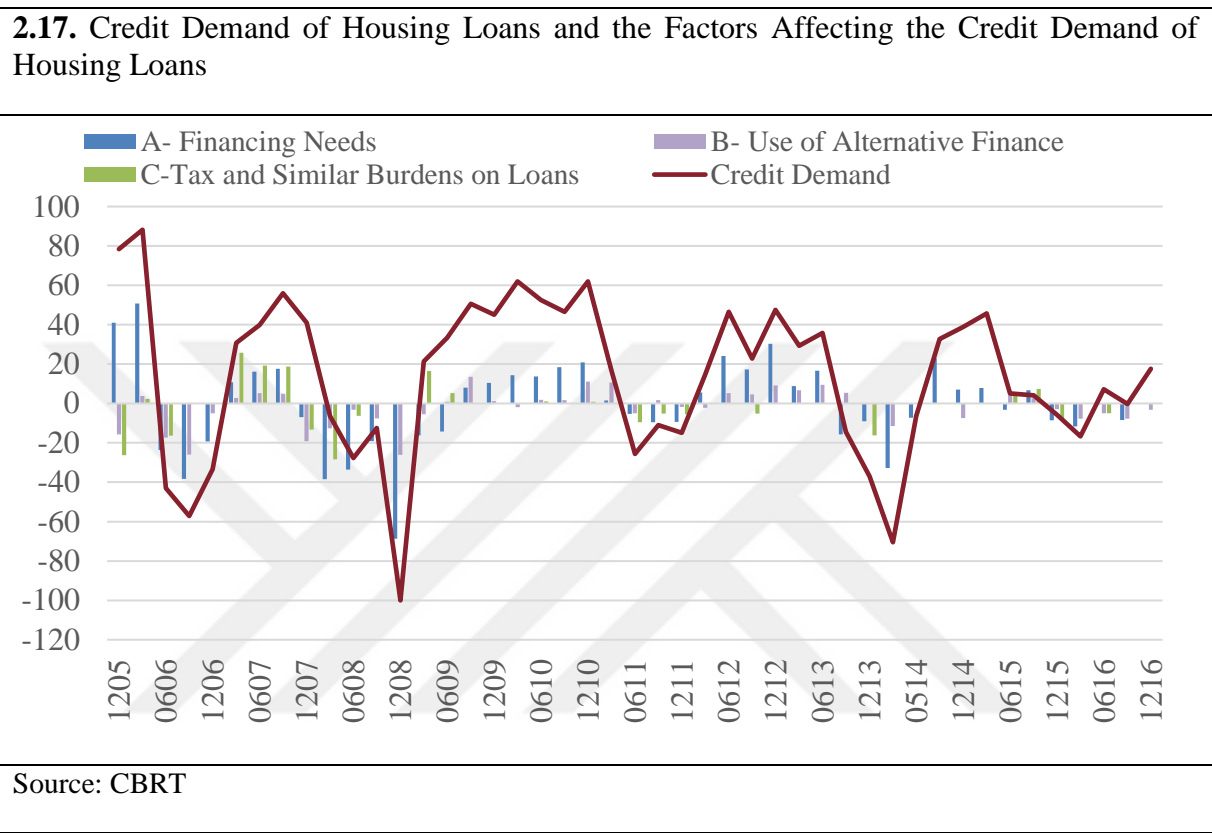
Housing Loan Demand

The factors affecting housing loan demand can be collected under three main groups. The first issue that is influential on housing loan demand is financing needs. How financing needs affect the housing loan demand depend on the following components: "housing market prospects", consumer confidence", "non-housing consumption expenditure" and "taxes and funds".

The second factor regarding the housing loan demand is the use of alternative finance. This issue has three components contributing to the housing loan demand, and these are "household savings", "loans from other banks" and "other sources of finance". The last main issue contributing to the housing loan demand is "tax and similar burdens on loans".

In this section, we will examine how housing loan demand and the factors affecting housing loan demand evaluated historically. Housing loan demand displayed rise during 2005 and the first quarter of 2006. However, it decreased during the last three quarters of 2006. During 2005, financing needs factor was effective in the rise of housing loan demand (Graph 2.17). Furthermore, in 2006, although housing loan demand decreased, financing needs was the factor that was most influential in the decline of housing loan demand. Under financing needs subject, the most effective ones are housing market prospects and consumer confidence in these three quarters. In the second and third quarter of the year, non-housing consumption expenditure and

household savings were also in place. Furthermore, in the third quarter of 2006, the use of alternative finance contributed to the decline of housing loan demand.



In 2007, housing loan demand was reported as increasing. In this period, housing market prospects and, taxes and funds were influential. However, in 2008, especially in the fourth quarter of the year, housing loan demand declined strictly. Financing needs was the most striking factor in the decrease of housing loan demand. In the first quarter of 2008, tax and similar burdens on housing loans were also effective in addition to the housing market prospects and consumer confidence.

In every period until the second quarter of 2011, housing loan demand displayed easing. In the first quarter of 2009, tax and similar burdens on loans were efficient in the increase of housing loan demand, whereas other factors contributed in terms of decreasing the housing loan demand. From the third quarter of 2009, the rise in housing loan demand was significant till the last quarter of 2010. In this period, especially in 2010, housing market prospects and consumer

confidence were influential on the rise of housing loan demand. In this period, household savings also contributed to the increase in housing loan demand. In the last three quarters of 2011, housing loan demand displayed a decline where finance needs were effective within this development.

In 2012 and the first half of 2013, housing loan demand increased. During this period, housing market prospects, and consumer confidence played a role within the increase of housing loan demand. In the second half of 2013 and the first half of 2014, housing loan demand declined as a result of housing market prospects, deterioration of consumer confidence and non-housing consumption expenditure. Then due to the recovery of these mentioned factors, until the fourth quarter of 2015, housing loan demand increased.

Personal Loan Demand

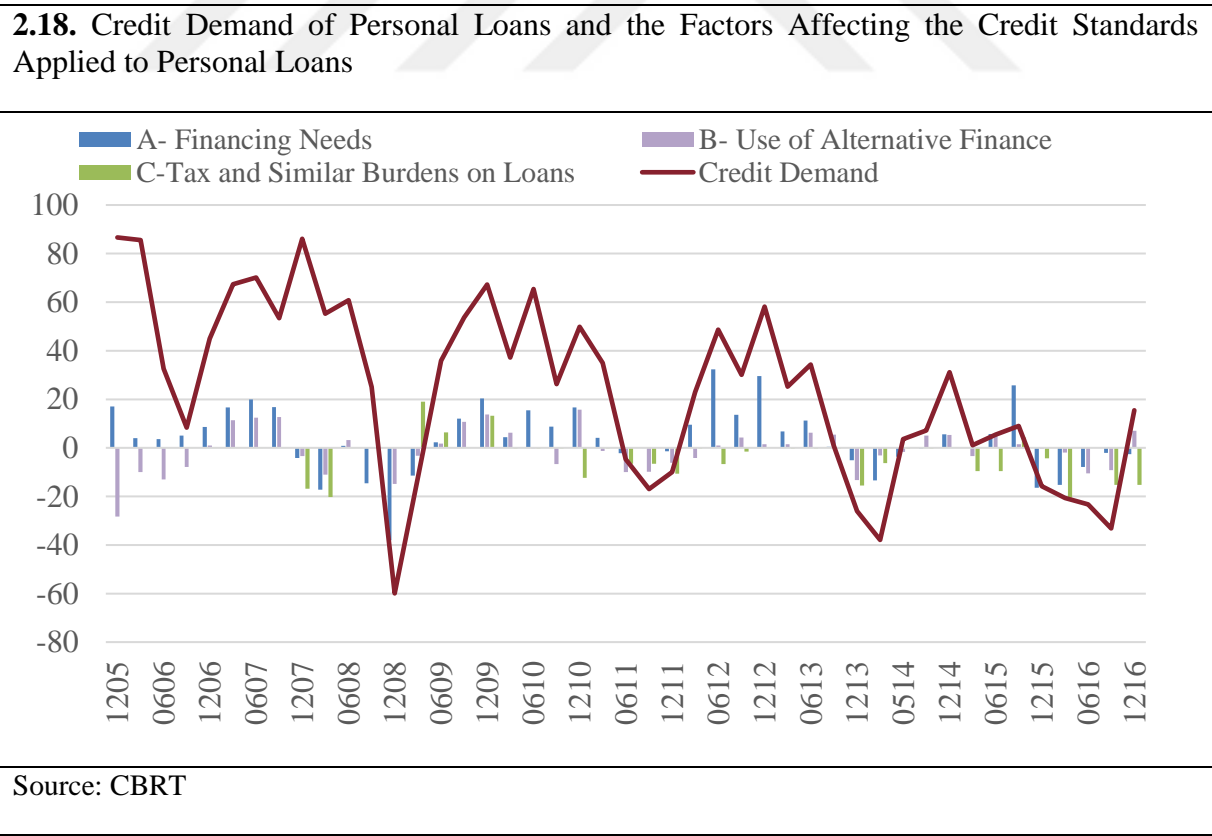
The main factors affecting personal loan demand are financing needs, use of alternative finance, and taxes and similar burdens on loans. Financing needs consist of “spending on durable consumer goods”, “consumer confidence,” and “securities purchases”. The use of alternative financing includes “household savings”, “loans from other banks” and “other sources of finance”. The last factor is tax and similar burdens on loans.

It is observed that credit demand has increased continuously from the second quarter of 2004 to the last quarter of 2008. In this period, spending on durable consumer goods and consumer confidence were the main factors supporting the increase in demand. In the same period, individual savings and other financing sources adversely affected the demand for bank loans (Graph 2.18). Securities purchases, spending on durable consumer goods, household savings and taxes on loans negatively affected demand in the last quarter of 2007. On the other hand, when banks eased credit standards, the ratio of banks that reported an increase in demand was 86 percent in this quarter.

Since the beginning of 2008, banks have reported that demand has decreased in the last quarter of the year. It is the period when all banks reports the standards as tight. Loan demand, which declined in the following quarter, started to increase again as of the second quarter of 2009. Credit demand continued to increase until the second quarter of 2011; consumer spending

and durable consumer goods were positively affected, and the tendency of consumers to use bank loans instead of other financing sources contributed to the increase in demand. In 2011, in the last three quarters, personal loan demand displayed reduction. In all these three periods, consumer confidence, other sources of finance and taxes play an important role in the decline of personal loan demand. In the fourth quarter of the year, spending on durable consumption goods was also effective in the reduction of personal loan demand.

After 2011, personal loan demand displayed increase until the last quarter of 2013. In this period, consumer confidence, household savings, loans from other banks and taxes was effective in personal loan developments. In the first period of 2014, instead of loans from other banks, spending on durable consumer goods was influential. In the last period of 2015 and the first three quarters of 2016, the decline in personal loan demand was a result of almost all factors. Exceptionally, in the first quarter of 2016, household savings, and in the second and third quarter of 2016, securities purchases contributed positively to personal loan demand.

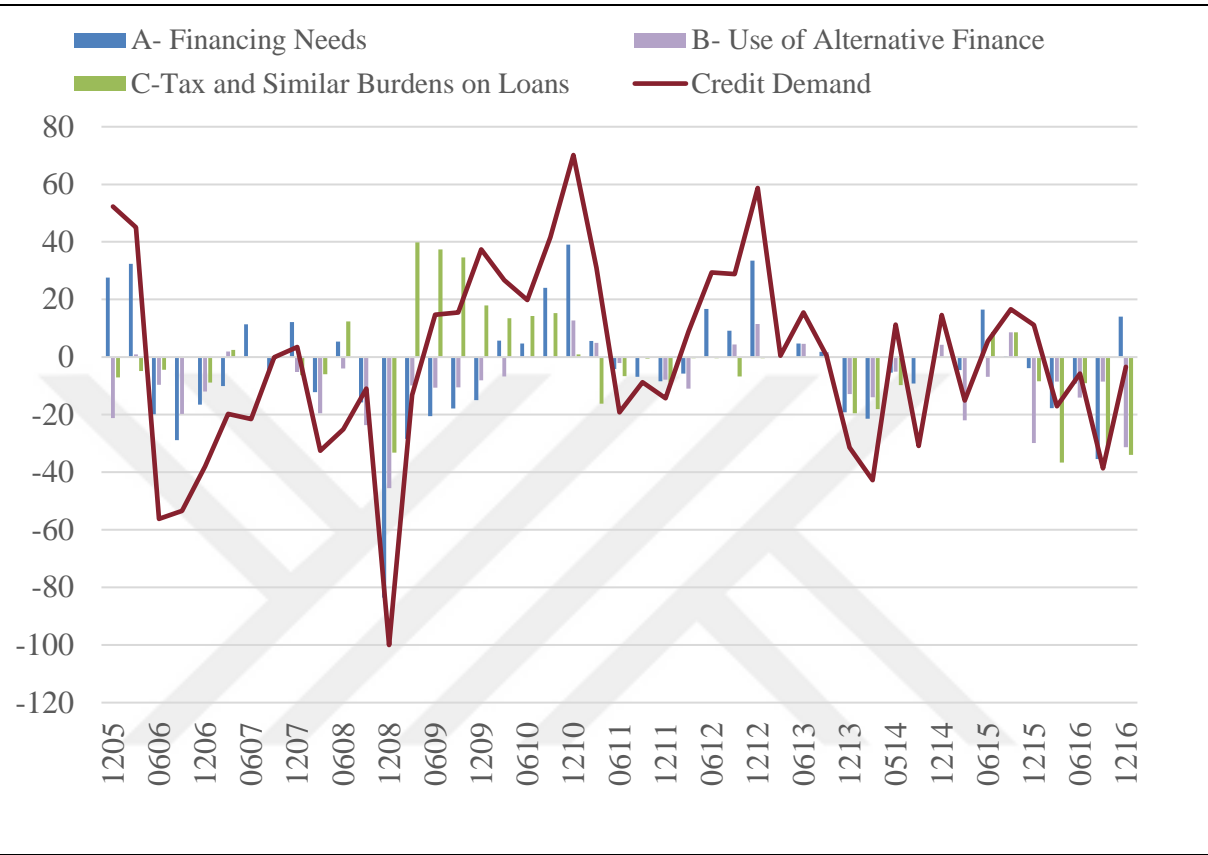


Vehicle Loan Demand

Before analyzing the vehicle loan demand historically, the factors affecting the loan demand is explained. The factors are categorized under three main subjects similarly to other consumer loan types. These main subjects are: financing needs, use of alternative finance and tax and similar burdens on loans. Financing needs consists of “vehicle market prospects”, “consumer confidence” and “non-vehicle related consumption expenditure”. The use of alternative finance has the following components: “household savings”, “loans from other banks” and “other sources of finance”. The survey also asks the contribution of tax and similar burdens on loans to demand.

Vehicle loan demand increased in the last quarter of 2004, during 2005 and in the first quarter of 2006. In this period, finance needs contributed to vehicle loan demand in terms of positive effect. On the other hand, tax and similar burdens on loans contributed negatively to vehicle loan demand in this period although vehicle loan demand raised. The demand for vehicle loans displayed a decline between the second quarter of 2006 and the first quarter of 2009 except the last quarter of 2007 (Graph 2.19). In this period, almost all the factors contributed to the decline in vehicle loan demand. In the periods of sharp decline in loan demand, vehicle market prospects, non-vehicle related consumption expenditure and consumer confidence were the most effective ones. Consumers’ preference of other sources of finance sources also supported the decline in demand. In the last quarter of 2008, all of the banks surveyed reported that credit demand decreased compared to the previous quarter. In this period, all factors affected demand negatively. The decline in demand was mainly driven by the deterioration in vehicle market prospects by 95 percent, deterioration in consumer confidence by 87 percent, and the increase in non-vehicle related consumption expenditure by 66 percent.

2.19. Credit Demand of Vehicle Loans and the Factors Affecting the Credit Standards Applied to Vehicle Loans



Source: CBRT

Credit demand for vehicle loans increased until the first quarter of 2011, started to decline in the second quarter of the year. It can be clearly observed the most effective factors in the decline is non-vehicle related consumption expenditure in the last three quarters of 2011. Afterwards, a strong reduction is seen in the last quarter of 2013, the first quarter of 2014 and the third quarter of 2016. The common properties of these declining periods of loan demand, taxes and similar burdens played a role in the reduction of vehicle loan demand. Consumer confidence and non-vehicle related consumption expenditure were effectively contributed to the decline of vehicle loan demand in the third quarter of 2013.

2.4 Summary

Identification of loan demand and loan supply is a hard issue which is also stated as in the literature. The underlying reason is that we observe the realizations of loans in the economy. The observed volume of loans in the economy is somehow the equilibrium values of loans resulting from its price and its quantity by means of loan demand and loan supply. As a result, to identify loan demand and loan supply, some methods and/or databases are utilized. In that manner, to identify and analyze the components of observed loan in the market, bank loans tendency surveys are mostly used in the literature with different methodologies.

Bank loans tendency surveys are important since they show that from the perspective of the bank, how the credit developments changed for the corresponding quarter. They give information about different aspects of the credit market. First of all, they display how the banks have changed their credit standards regarding non-financial firm loans and consumer loans. Secondly, they mention why they change the credit standards. This point is important and very informative since it gives an idea about banks' perception about the economy, the borrowers, and loan market. Thirdly, banks report how the borrowers' demand has changed in the survey period. It is another essential point of the survey since there is no other public source to measure the loan demand of non-financial firms and consumers. Furthermore, about the bank's liquidity conditions, the survey has important questions.

To sum up, in Turkey, the BLTS is conducted by the CBRT quarterly with the fifteen banks who have the highest share in the market. It gives detailed information about lending conditions and loan demand of the borrowers in the market. In this study, the credit standards are utilized as a measure of credit channel. Moreover, factors affecting the loan standards are used for the measures of the sub-channels of the credit channels which will be detailed in Chapter 4. To sum up, in Turkey, the BLTS is conducted by the CBRT quarterly with the fifteen banks who have the highest share in the market. It gives detailed information about lending conditions and loan demand of the borrowers in the market. In this study, the credit standards are utilized as a measure of credit channel. Moreover, factors affecting the loan standards are used for the measures of the sub-channels of the credit channels which will be detailed in Chapter 4.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

Along with the global financial crisis, the importance of the financial sector over the business cycles has been understood. From a general perspective, it is known that loans are important for consumption and investment financing. In the crisis period, the decline in the credits may be due to the decrease in the demand for loans of firms or households as well as the contraction of the credit supply of banks. In this case, the central banks implement monetary policies supporting the credit scheme and total demand. In this context, it has become important to understand monetary policy and its relationship and interaction with credit channels and business cycles.

Monetary policy affects aggregate demand and economic activity through household demand for consumption and firms' demand for investment. In the literature, it is referred to as the interest rate channel of monetary policy. However, especially after the global financial crisis, it has been commonly accepted that credits play a significant role in the monetary policy transmission mechanism and in the real economic activity; and, the way that monetary policy affects the real economic activity may differ according to the credit channel. Therefore, the real interest rate may not represent the stance of monetary policy. However, the reaction of the macroeconomic variables to monetary policy may be roughly the same in the traditional interest rate channel and the credit channel, as a result, their differentiation is difficult.

According to the credit channel theory, monetary policy is influential on economic activity through credit supply and credit demand. This channel works through the balance sheets of the lenders and the borrowers. However, since these effects are hardly observable, the identification of the credit channel is difficult.

In the literature, besides the broad credit channel, bank lending channel is also analyzed (Bernanke and Gertler, 1989, 1995). In this case, a change in monetary policy may affect the loan supply by changing the amount and the cost of borrowing from the central bank.

In light of the abovementioned framework of the credit channel, this study analyzes the importance of the credit channel in the monetary policy transmission mechanism in Turkey. In this chapter, section 3.2 summarizes the studies on monetary policy transmission mechanism differentiating traditional interest rate channel and credit channel. In section 3.3, regarding the monetary policy and transmission mechanism, the relevant studies conducted utilizing bank loans survey data is examined: and, section 3.4 summarizes and concludes the Chapter 3.

