THE EFFECTS OF MACROECONOMIC POLICES INTERACTION & MACRO-PRUDENTIAL AND MONETARY POLICIES COORDINATION ON FINANCIAL STABILITY: EVIDENCE FROM TURKEY

Master of Science Thesis

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The Effects of Macroeconomic Policies Interaction & Macro-prudential and Monetary Policies Coordination on Financial Stability: Evidence from Turkey

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Master of Science Thesis

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This thesis titled "The Effects of Macroeconomic Policies Interaction & Macro-prudential and Monetary Policies Coordination on Financial Stability: Evidence from Turkey" has been prepared and submitted by ……..……..……. in partial fulfillment of the requirements in "Anadolu University Directive on Graduate Education and Examination" for the Degree of Master of Science Master of Arts Proficiency in Arts in ……..…… Department has been examined and approved on …../…../……..

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Abstract

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This study investigates the financial conditions' responses to both monetary and fiscal policy interaction, employing Vector Error Correction (VEC) model on the one hand, and macro-prudential and monetary policy coordination, adopting ARDL method on the other hand. Both long and short relationships between financial variables and policies were analyzed, using monthly data covers the period of 2010:01-2017:09 in Turkey. The study was divided to two parts, the first part examined the effectiveness of fiscal and monetary policy cooperation on stock prices and bond yields while the second part investigated the role of macro-prudential and monetary interaction in real credit and housing prices. According to first part, the main findings showed that in the long run, only fiscal policy had a significant relationship with financial assets, however the symmetry of the financial markets response to fiscal policy was not homogenous. Moreover, in terms of the short run, the impact of monetary and fiscal policy coordination was appeared to be insignificant in which it indicated that the interdependence between policies is not enough efficient to affect stock prices, while the joint impact of monetary and fiscal policy on bond yields was significant at 10% level, but it was less effective than impact of each policy alone. The main result of the second part found that the impact of monetary and

macro-prudential policy coordination on real credit made no significant difference from the effect of each single policy, only the impact of monetary policy was statistically significant, and it affected real credit negatively in the long run whereas macro-prudential tools responded positively in the short run. Furthermore, the joint impact of both policies on housing price index was not effective significantly which explains the reason behind the soaring prices in Turkey.

Keywords: Policy Coordination, Monetary Policy, Fiscal Policy, Macro-prudential policy, financial conditions.

ÖZET

Makroekonomik Politikanın Etkileşimin & Makro İhtiyatlı ve Parasal Politika Koordinasyonunun Finansal İstikrarının Üzerindeki Etkileri: Türkiye'den bir örnek

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Yüksek Lisans Tezi

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Danışman: Prof. Dr. Kemal yıldırm

Bu çalışma bir yandan finansal koşulların para ve maliye politikalarına verdiği tepkileri VER modeler ıle ölcerken, diğer yandan makro-ihtiyati tedbirlerin ve para politikası koordinasyonunun etkilerilerini ARDL modeleri ile ölcemektedir. Bunları yaparken türkyieyi örnek olarak 2010:01 ve 2017:09 dönemi ile olarak kısa ve uzun dönem ilişklerini analız etmektir. Bu çalışma iki bölöme ayrılmıştır. İlk bölüm, para ve maliye politikası birlekte hisse senedi ve tahvil fiyatları üzerindeki etkilerini araştırırken, ikinci bölömde makro ihtiyati tedbirler ile para politikalarınının reel kredi ve konut fiyatları üzerindeki rolune değinilmiştir. Bu çalışmanın birinci bölömönde uzun dönemde finansal varkılıkler üzerinde sadece para politikalarının etkili olduğu görülürken, finansal piyasaların para politikalarına uyunu homojen değildir. Dahası, kısa dönemde para ve maliye politikasının birlekte uyğulanmasının etkisinin önemsiz olduğunu ortaya koymaktadır. Bu politikaların birlekte uyğulanmasının hisse senedi fiyatlarını etkılemede %10 düzeyinde anlamlı olduğu, ayrı ayrı uyğulanması durumunde ıse etkisinin daha az olduğu görülmemiştir. Ikinci bölömün en önemli sonuçu ise para ve makro ihtyati tedbirlerin birlekte uyğulanması ile tek tek uyğulanması arasındeki bir fark görülmemiştir. Sadece, para politikası tek başına uyğulandığında istatatistiki anlamlı ve uzun dönemde reel kredileri negatif olarak etkilemekle beraber makro ihtiyati tedbirler kısa dönemde, pozitif etkilemektedir. Bunun dışında, bu politikalar birlekte uyğulandığında konut fiyatlar, üzerinde etkili değildir. Bu durum Türkiyedeki konout fiyatlarındeki artışları açıklamaktadır.

Anahtar kelimeler: Politika Koordinasyonu, Para Politikası, Maliye Politikası, Makro ihtiyati politika, finansal koşullar.

STATEMENT OF COMPLIANCE WITH ETHICAL PRINCIPLES AND RULES

I hereby truthfully declare that this thesis is an original work prepared by me; that I have behaved in accordance with the scientific ethical principles and rules throughout the stages of preparation, data collection, analysis and presentation of my work; that I have cited the sources of all the data and information that could be obtained within the scope of this study, and included these sources in the references section; and that this study has been scanned for plagiarism with "scientific plagiarism detection program" used by Anadolu University, and that "it does not have any plagiarism" whatsoever. I also declare that, if a case contrary to my declaration is detected in my work at any time, I hereby express my consent to all the ethical and legal consequences that are involved.

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ETİK İLKE VE KURALLARA UYGUNLUK BEYANNAMESİ

Bu tezin bana ait, özgün bir çalışma olduğunu; çalışmamın hazırlık, veri toplama, analiz ve bilgilerin sunumu olmak üzere tüm aşamalarında bilimsel etik ilke ve kurallara uygun davrandığımı; bu çalışma kapsamında elde edilen tüm veri ve bilgiler için kaynak gösterdiğimi ve bu kaynaklara kaynakçada yer verdiğimi; bu çalışmanın Anadolu Üniversitesi tarafından kullanılan "bilimsel intihal tespit programı"yla tarandığını ve hiçbir şekilde "intihal içermediğini" beyan ederim. Herhangi bir zamanda, çalışmamla ilgili yaptığım bu beyana aykırı bir durumun saptanması durumunda, ortaya çıkacak tüm ahlaki ve hukuki sonuçları kabul ettiğimi bildiririm.

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TABLE OF CONTAINS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

GDP: Gross Domestic Product

IMF: International Monetary Fund

CBRT: Central Bank of Republic of Turkey

VECM: Vector Error Correction Model

ARDL: Auto-regression Distributed lags

US: United States

UK: United Kingdom

IS: Investment-Saving

MR: Monetary Rule

ECB: European Central Bank

ERBS: Exchange Rate Based Stabilization

IT: Inflation Targeting

IS-LM: Investment-Saving, Liquidity-Money Model

AS: Aggregate Supply

AD: Aggregate Demand

DTI: Debt-to-Income

LTV: Loan-to-Value

FSC: Financial Stability Committee

VAT: Value-Added Tax

OECD: The Organization for Economic cooperation and Development

MTP: Medium Term Program

VAR: Vector Auto-Regression

DSGE: Dynamic Stochastic General Equilibrium

BIST: Borsa Istanbul Stock exchange

OLS: Ordinary Least Square

BVAR: Bayesian Vector Auto-Regression

DL: Distributed Lags

CAR: Capital Adequacy Ratio

RC: Real Credit

BY: 10Y Government Bond yield

BISTI: BISTI-100 Index

ONIR: Overnight Interest Rate

CGBE: Central Government Budget Expenditures

HPI: Housing Price Index

MPP: Macro-prudential Policy

ADF: Augmented Dickey-Fuller Test

PP: Phillips-Perron Test

KPSS: Kwiatkowski, Phillips, Schmidt and Shin Test

AIC: Akaike information criterion

FPE: Final prediction error

1. INTRODUCTION

The recent global financial crisis has raised the question to what extent macroeconomic and macro-prudential policies should take account of financial objectives. Moreover, it led to a rethinking of the policy framework which focused primarily on maintaining price stability without including the financial stability. In this regard, this crisis enhanced policymakers acknowledge widely the necessity of ensuring the financial markets stability and consider the solid links between financial sector and real economics. Many economists found a clear evidence on this strong relationship between the economic and financial sides, such as Erdem and Tastsaronis (2013) who underlined that financial variables contain information that is complementary to that in real variables. Borio (2011, p.25) also concluded that "analytics of financial and macroeconomic stability are two of the same coin".

Financial assets can play an important role in the real activity through twofold wealth effect: 1) demand side and 2) supply side wealth effects. In Bernanke and Gertler (1999) and Carlstorm and Fuerst (1997) models, the focus of analyzing the wealth effect is on the supply side. They showed that the fluctuations in stock market have a direct impact on the amount of credit available to firms, and hence the real economy. The reason is that firms' borrowing capacity is usually limited by their own net worth which depends on asset prices, therefore, when stock prices decrease, the net worth will decrease in value, then firms' credibility will be affected negatively worsening the real activity. On the other hand, Lacoviello (2005) in his model, concentrated on demand-side wealth effects. His study captures the financial accelerator mechanism based on housing market which can generate indirect effects on consumer spending. As value of houses decrease, it will reflect negatively on capacity of private borrowings, and hence reduce the financial ability to consume, which in turn decreases output. Thus, the transmission channels between both financial and real sectors are strong enough to create solid interconnections between their relative variables which in turn induce macroeconomists to consider

financial stability along with economic stability as a basic aim through the process of making decisions.

Macroeconomic policies have a crucial role in achieving economic and financial stability. However, without interaction between those macroeconomic policies, namely fiscal and monetary policies is not possible to reach those desired outcomes. Sargent and Wallace (1981) stated in their study two polar forms of coordination. The first one, they considered that monetary policy dominates fiscal policy. Therefore, the monetary authority determines the revenue of fiscal authority through seignorage, then the latter will be subject to the monetary authority which can permanently control inflation. Under the second polar form, the fiscal policy dominates the monetary policy. The former sets independently its budget and determines the amount of revenue which must be raised through bonds sales and seignorage. Therefore, monetary authority is forced to cover the difference between the required amount of revenue to fiscal authority and amount of bonds that can be sold to public. However, if fiscal policy cannot deal with the fiscal deficit, the monetary authority has to finance it by seignorage which will lead to higher inflation. In this respect, Sargent and Wallace (1981) argued that fiscal policy should be a complement to monetary policy for price stability. Consistently, Laurens and de la Piedra (1998) confirmed the need for effective coordination of monetary and fiscal policy for optimal economic performance.

Implementing both policies in effective manner requires a serious corporation and extensive coordination between monetary and fiscal authorities. By doing so, policymakers can ensure achieving policy objectives effectively, and avoid the problem of time inconsistency which might results from following discretionary policies. For an efficient policy interaction between monetary and fiscal policies, both sustainability and credibility objectives should be taken into account. The policy coordination cannot be an efficient if one or both fiscal and monetary authorities is not able to commit its plans on a certain course. Here an example suggested by Laurens and de la Piedra (1998) study clarified the necessity of policy sustainability, they supposed that the fiscal authority set its policies on a

certain course in which government debt to GDP will raise during this course. Such a fiscal plan might limit monetary authority from controlling real interest rate. However, the real interest rate will still tend to increase over time, and hence the monetary and fiscal policy combination will lose its sustainability.

Credibility for each of the two policies is not also less important than sustainability objective in terms of promoting the policy coordination. A credible monetary policy is one in which the central bank's actions are consistent with reaching its goals, while the credibility of fiscal authority is attained the government carries out its proposed policy announcements as planned. Therefore, if either of authorities fails to carry out its plans or even postpones them for some reason, it will hamper the policy cooperation.

The recent financial crisis revealed the importance of macroeconomic policies for taking account of financial stability as important as traditional objectives – prices stability and economic growth- and showed through many of empirical studies the effect of monetary and fiscal policies together on financial conditions. For instant, it has been found that monetary policy has a significant effect on financial variables, such as credit, asset prices and housing prices (Zdzienicka et al., 2015; Iacoviello and Minetti, 2008). Similarly, there are some studies showed the impact of fiscal policy on stock prices and housing prices (Agnello and Sousa, 2010; Afonso and Sousa, 2009, 2011). On the other side, with regard to necessity of the coordination between both policies, some empirical studies in literature, such as Chatziantoniou et al., 2013; Afonso and Sousa, 2011; Van Aarle et al., 2003 highlighted the interaction between both monetary and fiscal policies and showed their effective job together in explaining the financial markets developments.

In the recent years, macro-prudential policies also have been used intensively after the global financial crisis as effective tools for confronting financial instability in both advanced and developing countries. Many of those tools have been employed, such as General Countercyclical Capital Buffer/Requirement, Leverage Ratio for banks, Time-Varying/Dynamic Loan-Loss Provisioning, Loan-to-Value Ratio and Debt-to-Income Ratio.

According to Akinci and Olmstead-Rumsey (2015) study, in advanced countries, macro-prudential policies have primarily targeted the housing sector, while capital inflow restrictions have employed in emerging countries to control credit growth.

Furthermore, it has been concentrated on the extent of effectiveness of interaction between monetary and macro-prudential policies. It is found that coordination between both policies can target many different policy objectives as well as improving the trade-off process between polices for earning better outcomes. IMF (2013) study showed that since monetary policy became an additional tool to deal with financial stability, macro-prudential policy has been able to enhance monetary policy's credibility and transparency, which in turn can support macro-prudential policy to reach its goals. For instant, macro-prudential policy can offset the side effects of expansionary monetary policy on inflation by affecting any of available tools, such as Leverage Ratio for banks, Dept-to-income Ratio, et cetera. However, the relationship between macro-prudential and monetary policy can turn to conflict of interest if any of them is misused. As result, the study suggested a solution which claims the necessity of distinguishing between the two policy functions through separate decision-making in the way which can ensure optimal results.

1.1. Problem Statement

Since the recent global crisis which targeted the financial sector of global economy, the policy coordination became significantly necessary for financial stability. In terms of the relationship between fiscal and monetary policies, ensuring an effective fiscal and monetary policy interaction needs a high level of credibility between both authorities, in addition to sustainability in which each policy should commit own plans on short or long course. Independent central bank in tandem with reliable fiscal authority also plays a crucial role in stronger policy interconnections. In the other hand, the use of macro-prudential policies in coordination with monetary can also contain the financial risk. Monetary policy and macro-

prudential policy usually follow different goals in which each policy can have adverse effects on the other's goals. However, as long as effective policy coordination exists, those side effects can be avoided to have a more stable financial system.

Although the coordination of macroeconomic and macro-prudential policies for financial stability seems a fairly new practice around the world, there is a number of studies on the effectiveness of interaction between whether fiscal and monetary policies, such as (Chatziantoniou et al., 2013; Afonso and Sousa, 2011; Jansen et al. (2007); Chatziantoniou, Duffy and Filis study (2013); Handoyo et al. study (2015)) or macro-prudential and monetary policies, such as (Smets (2014); Dell'Ariccia et al. (2012); Nier and Kang (2016); lim et al. (2011)).

Turkish economy as a small open economy was one of those developing economies which took measures to offset the risky effects of the crisis. In the period of the crisis, Turkey pursued easing monetary and fiscal policies to support the credit and financial markets trying to alert the domestic demand, and hence, it managed to absorb the direct impact of crisis and simulate the domestic demand consistent with appreciation in Turkish lira. In 2010 Turkey has adopted a new policy approach which follows unconventional monetary policy contributes in fighting the financial risk. The Central bank also contributed in establishing a formal macro-prudential framework which promotes a more stable financial system. However, turning to relative literature, although there exist some studies describe the effectiveness of implementing macro-prudential measures, such as (Başçı and Kara (2011); Central Bank of Turkey (2014); Bumin and Taşkın (2015); Kara (2016)) there are no empirical researches that clearly demonstrate the coordination and interaction between polices in Turkey. In addition, the continuously intensifying debate between fiscal and monetary authority on policy approach urges to the need for investigating the relationship between monetary and fiscal policy in an attempt to take a serious action towards a more effective policy coordination and financial stability.

On the basis of that, this thesis clarifies to what extent macroeconomic and macro-prudential policies can affect the financial markets in Turkey. It also shed light on effectiveness of the interaction between both monetary and fiscal policies on one side, and the coordination of monetary and macro-prudential policy on the other side.

1.2. Objectives

The general objective of the thesis is examining the effectiveness of policies coordination and interactions on the financial conditions in Turkey.

The specific objectives are:

- To analysis the responses of stock, bond and housing markets to monetary policy.
- To exam the effect of monetary and fiscal policy interactions on stock and bond markets.
- To explore the effect of macro-prudential polices on financial variables: credit growth, assets prices.
- Investigating the role of macro-prudential and monetary policies coordination towards financial stability.

1.3. Assumptions

The assumptions of the thesis:

- Monetary or fiscal policy has an individual effect on financial markets performance. However, the interaction between two policies plays more important role in analyzing the developments of financial markets.
- Macro-prudential or monetary policy solely has a significant impact on financial variables. However, the macro-prudential and monetary policy coordination can contribute more in maintaining financial stability.

1.4. Limitations

This study focused on the role of both macroeconomic and macro-prudential policies on financial markets in Turkey during the period of

2010-2017. All data of this study was derived from CBRT except for bond yields which was not available, so it was taken from investment website.

In this thesis, the methodology of both VEC model and ARDL framework using time series monthly data was employed. The reason behind using two models is belong to the nature of data used in this study, as well as the necessity of the analysis. The financial conditions were approximated by real credit, stocks prices, bonds prices and housing prices. Although these variables are powerful to represent financial conditions, credit growth was a general index which cannot show detailed information about effects of the branches of the real credit on financial stability. Both of monetary and fiscal policy are represented by overnight interest rate, Central Government Budget Expenditures respectively. However, this study can be extended to involve more tools to represent monetary policy, such as reverse requirement and monetary supply, while taxes could be an additional proxy to fiscal policy. In terms of macro-prudential measures, they consist of both demand and supply side tools represented by Credit Restrictions, Capital Adequacy, General provisions and Reserve Requirements, but in this study, only the impact of cumulative macro-prudential index was considered.

1.5. Terms of Definitions

Macroeconomic policy: it refers to macroeconomic quantities which can be directly controlled by an economic policy maker.

Monetary policy: it is a macroeconomic policy conducted by the central bank to achieve a number of macroeconomic objectives.

Fiscal policy: it is the use of government expenditure and taxes that influence the economy.

Financial accelerator: the process which states that a small shock to financial markets can lead to a large change in the economy and create a feedback loop.

Macro-prudential policies: financial regulations that aim to contain the risk of the financial system.

General Countercyclical Capital Buffer/Requirement: it aims to ensure that banking sector capital requirements can protect the banks from periods of excess aggregate credit growth which is associated with financial risk.

Leverage Ratio for banks: The leverage ratio is the proportion of debts that a bank has compared to its equity/capital.

Dynamic loan-loss provisioning: it is the adjustment of banks provisions for uncollected loans and loan payments.

Loan to value ratio: the ratio that indicates to the size of the loan compared to the value of the property which aim to secure the bank loan.

Aggregate monetary targeting: it is a rule for monetary policy in which central bank manages money supply as intermediate target to affect price stability.

Inflation targeting: when central bank sets a specific inflation rate as its goal through controlling interest rate.

Nominal anchor: a nominal variable such as the inflation rate, an exchange rate, or the money supply that monetary policymakers use affect the price level.

2. THEORETICAL BACKGROUND

In this chapter, macroeconomic and macro-prudential policies is briefly theoretically discussed. In addition, it is highlighted on the evolution of policies in Turkey.

2.1. Monetary Policy Evolution

Monetary policy has adopted several rules over the last 60 years. At the beginning, central banks tended to target aggregate money supply as an indirect tool based on classical thought to absorb the volatility of inflation rate. The monetary target had proved to be an efficient rule up to the period of recession in the early 1980s. In 1990s, it was a new decade that started with a new monetary policy approach which targeted directly the inflation rate. Inflation targeting concentrated on price stability which was the main objective for central bank and could achieve considerable findings in terms of sustainable growth rate and price stability.

However, during the financial crisis in 2009, it has been discovered that inflation targeting as a nominal anchor for monetary policy alone no longer could stabilize both economic and financial sides. In this regard, monetary authority has suggested a more effective approach which takes in account of the bank regulations and financial stability.

2.1.1. Monetary policy and Aggregate monetary target as a nominal anchor

Classical economists are the first who came up with the idea of classical dichotomy that real variables such as output, employment and interest rate can be completely analyzed without taking into account the changes in their nominal values. In other words, the real variables can be determined without the need to know the levels of nominal money supply or inflation rate. As a result, money described as neutral which cannot have any effect on the real variables except the price level. Classicalists believe that the economy is perfectly competitive without imperfections or rigidities where prices and wages always adjust immediately to keep the economy at equilibrium. The classical dichotomy which demonstrates the relationship between money and price level can be explained through the Quantity Theory of Money:

$$PY = MV \tag{2.1}$$

where P is price level, Y, the level of output, M, the supply of money, and V, velocity of money.

Converting the equation of the Quantity Theory of Money into growth rates, we get:

$$\frac{\Delta P}{P} + \frac{\Delta Y}{Y} = \frac{\Delta M}{M} + \frac{\Delta V}{V} \tag{2.2}$$

Assuming that output growth is zero and velocity of money is constant. Then it gives a simple expression:

$$\frac{\Delta P}{P} = \frac{\Delta M}{M} \rightarrow \pi = \frac{\Delta M}{M} \tag{2.3}$$

Under these assumptions, the growth of money rate chosen by monetary authority can control the price level, and hence the inflation rate. This view

of the quantity of money has an effect on the price level belongs to Monetarists who believe that monetary policy can be conducted through targeting the growth of money supply which in turn affects the price level. Practically, the idea of monetary targeting was efficient as Germany and Switzerland adopted it in 1974 for maintaining low inflation. Central bank of Germany could success in using monetary targeting method to earn the public's trust towards long run stability of low inflation. The Bundestbank established a coefficient on the inflation target with value close to 1 in Philips curve:

$$\pi_t = \qquad (2.4)$$

When agents are rational, the announcement of low inflation would lead to an immediate fall in inflation without unemployment cost. In general, monetary targeting can be successful in controlling inflation under two conditions. First, the central bank must be able to control monetary aggregate. Second, the relationship between aggregate monetary and inflation must be reliable. However, in UK under Margaret Thatcher, although the central bank could control the narrow aggregate monetary, for many reasons such as changes in economy policy, financial innovations and the recession in the early 1980s, the government lost control of M3 stating higher levels of inflation. The central bank's reaction of adopting a tighter policy was accompanied with harmful effect on the economy resulting higher unemployment costs. Table 2.1 shows how much higher the cost of reducing inflation was under Monetarism view as unemployment rate soared from 6.9% to 11.6% during only three years. The experience of UK and other countries such as US and Canada in the 1980s clearly discredited aggregate monetary targeting as a practical policy approach and called for a new framework using inflation target as a nominal anchor.

Table 2.1. *Aggregate monetary and UK economic performance*

	1980	**1981**	**1982**	**1983**
M3 growth target (%)	7-11	6-10	8-12	7-11
M3 growth (%)	19.4	13	11.1	9.5

Inflation rate (%)	18	11.9		8.6
4.6				
Unemployment rate (%)	6.9	9.8	10.9	11.6

Source: Goodhart (1986); UK Office for National Statistics.

Turkish case

In 1986, Turkey implemented indirect monetary policy instruments for controlling the inflation. The Central bank of Turkey used broad money supply (M2) as the intermediate target of the monetary policy through controlling banking system. In Arin and Gur (2009) study, the macroeconomic effects of aggregate monetary targeting and exchange rate targeting were compared in Turkey for the period of 1986 to 2001. The results showed that monetary aggregate targeting is a superior policy comparing to exchange rate targeting. It was also found that money supply has a positive long run impact on industrial output and a positive short run impact on trade balance. On the basis of this study, it seems using money supply target as a nominal anchor was more appropriate for Turkey's case during that period of time.

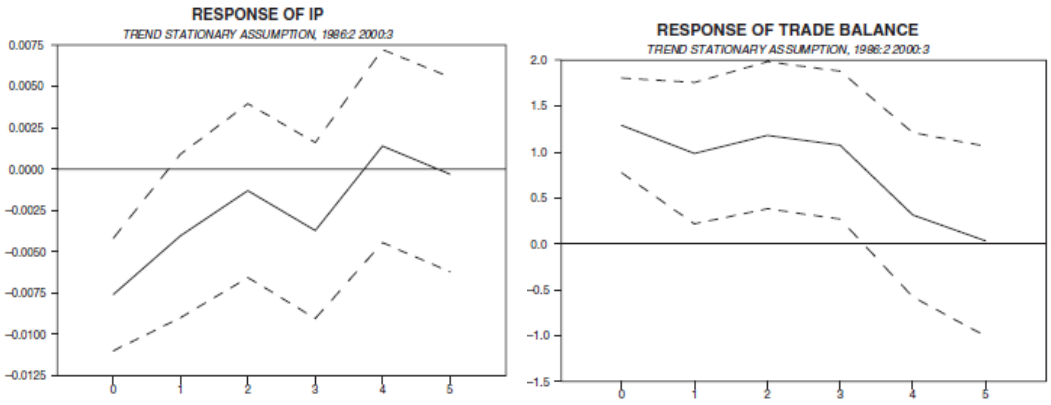


Figure 2.1. *The effect of aggregate monetary targeting on both industrial output and trade balance*

2.1.2. The modern monetary policy framework

Sine the early 1990s which accompanied with the failure of aggregate monetary target as a nominal anchor, a growing number of central banks have adopted inflation targeting monetary policy framework that aims to stabilize the economy around a low target inflation rate. Passive monetary policy which keeps the nominal interest rate fixed was no longer pursued after the surge in inflation. Central banks actively intervened to adjust the interest rate frequently attempting to guide the economy back to the inflation target. The central bank often does its best to choose the most appropriate interest rate which achieves its objectives in terms of the current state of the economy. This behavior can be represented by Taylor rule which belongs to John Taylor in his landmark 1993 study and stated the responsiveness of the nominal interest rate to changes in inflation and output. The best response Taylor rule can be derived from the three equations:

$$\pi_1 = \pi_0 + \propto (Y_1 - Y_e) \qquad \text{(Philips curve)}$$

$$Y_1 - Y_e = -\sigma(r_0 - r_s) \qquad \text{(IS)}$$

$$(Y_1 - Y_e) = -\alpha\beta(\pi_1 - \pi^T) \qquad \text{(Monetry rule MR)}$$

Where π^T is the cental bank's inflation rate, Y_e is the equilibrium level of output, and $r_s$is the stabilizing of interest rate**.** In terms of the period zero observation of inflation, with some substitutions we get:

$$r_0 - r_s = \frac{1}{\sigma\left(\alpha + \frac{1}{\alpha\beta}\right)}(\pi_0 - \pi^T) \qquad \text{(Best response Taylor rule)}$$