3.2 Monetary Policy Transmission Mechanism

The monetary transmission mechanism is the channel through which monetary policy affects the macroeconomic variables which are the production growth and the price level. Having perfect knowledge about timing and the results of the implemented monetary policy is necessary for the success of the monetary policy, and, it is crucial to understand the mechanism by which monetary policy affects the economy (Mishkin, 1995). In the literature, there are a wide range of views about monetary transmission mechanism that differ in the emphasis about money, credit, interest rate asset prices or the role that banks and other financial institutions (Taylor, 1995). Monetary policy transmission mechanism channels are divided into two main categories. The first one is the traditional interest rate channel, and the second one is the credit channel. The interest rate channel of monetary policy transmission mechanism focuses on the liability side of bank balance sheets.

The monetarist view claims that changes in money supply result in a change in total expenditure level and in asset prices, which result in the change of the level of production. According to the credit view, changes in monetary policy affect the amount of bank loans, asset prices and the level of real production respectively.

The credit channel view differs from the monetarist view by rejecting the idea that non-monetary assets are complete substitutes. As a result of the asymmetric information between the

lender and the borrower, lenders in financial markets cannot fully monitor borrowers. As a result, there occurs a difference between the cost of firms' internal financing sources and the cost of external funds. However, internal sources of finance, bank loans and other sources of finance are non-substitutable sources for firms since commercial banks have special tools such as providing firms with less costly funds than other alternative financing sources to control borrowers (Ramey, 1993).

In the following section, how the main channels of monetary policy transmission mechanism differs is explained.

In the literature, the issue of how financial stabilization is conducted has become important especially after the global financial crisis. The reason is that after the financial crisis, due to the slowdown in bank lending, it is questioned if it is the result of a decline in loan supply standards or loan demand. The regulatory framework was claimed as deficient because of its microprudential structure. The safeguards against financial instability should be strengthened, and the debate is about the channel of the defense. The recent consensus seems a move from microprudentials to macroprudentials. According to Ben Bernanke (2008):

“Going forward, a critical question for regulators and supervisors is what their appropriate ‘field of vision’ should be. Under our current system of safety-and-soundness regulation, supervisors often focus on the financial conditions of individual institutions in isolation. An alternative approach, which has been called system-wide or macroprudential oversight, would broaden the mandate of regulators and supervisors to encompass consideration of potential systemic risks and weaknesses as well.”

In the literature, the argument about the financial system is that systemic risk has not been taken into account as it should be. The regulations conducted for financial stability was microprudentials in which the policy is limited to the distress of individual institutions. The ultimate objective of microprudential regulation is consumer (investor/depositor) protection. The risk is taken as exogenous, and correlations and common exposures across institutions are considered to be irrelevant. As a result, the calibration of prudential controls is bottom-up. The idea is that while the banks financing themselves with government-insured deposits and deposit insurance has the effect of preventing runs (Diamond and Dybvig, 1983; Bryant, 1980), it

creates an incentive for managers of banks to take excessive risks. The aim of capital regulation is to make banks internalize losses to protect the deposit insurance fund and to eliminate moral hazard. If the level of the probability of the deposit insurer bearing losses is low enough, the microprudential regulation is working. However, there is a critique that when a microprudentially-oriented regulator pushes a troubled bank to restore its capital ratio, the regulator does not care through which channel it is done, either raising new capital or by shrinking assets. If a bank chooses to shrink its assets, and if the large fraction of the system is in trouble, similar attempts of many institutions can be damaging for the whole economy. (Borio, 2003)

Before the global financial crisis, systemic risk was insufficiently understood and its importance was underestimated. Its influence on the real economy was also ignored. That is why the emphasis is moving from macroprudential regulation to micro-prudential regulation which failed to ensure that financial institutions had sufficient capital and liquidity to cope with the financial and real sector shocks. The design of the macroprudential policy is under attention. The agreement is that the purpose should be to reduce the systemic risk, to strengthen the financial system against shocks and to provide stable functioning. However, the questions and debate continue since there is not a consensus exists yet. Firstly, the point is to define systemic risk. A proposed definition made by the IMF, FSB and BIS is as the following: risk of disruption to financial services that is caused by an impairment of all parts of the financial system and has the potential to have serious negative consequences for the real economy. Macroprudential policy focuses on the financial market as system-wide. For that reason, it complements the focus of the microprudential policy that is the risk of individual institutions and takes the economy as given. It has two main objectives: to strengthen the financial system's resilience to economic downturns and to limit the build-up of financial risks to reduce the probability and the severity of a bust.

Central banks have the responsibility of financial stability, sometimes implicitly. Macroeconomic stability reduces the financial system vulnerability, and a strong financial system reinforces the monetary policy. In fact, they both need to take into account each other's developments and objectives. The significance of each of them on the other depends on the financial conditions, macroeconomic environment and the share of bank-based intermediation.

By the coordination of the two authorities, it is expected to gather more moderate cycles. Before the global crisis, the consensus is that the monetary policy should focus on inflation targeting. However, there is an increasing literature that searches the implementation of macroprudential policy while the central bank implements price stability.

The stabilization of the macroeconomic environment requires a successful monetary and macroprudential policy that the two reinforce each other. Due to changes in banking activities and the structure of the financial system, the transmission mechanism seems to change over time. For that reason, considering the financial accelerator mechanism as well as the transmission mechanism of monetary policy to the economic activity and price stability has become one of the key components of monetary policy implementation. In this manner, from the monetary policy perspective, the transmission of monetary policy via the credit channel is important. In fact, in the literature, the credit channel is not separated from the interest rate channel, it is seen as a complementary one to the traditional interest rate channel (Bernanke and Gertler, 1995). The recent strand of literature studying the balance sheet channel emphasizes this channel as risk-taking behavior of banks. For that reason, it could be claimed that analysis of credit channel with its sub-channels is vital for financial stability matters.

3.2.1 Traditional Interest Rate Channel

In the Keynesian IS-LM model, monetary policy changes affect real production via interest rates change. According to the traditional interest rate channel theory, an increase in the short-term nominal interest rates first causes the long-term nominal interest rates to increase. Since prices do not adapt to the changes immediately, movements in nominal interest rates are reflected in real interest rates. The increase in borrowing costs for all types of maturities causes firms to cut investment expenditures and individuals to reduce their expenditure on housing, vehicles and other durable consumer goods (Ireland, 2005, p.3). The study of Mishkin (1995) contributed to the literature summarizing the baseline model of the monetary transmission mechanism as following:

(i) There are two types of assets such as money and others. The importance of reserves stems from the need for banks to keep reserves against demand deposits, and a decrease in reserve leads to a reduction in demand deposits which results in nominal interest rates rising.

Within this framework, there is no need for other means for banks to replace money in the economy (Ramey, 1993). The decision is based on the idea that financial innovations cannot develop fully substitute financial assets for money (Gertler and Gilchrist, 1993).

(ii) When a tightening monetary policy is implemented, short-term nominal interest rates increase as well as short-term real interest rates since prices cannot immediately adapt to changes in interest rates.

(iii) Expectations are rational. Long-term real interest rates are the weighted average of the expected short-term interest rates in the future. Therefore, the increase in short-term interest rates is reflected in the long-term real interest rates. Long-term real interest rates increased by monetary tightening affect total spending and investment decisions and change total demand since fixed capital investments, housing investments, stock investments and expenditures on durable consumer goods are sensitive to changes in long-term real interest rates. On the other hand, in the short term, the output level decreases because the output level is determined by demand.

Monetarist economists criticize IS-LM model since it focuses only on one asset price (interest rates) and ignores other asset prices. They described a mechanism that the relative prices of assets other than the interest rate and the monetary changes of the real wealth transfer to the economy (Mishkin, 1996). These are exchange rate channel, stock price channel and wealth effect.

Now, these three channels are explained broadly. The mechanism of how the exchange rate channel works is as the following. When there is expansionary monetary policy, real interest rate decreases, and demand for a domestic currency decreases. It results in an increase in foreign currency assets, which leads to an increase of total output level as net exports rises.

Mishkin (1995) claims that changes in the stock prices are effective on the economy via two sub-channels, which are Tobin's q-effect on investment and wealth effect on expenditure. According to Tobin's definition, Tobin's q is the ratio of the firm's market price to capital replacement cost. If the firm's q-value is high, by issuing new shares, the firm could finance its investments which results in an increase in production. Accordingly, stocks become more attractive than bonds and stock prices rise. Increase in the stock prices effective on the economy

via its impact of wealth on consumption expenditures. Modigliani's theory states that lifelong consumption depends on lifelong resources including human capital, financial wealth and real capital. When monetary policy expands, due to the increase in financial wealth of consumers, the total output level rises (Mishkin, 1996).

3.2.2 Credit Channel

In the literature, the transmission of monetary policy via the credit channel is examined with the two sub-channels of it. The first one is the broad credit channel. It is the firstly analyzed channel within these two subchannels. The second one is the balance sheet channel. Recently, due to risk-taking behavior effects, balance sheet channel is under consideration more than it was. This section briefly explains these two sub-channels of credit channel.

Broad Credit Channel

First milestone study for broad credit channel of the monetary transmission mechanism is conducted by Bernanke and Gertler (1995). Utilizing VAR methodology, they show that the traditional monetary transmission mechanism, the interest rate channel, is insufficient to explain the size, timing and composition of the response to monetary policy change. However, it is sufficient to explain the direction of the economy's response to the monetary policy change. As a result, the credit channel is not an alternative to the traditional interest rate channel, but a collection of factors that accelerates the effects of the traditional interest rate channel on the economy.

Gertler and Gilchrist (1993) claim that the main idea in the credit view is that there is no close substitution of bank loans for the majority of borrowers such as households and small firms since the cost of borrowing is very high for households and small firms by issuing securities. This group is entirely dependent on bank loans for external financing. Therefore, any cut in the flow of bank loans would have significant real effects.

Mishkin (1996) states that for the assumption that there are no sources of funds for banks to substitute fully, expansionary monetary policy leads to an increase in bank reserves and deposits which provides the opportunity to extend loan supply. Due to the unique role of banks

in the financial system, the increase in credit supply will lead to a rise in investment and possibly consumption expenditures.

The bank lending channel works through the impact of monetary policy on the amount of credit available to banks and thus the fluctuation of external financing premium for borrowers (Bernanke and Gertler, 1995). When the policy interest rate increases, the difference between deposit interest rates and treasury bill interest rates increases (Bernanke and Gertler, 1995). It is observed that non-deposit resource utilization costs of banks increases as a result of tight monetary policy. Consequently, as a result of monetary tightening, the resources that banks can use as loans are decreasing. In addition, Kashyap and Stein (1993) claim that strong relation between firms and certain brokerage houses will have a significant impact on the monetary transmission mechanism and that the credit channel will be stronger while other conditions are fixed.

When the academic literature is examined, due to restrictions on the credit channel identification, the data from the Bank Loans Tendency Survey is commonly used. There are studies for the US, Euro Area and some European countries utilizing the data of BLTS. For the Euro Area, there exist studies utilizing the BLTS data analyze for the transmission mechanism of monetary policy (eg. Maddaloni and Peydro, 2011). De Bondt et al. (2010) analyze the effects of survey data on the credit growth and gross domestic product growth with country panel data analysis and shows that. Similarly, Hempell and Kok Sorensen (2009) examine the relative importance of the various factors affecting supply constraints for the crisis period.

The studies for the US show that the data set is larger. Lown and Morgan (2006) show that changes in the credit standards have a predictive power of forecast loan growth and real economic activity, furthermore, following a contraction of the credit growth, economic recessions are observed. Swiston (2008) shows that a contraction of credit standards by 20 percent results in a decrease of economic activity by 0.75 percent after one year. According to Asea and Blomberg (1997) study, banks ease or tighten the credit standards conformably with business cycles.

There are also bank-based micro data studies as well as macro data studies. These studies, which analyze bank-based survey results with the loan growth of each corresponding bank, are

conducted for Italy (Del Giovane et al., 2010), Germany (Blaes, 2011), Denmark (Kuchler, 2012) and Croatia (Pintaric, 2015).

To sum up, studies on the credit channel mostly focus on the external finance premium that borrowers undertake due to asymmetric information between firms and lenders. The strength of the transmission of the monetary policy can be enhanced by the financial accelerator effect of the external finance premium. This channel is known as the broad credit channel or as the borrower balance sheet channel (Bernanke and Gertler, 1987; Bernanke and Blinder, 1992; Kashyap and Stein, 2000; Bernanke, 2007).

Balance Sheet Channel

In the literature, the balance sheet channel is recently more re-examined subchannel. Before analyzing its risk-taking behavior side, this subchannel is briefly explained.

The fact that borrowers are more advantageous in terms of having information about the project financed over lenders causes intention problems. For external lenders, the difference between external funding and internal funding is the compensation for the cost of mitigating this intention problem. This premium may reflect the expected cost of evaluation and monitoring. In both cases, foreign financing premium affects real economic decisions by affecting borrowing costs (Gertler and Gilchrist, 1993).

The balance sheet channel is based on the assumption that the external financing premium is based on the financial position of the borrower. A strong financial situation is important in terms of providing the conditions or rules such as certain financial ratios, showing certain guarantees and/or depositing a certain down payment could be met more easily for the borrower (Bernanke and Gertler, 1995). The balance sheet works with this effect that changes in monetary policy affect the financial situation of borrowers as well as interest rates. Monetary policy affects the balance sheets of borrowers both directly and indirectly. The increase in interest rates resulted from tight monetary policy decreases the value of assets in the assets of the balance sheet. In other words, foreign financing premium changes in the same direction in monetary policy. As the monetary policy is tightened, the financial situation of borrowers tends to be worsened indirectly. Bernanke and Gertler (1995) exemplify result of the tight monetary policy as the following: if the firm cuts its customers' expenses, the firm's income will decrease and

since fixed expenses will remain the same in the short term, this situation will negatively affect the financial position of the firm and decrease its net value.

In addition to the interest rate, the change in external premium is also complimentary factor in the effect of monetary policy on borrowing requirement, cost expenditures and real activities. This complementary movement also fills the gaps in the traditional interest rate theory in explaining the composition of the economic impact of monetary policy (Bernanke and Gertler, 1995). The balance sheet channel is based on the assumption that the external financing premium is based on the financial position of the borrower. A strong financial situation is important in terms of providing the conditions or rules such as certain financial ratios, showing certain guarantees and/or depositing a certain down payment could be met more easily for the borrower.

According to the broad credit channel, the relation between investment expenditures and domestic finance is strengthened compared to other times after monetary tightening (Oliner and Rudebusch, 1996). On the other hand, the relation between investment expenditures and domestic financing will be stable without a broad credit channel. According to the literature, the loan channel works through the effects of monetary policy on credit supply; however, the balance sheet channel operates on the effects of changes in monetary policy on the firm's balance sheets, firm's net value and cash flow. In that manner, the existence of incomplete information in the financial markets is critical to the existence of a separate credit channel.

Walsh (2010) states that credit market failures result from the reverse selection, moral weakness, monitoring costs, and costs of representation. Reverse selection is explained as: If the lender has sufficient knowledge of the expected return and risk of the funded project, the lender may differentiate the interest rate on customer basis and equalize the expected return to the opportunity cost. But if there is lack of information in the market, and when lenders do not know which risk group their customers are in bring the problem. Moral weakness problem is the problem about the behavior of the borrower affected by the terms of the loan agreement and the lender cannot control the behaviors of the borrower. Monitoring cost arises where the lender is obliged to monitor the borrower, and the monitoring cost may cause interest rate increases to decrease the expected return of the project financed from the lender. Moreover, when the activities of the borrower cannot be controlled or it is not possible for the borrower to share

information, the cost of representation can occur. The cost of representation causes a difference between external and internal financing (external financing premium). Bernanke and Gertler (1995) claim that the size of the external finance premium shows the imperfections in the credit markets.

In the literature, concerning the credit channel, the studies mostly focus on the credit channel in terms of firms. However, the credit channel works similarly in terms of consumers especially for housing and durable goods consumption (Mishkin, 1996). When monetary policy is tightened, it results in a decline in consumption of housing and goods made by households. When expectations are worsened, individuals tend to choose liquid assets rather than durable goods. For that reason, contrary to firms, the balance sheet channel for consumers works by changing the willingness of household to use credits.

Bank Lending Channel

In addition to the broad credit channel, there is also the bank lending channel. In this channel, any change in monetary policy may affect the loan supply of a bank by altering the quantity and cost of borrowing from the central bank. In the literature, the bank lending channel was firstly interpreted by Bernanke and Blinder (1988), and they call it a special case of multi-asset models. The main idea is that if someone wants to check the impact of tightening monetary policy, it should be checked that if it leads to the contraction of deposits available in the banking system. Bernanke and Blinder (1992) claim that it holds for the whole banking sector.

Kashyap and Stein (1995) state that if the lending channel works, it should be expected that the loan and security portfolios of large and small banks to respond differentially to a contraction in monetary policy. The central bank should have the capability to change loan supply power of banks via open market operations. Bank size is considered as one of the bank characteristics and it leads to information asymmetry (Kishan and Opiela, 2000). Ehrmann et al.(2013) state that smaller one is more affected by monetary policy actions.

Moreover, capitalization also matters in times of tightening or loosening. If a bank is better capitalized, it will raise external funds more easily. Furthermore, bank liquidity is important for banks in terms of their reaction to monetary policy. Kashyap and Stein (2000) argue that the banks who have the least liquid balance sheets are more affected by monetary policy actions.

After global financial, monetary policy actions and bank' responses have changed. Apergis and Christou (2015) claim that like another central bank, ECB has taken liquid measures. Recently, utilizing micro-level data, bank lending channel of EU countries are examined (Heryan, Tzeremes, 2017). They claim that lending channels are affected by changes in short-term interest rates and monetary aggregate of M2.

Monetary policy operates via bank lending channel to affect macro-economic variables. The first necessity is that firms should respond to loan supply changes. Secondly, the loan supply should respond to changes in monetary policy. And lastly, if prices adjust, money supply also changes. The bank lending channel operates through loan supply and the factors affecting it. This study contributes to the existing literature by identifying the bank lending channel and balance sheet channel utilizing the BLTS data for Turkey.

3.3 Literature on Bank Loans Surveys

In the literature, many studies are conducted relying on some theoretical models to test the effectiveness of monetary policy through credit channel. On the other hand, there is a growing literature that are trying to measure the impact of monetary policy on macro-economic variables empirically. One strand of literature stands solely on the macro variables and total loan values. The other strand of literature stand on the bank and/or firm-level data and search for the effectiveness of monetary policy transmission mechanism via micro-level data. Recently, bank loans tendency survey data are utilized by many researchers for many countries, both for developed and developing ones. The underlying reason is that bank loans tendency surveys are important sources of information about the credit market. In the data, the observed values are the ones that are realized after demand and supply conditions are met according to the price (interest rate) and the quantity of loans in the market. Therefore, to gather more information about loan demand, loan supply and the efficient determinants of the observed loan values, bank loans surveys are mostly utilized in the literature.

In the literature, the studies are conducted for most developed countries. There are papers analyzing the transmission of monetary policy for Euro Area, USA and Japan. In this part, their results and methodologies are summarized.