Assuming$\sigma = \alpha = \beta = 1$, then we can see:

$$r_0 - r_s = 0.5(\pi_0 - \pi^T) \qquad (2.5)$$

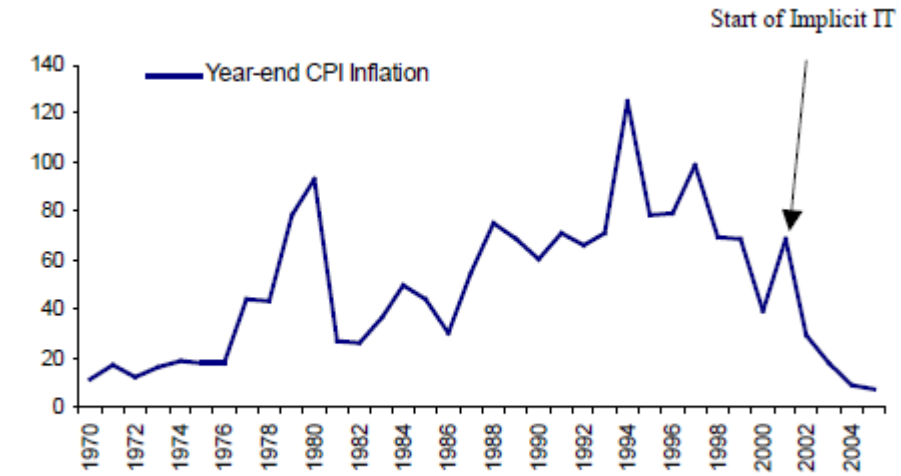
It said that if inflation is one percentage point above the target, then the nominal interest rate needs to be 1.5 percentage points in order to keep the inflation at target. This is consistent with the Taylor principle that

implies the nominal interest rate should be raised enough to push up the real interest rate which in turn guide the inflation back to its target.

Generally, the central banks do not have the same mandate in which all central banks focus on the objectives of price stability, full employment and sustainable economic growth, but they usually place different weights on each of these objectives. For instant, the primary aim of the Bank of Japan was achieving price stability and keep inflation at the target, depending on the fact that price stability will maintain sustainable economic growth and low unemployment rate. While other central banks, such as the Swedish central bank and Federal Reserve seek both price stability and full employment. In other hand, there are also central banks that have a primary objective of price stability, and a secondary objective of full employment, such as ECB and the Bank of England.

Turkish case

In December 1999 Turkey adopted an IMF-supported exchange rate-based stabilization (ERBS) program for an 18-month period. The aim of this program was reducing the inflation rate which the Turkish economy suffered over the last 25 years. In the first half of the year 2000, Turkey could achieve a success when the inflation rate almost reached the targeted annual rate. However, the sizable current account deficit which was about 10$ billion led to a huge devaluation of Turkish lira, then the Turkish central bank had to make the decision of letting Turkish lira to float, giving up on the (ERBS) program. In 2002, the central bank of Turkey announced that inflation targeting regime was adopted as a nominal anchor instead of the (ERBS) program, but CBRT was aware that fully adopting inflation targeting officially needed to first satisfy a set of necessary conditions. For this reason, CBRT initially decided to adopt implicit inflation targeting. During this waiting period between 2002 and 2005, the annual inflation rate dropped to its lowest level since more than 25 years. The outcome was very successful, it came down from 68% at the end of 2001 to 7.7% in 2005.



Source: Turkish Statistics Institute

Figure 2.2. *Inflation rate in Turkey during 1970-2004*

The considerable success in reducing inflation rate during the period of implicit IT paved the way for CBRT to announce officially adapting full IT regime as monetary policy at the beginning of 2006. Kara (2008, p.12) listed the main innovations in the full-fledged IT regime as follows:" (i) Decisions were to be made on a voting basis in which the Monetary Policy (ii) A Committee assumed the whole responsibility on setting the interest rates; multi-year target horizon was set and medium term inflation forecasts were published in the new "Inflation Report"; (iii) The CBRT committed to be accountable in case of sizeable deviations from the target". This rabid improvement of inflation rate is considered a remarkable achievement for Turkey. The new monetary policy approach promoted strongly the stability of Turkish economy and helped creating an attractive environment for both local and international investments. For instant, the direct investment in Turkey reached to high levels at the first years of implementing full inflation targeting regime as 3.7% and 3.3% of GDP in 2007 and 2008 respectively. However, there still exist an obvious gap between the actual inflation and the inflation targeting especially in the last years due to economic and political problems, such as the ongoing deficit in current account which leads to capital outflows, in addition to the side effects of the Syrian conflict and the domestic terrorism works on Turkish economy. All of these serious

issues urge CBRT to make more efforts in order to reduce this gap and maintain price stability.

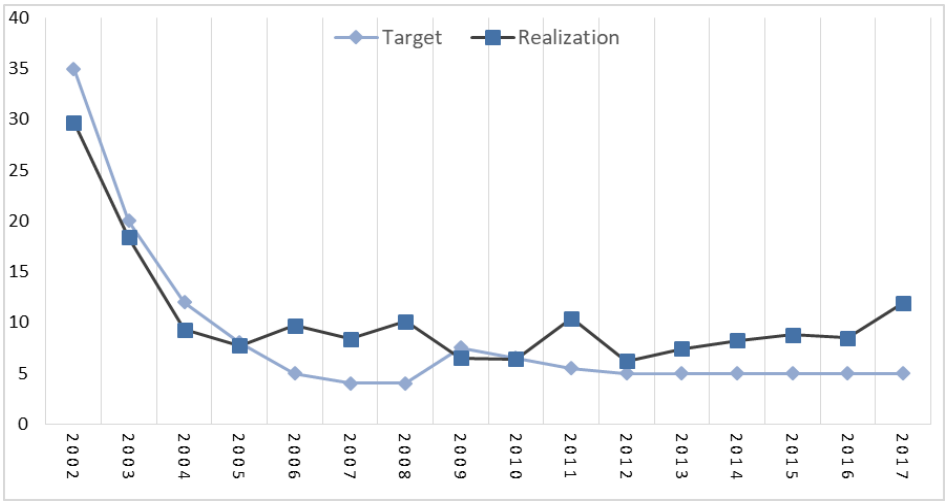


Figure 2.3. *Evolution of actual inflation and inflation targeting Source: CBRT*

2.1.3. Monetary policy and financial stability

The global financial crisis in 2009 forced central banks to pursue unconventional monetary policies such as "Quantitative easing" and rapidly expend their balance sheets to stimulate the aggregate demand and put an end to the recession. In the wake of the crisis, reforming the monetary policy framework and financial regulation became the main debate for central banks to avoid any future financial crisis. The policymakers realized that inflation targeting monetary policy alone cannot ensure stabilizing the economy when it is in the upswing phase of financial cycle and therefore central banks should take on more responsibility for banking regulations and monitoring the financial stability.

2.1.3.1. Monetary policy channels and financial markets

Central bank can affect the financial markets through many monetary policy transmission channels. Monetary transmission mechanism is the procedure that occurs through several channels in which asset prices and economic condition are affected due to monetary policy decisions.

Beginning with the traditional interest rate channel which is the key monetary transmission mechanism in the IS-LM and AD/AS models. The channel suggests that an expansionary monetary policy leads to a decrease in interest rate, which in turn reduces the cost of capital, causing a lower present value of future net cash flows, which, in turn, leads to rise in the asset prices.

Credit view is another indirect category to monetary transmission mechanism which operates through asymmetric information effects on financial markets. It proposes two types of monetary channels: the channels which work through effects on bank lending and channels that operate via effects on balance sheets of both firms and households. The credit view suggests that expansionary monetary policy can cause a positive impact on investment through its different channels such as, bank lending channel, balance sheet channel, cash flow channel, etc., which, in turn, leads to higher firm market value.

Exchange rate channel is also an indirect channel which involves interest rate effects to clarify the way which the interest rate affects the assets prices. It shows that a lower domestic real interest rate leads to depreciation in the domestic exchange rate, making domestic goods cheaper than foreign goods, thereby causing a rise in net exports, and hence in aggregate output which eventually leads to higher asset prices.

According to Modigliani's theory consumers smooth out their consumption spending over time. Therefore, their consumption is determined through their lifetime resources, not just their income today. Financial wealth such as, stocks is considered an important component of consumers' lifetime resources. For instant, when stock prices rise, the value of financial wealth increases, and hence lifetime resources of consumers, and consumption should rise as well. Considering that, the transmission mechanism can also operate through wealth effect which suggests that an expansionary monetary policy can lead to a rise in asset prices through alerting the interest rate, causing an increase in financial wealth. Finally, James Tobin (1969) developed a theory which known as Tobin's q theory. It shows how monetary policy affect the economy through its impact on

stock prices. When monetary policy is expansionary, the public tends to spend those excess money by investing them in the stock market, putting pressure on demand for stocks and consequently causing higher stock prices. Conversely, a higher interest rate offered by the monetary authority, it could induce less demand for stocks, leading to lower stock prices. However, in the case of tightening monetary policy, investors might flee those investment for more stable assets such as the stability that bonds tend to offer.

2.1.3.2. Macro-prudential policy as a financial stabilizing policy

Stabilizing the business cycle by using monetary policy is not guarantee of financial stability. This is clearly featured in the early 2000s when USA, UK, Germany, Sweden and Japan experienced a financial cycle upswing represented by the increase in the housing prices and credit growth during a recession in business cycle. Considering the financial cycle induces policymakers to introduce a financial policy committee that aims to implement macro-prudential policies. Macro-prudential policies described as counter-cyclical intervention which help the economy to recover from the consequences of upswing or downswing of the financial cycle.

There is a range of macro-prudential tools which reflects a variety of potential resources of risk, such as capital adequacy, dynamic provisioning, and levies on short-term borrowing the tools which affect the banking sector, and LTV caps for mortgage loans and debt-to-income (DTI) limits which control the household sector. In times of financial cycle upswing, the central bank can control the process of issuing loans and reducing the leverage of banks through the increase the bank capital ratio or reducing the loans-to-value ratios for housing which restrict the household sector borrowing. This would help dampening the boom and avoiding asset price bubbles. In other hand, decreasing the bank capital ratio or raising the loan-to-value ratios would recover the economy from the downswing of financial stability and revive the financial markets.

Turkey case

In the post-crisis period, due to quantitative easing policy followed by advanced countries, developing countries, including Turkey became attractive places for investors, then the surge in capital inflows exacerbated the deteriorations of Turkish lira and the current account state, thus, central bank had to adopt a new approach of monetary policy to cope with this global financial risk which threated both of financial and economic stability.

Inflation targeting framework which aims to achieve the price stability has been no longer the strategy which has been followed by center bank since 2001. At the end of 2010, the central bank has pursued a new framework is not only limited to conventional monetary policy, but it employs a new instrument, namely, reserve requirement ratio and interest rate corridor. The aim of this new policy approach is to put an end to ;the rapid capital inflows and the acceleration of Turkish lira appreciation – which harms the foreign and domestic demand- as well as the deterioration of current account, so the cental bank can ensure financial stability beside price stability.

Again, CBRT have acknowledged that the new policy framework may not be sufficient to contain credit growth and capital inflows, therefore, as kara (2016, p.130) study clarifies that "the efforts by the CBRT to contain macro-financial risks have increased the awareness of the need to establish a formal institutional body for macro-prudential policies, paving the way for the foundation of the Financial Stability Committee".

The FSC which founded in June 2011 underlined the crucial role of macro-prudential tools in reducing the financial risks and concentrated on two main objectives. The first objective is containing credit growth and household debt through effective measures which target assets side of balance sheet of banks, while the second objective is improving the quality of liabilities of capital inflows through targeting liabilities side of balance sheet of banks. In this regard, different effective macro-prudential tools followed by FSC, such as Credit Restrictions, Regulation on Measurement

and Assessment of Capital Adequacy of Banks, General Provisions and Reserve requirements. Table 2.2 shows macro-prudential tools and their measures on retail and corporate loans

Macro-prudential Tools	Regulation	Macro-prudential Measures (Tightening)	Enforcement Date	Macro-prudential Measures (Easing)	Enforcement Date
Credit restrictions	Regulation on Bank Cards and Credit Cards	Increasing minimum payment rates of credit cards	17.12.2010 01.01.2014		
		Loan/Income ratio restriction for credit card limits	08.10.2013		
		Closing credit cards in certain cases	17.06.2011 08.10.2013		
		Limiting the installment period of credit card debt	01.02.2014 13.05.2014 22.10.2014	Extending the installment period of credit card debt	25.11.2015 27.09.2016
	Regulation on Credit Operations of Banks	Restricting maturity of vehicle loans to 48 months and consumer loans except housing and vehicle loans to 36 months	31.12.2013	Extending maturity restrict ion for consumer loans except housing and vehicle loans to 48 months	27.09.2016
	Regulation on Principles for Establishment and Operations of Financial Leasing, Factoring and Financing Companies	Loan/Value ratio restrict ion (75%) for housing loans extended to consumers	01.01.2011	Increasing the Loan/Value ratio restrict ion to 80% for housing loans extended to consumers	27.09.2016
		Loan/Value ratio restrict ion (50%) for housing loans extended for commercial purposes	01.01.2011	Abolition of Loan/Value ratio restrict ion for housing loans extended for commercial purposes	04.04.2013
		Loan/Value ratio restrict ion for vehicle loans (70% up to 50,000 TL of the billing value, 50% for the rest)	01.02.2014		
Capital adequacy	Regulation on Measurement and Assessment of Capital Adequacy of Banks	Increasing risk weight s applied to consumer loans and credit cards	22.03.2008 18.06.2011 08.10.2013	Decreasing risk weight s applied to consumer loans and credit cards (To comply with Basel regulations)	01.07.2012 31.03.2016
	Regulation on Procedures	Incremental general provision rates for consumer loans except housing loan	18.06.2011 08.10.2013 24.12.2013	Abolition of incremental general provision rates for consumer loans except housing loans	27.09.2016

General provisions	and Principles for Determination of Qualifications of Loans and Other Receivables by Banks and Provisions to Be Set Aside Regulation on Accounting Applications and Financial Tables of Financial Leasing, Factoring and Financing Companies			Reducing general provision rates • to 0% for export loans, • by half for SME loans, which are categorized in the first group	14.12.2016
				Reducing general provision rates • to 0% for SME loans and syndicated loans for large-scale public procurement s, • by half for commercial loans, which are categorized in the first group	14.12.2016
Reserve requirements	Communiqué on Reserve Requirement s	Inclusion of financing companies in the reserve requirement system	06.12.2013		

Table 2.2. *Macro-prudential Regulations on Retail and Corporate Loans*
Source: Financial stability report 2017

2.2. The Role of Fiscal Policy in Stabiliztion

The government used to consider fiscal policy as a way to raise revenue through taxation to meet the public expenditure and achieve a set of necessary objectives. Income redistribution is one of these objectives in which the government follows a tax and transfer system redistributes income from higher-income households to low- income households. Fiscal policy also is used to reallocate the market resources among industries through its tools: taxation and subsides. The government can encourage some particular industries by providing them with subsides which will help devote the resources economically. On the other hand, taxation can discourage the undesired industries, such as those which harm the environment. In addition, the government takes responsibility of providing public goods which market would not provide, such as clean air and defense.

2.2.1. Political views of fiscal theory

From a political perspective, the fiscal policy theory is considered a critical topic among economists and policymakers. Bernheim (1989) shed light on three schools of thought concerning the economic effects of budget deficits: Neoclassical, Keynesian, and Ricardian perspective. He was suspicious about the benefits of using fiscal policy as tool for stabilization.

Before the Great Depression of the 1930s, the balanced-budget regime had been followed. Under this regime, the fiscal policy was pro-cyclical in which government raised the tax rates or decreases the public expenditure during periods of recession to offset any declining in government revenues, while it declined the tax rate or raised its expenditure during periods of boom. In 1930s the economist John Maynard Keynes called for a new framework in which fiscal policy should be used counter-cyclically. Keynes suggested a fiscal stimulus- increasing government spending and decreasing the tax rates- for stimulating aggregate demand during the period of low economic growth, while in times of economic boom, decreasing spending or increasing tax rates to avoid any potential bust economic cycle. Contract to Keynesian theory of fiscal policy, many classical and neoclassical economists argue that increasing government

spending through expansionary fiscal policy negates any fiscal stimulus and causes "Crowding out effect". Crowding out takes place when the government tends to increase its borrowing for financing its expenditure, thereby this large borrowing can lead to a substantial rise in the interest rate, which absorbs the economy's lending capacity and crowds out firms due to the higher opportunity cost of borrowing money. On the other hand, Ricardian perspective argues that fiscal policy has no impact on aggregate demand. The reason behind this is consumers have expectations of the future, then they can anticipate that any tax cut occurred today, will be accompanied with a rise in future taxes. Therefore, both income and consumer spending will not change. Similarly, financing government spending through debt makes no difference. Robert Barro (1974) found that under certain conditions, financing public expenditure by bonds gives the same result as raising taxes.

2.2.2. Discretionary fiscal policy vs. Automatic Stabilizers

Generally speaking, as monetary policy is considered a preferred stabilization policy, fiscal policy also plays an important role in stabilizing the economy through its two key components: automatic stabilizers and discretionary fiscal policy. *Discretionary fiscal policy* is used by the government to expand or shrink the economy, depending on the prevailing economic situation. This type of fiscal policy needs to be deliberated and debated legislatively which takes a long time to be implemented. Discretionary fiscal policy has two ways to enhance the aggregate demand. They are tax code and budget process. Tax code includes taxes on incomes and profits and other excise fees which aims to raise or lower taxes responding to the economic situation. While budget process is a change in the government budget to affect the spending and the aggregate demand.

Discretionary fiscal policy can be expansionary or contractionary policy. The expansionary fiscal policy is when the government increases the spending or cut taxes in attempt to boost aggregate demand. If the government increases public expenditure, the changes in spending would create more jobs which in turn increase income and alert a greater aggregate

demand. Alternatively, government can cut income taxes leading to increase in disposable income and spending which in turn promote higher economic growth. The initial injection of governmental spending into the economy causes a greater increase in GDP than the initial government expenditure thanks to the fiscal multiplier effect. However, expansionary fiscal policy can also lead to higher inflation due to the higher demand in the economy.

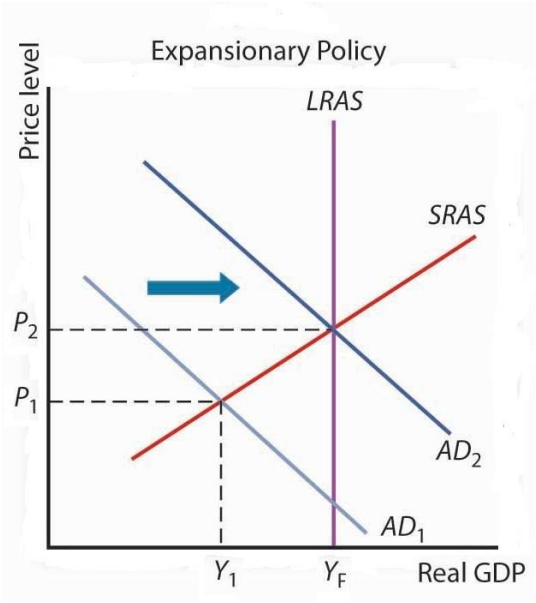


Figure 2.4. *The effect of expansionary fiscal policy on GDP and inflation*

On the other hand, contractionary fiscal policy involves increasing taxes or reducing public spending attempting to fight the inflation. Government can control inflation through raising taxes which leaves household with less disposal income to spend, then a lower aggregate demand. Decreasing government expenditure is a direct way to affect GDP as government spending is considered a part of the GDP.

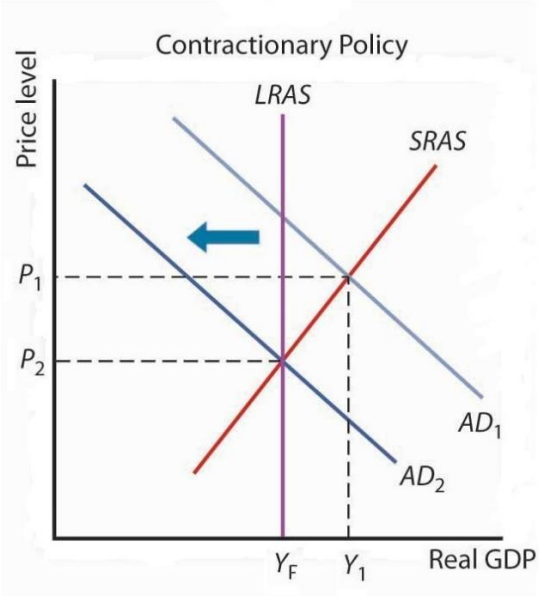


Figure 2.5. *The effect of contractionary fiscal policy on GDP and inflation*

Discretionary fiscal policy should work as countercyclical policy to stabilize the business cycle. Fiscal authority should raise tax rates or cut spending during expansion phase, while cutting taxes or increasing spending will be a more appropriate decision when the economy is in the slowdown periods.

Automatic stabilizers are the second type of fiscal policy that automatically tends to dampen business cycle fluctuations without specific new legislation. The aim of the fiscal automatic stabilizer is to offset the negative consequences of the unexpected booms or recessions using taxes and government spending. The progressive tax system is one of the fiscal automatic stabilizer which is used to slow down the economic activities by higher tax brackets in expansion phase, while enhancing the economic growth in times of recession. The unemployment insurance program is also an automatic stabilizer that aims to regulate the economic cycle through providing unemployment benefits to unemployed people during the periods of recession. Conversely, during the phases of high economic growth the program will automatically reduce the spending on unemployment benefits, as a result budget deficit decreases and the business cycle becomes more stable.

Since the failure of traditional monetary policy in dealing with recession of 2009, the governments turned to fiscal policy and considered it

as an important instrument to stabilize the economy. In the wake of global financial crisis, the aggressively easing fiscal policy response of major countries was effective in containing the risk of recession and alerting the aggregate demand. The automatic fiscal stabilizers automatically without any change of policy took its role to increase the government transfers, such as unemployment benefits and cut taxes such as progressive tax system. By doing so, the automatic stabilizers could limit the fall in aggregate demand. However, the severity of the fall in aggregate demand urged the government to adopt a discretionary fiscal policy through introducing fiscal stimulus packages. For instant, in UK, the VAT rate temporary was decreased from 17.5% to 15%, while many European countries followed many different measures to put an end to the recession. Figure (2.6) shows the size of the fiscal stimulus packages of a group of OECD countries in relation to GDP

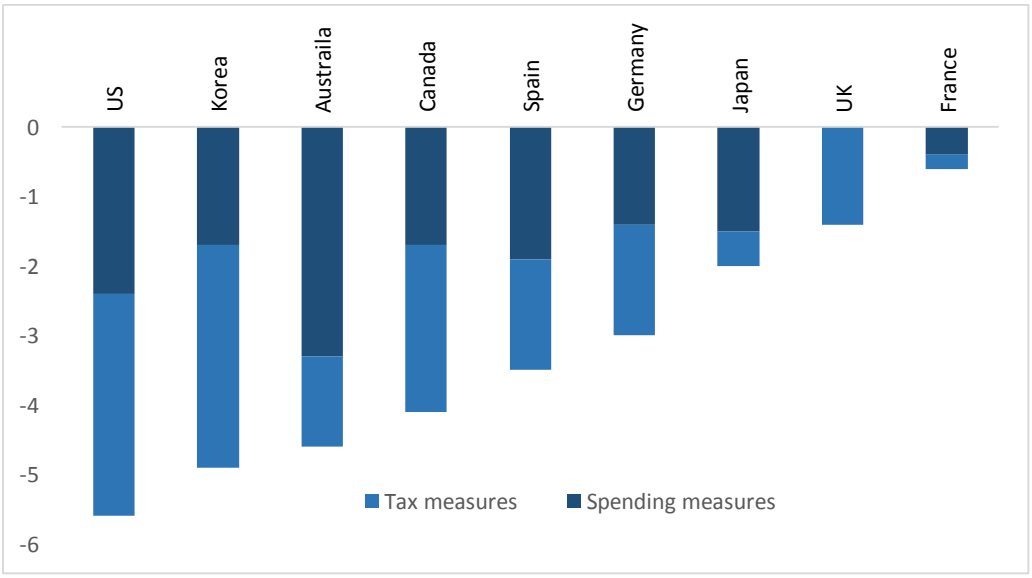


Figure 2.6. *Composition of fiscal packages over 2008-2010 period as % of GDP in 2008. Source: OECD.*

The consequences of the automatic stabilizers and implementing the fiscal stimulus packages were large deteriorations in fiscal balances. The IMF found that fiscal balances relative to GDP reached to 5.9% across the G20 in 2009. Economic theory highlights on the conditions under which fiscal stimulus is effective to alert the aggregate demand and output. The

effectiveness of fiscal stimulus relies on the state of economy in which the countries that suffer from a high level of government debt and deficit are less likely to be able to implement fiscal stabilizers, such as the case of Ireland's sizable debt during the financial crisis which constrained its ability to borrow to finance fiscal stimulus. Furthermore, the stance of monetary policy can also play a crucial role in affecting fiscal policy measures through controlling the interest rate in tandem with the state of economy, for instant, monetary policy can support expansionary fiscal policy by preventing interest rate from increasing.

Turkey case

In general, the developing countries which have limited domestic savings such as Turkey have no other funding choices except deficit financing. They usually depend on external financing from the creditor countries to fund the public infrastructure expenditures and promote the economic development. However, a sizable current account deficit may cause a loss of confidence and credibility which has harmful effects on the economic performance. In 1990s, Turkey adopted an expansionary fiscal policy which depends excessively on current account deficit financing as an attempt to push up the economic growth. At the end of that period, the public deficit reached almost 11.7% of the GDP, while the interest payments paid by public sector soared from 3.8% in 1990 to 11.5% in 1999 resulting a negative public savings. The decline in the public saving caused a deterioration in the current account balance which required more foreign financing from abroad to handle the deficit of 10% of GDP. Moreover, Turkey had suffered from a high inflation rate of 60% on average due to the expansionary fiscal and monetary policies. The inflation dampened the economic activity and undermined the confidence in the Turkish lira.