For the USA, the Senior Loan Officer Opinion Survey (SLOS) on Bank Lending is conducted by FED New York since 1967. Lown et al. (2000) test the results of the survey if they could forecast loan level in the market and the production level. Their study shows that there is a negative correlation between loan standards and the output which can be interpreted as the tighter standards cause a decrease in loan growth and GDP. The study also claims that tighter standards are the main factor in the higher interest rates causing a decrease of loan growth and the GDP. The regression analysis used by Lown et al. (2000) illustrates that the coefficient of the tightening the standards is negative as expected and this result is significant at five percent or one percent for all sub-periods. However, it is found that the coefficient of demand variable is negative but statistically insignificant contrary to expectations. They also studied the relation between loan standards and the level of economic activity. They claim that the effect of credit standards on firm expenditures depend on the impact of credit standards on the loan level. According to this study, credit standards have a significant effect on investment of durable goods, the change in stock investments and production. They also emphasize that there is no strong relation between stock investments and credit standards while stock investments are estimated to move along with interest rates. Moreover, they test the asymmetry between tightening and easing the credit standards via VAR analysis. Lown et al. (2000) claim that the relaxation in the credit standards takes effect later than the tightening in the standards. Banks continue to tighten standards for a year after a shock in the tightening of standards and loosening standards only after two years. However, it is claimed that since the survey do only reflect the opinion of banks, the sample is too small to present the credit market and there is a high possibility of respond bias, the results of the study should be tested via robustness checks.

Lown and Morgan (2004) do the similar analysis of Lown et al. (2000), but in the later study, they utilize single equation VAR methodology and separate the analysis period into two as 1968Q1-1984Q1 and 1990Q2-2000Q2. Their results show that tight credit standards are associated with lower credit and output levels in the future. While there is a reverse causality between the credit level and the standards because of the relationship between the high amount of credit in the previous period and the tightening of standards in later period, there is no direct relation between the output level of the previous period and the standards. The indirect relationship between the output level of the past period and the standards stems from the positive correlation between the past output level and the loan amount. According to impulse response

analysis in the study, eight percent shock was given to the net percentage change rate of the banks that reported that they tightened the standards. Then the changes in standards, GDP, GDP deflator, prices, government bond interest rates and loan amount were examined. According to the results of this analysis, after a tightening shock in the standards, standards continue to be tightened for the proceeding three quarters and only after nine quarters the credit standards started to be eased. Interest rates on loans, output and government bonds are decreasing in response to the tightening of standards. While credit contracts decreases following the shock, and continue to decline until the standards were loosened. Shocks to commodity prices and credit amounts lead to tightening of standards, while shocks to government bond interest rates do not affect standards.

In order to include the changes in loan demand to the study, the authors made a new analysis by using the proxy variables, such as expected output level, expected return on investments and bankruptcy rates, for the loan demand in the model². When the model is extended with these variables, credit standards are again found to be significant to estimate loan level and the production level. However, the VAR analysis with the added variables revealed that when credit standards are implemented, loan interest rates become insignificant in estimating the output level whereas, within the variables added, only bankruptcy rates were significant in explaining the change in standards.

Another study utilizing the Senior Loan Officer Opinion Survey is conducted by Cunningham (2006). This study seeks an answer to the question of whether banks' senior credit managers are only a well-informed group or a group that can affect the rest of the economy by using the results of the Senior Loan Officer Opinion Survey implemented by the FED. Within a framework of time series analysis, based on the standards and demand of loans, Cunningham (2006) claims that the question about the banks' willingness to give consumer loans provides information not only for consumer loans but also for GDP and housing market. The willingness of banks to give consumer loans can predict real GDP changes. The real growth rate of private sector investments significantly depends on commercial loans and the willingness of banks to

² They also add the ratio of interest payments to cash flows to represent the credit quality; the spread between the interest rate applied to commercial bonds and government bonds as a signal for possible economic contraction; capital to asset ratios of banks and loan interest rates.

use installment consumer loans. In addition, results show that willingness to extend consumer loans is also significant in predicting housing market activities.

Another study utilizing the Senior Officer Opinion Survey is conducted by Swiston (2008), and finds that a net tightening of credit standards by 20 percentage points reduces the economic activity by 0.75% after one year and by 1.25% after two years.

Disentangling the supply and demand factors using stock variables of loans and/or other macro-variables is difficult. It is known that the realization is a result of the equilibrium values of the supply and demand of loans since changes in both prices and quantities reflect shifts in credit demand and supply curves, which change as a result of business cycle fluctuations and monetary policy implementation (see Bernanke and Gertler 1995, Kiyotaki and Moore 1997, and Bernanke et al. 1996).

The study of Giovane et al. (2010) searches the relative role of supply and demand factors in shaping credit developments in Italy. It also assesses the role of the various factors behind changes in credit standards, distinguishing between factors relating to the cost of funds and balance sheet constraints on the one hand and factors connected to borrowers' creditworthiness and banks' risk perception on the other. The analysis conducted by combining qualitative information from the Eurosystem Bank Lending Survey (BLS) with micro-data on loan quantities and prices for the Italian banks participating in the survey. A counterfactual experiment they conduct claims that both demand and supply factors had a significant negative impact on credit developments during the financial crisis.

The studies thus far examined mostly test the relevance of the survey data for estimation the macroeconomic variables or the consistency of the survey variables with the credit realizations. However, since the survey data is an important indicator for credit market realizations and the perception of the banks about credit market developments, there are many studies conducted to capture the relationship between monetary policy and credit variables utilizing the bank loans tendency survey data.

Another study utilizes Euro Area Bank Lending Survey is conducted by Bondt et al. (2010). They firstly examine if the BLS data is a credible measure or not, and they claim that the survey data is a credible measure of credit availability. Furthermore, with cross-country panel

regressions, they show that credit standards to enterprises, the corresponding price and non-price conditions and terms significantly effective in explaining bank loan growth and real GDP growth in the Euro Area. Their findings also show that loan growth is not only affected by changes in loan demand in the short-term, but also by changes in bank loan supply restrictions. If the details of the study is analyzed, they are as follows. Bondt et al. (2010) used survey data from 12 Euro Area countries for 28 quarters to measure the power of the survey to predict bank loans and real GDP. They implement panel regression including questions about credit standards, conditions and terms, and risk perception in addition to credit standards. The results of the panel regression show that credit standards, and conditions and terms have predictive power for loans and real GDP. Although standards are more effective in the same period for housing loans; for commercial loans, standards are effective in the third and fourth lagged values; and for consumer loans, credit standards have the highest impact in the third lagged values. Moreover, in terms of maturity of loans the effect of standards is higher for short-term loans. After the credit demand was also included in the regression, it was seen that the standards for commercial loans and the survey responses regarding the conditions and rules are four quarter earlier than the growth rate of the bank loans. According to the study, the growth in loan amount is not only affected by short-term demand changes but also by changes in credit supply constraints. This study implies that credit demand and monetary policy interest rate are significantly important for the commercial loan growth rate, and they claim that the results prove the existence of the loan, balance sheet and risk-taking channels of monetary policy transmission.

Bondt et al. (2010) study the Euro Area as possible as much including the countries. Another similar study is conducted by Hempell and Sørensen (2010) utilizing Bank Loans Survey data of European Central Bank to measure the effects of the bank balance sheet restrictions on credit developments. The study is carried out over the panel data set consisting of data from 12 countries. The changes in loans given to non-financial companies and consumer loans for housing are analyzed with additional information obtained from the survey, as well as macroeconomic variables in order to determine the effects of supply and demand. In the first model credit growth rate is analyzed with the percentages of the net change in demand and standards, and with additional control variables. In the second model, factors affecting standards were used instead of standards. Cost of capital, access to market finance and bank's liquidity

position is included in the analysis as credit supply effects. The factors affecting standards consisting of expectations about economic activities for commercial loans, the outlook for industry/firms and expectations for housing loans were added to the model as a proxy for banks' risk-driven supply movements. The results indicate that even when demand-driven effects are controlled in both housing loans and commercial loans, pure supply-driven effects are significant in explaining the loan growth rate. The credit growth rate is negatively affected by supply constraints and supply constraints reflect the risk factors as well as the conditions in the bank's balance sheets. Furthermore, the increase in the price and the limitations on the loan amount has a negative effect on the growth rate of the loans.

For the Euro Area, another study implies that the existence of credit channel in Eurozone and the change in credit supply as a result of the changes in standards and credit volume affects economic activity level (Cappiello et al.,2010). The analysis using BLS data of European Central Bank survey data are conducted to investigate the effect of changes in the cost of banks on credit supply and the effect of the change in credit supply on the output.

In addition to the studies conducted for the Euro Area, utilizing the results of the BLS of ECB of participant countries, there are studies conducted for individual countries. Pintaric (2015) analyzes the effect of supply and demand on credit growth standing on the Survey answers by individual banks of Croatia, and individual banks is combined with the Survey answers on credit standards and credit demand. The analyses are conducted via the microeconomic panel data analysis, and the results show a statistically significant relationship between the growth of loans to enterprises and the growth of consumer credit and other lending on one hand and credit standards and credit demand. However, it is noted that changes in credit demand have a faster impact on credit growth than changes in credit standards.

Moreover, there are studies for Euro Area utilizing micro-level data. Van der Veer and Hoerberichts (2013) asses that a one-point increase in the level of a bank's lending standards, which means tightening, reduces the bank's quarterly growth rate of business lending in the range of 0.5 percentage points, relying on micro-data on the sample of banks that participate in the Eurosystem Bank Lending Survey in The Netherlands. A similar study is conducted for Germany by Blaes (2011). They investigate the relative importance of several factors that affect developments of loans given to non-financial firms. Microdata on lending with BLS is the data

they utilize. The study shows that BLS explain the observed lending significantly. Moreover, their findings imply that, during the sample period, one-third of the negative loan development is due to the tightening adjustments of bank-side determinants.

Kuchler (2012) analyses which factors of loan demand and loan supply have a meaningful impact on loan growth. The contribution of the study is that it measures the relative importance of the factors of loan demand and loan supply. It implies that demand shocks have the most significant effect on loan growth in all the model specifications, however, supply shocks are effective in some specifications. These results are gathered utilizing micro-level data for Danish bank system and the Danish Bank Lending Survey. In times of stress, banks seem to have a tendency to tighten loan standards more than the macroeconomic conditions imply.

Dell Arricia et al. (2012) searches the relation between loan growth and loan denial rates by a large data set of loan applications. During the US mortgage credit boom period, they show that loan denials were lower in areas where loan growth is faster. Furthermore, it is also showed that the relationship between loan denials and loan growth is beyond a correlation relation, lower denials are triggered by an exogenous increase in loan growth. Unlike other papers focusing on supply-side factors, this paper focuses on the demand side. Furthermore, this study claims that as the reduced loan standards become efficient, the decline in monitoring bad borrowers increases the likelihood of financial instability.

When the literature is examined more deeply, it is seen that the focus is mostly on the effect of monetary policy or credit channel on macro variables, which is the rational and expected one. In the literature, it is found that when the monetary policy rate is low, loan standards to firms and households are softened; and, the softening process is amplified when the securitization is high and supervision for bank capital is weak (Maddolini and Peydro, 2010). The reason might be that low-interest rates may encourage banks' risk-taking behavior.

Risk-taking channel is analyzed through three mechanisms (Delis et al., 2017). In the first case, low-interest rates increase the bank-asset managers' incentives to take more risk which is stated as in the study of Rajan (2005). The second mechanism works between interest rates and probability of default via price volatility (Borio and Zhu, 2008). Adrian and Shin (2010) claim that low interest rates lead to a higher value of banks' asset portfolios which results in banks to

undertake risky positions. Thirdly, if the central bank commits for the lower interest rate to decrease the probability of risks, it makes banks to assume there exist greater risk; and, it is called a transparency effect. De Nicolo et al. (2010) claims that if the current rate is high, expected interest rate cuts corresponds to a higher risk position when monetary policy can be eased.

Another study that examines the relationship between risk-taking behavior and monetary policy is conducted by Bekaert et al. (2013). As the central banks loosen liquidity conditions, risk-taking in the financial markets increases. This risk-taking behavior is regarded as the unnoticed or forgotten transmission mechanism of monetary policy. The study of Bekaert et al.(2013) provides a first characterization of the dynamic links between risk, uncertainty and monetary policy where risk and uncertainty are the components of implied volatility, and vector autoregressive methodology is utilized. The results show that loose monetary policy causes an increase in the risk-taking behavior in the future and the effect is significant between nine months and two years. The converse result also applies, high uncertainty and high-risk aversion lead to loose monetary policy.

Jimenez et al. (2007) show that when interest rates are low prior to loan issuance and interest rates are high over the life cycle of the loan, loan credit risk is maximized. They utilize the credit register data of Spain. Their findings imply that when the interest rates are low at loan origination, hazard rates, i.e. default probability per unit of the period, increase. Furthermore, in that case, they find that banks also soften their lending standards, where they lend more to borrowers who have bad loan history. This result shows that monetary policy is effective on the composition of loan within the economy via redistribution of the loans according to the quality of borrowers.

The risk-taking channel of monetary policy is defined as to denote the impact of monetary policy to consider the risk-taking behavior of market participants, and it affects the financial conditions which lead to an effect on real economic variables (Borio and Zhu, 2012). Bruno and Shin (2015) focuses on the operational side of the risk-taking channel of monetary policy through the banking sector. They show that banking sector leverage is a channel for monetary policy transmission effective on exchange rate movements and cross border bank capital flows.

This study complements micro-level studies of the risk-taking channel via searching how credit standards are affected by monetary policy decisions.

How macroeconomic shocks are transmitted into banks' risk-taking behavior is analyzed by Buch et al. (2014). Their findings show that after an expansionary macroeconomic shock, lending by a bank increases; and, in terms of the transmission of the shocks to banks, there is asymmetry due to bank-specific characteristics and loan types. Utilizing FAVAR methodology, they search for the heterogeneous exposure of US banks to macroeconomic shocks. Their findings show that these shocks are effective on bank risk and other macroeconomic variables, and bank lending increases following an expansionary shock.

Liu and Minford (2014) search for the credit channel of monetary policy via standard New Keynesian model framework. They show that financial shocks are seriously effective on the banking crisis and they account two-thirds of output gap depending on the form of the shock.

The baseline study for this thesis is the analysis of Ciccarelli et al. (2015) for the US and Euro Area. They search for the effectiveness of monetary policy via the credit channel on GDP and price level. Their claim is that monetary policy has an impact on real macro-economic variables, through loan supply and loan demand, by affecting the balance sheet of borrowers and lenders. However, the changes cannot be observable. For that reason, identification of the credit channel and decomposition of it into sub-channels is vital. Since credit variables do not reflect enough information for the identification of loan supply, the literature tries to solve the identification problem via microdata (Bernanke and Gertler, 1995). However, this identification method through microdata cannot fully analyze the impact of a monetary policy shock on real activity (Kashyap and Stein, 2000). Ciccarelli et al. (2015) solve the problem of identification via utilizing the BLS data for the Euro Area and SLOS for the US. This study contributes to the existing literature as decomposing the credit channel into its sub-channels. Moreover, it links the monetary policy, the financial sector and the business cycles.

Finally, the study conducted on the Turkish economy standing on Bank Loans Tendency survey is considered. Kurul (2011) aims to measure the explanation power of the CBRT Bank Loans Tendency Survey in explaining credit growth and economic activity. In order to examine the effects of the willingness of banks to give loans to borrowers on credit growth, the

percentage of net change in standards and the percentage of net change in loan demand from the survey are employed in the model. The results show that when loan demand increases, the loan growth rate also increases although the relationship was not statistically significant. The study also examines the effect of price or non-price factors on credit growth rate by including credit conditions and terms as explanatory variables instead of credit standards. Results illustrate that if there is a tightening in credit conditions and terms, it has a negative impact on the credit growth rate. While both price and non-price conditions have an impact on credit growth, the coefficient of profit margin on risky loans alone is not statistically significant. In addition, the effect of the factors affecting standards on credit growth rate was examined. The study claims that the tightening effect of competitive pressure on standards has a positive effect on credit growth but the deterioration in balance sheet constraints and risk perception led to a slowdown in loan growth.

Moreover, in the second part of the study, the relationship between credit supply and economic activity level is examined and the results show that the tightening in credit standards adversely affects the level of economic activity. Kurul (2011) was also tested credit channel by using survey data. The results indicate a negative relationship between the monetary policy interest rate and the change in the bank's balance sheet constraints.

3.4. Summary

Transmission of monetary policy is a highly popular issue among researchers, academicians and policymakers. The reason is that monetary policy is one of the most effective tools that policymakers manage the economy. For that reason, analyzing its impact on macro variables is vital. However, there are many channels that the monetary policy transmission mechanism works through. These are summarized as price and quantity channel (Bernanke and Gertler, 1995). When the studies are examined, there is much study needs to be done.

The literature about the monetary policy transmission mechanism stands on theoretical and empirical studies. Theoretical studies utilize New Keynesian models. Following impulse response analysis, they search for the effectiveness of monetary policy shocks on macro-economic variables. However, utilizing real-world data, advanced econometric tools are utilized

in that manner. The hard point in terms of analysis is the identification of the credit channel and decomposition of its sub-channels. For this purpose, the utilization of bank loans survey data is commonly referred to. Since these surveys give detailed information about the credit conditions of the market, the data gathered from them is invaluable. The banks answer the questions regarding how credit standards, credit demand, conditions and terms, and the factors affecting the loan standards and demand have changed. These variables are used as measures of loan supply, loan demand and sub-channels of the credit channel. Ciccarelli et al. (2015) precisely identifies the broad credit channel and decompose it into sub-channels within Bayesian VAR methodology.

In this thesis, following the methodology of Ciccarelli et al. (2015), the broad credit channel of monetary policy and its sub-channels are identified utilizing the BLTS of the CBRT. It is the first study conducted for Turkey in that manner.

CHAPTER 4: METHODOLOGY & DATA

4.1 Introduction

In this chapter, empirical strategy, macroeconomic variables and identification strategy for the credit channel are explained. Since the main objective is to test the theory of the credit channel of monetary policy, identification of credit channel variables is important.

According to the theory, monetary policy has real effects through credit supply and demand via its effect on the balance sheet of lenders and borrowers. However, the effect via credit channel mostly unobservable. For that reason, it is important to identify the credit channel and its sub-channels. According to the literature, this issue has not been clarified yet via both micro-level and macro-level data. Although identification of the credit channel is difficult, identification of its sub-channels is much harder.

In this study, this problem is tackled by using the Bank Loans Tendency Survey (BLTS) data which is detailed in Chapter 2. Like any survey data, using the survey data have pros and cons. The reliability of answers can be questioned however, this survey is conducted by the Central Bank like other countries. If the reliability of the answers of the survey are suspected, the Central Bank could cross-check the data with hard bank data. This makes the survey data reliable and credible in terms of the information it provides.

With the help of the BLTS data, this study quantifies the level and relative importance of the credit channels via different designed experiments. The crucial point is to disentangle the effects of monetary policy through the credit channels by using the data gathered from the BLTS. For this point, factors affecting the loans standards are utilized. The reasons behind banks' decisions for changing their lending standards are important to see via which channel monetary policy has an impact on the aggregate macro variables.

In order to test the effect of monetary policy via credit channel, the most convenient way is a contractive monetary policy shock which reduces output and price level via a decrease in loan supply and a tightening in loan standards due to constraints regarding firms and households. The main purpose is to identify the different balance sheet channels which are of firms and households.

This chapter focus on the data that address the identification issues. All the variables are quarterly. The analyzed period lies between the last quarter of 2004 and the last quarter of 2016. In section 4.2.1, variables that are gathered from the Bank Loans Tendency Survey is summarized, and the credit variables are described; in section 4.2.2, macroeconomic variables. Section 4.3 explains the reasons using Bayesian VAR method and illustrates the empirical method.

4.2 Data

In this section, the Bank Loans Tendency Survey conducted by the CBRT and macroeconomic variables for Turkey those are utilized in the model of the study are explained. Moreover, as Euro Area variables are used as priors in the Bayesian VAR method, Euro Area Bank Lending Survey and Euro Area macroeconomics variables are depicted.

4.2.1 The Bank Loans Tendency Survey

Details of the Bank Loans Tendency Survey released by the Central Bank of the Republic of Turkey are explained and analyzed in Chapter 2. In this section, BLTS is analyzed slightly, but more specifically, data gathered from BLTS which are utilized in the models and identification methods for credit channels is illustrated.

The Central Bank of the Republic of Turkey conducts the BLTS to provide information on the loan standards of the banks that they apply to their customers and on the loan demand of those customers. The BLTS contains 26 questions about the previous quarter's credit developments and expected credit developments for the following quarter. The survey focuses

on two borrower types which are firms and households. Loans given to households are sub-grouped as housing, vehicle and personal loans.

The BLTS is published quarterly on the website of the CBRT³ at the beginning of the following months: January, April, July, and October. Each survey period is the previous quarter of the mentioned months. For example, the April survey gives the results of the January-March period. The answers are reported as net percentage change which is the aggregated result of each participating bank. The answers at the bank level is confidential.

The survey is answered by 15 banks which has the largest shares in the loan market operating in Turkey and these banks provide almost 80 percent of the total loans in the banking sector in Turkey. These respondent banks consist of one public, nine private and five foreign banks. The sample of the banks of the BLTS is a representative of the banking sector in Turkey.

The coverage of the BLTS has changed slightly since the beginning of the questionnaire. When the historical changes within the questionnaire is checked, it is seen that there are few questions added to the survey and one method change. Beginning from the October-December 2012 survey round, the questions regarding the underlying currency of loans granted to firms are added. This information provides a deeper knowledge of the loans those may differ according to cost or demand conditions. In this survey period, the questions regarding the funding conditions were also included to the BLTS. Beginning from the April-June 2014 survey period, the question regarding the size of the loan or the credit line granted to firms were added. Furthermore, in this period, two questions regarding the changes in international funding costs and other conditions and terms for international funding are added to the BLTS. In terms of methodological change, as of the January-March 2017 period, the weighting method of the answers has been changed. It was a three-month weighting system and it has been changed to a one-year weighting system. However, when the previous series and the current series are compared, there is no compromising or sign change of answers, instead, there are minor changes.

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<http://www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Statistics/Tendency+Surveys/Bank+Loans+Tendency+Survey/>

The BLTS covers both loan standards and loan demand. Regarding loan supply, questions measure changes in loan standards, changes in the factors affecting the loan standards, and differences in credit conditions and terms applied to customers. Regarding the loan demand, the BLTS measures how customers' loan demand changed and illustrates how factors affecting loan demand changed. Furthermore, banks' expectations for lending standards and demand for loans for the following quarter are also asked which give a priori information about their expectations regarding the economic outlook since households and firms are representatives of the economy.

For the loan supply, firstly, banks are asked how they changed their lending standards for each type of loan, i.e. loans to firms and to households which are sub grouped as housing, vehicle and personal loans. Loan standards are claimed to be internal guidelines of a bank's lending policy (Freixas and Rochet, 2008). For market actors, answer to loan standards give idea about how banks perceive borrower's and act accordingly. The underlying reason of lending behavior of banks and/or how they perceive the customers lie under the question of the factors affecting bank's credit standards. The question asking how the factors have affected bank's credit standards differentiates bank balance sheet constraints, changes in competition pressures from other banks, changes in borrowers' balance sheet constraints regarding their credit worthiness and net worth.

About the loan demand, like loan supply, the questions are asked in distinction of loans to firms, and households with sub groups of housing, vehicle and personal. Banks answer how demand for loans or credit lines to firms have changed apart from the seasonal fluctuations. Moreover, like loan standards, banks are asked how the factors affected the demand for loans or credit lines. Factors affecting the loans demand are grouped under four categories: financing needs, use of alternative finance, tax and similar burdens on loans, and other factors.

Concerning the aim of this study, the answers of few questions are utilized. These are the questions about loan standards, loan demand and the factors affecting loan standards. In the model, the answer to the question, which asks how bank's credit standards have changed as applied to the approval of loans or credit lines to enterprises, is used as an indicator of loan supply to firms (Table 4.1). Similarly, the answer to the question, how banks have changed credit standards as applied to the approval of loans to households for house purchase, is

evaluated as an indicator of housing loan supply (Table 4.2). The answer to the question, how banks have changed credit standards as applied to the approval of other consumer loans to households, is evaluated as an indicator of personal loan supply (Table 4.3). The answer to the question, how banks have changed credit standards as applied to the approval of loans to households for vehicle purchase, is utilized as an indicator of vehicle loan supply (Table 4.4).

The similar case applies for the demand side. Banks' answer to the question, how the demand for loans or credit lines to enterprises changed, is used as a measure of loan demand of firms. The questions asking how the demand for loans to households changed at the bank apart from seasonal fluctuations is answered for each type of household loans and they are used as an indicator of housing, vehicle and personal loan demand respectively.

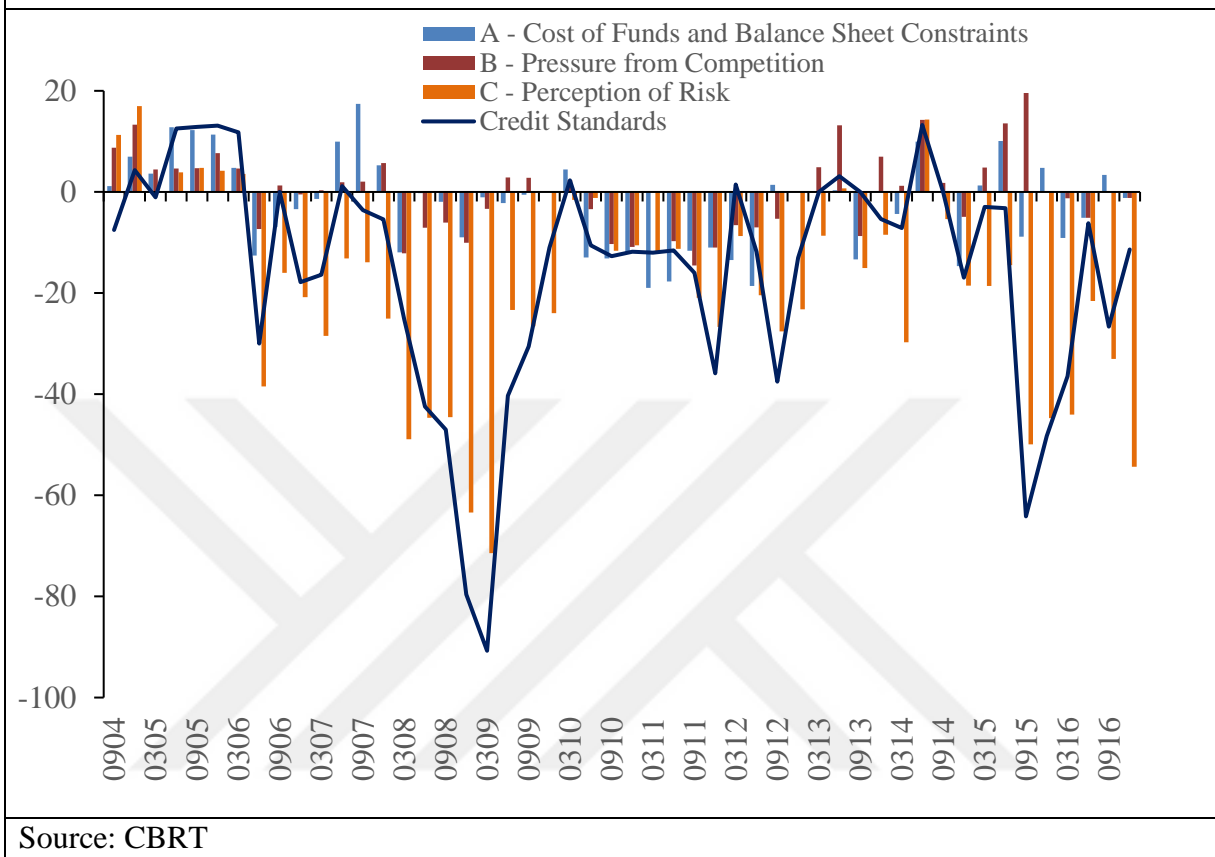
The variable of loan supply gives the idea of how monetary policy work through broad credit channel for the specified loan type. For that reason, the answer to the question, how bank's credit standards as applied to the approval of loans or credit lines to enterprises have changed, is the broad credit channel variable in this study in line with the literature. The important point in this study is to differentiate sub channels of credit channel which are borrower's balance sheet channel and bank lending channel (Table 4.5). To overcome this issue, BLTS variables are utilized. For this purpose, answers to the question, factors affecting credit standards are used as measures of borrower's balance sheet channel and bank lending channel.

Factors affecting the loan standards differ slightly for firms and for households. All these factors' impact on lending standards is in the direction of tightening if reported as negative, is in the direction of easing if reported as positive (Graph 4.1). If a factor is reported as zero, it means that it does not have an impact on lending standards for the relevant quarter. Firstly, factors affecting loan standards as applied to the approval of loans or credit lines to enterprises is explained. Factors affecting credit standards regarding firms have three main subjects. First one is cost of funds and balance sheet constraints. This issue is divided into three sub categories to specify which component is most effective in determining the cost of funds and balance sheet constraints of the bank. These sub categories are costs related to bank's capital position, bank's ability to access money or bond market financing, and bank's liquidity position. In the periods of tightening, costs related to bank's capital position seems to be the most effective component

whereas, within these three sub categories, other factors have also impact on loan standards (Graph 4.1).

Second factor regarding loan standards is pressure from competition. It has three subcategories in terms of competition issue, these are: competition from other banks, competition from non-banks, and competition from market financing. When their historical change is evaluated, competition from non-banks and competition from market financing move mostly in the same manner and most of the time, they affect loan standards negatively. However, competition from other banks displays contribution on terms of tightening the loan standards in period of serious tightening such as in 2008 and 2011 (Graph 4.1). The first and second issues are related to the bank's own constraints however the third one differs from others since it gives the idea about bank's perception about borrowers. This third issue effective on lending standards of loans given to firms is perception of risk. Similarly, it has also three sub components, these are given as expectations regarding general economic activity, industry or firm-specific outlook, and risk on collateral demanded. These sub categories' analyses show that since the beginning of the survey, they mostly move in coherence. On the other hand, it is obvious that expectations regarding general economic activity and industry or firm-specific outlook contributes more to lending standards.

Graph 4.1. Credit Standards Applied to Non-Financial Firms and the Factors Affecting Credit Standards



Now, factors affecting loan standards as applied to the approval of loans or credit lines to households is explained. For households, the survey is conducted for different household loan groups. These are housing, vehicle and personal loans, as mentioned. Factors affecting credit standards differ slightly for these subcategories of consumer loans. For all these subgroups of consumer loans, factors effective on loan standards have three main issues, similar to the factors affecting loan standards regarding firm loans, these main factors are: cost of funds and balance sheet constraints, pressure from the competition, and perception of risk. Cost of funds and balance sheet constraints factor has no sub-components for all types of consumer loans. Historical development of this factor for housing loans shows that in the tightening periods like 2008 and 2011, this factor was effective on the tightening of consumer loans standards. Most of the survey period from the beginning, this factor moves similarly to all subgroups of consumer loans (Graph 2.7, 2.9, 2.11).

For all subgroups of consumer loans, pressure from competition has two sub-components. These are: competition from other banks and competition from non-banks. From the beginning of the survey, these factors for the housing loans displayed as unchanged or mostly contributed in terms of easing of housing loan standards. In tightening times of 2008, their contribution was in terms of tightening the housing loan standards. For the housing loans, the third factor, perception of risk, has two components which are expectations regarding general economic activity and housing market prospects. During times of tightening of the loan standards, their effect was also in the way of tightening on the housing loan standards.

When the factors affecting vehicle and personal loans are examined for the factor of perception of risk, they have similar components. Banks respond to how they act in the decision of lending standards in terms of perception risk issue under three components which are expectations regarding general economic activity, the creditworthiness of consumers, and risk on collateral demanded. Their historical movements show that most of the time banks have the tendency to report these factors in terms of tightening contribution to lending standards. Expectations regarding general economic activity have the most powerful impact within the components of perception of risk group.

Table 4.1 Factors affected bank’s credit standards as applied to the approval of loans or credit lines to enterprises

<i>Factors Affecting Commercial Credit Standards</i>	Contributed Considerably to Tightening of Credit Standards	Contributed Somewhat to Tightening of Credit Standards	Contributed to Basically Unchanged Credit Standards	Contributed Somewhat to Easing of Credit Standards	Contributed Considerably to Easing of Credit Standards	Not Applicable	Net Change %
A-COST OF FUNDS AND BALANCE SHEET CONSTRAINTS							
Costs Related to Your Bank’s Capital Position							
Your Bank’s Ability to Access Money or Bond Market Financing							
Your Bank’s Liquidity Position							
B- PRESSURE FROM COMPETITION							
Competition From Other Banks							
Competition From Non-Banks							
Competition From Market Financing							
C- PERCEPTION OF RISK							
Expectations Regarding General Economic Activity							
Industry or Firm-Specific Outlook							
Risk on the Collateral Demanded							

Table 4.2 Factors affected bank’s credit standards as applied to the approval of loans to households for house purchase

<i>Factors Affecting Housing Credit Standards</i>	Contributed Considerably to Tightening of Credit Standards	Contributed Somewhat to Tightening of Credit Standards	Contributed to Basically Unchanged Credit Standards	Contributed Somewhat to Easing of Credit Standards	Contributed Considerably to Easing of Credit Standards	Not Applicable	Net Change %
A- COST OF FUNDS AND BALANCE SHEET CONSTRAINTS							
B- PRESSURE FROM COMPETITION							
Competition From Other Banks							
Competition From Non-Banks							
C- PERCEPTION OF RISK							
Expectations Regarding General Economic Activity							
Housing Market Prospects							

Table 4.3 Factors affected bank’s credit standards as applied to the approval of loans to households for personal loans

<i>Factors Affecting Personal Credit Standards</i>	Contributed Considerably to Tightening of Credit Standards	Contributed Somewhat to Tightening of Credit Standards	Contributed to Basically Unchanged Credit Standards	Contributed Somewhat to Easing of Credit Standards	Contributed Considerably to Easing of Credit Standards	Not Applicable	Net Change %
A- COST OF FUNDS AND BALANCE SHEET CONSTRAINTS							
B- PRESSURE FROM COMPETITION							
Competition From Other Banks							
Competition From Non-Banks							
C- PERCEPTION OF RISK							
Expectations Regarding General Economic Activity							
Creditworthiness of Consumers							
Risk on the Collateral Demanded							

Table 4.4 Factors affected bank’s credit standards as applied to the approval of loans to households for vehicle purchase

<i>Factors Affecting Vehicle Credit Standards</i>	Contributed Considerably to Tightening of Credit Standards	Contributed Somewhat to Tightening of Credit Standards	Contributed to Basically Unchanged Credit Standards	Contributed Somewhat to Easing of Credit Standards	Contributed Considerably to Easing of Credit Standards	Not Applicable	Net Change %
A- COST OF FUNDS AND BALANCE SHEET CONSTRAINTS							
B- PRESSURE FROM COMPETITION							
Competition From Other Banks							
Competition From Non-Banks							
C- PERCEPTION OF RISK							
Expectations Regarding General Economic Activity							
Creditworthiness of Consumers							
Risk on the Collateral Demanded							

This study contributes to the literature in two ways. Firstly, it identifies the impact of monetary policy shock on loan demand and loan supply. Secondly, and more importantly, this study differentiates the effect of the borrower balance sheet channel of firms and households from the bank lending channel. For the identification problem, BLTS data is utilized. The identification method stands on the answers of the BLTS data for Turkey. Since the CBRT conducts the survey, there is no doubt on the reliability of the BLTS. Standing on the answers of the survey, according to the answer to the question how they changed lending standards is used as a measure of loan supply which is quantified as broad credit channel in the model of this study. To disentangle the credit channel, factors affecting the loan standards are utilized. Cost of funds and balance sheet constraints and pressure from the competition are a measure of bank lending channel. Borrower's balance sheet channel is quantified by using the factor of perception of risk (Table 4.5).

Credit Channel Variable	Questions of BLTS
Bank Lending Channel (BLC) Variable	A – Cost of Funds and Balance Sheet Constraints
	Costs Related to Bank's Capital Position
	Bank's Ability to Access Money or Bond Market Financing
	Bank's Liquidity Position
	B – Pressure from Competition
	Competition From Other Banks
	Competition From Non-Banks
	Competition From Market Financing
Borrower Balance Sheet Channel (BBSC) Variable	C – Perception of Risk
	Expectations Regarding General Economic Activity
	Industry or Firm Specific Outlook
	Risk on Collateral Demanded

Euro Area Bank Lending Survey has a similar structure in terms of content, questions and answers. The survey makes it easier to match the variables that are gathered from the Bank Loans Tendency Survey of the Central Bank of Turkey and those are gathered from the Euro

Area Bank Lending Survey (BLS). For the Euro Area, each country's national central bank provides information via a quarterly survey about bank lending standards with a representative collection of banks to the Eurosystem. This survey has 18 questions asking banks their past quarter experience about loan standards and the following quarter's expectations. Concerned borrower group in the survey is firms and households where household loans have subcategories of housing and consumer credit (corresponds personal loans in BLTS). The sample of banks are claimed to be representative of each country. The survey is sent to senior loan officers, it is conducted on a quarterly basis and is published on the European Central Bank's website⁴.

Euro Area BLS asks the participating banks their perceptions regarding lending standards and loan demand. Since the beginning of the survey, the questions that display beneficial information about loan supply and demand have been in place. However, there are few questions added to the questionnaire in accordance with the necessity of periodical developments or specific issues.

Regarding the loan supply, banks are asked if they changed lending standards or not, why they changed their lending standards and how they changed them. The question of why they changed their lending standards is answered as the factors affecting these lending standards. These factors have a similar pattern as the survey conducted by the CBRT. Furthermore, credit conditions and terms applied to borrowers give the answer to the question of how banks changed lending standards. For the purpose of this study, on the supply side, change in lending standards and factors affecting the lending standards are benefitted. The actual realized changes in lending standards are under the concern of this study whereas expectations are not used; and the lending standards are the measure of loan supply which is utilized as broad credit channel in the model of the study. Moreover, due to the aim of the study, the main concern is to disentangle the bank balance sheet channel and borrower's balance sheet channel via factors influencing the lending standards within the claimed quarter.

The answers to the change in lending standards in BLS of Euro Area have five choices. These are "eased considerably", "eased somewhat", "unchanged", "tightened somewhat",

⁴ https://www.ecb.europa.eu/stats/ecb_surveys/bank_lending_survey/html/index.en.html

“tightened considerably”. For the questions related to the change of demand for loans, the answers have the following choices: “decreased somewhat”, “decreased considerably”, “unchanged”, “increased considerably”, “increased somewhat”. The final calculation of the answers are done by net percentage method which is commonly accepted way of calculation.

To disentangle borrower balance sheet channel and bank lending channel for the Euro Area, data from BLS is utilized. Factors affecting the lending standards are quantified relying on the answers of the BLS. The quantitative inferences made through the answers to the questions of the BLS. The questionnaire for the Euro Area is conducted by the national central banks of the responding countries. For that reason, like the survey conducted in Turkey, there is no doubt about the reliability of the answers. The information from the bank lending surveys of the 12 countries are aggregated. For each survey, bank’s approach to lending standards shows numerically how they change loan supply and it is used as a measure of bank lending channel in the model of this study. The reasons explaining the change in lending standards which specifies constraints regarding banks’ balance sheet concerns and borrowers’ balance sheet constraints are utilized as a bank lending channel and borrower’s balance sheet channel.

4.2.2 Macroeconomic Data

Information about loan supply and demand is gathered via the BLTS from the CBRT. Additionally, in the analysis, macroeconomic variables are included. These are aggregate output, price level, exchange rate and monetary policy rate. As a measure of aggregate output, real gross domestic product is used. For the price level, consumer price index (CPI) is utilized, but the core D index⁵ is used since this index less reflects seasonal developments resulting from unprocessed food and prevents sudden changes due to tax regulations.

In Turkey, the CBRT applies different policy tools from time to time. The applied tools change according to market needs. For that reason, the most appropriate variable to measure monetary policy rate is the CBRT average funding rate. It is calculated as taking the weighted average of interest rates of funding made by the Central Bank for various instruments (repo etc.)