This decade which coupled with severe volatility and weak economic performance urged the Turkish government to pursue a new reform initiative for adopting a comprehensive economic program with the support of the IMF. Turkey in collaboration with IMF implemented three stand-by arrangements that suggested a set of measures which aimed to design a monetary policy that could maintain the price stability. These

measures involves promoting the independence of the central bank and restructuring the banking system, and following a tightened fiscal policy which improves the state of current account deficit and enables the private sector to have more access to fund their own investments. The fiscal consolidation which was followed by government helped improve the public deficit in relation to the GDP from 12.1% in 2001 to surplus in 2005. Furthermore, the public interest payments declined to 5.5% in 2008 after it was about 18% in 2001. In addition, the improvements were seen in the state of current account and public savings which turned to positive savings after being negative during the 1990s.

Table 2.3. *Fiscal outlook of Turkey, 2000-08 percent of GDP*

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Public sector balance	–8.9	–12.1	–10.0	–7.3	–3.6	0.1	1.9	–0.1	–1.6
Public sector interest Payments	13.2	18.0	15.5	13.4	10.4	7.2	6.2	6.0	5.5
Public savings	–3.4	–7.1	–4.8	–4.1	–1.0	2.8	4.2	2.4	1.7
Saving-investment balance	–8.6	–11.2	–9.8	–7.8	–4.2	–1.2	0.6	–1.5	–2.5

Source: State Planning Organization of Turkey.

After the 19th stand-by arrangement, Turkish government announced its new medium-term program in September of 2009 which aimed to improve the fiscal balance by bringing the public deficit and debt gradually down. For maintaining fiscal discipline, the medium-term program introduced through the draft of Fiscal Rule Law a cyclically adjusted deficit rule for the general government balance. According to this law, the general government deficit is targeted to converge to 1% of GDP in the long run. It means that fiscal deficit rule would force the government deficit to maintain at 1% of GDP. At the same time, the fiscal rule aimed to target annual growth of 5% and to reduce the ratio of debt to GDP to 15% in the long run. The government planned to introduce the fiscal rule in 2011, but because the fiscal budget of 2011 was not coincidence with the fiscal rule, they had to postpone it to 2012. Practically, the Medium Term Program

(2010-12) supported by fiscal deficit rule could improve the fiscal balance (Aras and Öztürk, 2011). According to MTP, the government budget deficit to GDP ratio decreased from -5.5% in 2009 to -3.4, and -1.3 in 2010 and 2011 respectively. In the meantime, the debt stock to GDP ratio also fell from 46.1% in 2009 to 39.5% in 2011. The last six years have seen a significant improvement in the fiscal balance. The budget deficit started a remarkable decline in 2011 recording its lowest level in 2016 since two decades, at the same time, a significant advance in terms of the debt stock in relation to GDP which decreased gradually from 46% in 2009 until 28% at the end of 2016 was also observed.

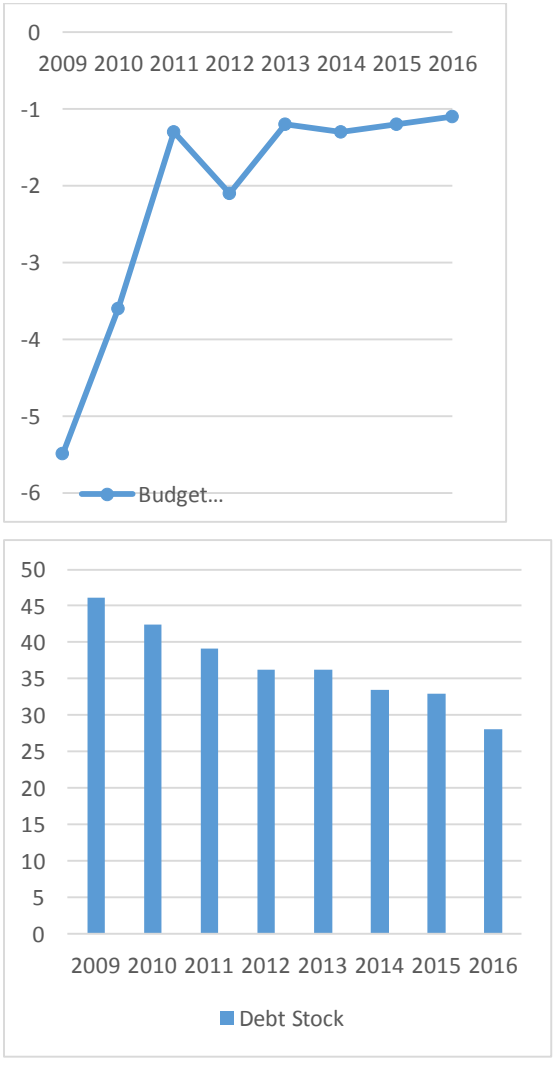


Figure 2.7. *Budget Balance and Debt Stocks during the period of 2009-16*
Source: MPT

3. LITERATURE REVIEW

This chapter consists of two sections. The first section covers macroeconomic policies approach and financial markets related literature, the second section examines the literature on the macro-prudential and monetary policy coordination for financial stability.

3.1. Macroeconomic Policies Approach and Financial Markets

In the literature, the financial markets variables have been incorporated recently in macroeconomic policy formulation after it was limited only to real economy. Furthermore, there is a broad consensus among empirical studies that macroeconomic policies have a significant impact on financial variables such as, stock prices, yield bonds and housing prices. However, most of those studies concentrated on the relationship between monetary policy and financial markets performance contrast to a few studies investigated the links with fiscal policy which has different theoretical perspectives. In addition, although the importance of the complicated interaction between both monetary and fiscal policies, this area of research has not given enough space in the literature. Restricting the examination to only one of these polices could not give the whole picture, unless the interaction between monetary and fiscal policy is considered.

3.1.1. Monetary policy and financial markets performance

The impact of monetary policy on asset prices is one of the main channels in which monetary policy can affect economic activity through its monetary transmission mechanisms. Mishkin (2001) in his famous paper, surveyed the transmission of mechanisms of monetary policy beyond the standard interest rate channel and he clarified how the monetary transmission mechanisms affect investment and consumption decisions of both firms and households.

Turning to the empirical studies in this field of research, we can find a significant number of studies which investigated the role of monetary policy on financial markets. For instance, Sellin and Riksbank (2001) study gives a comprehensive review of the literature on the interaction between

real stock returns, inflation and money growth, as well as the role of monetary policy. It showed that the findings of the later studies have found unambiguous evidence that monetary policy easing leads to higher equity prices.

Bredin, Hyde and Reilly (2005) investigated the influence of changes in UK monetary policy on UK stock returns using a variance decomposition method in the spirit of Campbell (1991) with sample period runs from the start of January 1993 to the end of May 2004. The result of this study indicated that the monetary policy shock leads to a persistent negative response in terms of future excess stock returns.

Similarly, with adopting Campbell (1991) and Campbell and Ammer (1993) which uses a vector auto-regression (VAR), Bernanke and Kuttner (2005) study analyzed the impact of changes in monetary policy on equity prices for measuring the average reaction of the stock market and understanding the economic sources of that reaction. The findings showed that on average, a hypothetical unexpected 25-basis-point cut in the federal funds rate target is associated with about a 1% increase in broad stock indexes. It is also found that the effects of unexpected monetary policy actions on expected excess returns account for the largest part of the response of stock prices.

In the study prepared by Fern´andez-Amador, et al. (2011), the impact of monetary policy on stock market liquidity was examined for Germany, France and Italia during the period 1999-2009 using VAR model method. The findings of this study showed that an expansionary monetary policy of the European Central Bank leads to an increase of stock market liquidity in German, French and Italian markets.

Airaudo, Cardani and Lansing (2011) presented a New-Keynesian DSGE model in which stock prices fluctuations have real effects both via the demand and the supply side. They showed over US data for the period 1990-2007 that monetary policy can eliminate stock prices non-fundamental fluctuations by a mild response to the stock price index in its policy rule.

Atgur and Yicit (2017) study is a new study investigated the effect of monetary policy on the Borsa Istanbul (BIST) stock market for Turkey

in the period 2006-2016 in which both of Co-integration and Granger Causality test methods were used. The Johansen Co-integration results proved a long-run relationship between the series, while the Granger Causality test results showed an important relationship between the money supply (M2) and deposit interest rate variables, and the BIST stock market price index and return index.

Kontonikas, et al. (2016) investigated the effects of monetary policy, measuring the surprise change in the Fed Funds rate, on the excess returns of U.S. corporate bonds over the period 1985.01-2013.12 using a VAR method. A significant negative response of excess bond returns to shocks in Fed Fund rate was found, and this effect is especially strong in the period before the financial crisis and for bonds with longer maturity and lower rating.

Kanlı et al. (2013) examined the impact of recent monetary policy on the corporate yield curve in comparison to the sovereign yield curve in Turkey over the period from 01 August 2012 to the end of February 2013. It is found that in December 2012, despite the increase in the required reserve ratios for banks' liabilities in foreign currency, a decrease in one-week repo rate by 25 basis points led to a shift up in both the corporate and sovereign yield curve.

In Bjørnland and Jacobsen (2010) study analyzed the role of house prices in the monetary policy transmission mechanism in Norway, Sweden and the UK using a VAR method. It was found that the role of house prices in the monetary transmission mechanism increased considerably in which house prices react immediately and strongly to monetary policy. In a particular, a contractionary monetary policy shock which rises interest rate with 1%, causing a fall in real house prices by a 3-5%.

Sarı et al. (2007) is another study examined the relationship between housing starts and macroeconmic variables from 1961 to 2000 in Turkey in which the generalized variance decomposition approach was used. The results indicated that the monetary aggregate has a substantial effect on housing market.

3.1.2. Fiscal policy and financial markets performance

Fiscal authority often uses fiscal policy to influence the aggregate demand in the economy, in an attempt to maintain a full employment, sustainable economic growth and price stability. However, there is no consensus on the effect of fiscal policy on the financial conditions, for this reason, empirical studies could give a better understanding of the role of fiscal policy in explaining the dynamics of the financial markets. Tavares and Valkanov (2003) analyze the impact of the taxes and government expenditure on market returns of stocks, government bonds, and corporate bonds over US quarterly data from 1960 to 2000 using VAR model. The findings showed that an increase in tax lowers annualized expected returns for both stocks and bonds by 4% and 9% at quarterly and yearly horizons respectively; while an increase in government expenditure has a positive effect on expected returns. Moreover, according to variance decomposition test, fiscal policy shocks account for 3-4% of the variance in unexpected stock returns and 8-10% of the variation in unexpected bond returns. Thus, it is found that fiscal policy is as an important source of return variability as the policy of the Federal Reserve.

Afonso and Sousa (2009) investigated the link between fiscal policy and the movements in housing and stock markets using a Fully Simultaneous System approach in a Bayesian framework in U.S., U.K., Germany and Italy. The data are quarterly over the following samples: 1970:3-2007:4, in the case of the U.S.A.; 1971:2-2007:4, in the case of the U.K.; 1979:2-2006:4, in the case of Germany; and 1986:2-2004:4, in the case of Italy. The results indicated that government spending shocks have a varied effect on housing prices, while leading to a quick fall in stock prices. In addition, government revenue shocks have a positive effect on both housing and stock prices

Using a panel quarterly data for ten industrialized countries, Agnello and Sousa (2010) showed that fiscal policy plays an important role in explaining the dynamics of asset markets. The authors applied panel VAR method over the following samples: 1980:1-2007:3, for Belgium; 1970:1-2007:4, for Finland; 1970:2-2007:2, for France; 1979:1-2007:2, for

Germany; 1980:1-2007:3, for Italy; 1977:1-2007:1, for the Netherlands; 1985:1-2006:4, for Spain; 1988:1-2007:4, for Portugal; 1955:2-2007:4, for the U.K.; and 1967:2-2007:4, for the U.S.. The empirical findings showed that a positive fiscal shock has a negative effect in both stock and housing prices. However, it was found that stock prices immediately adjust to the fiscal shock and the impact of fiscal policy is temporary, while housing prices fall gradually and remain depressed even thirty quarters-ahead. As a result, when fiscal authority attempts to mitigate stock prices volatility, housing prices may be severely destabilized. Moreover, the study showed that the expansionary effect of the fiscal policy has weakened in the recent years, therefore, asset prices became more sensitive to a deterioration in the fiscal stance which in turn, gives rise to importance of fiscal discipline.

Similarly, Ardagna (2009) study used a panel data of OECD countries from 1960 to 2002 and based on OLS Estimation. The results of the study showed that interest rates, particularly those of long-term government bonds fall and stock prices increase around episodes of fiscal consolidations, while during the periods of fiscal expansion the opposite occurs. In addition, the study suggested that financial markets' response to changes in the fiscal stance depends on the countries' initial fiscal positions and on the nature of fiscal contractions. For instant, when the countries with high levels of government deficit and that generate a permanent and substantial decrease in government debt adjust their fiscal stance, they will face larger reductions in interest rates and increases in stock market prices.
In the study prepared by Karagöz and Keskin (2016) the impact of fiscal policy on macroeconomic aggregates in Turkey was investigated. The study implemented Bayesian vector auto-regression (BVAR) method using quarterly data for 2003Q1 – 2015Q2. The findings revealed that according to impulse response functions, public expenditure has positive effect on stock market index, while revenue affects it negatively.

3.1.3. Monetary and fiscal policy interaction and financial markets performance

Before the recent global financial crisis, the main objectives of macroeconomic policies is to achieve sustainable economic growth and

price stability. For meeting these goals, many studies in the literature showed that it is important to reach to a close degree of coordination and interactions between monetary and fiscal policy. Laurens and de la Piedra (1998) study showed the need for effective coordination of monetary and fiscal policy based on a review of the relevant litreature. They underlined that efficient coordination between policies requires policy sustainability and credibility. In addition, the paper reviewed mechanism for ensuring effective coordination at both institutional arrangements and operational level. The institutional arrangements are essential for monetary policy in which they can guarantee central bank independence as well as currency boards, and for public debt management, which must take responsibility for public debt functions in a transparent way. With regard to importance of institutional arrangements, Beetsma and Bovenberg (1999) also emphasized that conservative independent central bank plays a useful rule in prices stability.

From operational perspective, Laurens and de la Piedra also continued that "Monetary programming provides a consistent framework for the design of policies and for the coordination of operational procedures. In addition, however, the authorities need to develop specific procedures for day-to-day operational aspects of policy implantations, such as the management of government cash balance, the timing and size of debt issuances, and liquidity forecasting." On the other hand, regarding the importance of coordination of monetary and fiscal policy, Sargent and Wallace (1981) emphasized that monetary stability cannot be achieved without first maintaining fiscal discipline.

Looking through fiscal and monetary interrelation relative empirical studies, Muscatelli et al. (2002b) investigated the response of monetary and fiscal policy to macroeconomic targets, and the interdependence between both policies. The study applied VAR models for a number of G7 countries. The results showed that monetary and fiscal policy are used as strategic complements. Again Muscatelli et al. (2004) contributed in another study, but in this time they examined the interaction between monetary and fiscal policies using an estimated New Keynesian

dynamic general equilibrium model over quarterly data for the period of 1970Q1-2001Q2. They showed that countercyclical fiscal policy can be welfare-reducing if fiscal and monetary policy rules are inertial and not coordinated.

Glenn and Samad (2012) study focused on long-run estimation of the price equation in US over the period of 1973Q1-2011Q3. The authors found Sargent and Wallace view that when debt and deficit exist, an easy monetary policy today will result in a lower price level over long run is validity for US. Furthermore, it is found that fiscal policy is effective to fight inflation over long run, while there is not fiscal or monetary dominate environment in United States.

In the literature, some studies used game theory tools to focus on the strategic elements of the interaction between policies, for instant, lambertini and Rovelli (2003) suggested a model in which each policymaker prefers to be the second mover in a Stackelberg situation. At the same time both Stackelberg solutions are preferable for each policymaker to the Nash solution. The solution implies that the government acts as a leader and sets fiscal policy in which Social Welfare Function is minimized and the objective of price stability is achieved. In this regard, the optimal solution reflects existing institutional arrangements, where the decisions of fiscal policy are taken previously, and less frequently than monetary policy decisions.

Monetary and fiscal interaction can also play an important role in explaining the developments of financial markets and improving their performances, for example, in a study prepared by Jansen et al. (2007), the role of interaction between monetary and fiscal policies on the assets markets in US was examined. It was used a flexible semi-parametric varying coefficient model specification over monthly data span from July 1954 to December 2005. The authors considered two roles of fiscal policy: as a separate direct information variable and as conditioning information variable indicating binding constraints on monetary policy. The results showed that the effects of monetary policy on the asset markets varies with fiscal stance (deficit or surplus). For example, when fiscal policy is

tightening, the contractionary monetary policy has large negative impact on both stock and bond returns, and the influence of the monetary policy decreases dramatically as the fiscal contraction changes to the fiscal expansion.

Chatziantoniou, Duffy and Filis study (2013) investigated the effects of monetary and fiscal policy interaction on stock market performance in Germany, UK, and US. It employed a Structural VAR model over quarterly data from 1991Q1 to 2010Q4. The findings underlined the importance of incorporating both fiscal and monetary policies in a single framework, as their interaction shows to have a significant contribution in explaining the behavior of stock markets. Similarly, Handoyo et al. study (2015) examined the effect of fiscal and monetary policy on Indonesian Stock prices as well as main sectors stock price using the Monte Carlo algorithm to Near-SVAR models for monthly data from 2001.1 until 2011.12. The results indicated that there is a positive response of stock price to monetary policy shock. In the consist of effect of fiscal policy on stock market, it was found that all sectors respond negative relationship. Furthermore, there is an evidence that the interaction between policies is important in explaining stock market performance.

While in Nasir et al. study (2016), sovereign debt market was incorporated alongside with stock market. They analyzed the responses of both markets to macroeconomic policy interaction in UK using Vector Auto-Regression (VAR) model on monthly data from January 1985 to August 2008. The empirical analysis showed that the impact of monetary policy was more effective on the stock markets, while the fiscal policy was more influential on the bond market. However, the joint impact of both policies was significant on both markets. Moreover, the interdependence between macroeconomic policies was significant as expansionary fiscal policy induced monetary policy to be an expansionary policy, while tightening monetary policy induced fiscal policy to adopt fiscal consolidation. In addition, both markets reacted positively to contractionary fiscal and expansionary monetary policies, and hence showed identical symmetry responding to macroeconomic policy interaction. The same

authors derived an optimal macroeconomic policy combination for both stocks and bonds markets stability in UK using a New Keynesian Dynamic Stochastic General Equilibrium (NK-DSGE) framework over monthly data from January 1985 to August 2008. The findings showed that fiscal policy expansion leads monetary policy to a conflicting contractionary stance which negatively affects financial markets. In addition, the empirical results suggested that fiscal discipline and accommodative monetary policy is optimal combination for financial markets.

3.2. Macro-prudential and Monetary Policy Coordination for Financial Stability

In the wake of the global financial crisis, macro-prudential policy has emerged as a new tool to deal with systemic risk in the financial sector. There is also a consensus among economists and policymakers that micro-prudential approach is no longer sufficient for financial regulation and supervision, and therefore there is an urgent need to adopt a new approach based on macro-prudential tools. Although macro-prudential policy was referenced publicly for the first time in the mid-1980s when Bank for International Settlement (1986) study described it as the policy which aims for the safety and soundness of the financial system as whole, the use of this term became more common in the 2007-8 global financial crisis.

Turning to the literature, in terms of the general aim of macro-prudential policy which is confronting the systemic risk of crisis, Landau (2009) pointed to that macro-prudential supervision would be both pragmatic and legitimate for avoiding financial bubbles. Perotti and Suarez (2009a) also called that macro-prudential policy should discourage individual bank strategies which cause financial systemic risk. The financial crisis has enhanced researchers not only to the objective of macro-prudential policy, but also to efficient use of macro-prudential tools. Galti and Moessner (2011) provided an intensive literature review about the objectives of macro-prudential policy, as well as the effectiveness of macro-prudential tools. IMF (2011a) study defined two kinds of macro-prudential instruments. The first one aims to mitigate the systemic risk and

countercyclical capital buffers. The other one is a set of tools which is considered as a part of the macro-prudential toolbox: Time varying loan-to-value (LTV), loan-to-income (LTI) or debt-to-income (DTI) ratios.

The empirical literature on the effectiveness of macro-prudential policies has grown since the financial crisis. Zdzienicka et al. (2015) study of effects of monetary and macro-prudential policies on financial conditions using Distributed lags (DL) model over US quarterly data from 1969Q3 to 2008Q4 for credit growth and 1970Q1 to 2008Q4 for property prices. The authors found that macro-prudential policies have immediate but shorter lasting on financial conditions. Akinci and Olmstead-Rumsey (2015) constructed a novel index of domestic macro-prudential policies in 57 advanced and developing countries. They used a dynamic panel data model over the period from 2000Q1 to 2013Q4 to investigate the effects of these policies on bank credit growth and house price inflation. According to the empirical analysis, the tight macro-prudential policies lowers bank credit growth, housing credit growth and house price inflation. Furthermore, in emerging countries, capital inflow restrictions also reduces credit growth. Similarly, Cizel et al. (2016) used a pane data model in examining the effectiveness of macro-prudential policy on bank and non-bank credit growth for quarterly data from 1980 to 2012 in advanced and emerging countries. The results showed that macro-prudential policies reduce bank credit growth effectively by 8 percentage points in the two years following the adoption of macro-prudential policy measures. While they found evidence of substitution effects in which credit provision moves from banks towards non-banks after the adoption.

Cerutti et al. (2015) investigated the effect of macro-prudential polices on credit growth in 119 countries over the period 2000-2013. They found that macro-prudential polices are used more in emerging countries, especially foreign exchange relative policies, while borrower-based policies are used more in advanced countries. Moreover, it is found that polices have more negative impact on credit growth in emerging countries than in developed and more financially countries. Vandenbussche et al. (2012) study examined the relationship between macro-prudential measures

and housing price inflation in 16 CESEE countries covering different time periods, beginning in the early 2000s. The findings showed that raising the minimum of capital adequacy ratio (CAR) leads to a significant deceleration in housing prices. While Igan and Kang (2011) examined the impact of LTV and DTI on house prices in Korea. They found that both of these tools are associated with a decline in house prices.

In terms of empirical literature, only a few papers cover the effects of macro-prudential policies in Turkey, for instant, Bumin and Taşkın (2015) study analyzed the impact of Macro-prudential measures on retail loans in Turkey. The study employed Welchs't-test for the period between December 2010 and September 2015. The results pointed to a significant decline in consumer loans, namely car loans m general purpose loans and credit cards. Varlik and Berument (2015) investigated through their study whether controlling credit channel of monetary policy as macro-prudential tool could put a stop to the impact of sudden capital inflows using Vector Auto-regression method (VAR). It was found that constraining credit growth helps economy avoid the negative effects of capital flows on imports and output. The central bank of Turkey (2014) analyzed the period of 2011-2014 where multiple macro-prudential polices were implemented. The results showed that the LTV regulation on housing credits leads to slow down the growth rate of housing loan and taming the vehicle credit growth. While the measure of reducing the maturity period lowers personal and other consumer credits.

The recent developments in financial markets have enhanced policymakers to think of appropriate macro-prudential tools which could help ensure financial stability. However, policymakers have also paid intention on understanding how such tools should be set along with monetary policy and whether monetary policy's target should be extended to include both of price and financial stability. In this context, Smets (2014) distinguished three different views. The first view argues that the monetary authority should keep focusing on price stability, whereas macro-prudential authority should pursue financial stability. The second one advocates that monetary policy should not only restrict to price stability, but it should also

consider financial stability as a new target along with its traditional objectives. The third view is a more extreme which argues that monetary authority deals with financial stability and price stability as equal objectives without any distinction.

Although there is still a serious debate about the relationship between two policies, there are a significant number of studies stressed that the interaction between monetary and macro-prudential policies can play an important role in stabilizing the financial conditions. Dell'Ariccia et al. (2011) found that policy coordination may improve the effectiveness of monetary and macro-prudential policies. While Tovar et al. (2012) study which investigated the effectiveness of Reserve Requirements on credit growth in Latin America showed that macro-prudential interments play a complementary role to monetary policy.

Conceptually, macro-prudential policy should offset the side effects of monetary policy, for instant, Nier and Kang (2016) investigated the interaction between monetary and macro-prudential policies. They found a strong complementarity between two policies. Specifically, they argued that monetary policy can lead to side effects on financial stability, but macro-prudential policy can offset these effects. On the other side, it is found that tight macro-prudential policy can have adverse effects on output, however, monetary policy can counter these effects. Tressel and Zhang (2016) study examined the effectiveness of macro-prudential instruments in Euro area. The results showed that limits on loan-to-value ratios tends to be more efficient in containing credit growth and house price inflation when monetary policy excessively loose. However, practically, some empirical studies showed the interaction between policies could be ineffective, such as lim et al. (2011) study evaluated the effectiveness of macro-prudential polices in reducing systemic risk using data for 49 countries. The findings showed that monetary policy cannot contain the side effects of tightening macro-prudential tools on credit growth and assets prices.

Generally speaking, monetary and macro-prudential policy coordination is still attracted by economists and policymakers trying to minimize the social cost of both macroeconomic and financial fluctuations

as in a study prepared by De Paoli and Paustian (2013) analyzed how monetary and macro-prudential policy should be conducted to reduce the cost of economic fluctuations. They found that the coordination between both policies can be improved by assigning conservative policy mandate, having macro-prudential authority as a leader to move first, choosing a macro-prudential instrument similar to the one of monetary authority. Başçı and Kara (2011) study assessed a new policy mix for financial stability adopted by Central Bank of the Republic of Turkey (CBRT). The findings suggested that the combination of a lower policy rate, a wider interest rate corridor along with higher required reserve ratio can be an efficient policy mix to counter short term capital inflows.

4. METHODOLGY

In the literature, most of the studies tend to use VAR analysis to investigate the nature of the relationships between economic policy variables and financial variables, such as Bernanke and Kuttner (2005) and Fern´andez-Amador, et al. (2011) who analyzed the effects of monetary policy on stock markets, Tavares and Valkanov (2003) and Agnello and Sousa (2010) investigated the impact of fiscal policy on assets prices, and Chatziantoniou, Duffy and Filis (2013) and Nasir et al. study (2016) studied the role of macroeconomic policy coordination in stabilizing the financial markets. However, in this study, due to the need of the analysis to run several econometric models, as well as considering the nature of data used in the research process, both of Vector Auto-Regression (VAR) and Autoregressive-Distributed Lag (ARDL) methods were applied.