⁵ CPI excluding unprocessed food, alcoholic beverages and tobacco.

at different maturities (overnight, weekly, etc.) to meet the market liquidity needs (repo etc.) at different maturities (overnight, weekly, etc.) to meet the market liquidity needs⁶.

Different from the approach of Ciccarelli et al. (2015), in this study, the exchange rate is also added to the macroeconomic variables. The reason is that Turkey is a developing economy, and it is exposed to capital flows, all macro variables are influenced by exchange rate developments directly or indirectly. For that reason, the exchange rate variable in terms of USD/TL is included to the analysis of the study for the variables of the Turkish economy.

It is known that the output and price level has seasonal components. For that reason, making a seasonal adjustment for those variables is convenient. Furthermore, when credit developments are examined, it is seen that credit volume also has seasonal behavior. As a result, it is convenient to think that the variables, gathered from the BLTS which are used as proxies of loan demand, loan supply and measures of credit channel, also may have seasonal components. Therefore, all variables from the BLTS were also seasonally adjusted. These adjustments made the estimation results straighter, removing the nonsense movements of the impulse responses.

For the Euro Area, the four-quarter growth rate of real GDP is the aggregate output variable. As a proxy for the price level, the four-quarter growth rate of the GDP deflator is utilized. Since Euro Area variables are used as priors, Euro/USD is added as the exchange rate variable. As a policy rate of Euro Area, the overnight rate (EONIA) is used in line with Ciccarelli et al. (2015).

4.3 Bayesian Vector Autoregression Method and Empirical Methodology

Vector Autoregressions (VARs) are reduced form and multivariate time series models, which give the chance to study the joint dynamics of multiple time series (Agrrippino and Ricco, 2018). Litterman (1979) and then Doan et al. (1984) were the ones who firstly incorporated Bayesian VARs with macroeconomic variables. In the first glance, Bayesian VAR methods are

⁶ <https://evds2.tcmb.gov.tr/index.php?/evds/dashboard/1441>

developed to improve the forecast of the macro variables, however, they are evolved to use for variety purposes. Recently, Bayesian VARs are popularly used by scholars for scenario analysis.

According to the theory, for meaningful policy analysis, identification restrictions are necessary. In terms of the construction of the model, historical information, and statistical and economic nature should be processed. For that reason, constructing a model that appropriately combines historical and apriori information is useful. Within unrestricted VARs, due to a short set of data, overfitting may occur and poor forecasting performance is gathered. However, Bayesian methodology solves this problem improving out-of-sample performance⁷. Within this methodology, the probability distributions of the unobserved parameters can be updated conditional on the observed data. It means that via Bayesian VARs, prior information could be utilized into posterior probability statements. These forms are called as informative priors.

In the cases where there is no prior information to implement to the model, these cases are named as ‘non-informative’ priors. When this is the situation, sample information is used via likelihood functions which are the probability density function of the data. Although they are used as a benchmark, in literature, generally, within empirical studies, informative priors are used since they are the representations of the data generating process.

This study will stand on Bayesian Vector Autoregressive method. Since the number of observations is limited, the estimation of the model within the Bayesian framework is important. In Bayesian approach, the first step is to assign initial values, then with iterations, the true parameters are converged. In this study, standing on Ciccarelli (2015), Euro Area BLS and macro variables are utilized as informative priors for iterations.

Within this framework, an econometric model utilizing the program RATS is specified as the following:

$$Y_t = C + A(L)Y_{t-1} + \epsilon_t$$

⁷ <http://apps.eui.eu/Personal/Canova/Articles/ch10.pdf>

Y_t denotes the vector of endogenous variables, $A(L)$ is a matrix of order p in the lag operator L and ϵ_t is a vector of residuals.

Credit supply and demand indicators will be calculated from BLTS, as mentioned. First of all, credit behavior will be measured by credit standards (BLTS-Question 1) and credit demand (BLTS-Question 4) with macro variables (growth and inflation) (Model-1).

With the calculated sub-channels of credit channel and credit demand variable, and macro variables, Model-2 will be estimated. In the Cholesky decomposition to identify the shocks in the model, the variables are placed in the order that they appear below.

Model-1: GDP Growth, Inflation, Exchange Rate, Broad Credit Channel, Credit Demand, Monetary Policy Rate

Model-2: GDP Growth, Inflation, Exchange Rate, Bank Lending Channel, Borrower Balance Sheet Channel, Credit Demand, Monetary Policy Rate

For each loan type, these two models are estimated and the corresponding data for the loan types are gathered from different questions of the BLTS. For the non-financial firms, in terms of broad credit channel, the first question of the BLTS is utilized for the Model-1. The second question of the BLTS displays the bank lending channel and borrower balance sheet channel. When the Model-1 is estimated with housing and personal loans, the eighth question of the BLTS measures the broad credit channel. For the identification of the sub-channels of credit channel within housing loans, the ninth question of the BLTS is considered whereas within personal loans, the thirteenth question is considered.

In this framework, it is assumed that policymakers observe and care about the macroeconomic variables in the determination of monetary policy rate. The ordering of the variables is slightly different from the Christiano et al. (1999) which claims that credit variables should follow the monetary policy rate. However, in Turkey, policymakers consider the developments in the credit markets like which is the case in Euro Area, as mentioned in Ciccarelli et al (2015).

4.4. Conclusions and Further Discussion

Identification of the loan supply and loan demand is a difficult issue. In the data, the realization of the credit volume is observable. However, how the changes in loan demand and loan supply occur cannot be directly observable. What is seen in data is that their equilibrium values resulting from the liquidity conditions and the price of the loan which is interest rates. In this study, standing on the Ciccarelli et al (2015), identification of the loan supply and loan demand, and to disentangle the broad credit channel is aimed. Within this purpose, for Turkey the Bank Loans Tendency Survey data, for Euro Area, the Bank Lending Survey results are utilized. These survey data are invaluable to give information about credit market developments. They are important from the perspective of a policymaker to understand both the behavior of the banks as loan supplier and the behavior of firms and consumer as loan demanders.

In addition to the credit variables, macroeconomic variables which can be the main concern of researchers and/or policymakers are considered. The growth rate of gross domestic product and inflation level are macro variables that are the ones in line with the study of Ciccarelli et al (2015). However, since Turkey is a developing country that is highly affected from exchange rate movements, different from the base study of Ciccarelli et al (2015), exchange rate is also utilized.

For the estimation technique of the model, Bayesian VARs methodology is in use with the help of the program RATS. Since it is a policy analysis and the simultaneous effects should be considered, VAR method is used but due to the fact that the time period is not so long to utilize other estimation techniques, one of the best solutions is Bayesian VARs methodology. In the estimation process, ‘informative’ priors are used.

For the purpose of the robustness checks, there are many exercises tried but not depicted, and these are explained slightly as follows. First of all, in the data selection process, in the first place, there was no seasonal adjustment made. The seasonal adjustment of all variables was made using the program Demetra. It is seen that, although the BLTS variables have no meaningful difference between the seasonal adjusted data and seasonal unadjusted data, the impulse response functions and their movements differed seriously. Furthermore, as Turkey is an emerging market exposed to capital flows, global liquidity variable was also added to the

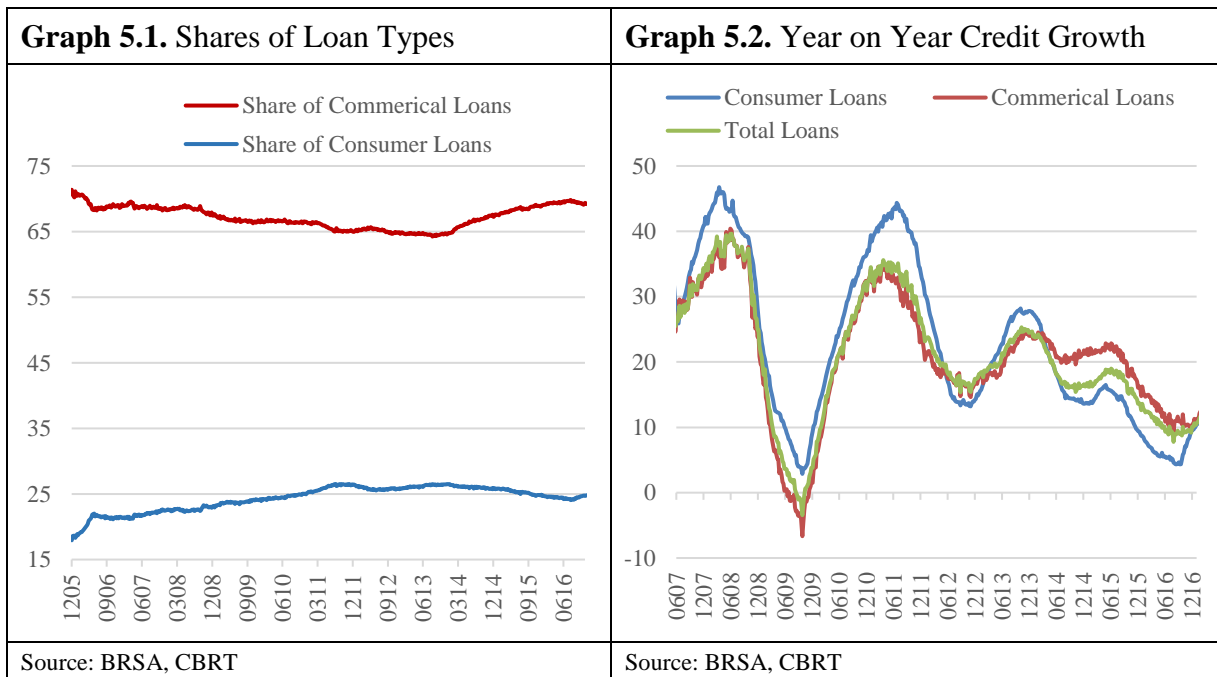
estimation. However, this change made the responses of the macroeconomic variables nonsense. The reason should be the fact that exchange rate movements capture the changes in the capital flows.



CHAPTER 5: ESTIMATION RESULTS

5.1 Introduction

Loans given to non-financial firms have the highest share within the total loans, it is almost seventy percent for the period of the study (Graph 5.1). As a result, developments in the loans given to non-financial firms drive total loan movements. For the loan developments, year on year growth of loan types and historical change of loan shares are examined. When we compare total loan growth and commercial and consumer loan growths, as expected, total loan growth and commercial loan growth move coherently (Graph 5.1 and 5.2). For that reason, in a first manner, the models standing on the loans to non-financial firms is the primary concern. However, the estimation results gathered for housing loans and personal loans is also reported; but, it should be noted that the estimation results of the models run with non-financial firm loans are more precise.



In this chapter, firstly, the effects of a tightening monetary policy shock on macro variables and credit variables are analyzed. Two types of models are estimated for all loan types as detailed in Chapter 4. Impulse response functions of the variables for Models 1 and 2 are displayed. Then, the dynamics of the broad credit channel and sub-channels of the credit channel is tested via designed experiments. In section 5.2, the estimation results with non-financial firm loans and designed experiments are depicted. In section 5.3, the estimation results with consumer loans and designed experiments are presented. Section 5.4 summarizes the estimation results, presents few policy implications of the estimation results and concludes.

5.2 Estimation Results with Non-Financial Firm Loans

In this section, the responses of macro-economic and credit variables to a tightening monetary policy shock is presented via impulse response functions. To compare the results for all variables on a single scale, all responses are normalized by the size of the monetary policy shock and the size of monetary policy shock is 25 bp. As intervals, 68 and 90 percent Bayesian intervals are reported.

In this section, the responses of macro-economic and credit variables to a tightening monetary policy shock are presented via impulse response functions. To compare the results for all variables on a single scale, all responses are normalized by the size of the monetary policy shock and the size of monetary policy shock is 25 bp. As intervals, 68 and 90 percent Bayesian intervals are reported.

The results of Model 1 with credit variables regarding non-financial firm loans are represented in Graph 5.3. This model involves a broad credit channel and macro variables for non-financial firm loans. When the impulse response functions are analyzed, it is seen that results are consistent with the theory. If monetary policy rate decreases by 25 bp, GDP responds with about a 0.25 percent decrease to monetary policy tightening shock and price level also declines by 0.25 percent. The impact of the monetary policy shock on credit variables seem different. When monetary policy tightens, it is expected to observe that loan demand decreases and credit standards tighten. The results for Model 1 implies that when monetary policy rate

decreases, although loan demand decreases slightly at first glance, there is no significant change in loan demand, whereas credit standards, that is broad credit channel in the model, tighten (Graph 5.3)⁸. It suggests that monetary policy is more effective on loan supply rather than on loan demand. The period that the median response of macro variables reaches the highest values varies. The median response of GDP peaks between 5-6 periods whereas the median response of prices reaches its highest level at almost 12th period. However, the median response of broad credit channel reaches more quickly its peak level, which is almost two quarters.

This study tries to answer the following question: through which channel, via loan demand or loan supply, monetary policy is effective on macro variables? Within the help of counterfactual experiments, the amplification mechanism of monetary policy through the credit channel is analyzed. The responses of the macro variables are compared for two estimations. In the first one, the Model-1 is estimated, but in the second case, the Model-1 is estimated as if the credit channel or the credit demand is closed.

The impact of monetary policy on GDP and price level can be clearly assessed via these counterfactual experiments. These experiments try to measure the impact of a channel with asking what if this channel does not operate. Neutralization of the channels is conducted via reverse shocks. In the VAR setup, the responses of the credit variables are a constraint to zero recursively to monetary policy rate shock. Leeper and Zha (2003) claim that this way of neutralizing the credit channels is not immune to Lucas' critique.

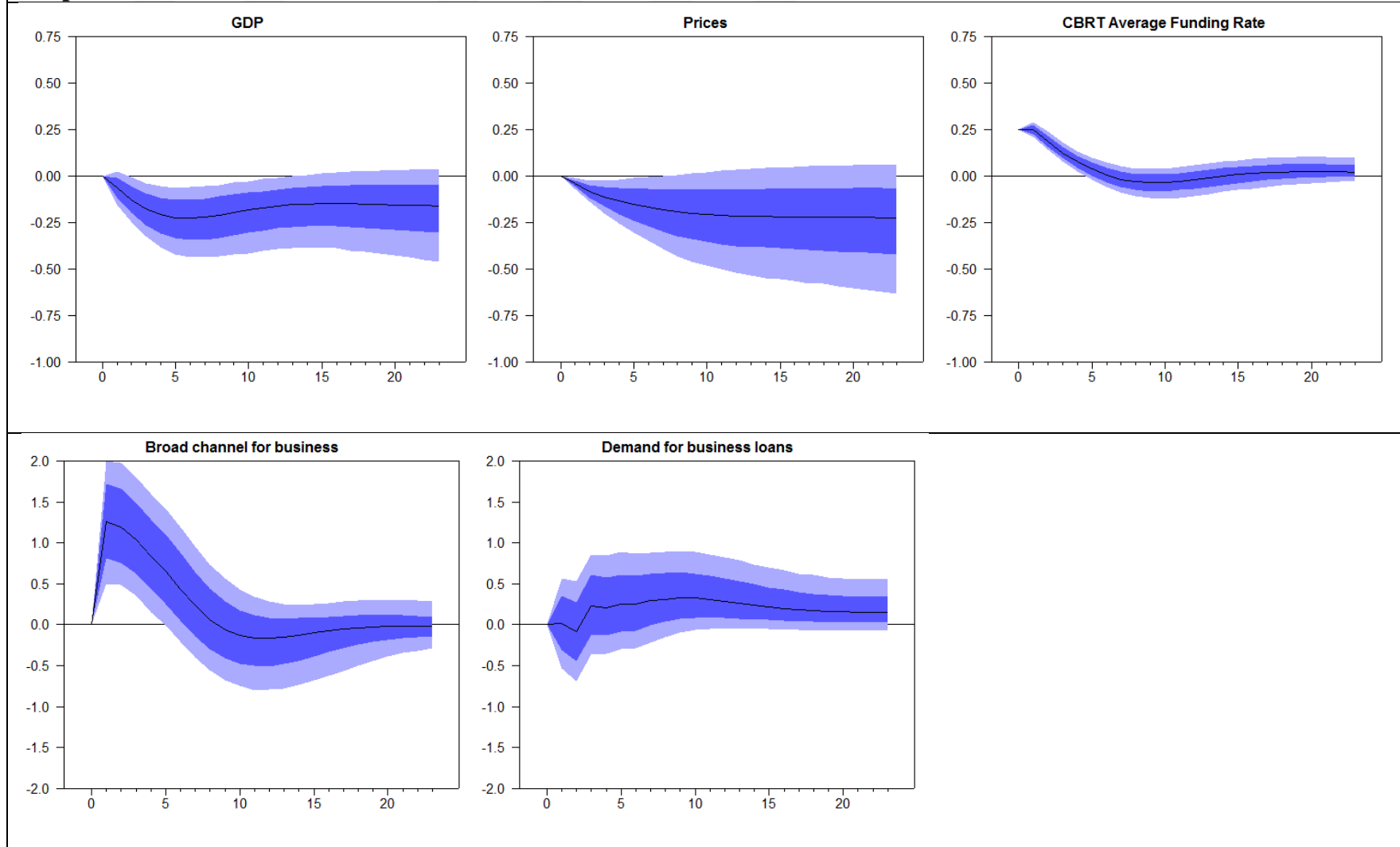
The results of these counterfactual experiments for Model-1 and utilizing non-financial firms are depicted in Graph 5.4. The first model is run for two cases, firstly, there is no assumption is made on the model; secondly, it is assumed that loan demand or loan supply channel is closed. The median responses of GDP and price level compared for these two cases. The black line represents where the channels are closed, and the blue line shows the cases where the channels are active. For the first exercise, assessing the effect of loan demand channel, it is seen that there is no obvious impact of monetary policy rate shock via loan demand channel on GDP and prices. However, when the influence of the monetary policy rate shock via broad credit

⁸ At this point, it may be helpful to note that an increase in the credit standards implies tightening whereas a positive reaction of loan demand implies an increase of loan demand.

channel (Credit Standards in the model) is analyzed, it is clearly seen that monetary policy is effective on GDP and prices via this channel. Especially on GDP growth, the impact of monetary policy rate shock is significantly different from the one if the broad credit channel is inactive. It can be inferred that when monetary policy is tightened, monetary policy transmission mechanism operates through broad credit channel in decreasing the GDP and price level. For non-financial firm loans, it seems that the broad credit channel is more important than the loan demand channel for the transmission of monetary policy.

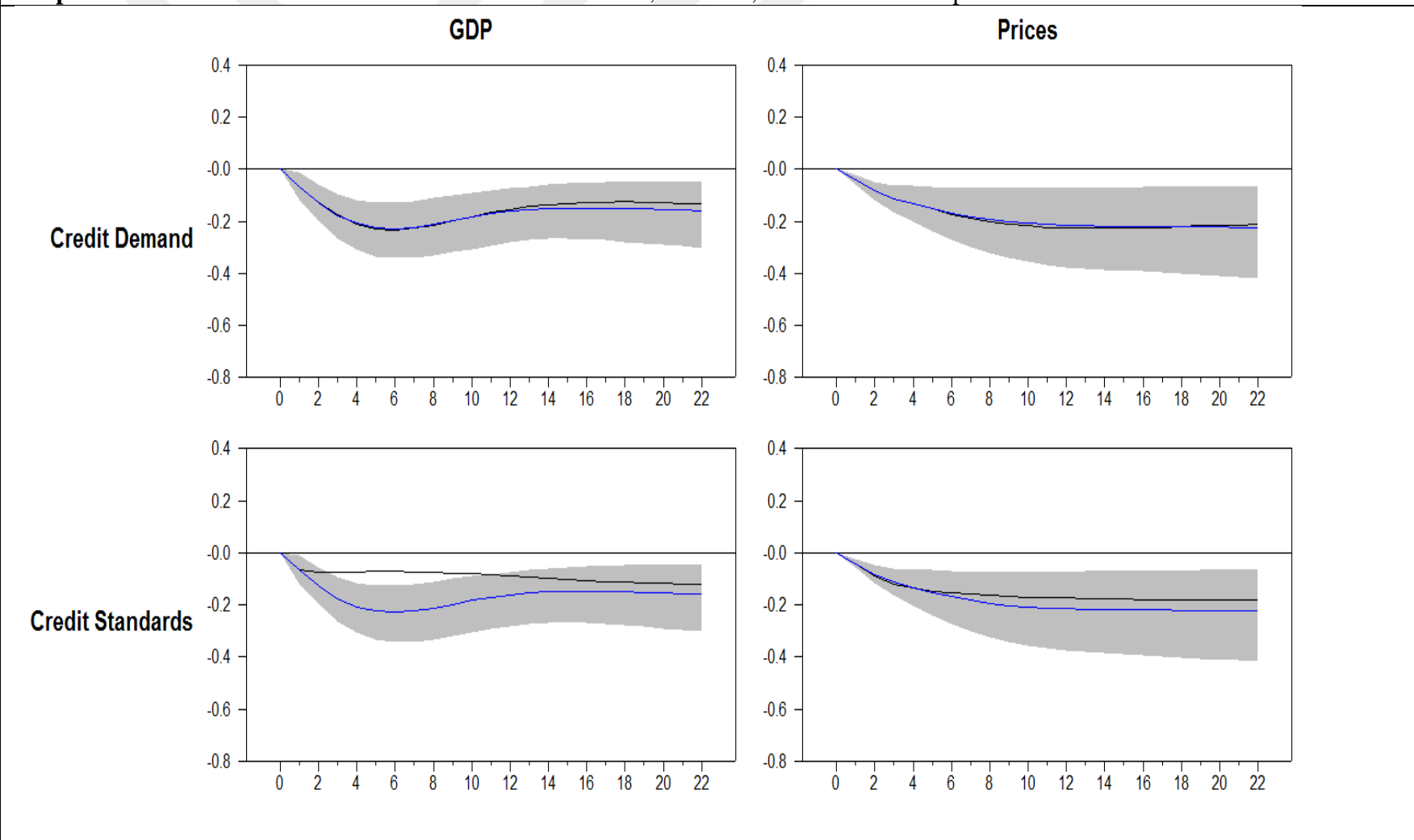


Graph 5.3. Estimation Results for Non-Financial Firm Loans, Model-1



The specification includes log GDP, log GDP deflator, credit demand and credit standards of firms, and CBRT average funding rate as monetary policy indicator (See Model 1). Responses of the series are normalized and divided by the size of the shock so that all responses to a shock are comparable on a single scale. On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

Graph 5.4. Estimation Results for Non-Financial Firm Loans, Model-1, Counterfactual Experiment



The responses of output and prices to a 25 bps monetary policy shock in base model (blue line) and in a model, where the monetary policy shock is combined with counter shocks such that broad credit channel and credit demand remains unchanged (black line), are compared. The specification includes log GDP, log GDP deflator, credit demand and credit standards of firms, and CBRT average funding rate as monetary policy indicator (See Model 1). Responses of the series are normalized and divided by the size of the shock so that all responses to a shock are comparable on a single scale. On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

In this part, the economic relevance of the sub-channels of the credit channel is measured. In order to disentangle the bank lending channel and borrower's balance sheet channel, utilizing the non-financial firm loans, the Model-2 is estimated. The results are depicted in Graph 5.5. The responses of the macroeconomic variables are similar to the results of the first model of non-financial firm loans. Tightening monetary policy rate shock has a decreasing impact on GDP growth and inflation. If we compare the number of responses of macroeconomic variables, it seems that they are broadly similar to the ones gathered from the Model-1. When the credit variables are examined, the response of the loan demand of non-financial firms to tightening monetary policy shock similarly demonstrates a slight decline in the first two quarters, however, afterward, the response becomes insignificant. Furthermore, the effect of monetary policy shock on the bank lending channel is not significant however firm's balance sheet channel reacts to monetary policy shock as expected which is in terms of tightening and in line with the literature. Since tightening monetary policy shock makes banks' lending conditions and firm's balance sheet constraints tighter.

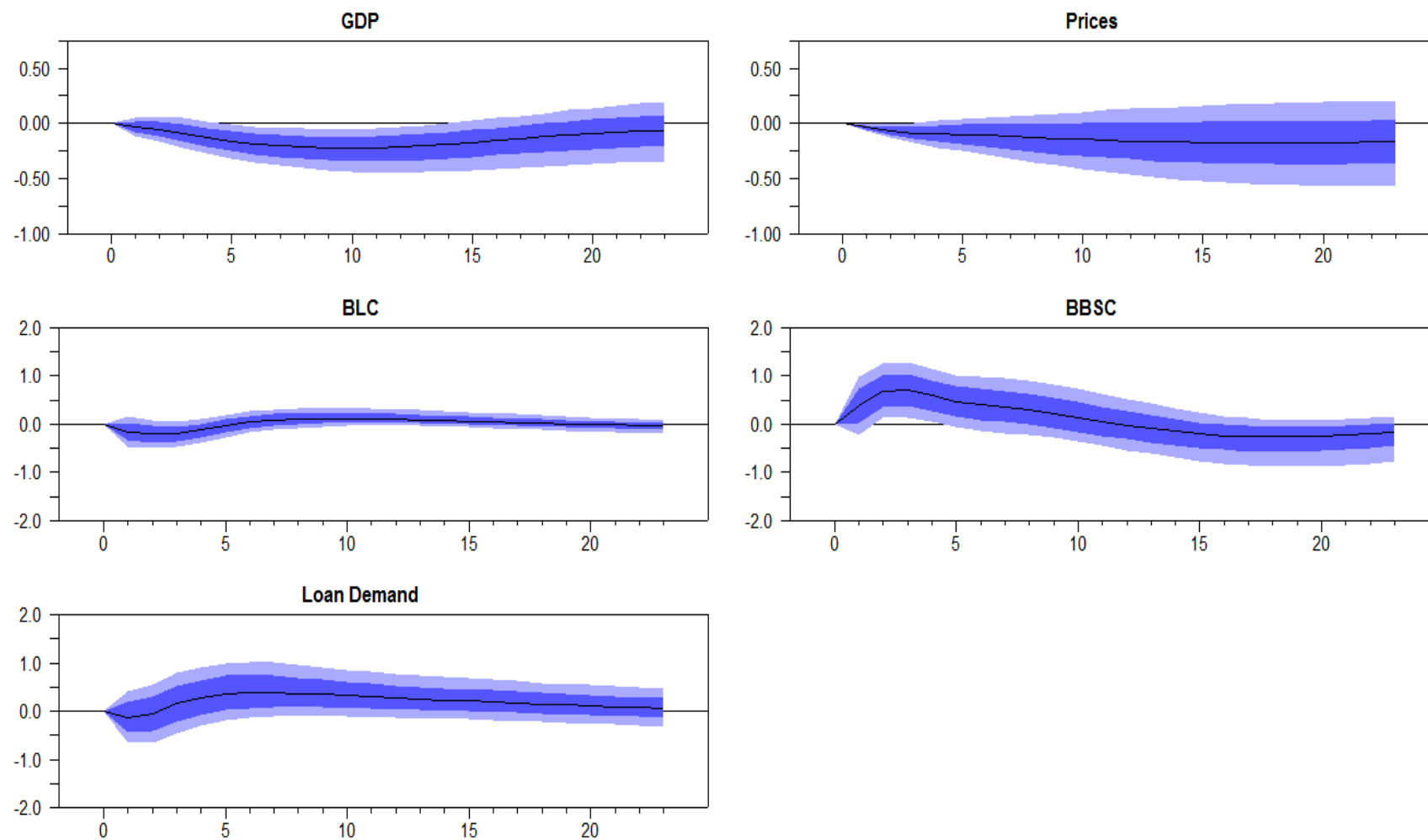
The counterfactual experiments are conducted for the Model-2. It aims to see the relative importance of the role of the bank lending channel and borrower balance sheet channel in the transmission mechanism of monetary policy. In that manner, the purpose is to understand the strength of the channels that monetary policy transmission works effectively on having an impact on macroeconomic variables. The results for the designed experiments of the Model-2 show that the firm's balance sheet channel is more effective than a bank lending channel for GDP growth and price level. Borrower's (firm's) balance sheet channel (BBSC) is highly influential especially on GDP. As a result, it can be claimed that when monetary policy is tightened, the constraints regarding the expectations of the general economic activity, industry or firm-specific outlook, and risk on collateral demanded would be attached more importance than bank's cost of funds and balance sheet constraints, and the pressure banks face from competition. If the results are numerically analyzed, when the borrower balance sheet channel is closed with a reverse shock that neutralizes its effect, it is seen that monetary policy has almost 45% less impact on GDP growth.

One last point about counterfactual experiments of the Model-1 and the Model-2 is as the following. When the quantitative results are compared through impulse responses of GDP and

price level, monetary policy seems to be the most effective on broad credit channel within the credit variables, in terms of the magnitude of its impact. Furthermore, when the designed experiments for the Model-1 and Model-2 are contrasted, the transmission mechanism of monetary policy on GDP via the firm's balance sheet channel is almost as effective as the broad credit channel.

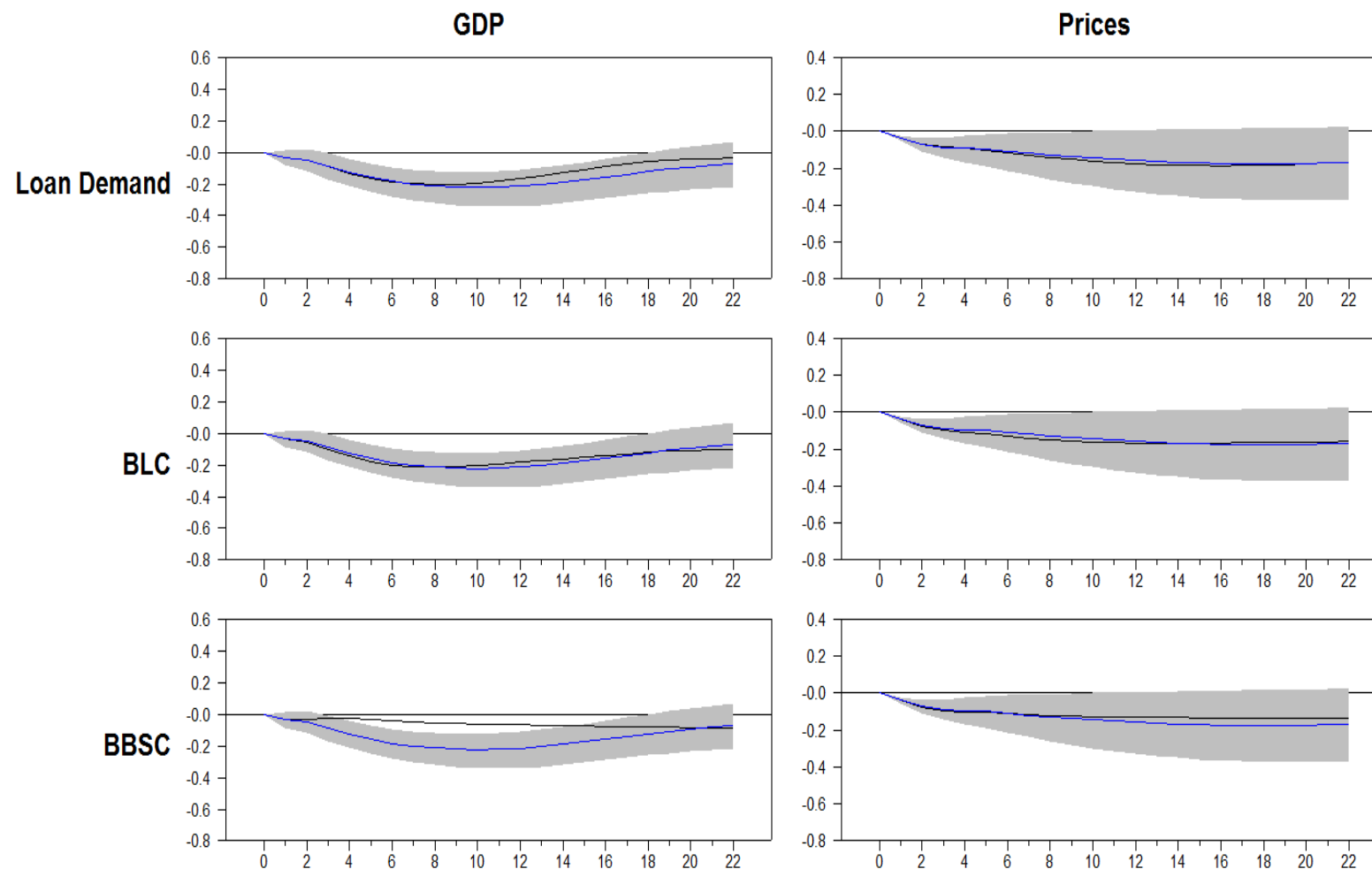


Graph 5.5. Estimation Results for Non-Financial Firm Loans, Model-2



The specification includes log GDP, log GDP deflator, credit demand of firms, BLC and BBSC for firms, and CBRT average funding rate as monetary policy indicator (See Model 2). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

Graph 5.6. Estimation Results for Non-Financial Firm Loans, Model-2, Counterfactual Experiment



The responses of output and prices to a 25 bps monetary policy shock in base model (blue line) and in a model, where the monetary policy shock is combined with counter shocks such that broad credit channel and credit demand remains unchanged (black line), are compared. The specification includes log GDP, log GDP deflator, credit demand of firms, BLC and BBSC for firms, and CBRT average funding rate as monetary policy indicator (See Model 2). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

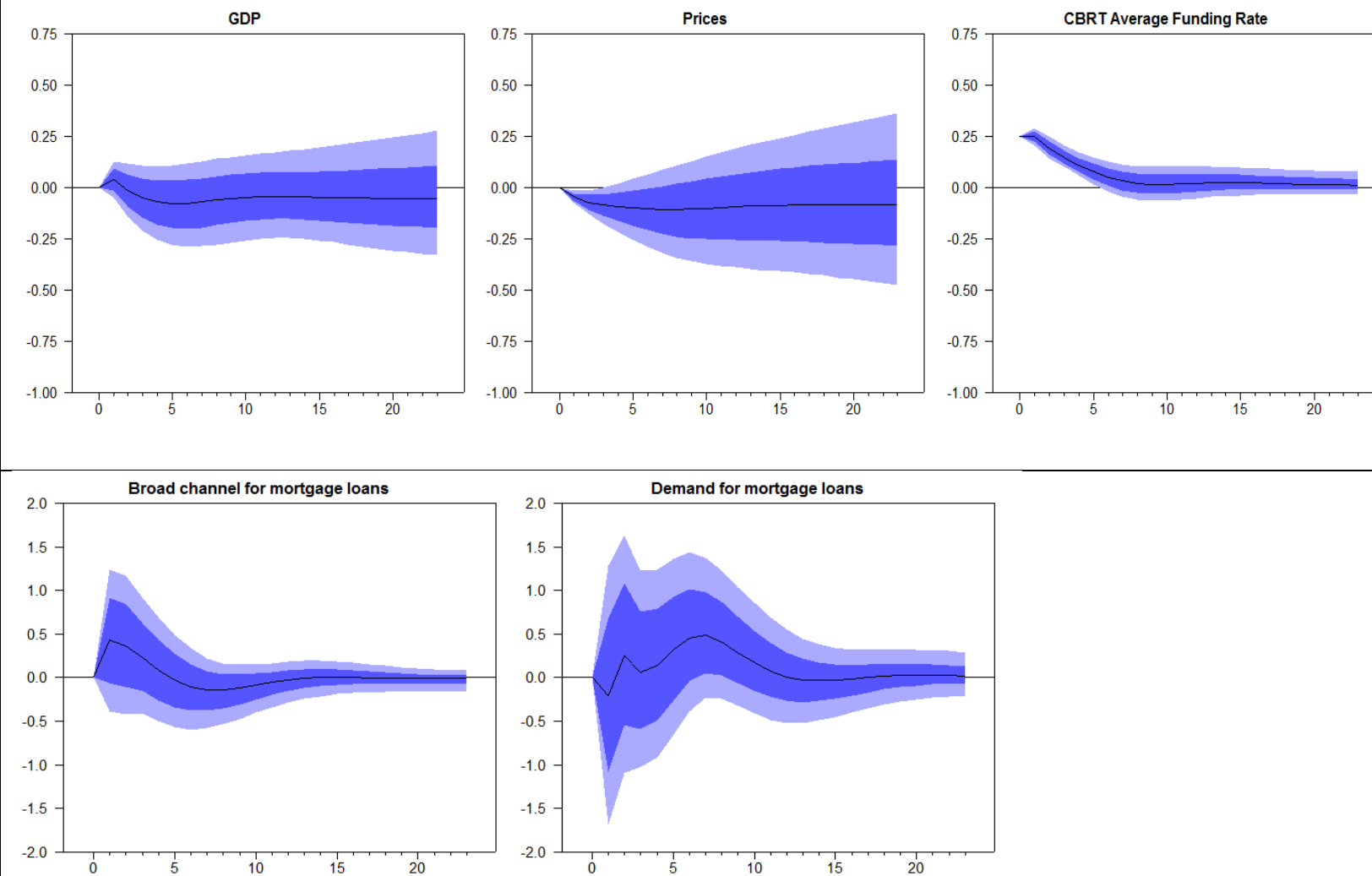
5.3 Estimation Results with Consumer Loans

In this section, the two model specifications are estimated for the sub groups of consumer loans. These are housing loans and personal loans which have the highest weight within the consumer loans. Furthermore, the designed experiments are also conducted for these loan categories. Similar to the ones in section 5.2, the responses of macro and credit variables to a monetary policy shock is presented via impulse response functions. Comparison of the results for all variables conducted on a single scale where all responses are normalized by the size of the monetary policy shock and the size of monetary policy shock is 25 bp. As intervals, 68 and 90 percent Bayesian intervals are reported.

To begin with the housing (mortgage) loans, the Model-1 is estimated and the impulse responses of the variables to monetary policy rate shock is examined. With a 25 bp decline in the monetary policy rate, GDP growth decreases 0.10 percent (Graph 5.7). It is observed that the deceleration effect of tightening monetary policy on GDP is much lower with mortgage loans compared to the non-financial firm loans. It might be an expected result due to the weight of the mortgage loans in the credit market. The same result applies to the price level. Monetary policy tightening declines the price level. In terms of credit variables, tightening monetary policy results in tight credit supply conditions for mortgage loans. However, its effect on loan demand seems insignificant.