VAR model is a structural framework developed by Sims (1980) who describes the dynamic interrelationships between stationary variables. It treats variables on an equal footing in which there are no distinction between endogenous and exogenous variables. Estimating VAR models require variables to be stationary at the same order of the integration, and choosing an optimal lag length which based on criterions such as Akaika or Schwarz. Including too many lags could consume degree of freedom or could cause multicollinearity between the variables, while including too few lagged terms could lead to specification errors. Therefore, to deciding the model which takes the optimal lag , the model which

shows the lowest values of these criteria must be used. VAR model also can be extended to the case where the model includes first difference terms and con-integrating relationships which called Vector Error Correction (VECM) model. VECM model is a special case of VAR for variables which are stationary at their differences and considers both long and short run relationships among the variables.

On the other side, ARDL model is introduced by Pesaran et al. (2001) to test for the existence of long run relationships between the time series. This model can be used to test for co-integration and to estimate the long run and short run dynamics when it comes to deal with variables that are stationary at level I(0) and others at first difference I(1) in the same estimation. Here in this study, VAR method which supposes all variables are stationary at the same order is not an appropriate model for all econometric regressions which run in this research. Therefore, thanks to distinguishing features of ARDL method which has some advantages over the conventional co-integration testing, ARDL model is able to handle the mixed order data with accurate outcomes

4.1. Research Models

In this study, two econometric models are adopted:

4.1.1. VAR Models

The structural representations of the VAR model of order k takes the general form:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \cdots + \beta_k Y_{t-k} + \varepsilon_t \qquad (4.1)$$

where Y_t is g×1 vector of endogenous variables, β_0 represents the g×g contemporaneous matrix, β_k are g×g autoregressive matrices, ε_t is a g×1 vector of iid structural disturbances with zero covariance.

In the case of the variables that are not stationary at level I(0), then whether they are co-integrated or not must be checked using Johansen co-integration test. Johansen (1988) shows that co-integration can be modelled within a modified VAR model which called VEC model. The vector error correction model is represented as:

$$\Delta Y_t = \beta_0 + \pi_1 Y_{t-1} + \cdots \pi_k Y_{t-k} + \mu_t$$

(4.2)

where π is a linear combination of the variables, and ΔY_t is $Y_t - Y_{t-1}$.

According to Johansen test, for getting co-integrated relationship, it is supposed to have non stationary variables or I(1), but the linear combination of these variables should be stationary I(0). In Johansen's VECM formulation, to test for co-integration we have to examine the hypotheses concerning the rank of the matrix π which depends on the number of variables used in the estimation. Johansen develops two likelihood estimators, known as the trace statistic and the maximal eigenvalue statistic. The null hypothesis of this test differs between two stages (assuming a bivariate model):

Table 4.1 *Johansen test's hypothesis*

Tests	λ_{trace}	λ_{max}
Stage 1	H_0: r = 0 H_1: r > 0	H_0: r = 0 H_1: r = 0
Stage 2	H_0: r ≤ 1 H_1: r = 2	H_0: r ≤ 1 H_1: r = 2

In the first stage, acceptance of null hypothesis means that series are I(1) and not co-integrated, while the rejection will proceed to stage 2. For stage 2, acceptance of H_0 refers that series are stationary at first difference I(1) and co-integrated, but if it is rejected, then the series are stationary at level I(0), and hence no need for a co-integration test. As Johansen test is based on VEC model examines the long-run relationship between variables, it can also determine the short-run relationship through error correction mechanism which take the form:

$$Y_t = \delta_0 \Delta X_t + \delta_1 \Delta Y_{t-1} + \delta_2 \Delta X_{t-1} + \cdots + \delta_k \Delta Y_{t-k} + \delta_k \Delta X_{t-k} + E(-1) + \varepsilon_t \quad (4.3)$$

Where Δ is the first difference operator,ΔX_t, ΔY_{t-k} and ΔX_{t-k} represent the model's short run dynamics, E(-1) is the lagged value of the error correction term, and ε_t is a white noise error term. E (-1) is "the speed of adjustment" which indicates how fast short run fluctuations can be adjusted for reaching long run equilibrium. It also expected to be negative and significant.

4.1.2. ARDL Model

The basic form of an ARDL model is:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \cdots \ldots \ldots + \beta_k y_{t-p} + \propto_0 x_t + \propto_1 x_{t-1} + \cdots \ldots \ldots + \propto_q x_{t-q} + \varepsilon_t \quad (4.4)$$

where ε_t is a random disturbance term which assumed to be "well behaved" and serially independent. Investigating whether there is a long run relationship between variables or not, depends on the F-test value of the hypothesis which is related to the following model:

$$\Delta y_t = \beta_0 + \sum \beta_i \Delta y_{t-i} + \sum \gamma_j \Delta x_{1t-j} + \sum \delta_k \Delta x_{2t-k} + \emptyset_0 y_{t-1} + \emptyset_1 x_{1t-1} + \emptyset_2 x_{2t-1} + e_t \quad (4.5)$$

The hypotheses are the null hypothesis: H_0: $\emptyset_0 = \emptyset_1 = \emptyset_2 = 0$; against the alternative : H_1: $\emptyset_0 \neq \emptyset_1 \neq \emptyset_2 \neq 0$

The rejection of H_0 implies that there is a long run relationship between variables, otherwise the acceptance of the null hypothesis would mean the absence of a long run relationship. The "bound test" which introduced by Pesaran *et al*. (2001) supplies two types of bounds on the critical values for the *asymptotic* distribution of the F-statistic: lower bounds and upper bounds. If the F-statistic exceeds the upper bound, it would mean that there is co-integration, or in other words, a long run relationship between series exists . In terms of short-run relationships between variables, Error Correction Model which based on ARDL approach is used. The model is represented in equation 8:

$$\Delta y_t = \beta_0 + \sum \beta_i \Delta y_{t-i} + \sum \gamma_j \Delta x_{1t-j} + \sum \delta_k \Delta x_{2t-k} + \alpha EC_{t-1} + \nu_t \quad (4.6)$$

Where EC_{t-1} is the lagged error correction term and it is the one lagged of the residuals from long run ARDL model. The coefficient of the lagged error correction (α) is the speed of adjustment towards the long run equilibrium which shows how fast deviations from the long run equilibrium are

eliminated. The coefficient of ECM should be statistically significant with a negative sign.

4.2. Data and statistical analysis

This part shows the data used in the study, as well as the analysis of data statistically, depending on the descriptive statistics analysis and unit root tests.

4.2.1. Data

The study's interest is investigating how macroeconomic and macro-prudential policies affect financial stability. As in the relative literature, the study approximates financial stability by adopting the growth rates of real credit and assets prices. According to many studies such as (Jorda et al., 2011; Gourinchas and Obstfeld, 2012; Dell'Ariccia et al., 2011; Williams, 2015), it has been found that these variables are powerful predictors of financial crisis.

Real credit was approximated using Banking Sector Credit volume (RC) to both non-financial and financial sector, while assets prices which include stock prices, bond prices and housing prices were represented by BIST-100 index (closing price) (BISTI), Turkey 10Y Government Bond Yield index (BY), and House Price Index (HPI) respectively. BIST-100 index was used as the base index for the ISE Stock Market. It is a capitalization-weighted index that measures the joint performance of 100 shares that belong to National companies which are traded in Istanbul markets. Turkey 10Y Government Bond Yield was adopted instead of bond prices because of the importance of Yield for economic agents (Campbell, 1995). CBRT Overnight Interest Rates (%) (ONIR) was used as a proxy for monetary policy which is considered the most effective tool for CBRT to achieve price stability. The second macroeconomic policy is fiscal policy that represented by Central Government Budget Expenditures including the interest rate payments (CGBE).

Macro-prudential policy considered as the first line of defense against the financial crisis which has been implemented intensively in the recent years. The index of macro-prudential policy was constructed from four tools - Credit Restrictions, Capital Adequacy, General provisions and

Reserve Requirements -frequently used by CBRT recently. In a similar way to literature (Akinci, et al., 2015) and (Zdzienicka, et al. 2015), for each macro-prudential tool, a dummy variable is created which takes a value equal to 1 in the month in which a macro-prudential tightening action is implemented, while it takes a value equal to -1 in the month when a macro-prudential easing action is introduced, and if there is no action was taken in a given month, then the dummy variable takes a value of zero. If a tool was implemented more than one time in a month, all the times are summed up over the month. Finally, for getting a cumulative index for macro-prudential policy (MPP) in a given month, the dummy variables of all macro-prudential tools with equal weight are summed.

The natural logarithm of the variables BY, BISTI, RC, and CGBE were used, while since the other variables of HPI, and ONIR are rational values, logarithm transformation was not needed. The sample data is a monthly data, covers the period of 2010:01-2017:09 and all data were obtained from Central Bank of the Republic of Turkey (CBRT) except Turkey 10Y Government Bond Yield (BY) which was extracted from Investing website. Table 4.2 shows the definitions and the sources of the data:

Table 4.2 *Sources and definition of the data*

Variable	Definition	Source
RC	Banking Sector Credit volume	CBRT
BISTI	BIST-100 index (closing price)	CBRT
BY	Turkey 10Y Government Bond Yield index	Investing website
HPI	House Price Index (2010=100)	CBRT
ONIR	Overnight Interest Rates (%)	CBRT
CGBE	Central Government Budget Expenditures	CBRT
MPP	Macro-prudential Policy	CBRT

Figures 4.1, 4.2, 4.3, 4.4, 4.5, and 4.6 which plot the observed variables above, can be seen in the Appendix.

4.2.2. Descriptive statistics analysis

Table 4.3 presents the monthly descriptive statistics of the study variables LNRC, LNBISTI, LNBY, HPI, ONIR, LNCGBE, and MPP. The

average of real credit during the sample period is about 305% while it hits the highest level at last two years, surging almost 9.2%. The BIST 100 index reaches an average 4.8% and reaches a peak of 579% in the middle of 2017. The overnight interest rate reaches its highest percentage of 8%. However, its average settles on a percentage of 5.8 %. The mean of housing price index is almost 156% and ranges between 96 % and 246% based on 2010. The average of central government budget expenditure is 7.5% with a maximum of 7.8% and a minimum of 7.3%. It also can be noticed that LNBISTI, and LNCGBE and LNRC are symmetric data due to having a mean and median almost close to each other, while HPI seems right-skewed. Finally, although there are some variables with a normal distribution, kurtosis of each series tend to be positive which shows heavier tails and a sharper peak than the perfect normal distributions.

Table 4.3. *Descriptive statistics for variables*

Series	LNRC	LNBISTI	LNBY	HPI	ONIR	LNCGBE	MPP
Mean	8.962596	4.85816	0.965494	156.4082	5.819892	7.544604	0.075269
Median	8.992159	4.87128	0.978181	145.35	6.5	7.551667	0
Maximum	9.288271	5.03496	1.061075	246.05	8	7.863246	3
Minimum	8.533065	4.71544	0.056031	96.92	1.5	7.27999	-4
Std. Dev.	0.213150	0.07347	6.65136	46.3022	1.94117	0.129411	0.82404
Skewness	-0.29277	-0.00308	-1.1475	0.44632	-0.95629	0.111341	0.21196
Kurtosis	1.948556	2.54787	4.13029	1.86695	2.82358	2.14608	13.0962

4.2.3. Unit root tests

The unit root test which test the stationarity of the data has become widely popular over the past several years. Historically, the stationary process has played a necessary role in analyzing time series data due to assuming that time series follow probability distributions are not stable over time. Dealing with non-stationary time series causes a spurious regression which causes misleading statistical results of an existence of a liner

relationship between variables, but in fact they are not causally related to each other and this spurious relationship refers to the presence of unit root in the non-stationary time series. Therefore, in order to avoid the problem of spurious regression, it is necessary to ensure that all variables are stationary. There are three key properties which must satisfied to investigate the stationarity of time series. First, the expected value $E|Y_t|^2$ of the time series must be constant and finite over time. Second, the variance Var (Y_t, Y_{t+k}) of the time series must be constant and finite over time. Third, the covariance Cov(Y_t,Y_{t+k}) of the time series must be constant and finite over time. In this regard, to investigate if the time series is stationary, unit root test must be applied. If it is found a unit root in the time series level, then it must be converted to a stationary data by taking its first difference.

In this study, for getting more accurate results, three unit root tests are employed, Augmented Dickey-Fuller (ADF) test (Dikey and fuller, 1981), Phillips-Perron (PP) test (Phillips and Perron, 1988), and Kwiatkowski, Phillips, Schmidt and Shin (KPSS) test (Kwiatkowski et al. 1992). The aim of these tests is to determine whether there is a unit root in the study variables or not, or in other words they investigate the stationarity of time series depending on two hypotheses, the null and the alternative hypothesis which they are different from test to another. According to both of ADF and PP tests, they test the null hypothesis that there is a unit root in a time series which means that the time series is I(1) against the alternative that it is I(0) which means there is no unit root in the time series.

The ADF test is based on the equation 9 and examines whether α is equal to zero or not.

$$y_t = \beta D_t + \alpha y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta y_{t-j} + \varepsilon_t \quad (4.7)$$

where D_t is a vector of deterministic terms (constant, trend etc.)