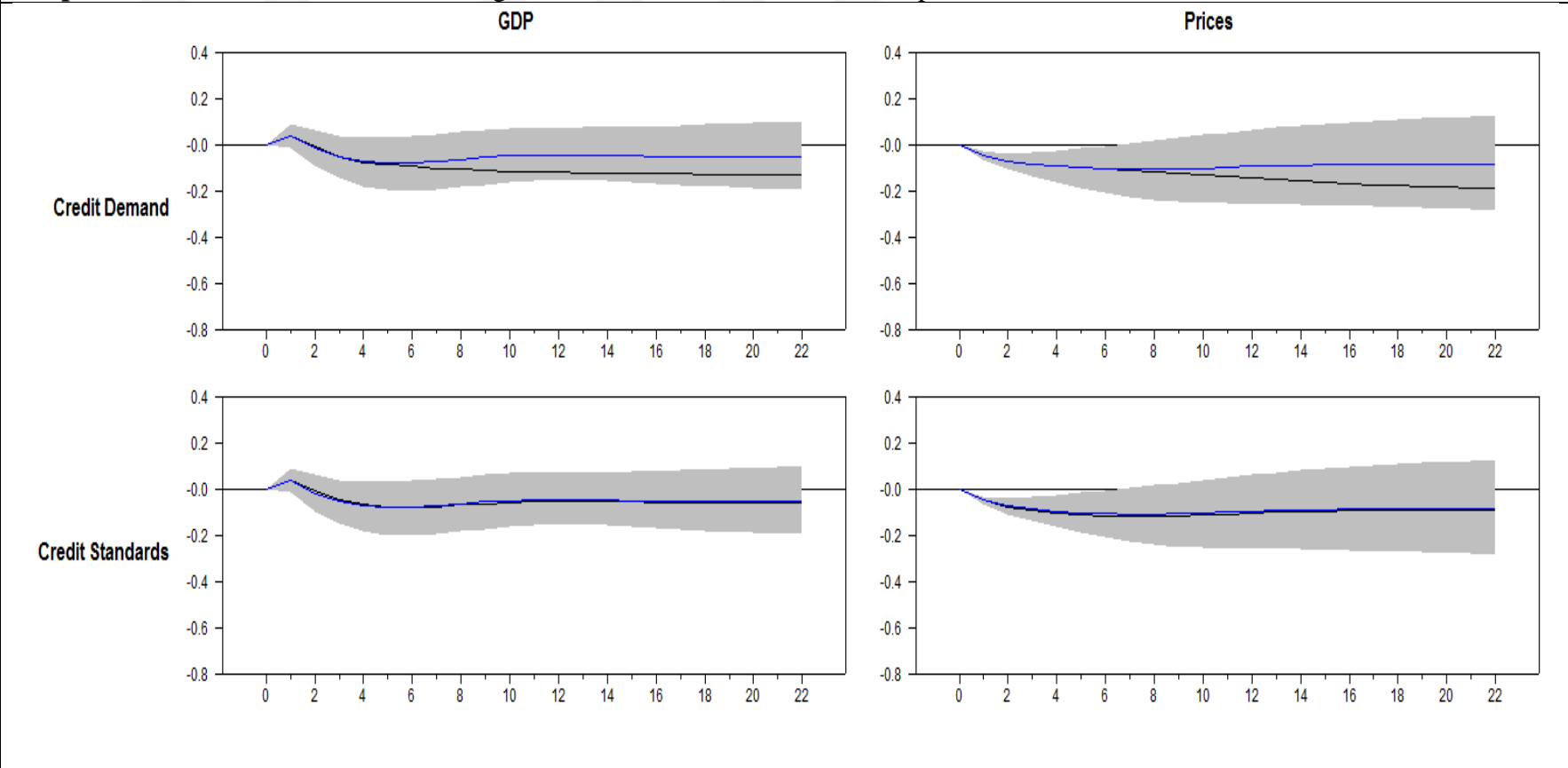
When the designed experiment is conducted for mortgage loans within the framework of Model-1 applying the same procedure that is explained in section 5.2, the results seem slightly surprising. When the broad credit channel is closed, the effect of monetary policy on GDP does not display meaningful change. However, if the credit demand channel is inactivated, monetary policy seems more effective on GDP, but this difference is observed after six quarters. For that reason, it may not be logical to rely totally on this result.

Graph 5.7. Estimation Results for Housing Loans, Model-1



The specification includes log GDP, log GDP deflator, credit demand of housing loans, BLC and BBSC for housing loans, and CBRT average funding rate as monetary policy indicator (See Model 1). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

Graph 5.8. Estimation Results for Housing Loans, Model-1, Counterfactual Experiment



The responses of output and prices to a 25 bps monetary policy shock in base model (blue line) and in a model, where the monetary policy shock is combined with counter shocks such that broad credit channel and credit demand remains unchanged (black line), are compared. The specification includes log GDP, log GDP deflator, credit demand and credit standards of housing loans, and CBRT average funding rate as monetary policy indicator (See Model 1). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

For the mortgage loans, the broad credit channel is identified into two sub-channels via the Model-2 specification (Graph 5.9). In that case, tightening monetary policy decreases GDP growth and price level, however, the impact seems inefficient. When the median peak response of GDP and price level is quantified, it seems less than the effect of monetary policy when the credit channel is not disentangled. If the responses of the credit variables are examined, the bank lending channel does not react significantly to the monetary policy shock. However, borrower balance sheet channel tightens significantly. Furthermore, like the exercise of non-financial firm loans, monetary policy does not have a meaningful impact on the loan demand.

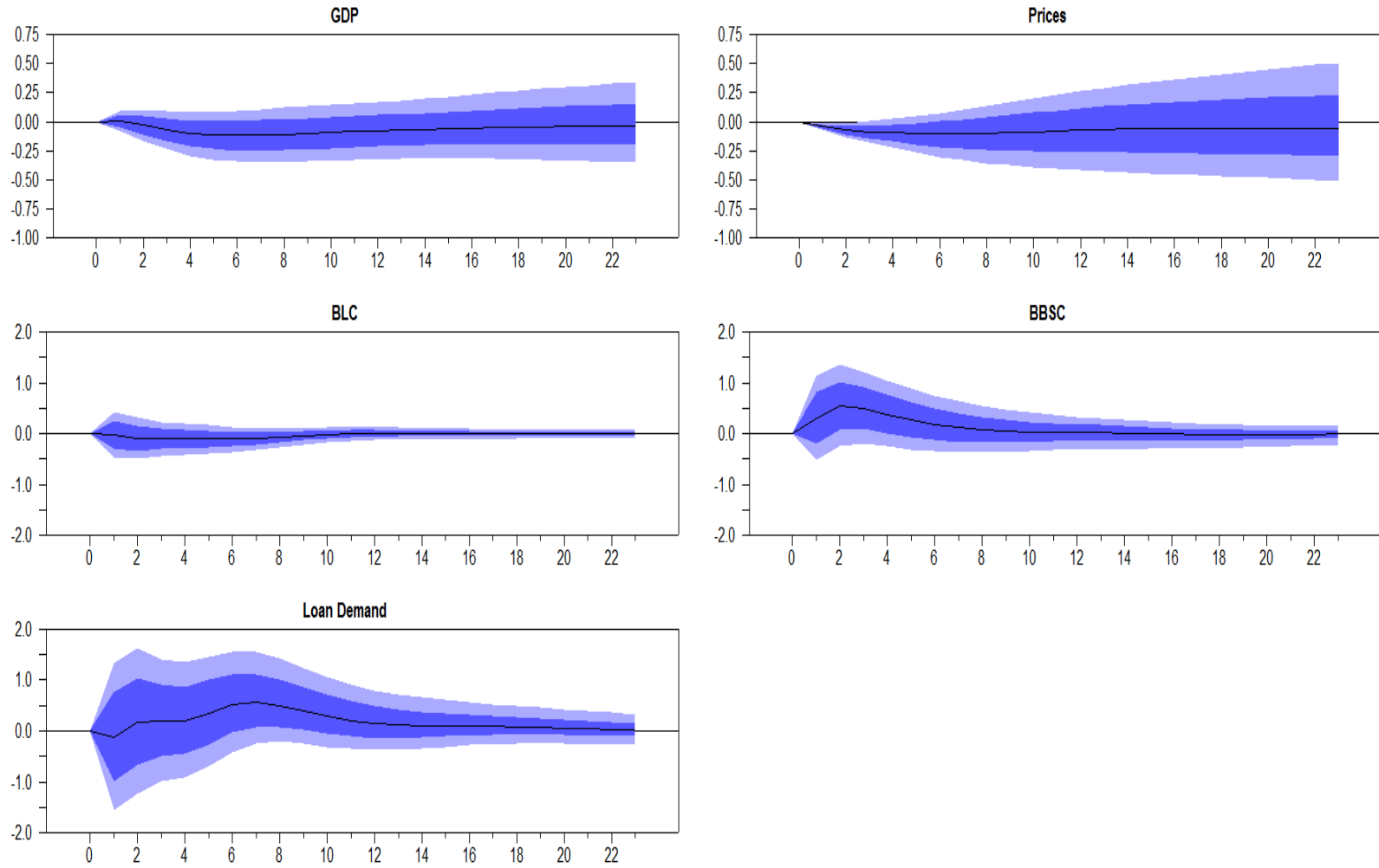
Within the framework of the Model-2, the designed experiments point out interesting results. When the loan demand channel is closed, after five quarters, the impact of monetary policy on GDP growth becomes clearer, and a similar result is gathered for prices (Graph 5.10). If the bank lending channel is inactivated, there is no explicit difference of the response of GDP, but prices respond slightly more with respect to the case where all channels are open. Lastly, if the borrower, in this case that borrower of housing loan, balance sheet channel is closed, after two quarters, the response of GDP growth to monetary policy shock is slightly less than the case where borrower's balance sheet channel is open. However, the price level reacts to monetary policy more when borrower's balance sheet channel is closed. These unexpected results may be due to some identification problems which will be analyzed in future work.

Lastly, the estimation results for personal loans is analyzed. When there is a 25 bp monetary policy shock, GDP decreases by 0.18 percent (Graph 5.11) and the median response peaks at the 4-5th quarter. The response of the price level is sizeable. At the 10th quarter, price level declines by 0.26 percent. When the responses of the credit variables are examined, loan demand response to a tightening monetary policy shock in the first quarter although the response becomes insignificant after four quarters. Broad credit channel or credit standards are tightened in response to a tightening monetary policy shock and in the second quarter the median response peaks. The counterfactual experiments of the Model-1 with personal loans show that broad credit channel is effective in the transmission mechanism of monetary policy (Graph 5.12). When the monetary policy rate is declined, and the loan demand channel is closed, there is no significant difference of the responses of GDP and price level. However, when the broad credit

channel is inactivated, in 4th quarter, there is almost 20 percent difference between the peak responses of GDP to tightening monetary policy shock.

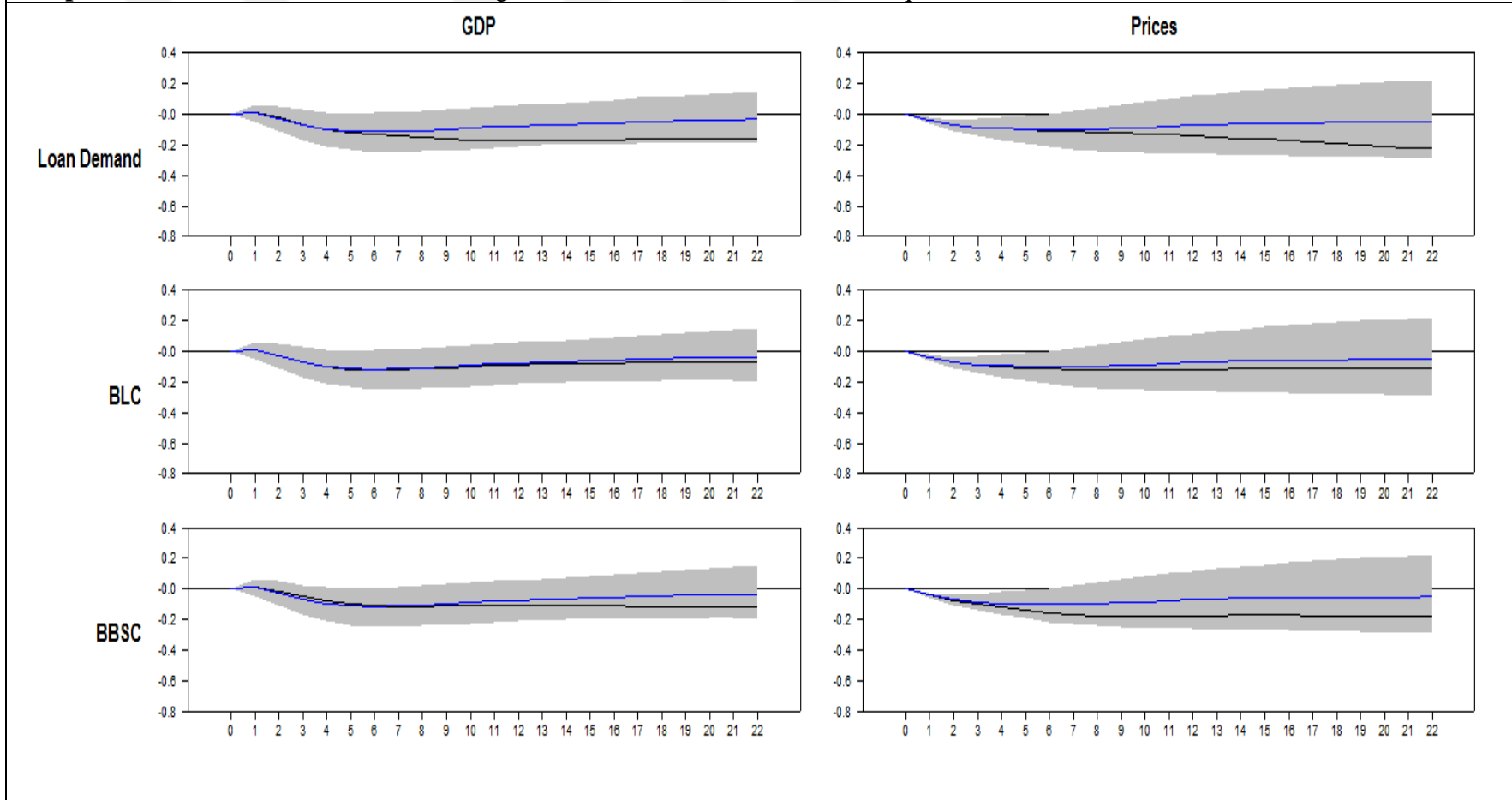


Graph 5.9. Estimation Results for Housing Loans, Model-2



The specification includes log GDP, log GDP deflator, credit demand of housing loans, BLC and BBSC for housing loans, and CBRT average funding rate as monetary policy indicator (See Model 2). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

Graph 5.10. Estimation Results for Housing Loans, Model-2, Counterfactual Experiment

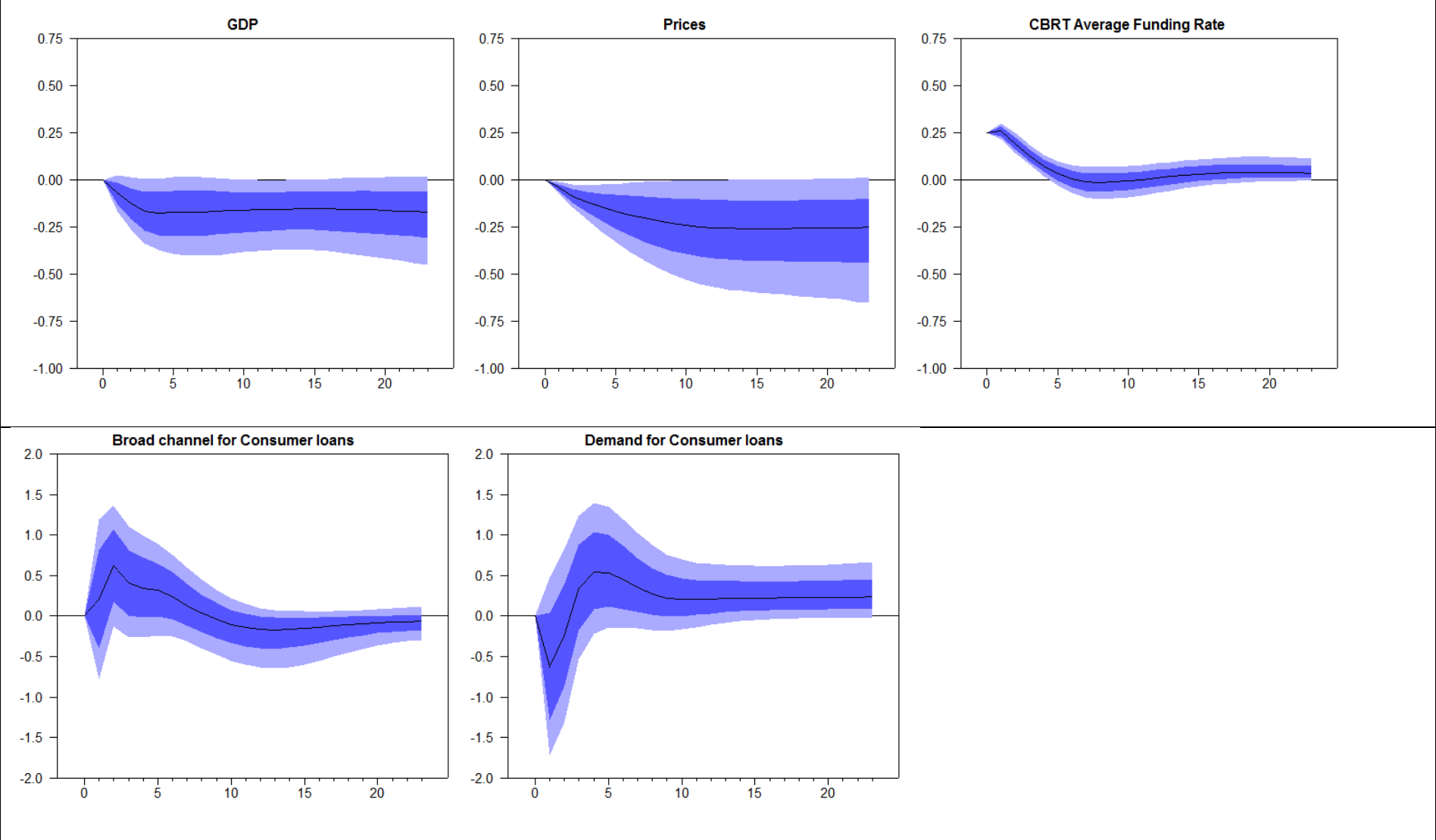


The responses of output and prices to a 25 bps monetary policy shock in base model (blue line) and in a model, where the monetary policy shock is combined with counter shocks such that broad credit channel and credit demand remains unchanged (black line), are compared. The specification includes log GDP, log GDP deflator, credit demand for housing loans, BLC and BBSC for housing loans, and CBRT average funding rate as monetary policy indicator (See Model 2).

In this part, the estimation results of the Model-2, where the credit channel is decomposed into the bank lending channel and borrower's balance sheet channel, is analyzed for personal loans. The responses of the macro variables and the credit variables seem precise and meaningful. GDP declines by about 0.20 percent and the median response peaks in the fourth quarter (Graph 5.13). The response of price level peaks later than the one of GDP, and the peak median response of the price level realizes in the 10th quarter and the price level declines by 0.24 percent. In this estimation, it is seen that the bank lending channel also responds in the first quarter in terms of tightening the bank lending channel in response to tightening monetary policy. Furthermore, the response the borrower's balance sheet channel responds highest in the second quarter. The median peak implies that if monetary policy is tightened by 25 bp, borrower balance sheet channel tightens by 0.6 percent, which is higher than the response of the bank lending channel and it seems more significant. Moreover, the response of the loan demand is in the direction of decline in the first quarter, which become insignificant after four quarters.

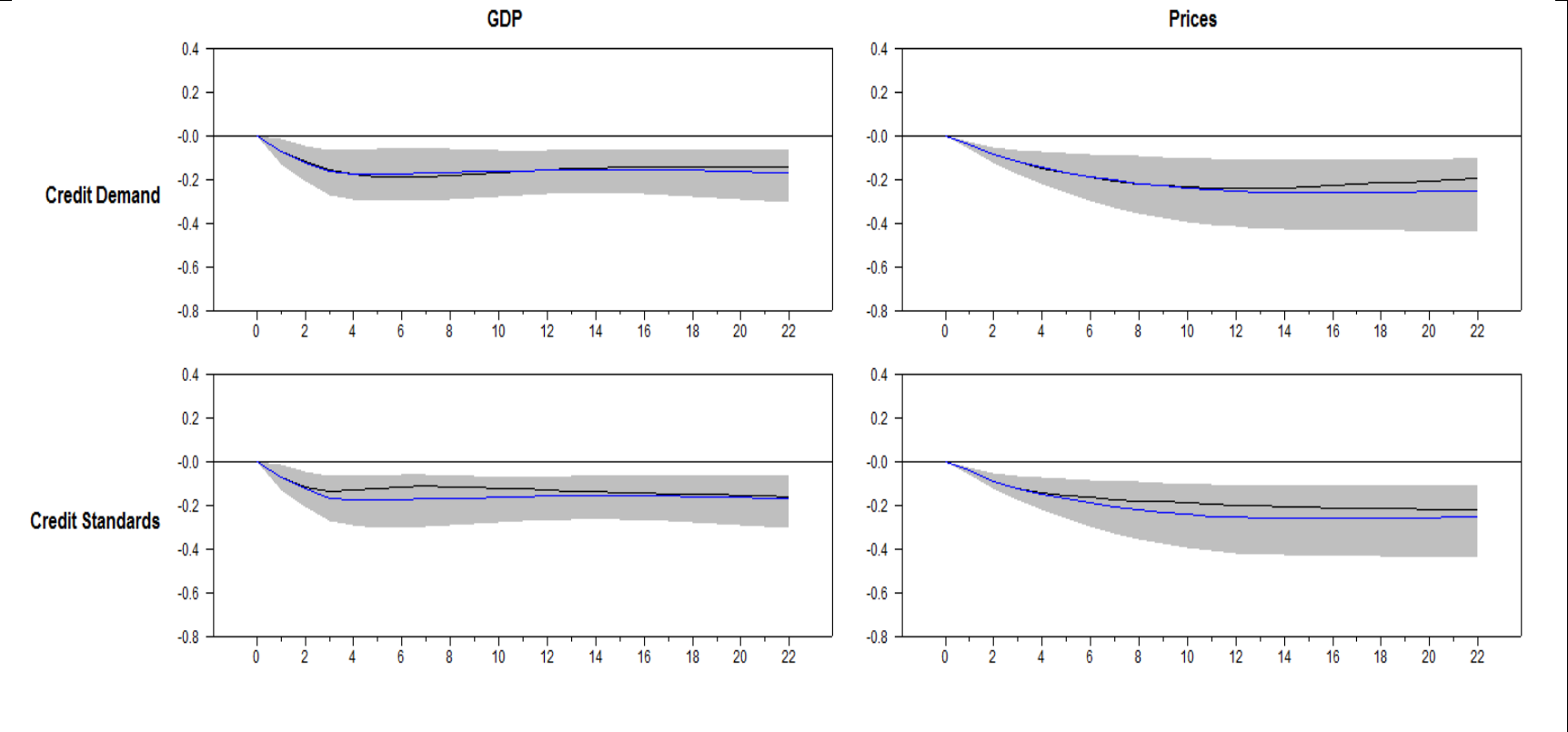
As a last point of the estimation results, the designed experiments are conducted for personal loans within the framework of the Model-2. It is seen that closing down the loan demand channel does not make a significant effect before 8 quarters, however, after 8-9 quarters, the response of GDP to monetary policy shock seems more when the loan demand channel is active (Graph 5.14). If the borrower's balance sheet channel is inactivated, after 6-7 quarters, GDP responds more with respect to the one where the channel is active. Similarly, the response of the price level differs after 3-4 quarters, and when the borrower's balance sheet channel is closed, tightening impact of monetary policy on price level seems more effective. However, when the bank lending channel is inactivated, there is an obvious difference, and GDP responds almost 40 percent more to the tightening monetary policy when the bank lending channel is utilized. The price level also reacts to a tightening monetary policy shock more explicitly when the bank lending channel is open.

Graph 5.11. Estimation Results for Personal Loans, Model-1



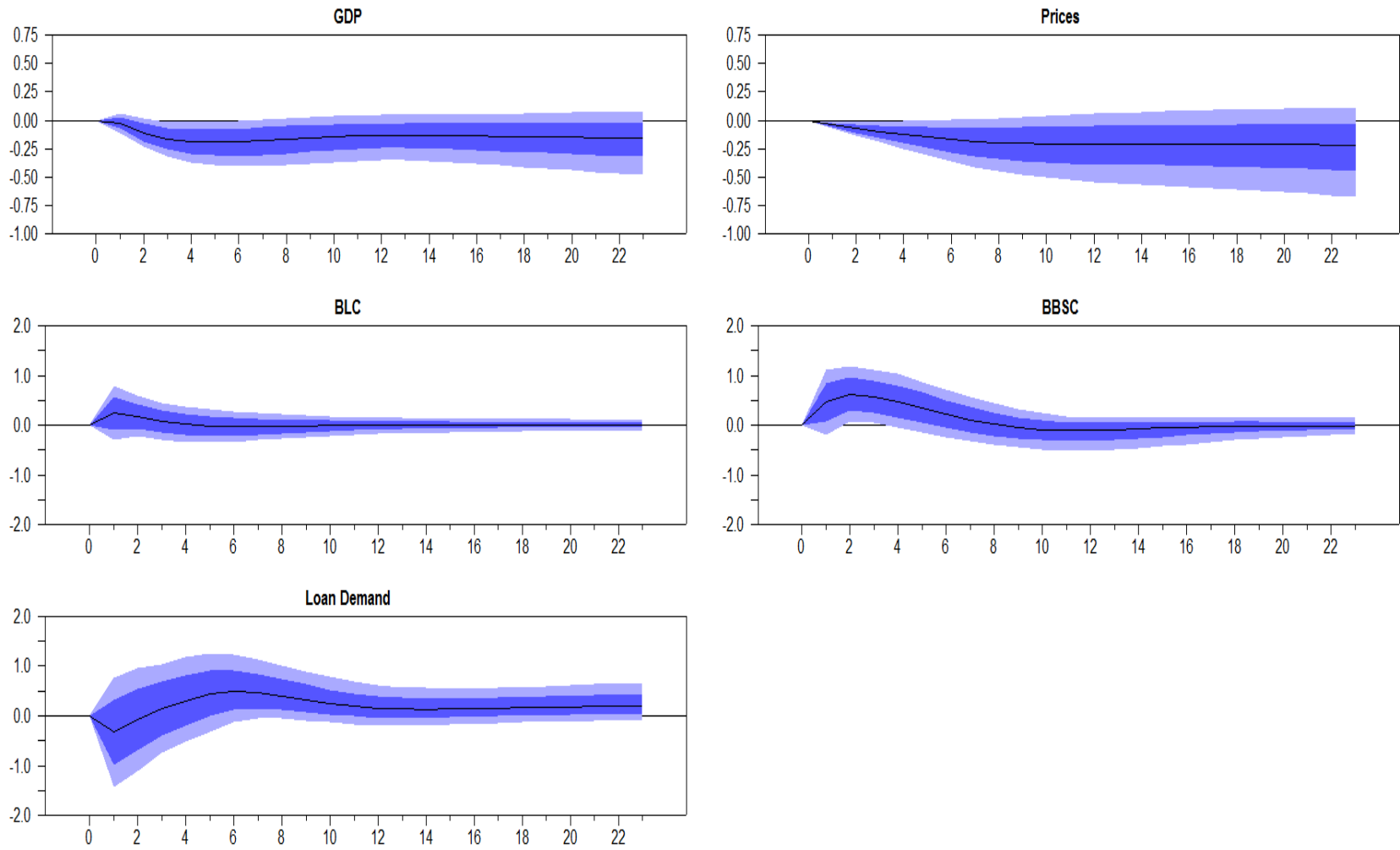
The specification includes log GDP, log GDP deflator, credit demand and credit standards of other consumer (personal) loans, and CBRT average funding rate as monetary policy indicator (See Model 1). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

Graph 5.12. Estimation Results for Personal Loans, Model-1, Counterfactual Experiment



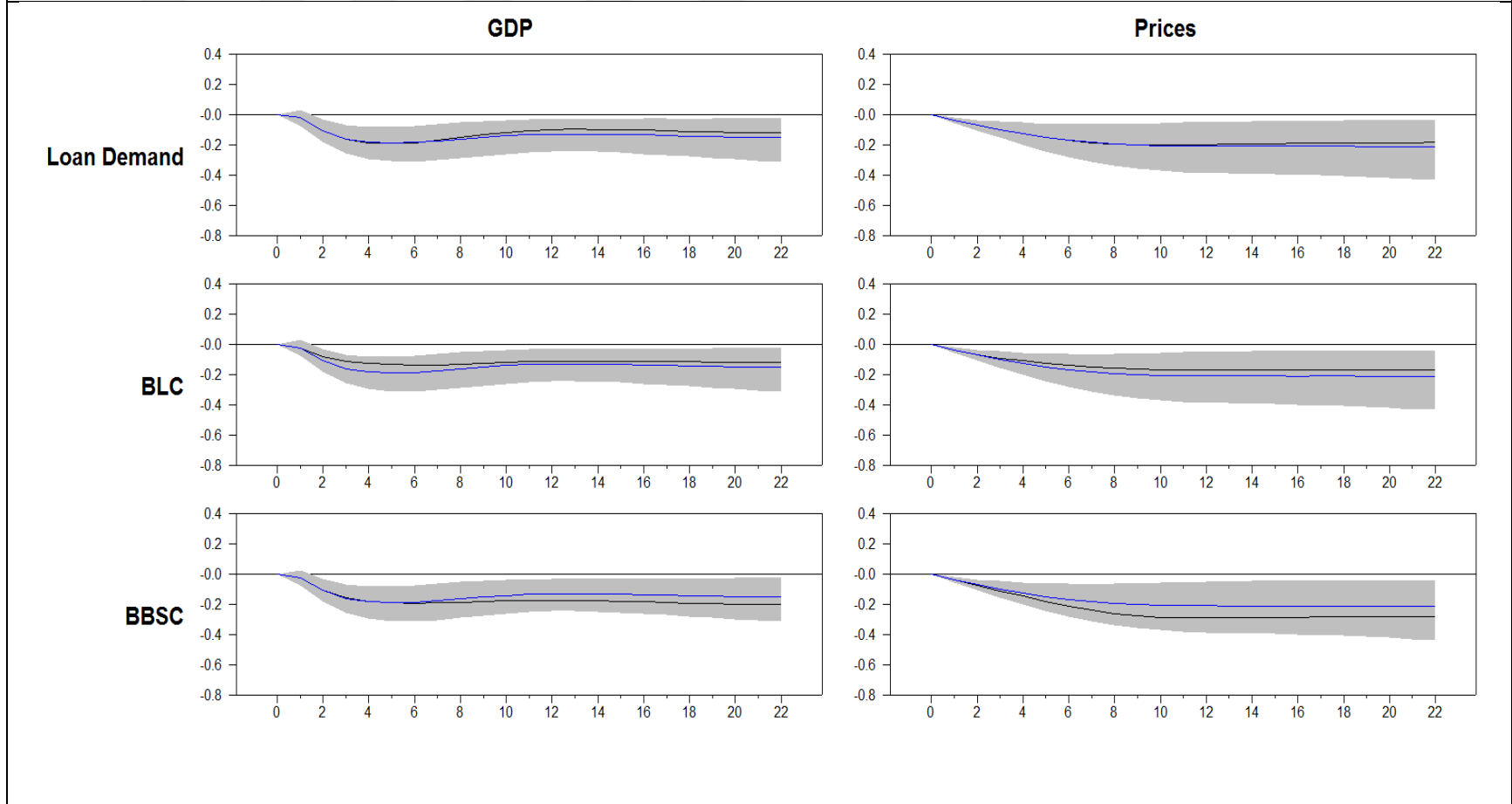
The responses of output and prices to a 25 bps monetary policy shock in base model (blue line) and in a model, where the monetary policy shock is combined with counter shocks such that broad credit channel and credit demand remains unchanged (black line), are compared. The specification includes log GDP, log GDP deflator, credit demand and credit standards of personal loans, and CBRT average funding rate as monetary policy indicator (See Model 1). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

Graph 5.13. Estimation Results for Personal Loans, Model-2



The specification includes log GDP, log GDP deflator, credit demand of firms, BLC and BBSC for personal loans, and CBRT average funding rate as monetary policy indicator (See Model 2)

Graph 5.14. Estimation Results for Personal Loans, Model-2, Counterfactual Experiment



The responses of output and prices to a 25 bps monetary policy shock in base model (blue line) and in a model, where the monetary policy shock is combined with counter shocks such that broad credit channel and credit demand remains unchanged (black line), are compared. The specification includes log GDP, log GDP deflator, credit demand for personal loans, BLC and BBSC for personal loans, and CBRT average funding rate as monetary policy indicator (See Model 2). On the horizontal axis, steps represents quarters; vertical axis represents percentage change.

5.4 Summary

In this chapter, the estimation results of the two models specified in Chapter 4 is examined. The results are important for answering different questions. First of all, for all the models, monetary policy is effective on macro variables, i.e. production and price level, in the expected direction as the literature states. Tightening monetary policy shock declines the GDP and price level. The results differ in terms of credit variables.

The first model is constructed with macro variables, loan demand and broad credit channel. When the first model is run with commercial loan variables, the results for credit variables suggest that monetary policy is more effective on loan supply rather than on loan demand, and credit standards are tightened. According to the counterfactual experiments, the tightening effect of monetary policy on GDP and price level works through credit standards (broad credit channel) rather than loan demand. Within the framework of Model-1, when credit variables for housing loans are inserted to the model instead of commercial loan variables, it is seen that the significance of monetary policy on credit standards decreases, but again it insignificantly affects loan demand of housing loans. Designed experiments of Model-1 with housing loans show that monetary policy transmission mechanism works more efficiently on GDP and price level when the loan demand does not operate. On the other hand, the counterfactual exercises with personal loans show that monetary policy transmission mechanism works efficiently through the broad credit channel.

To see the impacts of decomposed channels of the credit channel, and to test the economic relevance of the sub-channels of the credit channel, Model-2 is estimated. To disentangle the bank lending channel and borrower's balance sheet channel, BLTS data is utilized. Within commercial loans, the estimation results show that monetary policy is significantly effective on borrower's balance sheet channel rather than bank lending channel, and loan demand. The designed experiments for commercial loans in the framework of Model-2 represents the importance of borrower's balance sheet channel in the transmission mechanism of monetary policy, especially, in terms of its impact on GDP.

Similar results are gathered when the same exercises are conducted with personal loans. The monetary policy has a meaningful impact on borrower's balance sheet channel, and when monetary policy is tightened, loan demand also slightly decreases. According to counterfactual experiments, the monetary policy transmission mechanism operates more efficiently through

the bank lending channel. However, when borrower's balance sheet channel is open, monetary policy seems less effective on the price level.

If the same exercises are conducted with housing loans, when the monetary policy rate decreases, borrower's balance sheet channel tightens, but the counterfactual experiments show interesting results. Transmission of monetary policy functions better in affecting the GDP and price level when loan demand channel is closed. Moreover, it operates more efficiently on prices when borrower's balance sheet channel is not considered.

Overall, the results imply that monetary policy is effective on credit standards rather than loan demand. The transmission mechanism of monetary policy works more powerfully via broad credit channel than loan demand channel. When the broad credit channel is disentangled into its sub-channels, the exercises show that the monetary policy transmission mechanism operates through borrower's balance sheet channel more powerfully on macro-economic variables.



CHAPTER 6: SUMMARY AND CONCLUSIONS

6.1 Introduction

Turkey experienced a banking crisis in 2001 which is followed by structural regulation implementations. The actions taken by Banking Regulation and Supervision Agency (BRSA) and CBRT accelerated the credit growth as before the 2001 crisis, Turkey experienced a serious credit deepening. In the aftermath of the global financial crisis, as other emerging market economies, Turkey also faced substantial capital flows. In such an environment, financial regulations and the implementation of monetary policy gained more importance due to the fact that the capital flows resulted in volatility in credit growth and macro variables.

In addition to traditional monetary policy tools, micro and macroprudential policies are implemented by central banks or financial regulators. However, the importance of the monetary policy is always prioritized for price stability, for financial stability and for the coherent course of the economy, by policymakers and regulators.

For that reason, the search for true implementation of monetary policy tools and the transmission mechanism of monetary policy is popularly the aim of researchers. There are many channels that monetary policy works through. However, an efficient way is under consideration. Moreover, the identification of the sub-channels is a hard issue due to measurement difficulties.

Broad credit channel of monetary policy transmission is examined by many studies in the literature, however the search about how the monetary policy transmission mechanism works via credit channel has not been finalized yet. In this study, concerning the experience of Turkey, and bearing in mind the difficulties in measuring the credit channel variables, the transmission mechanism of monetary policy through credit channel is measured utilizing the BLTS data. The results may be instructive for both policymakers and researchers.

6.2 Research Questions Re-visited

The first aim of this study is to test the effectiveness of the monetary policy on macro-economic variables. The results of both models represent that monetary policy has a significant impact on the production and price level. The magnitude of the effects are logical and seem convenient with respect to the findings in the literature. Moreover, concerning the credit variables, monetary policy displays a more powerful effect on credit standards rather than loan demand.

The second and more critical point of the study is to decompose the credit channel into its sub-channels. The identification problem is solved by utilizing BLTS data as following the literature. Broad credit channel is disentangled into bank lending channel and borrower's balance sheet channel. Since commercial loans have the highest share in the credit market in Turkey, concerning the results of the models with commercial loan variables, it is seen that in the transmission mechanism of monetary policy, borrower's balance sheet channel is effective. In other words, when the borrower's balance sheet channel is not allowed to operate, in case of a tight monetary policy shock, the response of GDP and price level is explicitly less than the case where borrower's balance sheet channel operates efficiently.

Although the share of housing loans and personal loans are small in total loans concerning commercial loans, the results gathered from utilizing them are also different and interesting. The estimation results of the models with personal loans imply that monetary policy is effective on borrower's balance sheet variable. According to the designed experiments, monetary policy has more impact on GDP when bank lending channel is open; however, when borrower's balance sheet channel operates well, monetary policy is more effective on the price level.

The interesting results appear for housing loans. If monetary policy is tightened, borrower's balance sheet variable also tightens. According to the counterfactual experiments, the transmission of monetary policy functions better in affecting the GDP and price level when loan demand channel is closed; and, monetary policy operates more efficiently on prices when borrower's balance sheet channel is not considered.

6.3 Conclusion and Future Research Areas

The aim and the results of this study are important since this study is the first and only one conducted for Turkey to analyze the sub-channels of the credit channel in terms of monetary policy transmission mechanism. The results have important implications for both researchers and policymakers. They are essential for researchers since the results give them an idea about which side of the credit channel should be focused on emerging countries like Turkey. The results are important for the policymakers due to its implications. The estimation results for commercial loans firstly show that monetary policy is more effective credit standards than loan demand. It implies that policymakers could focus on the supply side channel of loans in the market considering the economy instead of the loan demand. Secondly, decomposition of the credit channel into its sub-channels shows that bank lending channel responds to monetary policy insignificantly, however if monetary policy is tightened, borrower's balance sheet channel responds significantly in terms of tightening. When the components of borrower's balance sheet variable are called and reconsidered, expectations regarding general economic activity, industry or firm-specific outlook and risk on collateral demanded seems more critical for banks. It tells to the policymakers that when they are implementing monetary policy, it may be noted that banks consider how the economic outlook seems to form their point of view instead of regarding their constraints. For that reason, the aim of the researcher and the policymaker could search for an optimal policy mix that makes the economic outlook optimal. The recent strand of literature studying the balance sheet channel emphasizes this channel as risk-taking behavior of banks. For that reason, it could be claimed that analysis of credit channel with its sub-channels is vital for financial stability matters.

For further analyses, there can be some advancements made in terms of data selection and model improvement. First of all, the model could be analyzed via using final domestic demand data for consumer loans. Secondly, for consumer loans, it might be more beneficial to conduct the analysis with different macroeconomic variables such as final domestic demand. This approach may help to explain meaningless movements in the impulse responses. Secondly, for a broader study, the analyses could be conducted for other emerging countries who conduct loans tendency surveys. At this point, one problem could be the matching of the surveys, but as the data evolved, it should be analyzed to see the overlapping characteristics of emerging markets in terms of loan demand and loan supply.



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