The PP test differ from the ADF test mainly in how it deal with serial correlation and heteroskedasticity in the errors. It also depends on the equation 10 and tests whether π is equal to 0 or not.

$$\Delta y_t = \beta D_t + \pi y_{t-1} + \varepsilon_t \quad (4.8)$$

On the other hand, KPSS test examines the null hypothesis that the time series is I(0) against the alternative that it is I(1). The null hypothesis is formulated as $\sigma_\omega^2 = 0$ which implies that μ_t is constant. The test is derived through this model.

$$y_t = \beta D_t + \pi y_{t-1} + \mu_t + \varepsilon_t \quad (4.9)$$

$$\mu_t = \mu_{t-1} + \omega_t \sim \mathrm{WN}(0, \sigma_\omega^2)$$

According to the table 4.4, ADF test showed both of LNRC and MPP were stationary at level and statistically significant at 1%, while the rest of variables had a unit root which means the null hypothesis of existing a unit root was not rejected and they were not stationary at level. In terms of PP test, it referred to having three stationary variables at level, LNCGBE was significant at 5% and both MPP and LNRC were statistically significant at 1%. However, KPSS showed quietly different results. As the KPPS null hypothesis of not existing a unit root in the variables is opposite of the other unit root tests, the KPSS rejected the null hypothesis for LNBISTI, LNRC, ONIR, HPI, and LNCGBE implying that the data were not stationary except LNBY and MPP which showed insignificant coefficients.

Table 4.4. *Unit Root Tests*

	ADF (1981)		**PP (1988)**		**KPSS (1992)**	
	Constant	**Constant & trend**	**Constant**	**Constant &trend**	**Constant**	**Constant &trend**
Levels						
LNRC	-3.59***	-2.43	-3.46***	0.36	1.26***	0.25***
LNBISTI	-1.05	-2.37	- 1.07	-2.64	1.01***	0.05
LNBY	-2.40	-2.70	-2.40	-2.70	0.28	0.18**
HPI	2.89	-1.85	5.38	-1.98	1.23***	0.32***
ONIR	-1.77	-2.68	-1.96	-2.83	0.67**	0.08
LNCGBE	1.5	-2.06	-2.92**	-12.42***	1.24***	0.04
MPP	-8.55***	-8.83**	-8.93***	-9.12***	0.29	0.10
First difference						
ΔLNRC	-8.56***	-9.43***	-8.74***	-9.47***	0.62**	0.07
ΔLNBISTI	-35.00***	-34.54***	-8.12***	-8.06***	0.06	0.05
ΔLNBY	-9.90***	-9.96***	-9.91***	-9.99***	0.15	0.03
ΔHPI	-3.73***	-5.28***	-3.57***	-5.34***	1.136***	0.142*

Δ ONIR	-8.80***	-8.78***	-8.80***	-8.78***	0.08	0.06
ΔLNCGBE	-10.03***	-8.22***	-51.93***	-51.66***	0.05	0.05
ΔMPP	-12.12***	-12.05***	-34.70***	-34.53***	0.07	0.07

****, **, and * denote statistical significance at 1%, 5%, and 10% level of significance, respectively. Delta (Δ) is the difference operator*

After taking the first difference of the all variables, and according to all unit root tests, almost all the variables were appeared to be stationary at first difference. Therefore, taking account of whole these results, it could be concluded that all the variables were integrated in the first order I(1), except both of LNRC and MPP which were integrated in level I(0). In this context, Engle and Granger (1987) and Johansen and Juselius (1990) co-integration tests no longer can be applied, because they require only variables are integrated in first order. Hence, these results show the need of applying Auto-regressive Distributed Lag model as a method for investigating the long and short run relationship between variables which are stationary at different orders (I(0) and I(1)).

5. FINDINGS AND COMMENTS

The study was divided to two parts of analysis, the first part investigated the effects of monetary and fiscal policy interaction on the both of stocks and government bonds yields, and the second one analyzed the role of macro-prudential and monetary policy coordination in real credit growth and housing prices. For this reason, reporting the findings of the first part was separated from the second one.

5.1. Monetary and fiscal policy interaction and financial assets

The examined variables in this estimation are LNBISTI, LNBY, ONIR and LNCGBE. After applying the unit root tests on those variables,

it was found that they were stationary at the first difference I(1) in which it requires employing Johansen co-integration test in order to determine whether there is a long-run relationship between variables or not. However, to examine the long-run relationship between variables, the optimal lag length must be selected. The estimation makes use of the Akaike information criterion (AIC), Final prediction error (FPE) and sequential modified LR test statistic (LR) to determine the optimal lag length. According to the table 5.1, it is clear that the length of 12 lags is the optimal lag length in which the model based on the 12 lags shows the lowest values of these above-mentioned criterions.

Table 5.1. *The optimal lag length*

Lag	LogL	LR	FPE	AIC	SC	HQ
1	418.4685	NA	5.68E-10	-9.937494	-9.464517*	-9.747729*
2	435.371	30.46625	5.57E-10	-9.959778	-9.013823	-9.580249
3	454.1804	32.04564	5.23E-10	-10.02915	-8.610213	-9.459852
4	466.0402	19.03428	5.86E-10	-9.926919	-8.035009	-9.16786
5	472.8352	10.23436	7.51E-10	-9.699634	-7.334746	-8.75081
6	483.3903	14.85529	8.87E-10	-9.565191	-6.727326	-8.426603
7	492.2032	11.533	1.11E-09	-9.387733	-6.07689	-8.05938
8	502.3029	12.21942	1.37E-09	-9.242048	-5.458227	-7.723929
9	523.1753	23.1915	1.32E-09	-9.362352	-5.105554	-7.654469
10	552.8884	30.07996	1.05E-09	-9.700948	-4.971172	-7.8033
11	570.0819	15.70761	1.18E-09	-9.730417	-4.527663	-7.643004
12	648.1959	63.64850*	3.07e-10*	-11.26410*	-5.588366	-8.98692

** indicates lag order selected by the criterion*

The analysis takes account of two types of likelihood estimators: a trace test and maximum Eigen value test which are derived from Johansen co-integration test. In the table 5.2, both of the estimators indicated to 1 co-integration equation at 5% level. According to the results of Johansen Co-integration Test , the null hypothesis of no co-integration between the variables at 5% level was rejected in favour of the alternative of existence at least one co-integration between the examined variables. As a result, the examined variables were co-integrated and it was found a long-run relationship between LNBISTI, LNBY, ONIR and LNCGBE variables.

Table 5.2. *Results of Johansen Co-integration Test*

Hypothesized No. of CE(s)	Trace Statistic	0.5 Critical Value	Prob.	Max-Eigen Statistic	0.5 Critical Value	Prob.
None *	100.2076	47.85613	0	71.19515	27.58434	0.0000
At most 1	29.01248	29.79707	0.0614	16.53765	21.13162	0.195
At most 2	12.47483	15.49471	0.1355	9.30329	14.2646	0.2618
At most 3	3.171537	3.841466	0.0749	3.171537	3.841466	0.0749

** denotes rejection of the hypothesis at the 0.05 level*.

Due to existence of co-intergradation relationship between variables, Vector Error Correction (VEC) model can be employed which is a restricted formulation of the Vector Auto-regression (VAR) model. VEC model can demonstrate both of long-run and short-run dynamics between variables. In addition, it presents the error correction term E (-1) which explains the extent of disequilibrium that can be eliminated at each period. Table 5.3 provides the results of long run relationship between the examined variables.

Table 5.3. *Co-integration equations (Long-run Dynamics)*

Co-integrating equation (LNBISTI as dependent variable)			
Variables	**Coefficients**	**Standard Errors**	**T-Statistics**
LNBISTI(-1)	1		
LNCGBE(-1)	0.532414	-0.07528	-7.07265*
ONIR(-1)	0.004415	-0.00384	-1.14836
LNBY(-1)	-0.146055	-0.08336	1.7522
C	0.955165		
Co-integrating equation (LNYB as dependent variable)			
Variables	**Coefficients**	**Standard Errors**	**T-Statistics**
LNBY(-1)	1		

LNCGBE(-1)	3.645289	-0.57801	-6.30659*
ONIR(-1)	0.030231	-0.03108	-0.97262
LNBISTI(-1)	-6.84672	-1.21635	5.62892*
C	6.539746		

**denotes rejection of the hypothesis at the 0.05 level*

According to the results, in the case of LNBISTI as dependent variable of co-integration equation, the fiscal policy had a significant positive impact on LNBISTI in the long run. This result was in line with Karagöz and Keskin (2016) which found a positive effect on Turkish stock market index due to government spending shocks. Moreover, in the second equation in which LNYB is dependent variable, the coefficient of fiscal policy was also significant at 5% and had a positive effect on LNBY. This result confirmed what Tavares and Valkanov (2003) demonstrated using VAR model in the USA in which the annualized expected returns of bonds rose when government expenditure increased. In other side, although the effect of monetary policy represented by overnight interest rate on bond yields was not significant in the long run, its positive impact could be explained consistent with the economic explanation and literature studies. Furthermore, the results showed a significant negative relationship between stock prices and bond yields which refers to existence positive links between stock and bond prices. The presence of co-integration between variables makes it possible to check the short rum dynamics. In table 5.1.4, the coefficient of the error corrections term which related to the first equation (D (LNBISTI) as dependent variable) was negatively significant and indicated that fifty five percent of disequilibrium in t-1 period is adjusted every month to reach the long equilibrium. However the coefficient on the error correction of the second equation (D (LNYB)) as dependent variable) was negatively insignificant proving the fact that the fluctuations between the lagged periods of short run values and long run values were neither eliminated nor extended each month which indicated that there were no disturbances exist.

Table 5.4. *Error Correction Terms for equations*

Error Correction Terms

E (-1)	Coefficient	Std. Error	t-Statistic	Prob.
D(LNBISTI)	-0.550374	0.156835	-3.50926	0.0014
D(LNYB)	-0.322972	0.230883	-1.39886	0.1721

To test the short run dynamics of the exogenous variables with 12 lags for both equations, parametric statistical "Wald" tests were implemented. This test can investigate not only the effect of each policy as exogenous variable on financial assets, but it also can examine the joint impact of both monetary and fiscal policies to check the extent of policy coordination. The results in table 5.5 shows that fiscal policy was significantly the most effective policy for stock prices while monetary policy had a non-significant impact on stock prices. Most importantly, although Chi-square test showed that the joint impact of both policies was significant at 5% level, it was not a significant in terms of F-statistic test. In this regard, the findings showed that there was no sufficient coordination between both monetary and fiscal policies to play a real role in controlling stocks prices.

Table 5.5. *Wald Test: Short Dynamics-Stock Prices*

	Value	Df	Probability
Fiscal Policy			
F-statistic	2.262263	(12, 30)	0.0346**
Chi-square	27.14716	12	0.0074***
Monetary Policy			
F-statistic	1.370605	(12, 30)	0.2335
Chi-square	16.44727	12	0.1716
Monetary and Fiscal Policy Coordination			
F-statistic	1.528429	(24, 30)	0.1348
Chi-square	36.6823	24	0.0471**

****, **, and * denote statistical significance at 1%, 5%, and 10% level of significance, respectively*

In the table 5.6, the Wald test showed that the effect of each macroeconomic policy alone on bond yields in the short run followed the same level of significance which was at 5% level. However, the combination of both monetary and fiscal policy implied a statistically significant impact on bond yields, but at %10 level of significance. Correspondingly, it was clearly that the impact of each policy on bond yields was more significant than the effect

of the joint impact of monetary and fiscal policies, and hence the macroeconomic policy cooperation still needs more effort to contribute further in stabilizing bond yields.

Table 5.6. *Wald Test: Short Dynamics-Bond yields*

	Value	**Df**	**Probability**
Fiscal Policy			
F-statistic	2.535649	(12, 30)	0.0192**
Chi-square	30.42779	12	0.0024***
Monetary Policy			
F-statistic	2.507476	(12, 30)	0.0204**
Chi-square	30.08971	12	0.0027***
Monetary and Fiscal Policy Coordination			
F-statistic	1.784787	(24, 30)	0.0666*
Chi-square	42.83489	24	0.0104**

****, **, and * denote statistical significance at 1%, 5%, and 10% level of significance, respectively*

To check the robustness of VEC model and to make sure that the models are non-spurious models, diagnostic tests are applied to the two equations represented in 5.7 table. The null hypothesis of each of Serial Correlation LM Test and Heteroskedasticity Test which claims no serial correlation in residuals and Homoscedasticity were not rejected at 5%, and hence the residuals of both equations are homogenous, without serial correlation. In addition, by checking the normality test, the null hypothesis of the normality of residuals was accepted indicating normal distributed residuals. As a result, it could be said that the regressions were robust and free of any spurious problems. In the first model, the R^2 indicated that about 79% of variation in the dependent variables was explained by the variation in the independents variables, while F-statistic showed that whole model was statistically significant at 5% level. The R^2 in the second model showed almost 72% of variation in the dependent variables was explained by the variation in the independents variables, while F-statistic indicated that the model was significant but at 10%.

Table 5.7. *Diagnostic Tests: Stock prices and Bond yields*

Stock prices			
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.945532	Prob. F(2,28)	0.4005
Obs*R-squared	5.061215	Prob. Chi-Square(2)	0.0796
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.46415	Prob. F(52,27)	0.9912
Obs*R-squared	37.75953	Prob. Chi-Square(52)	0.9308
Normality Test			
Jarque-Bera	0.690337	Probability	0.708101
R-squared	0.790174		
F-statistic	2.305631	Prob. (F-statistic)	0.008333
Bond Yields			
Breusch-Godfrey Serial Correlation LM Test			
F-statistic	2.048502	Prob. F(2,28)	0.1478
Obs*R-squared	10.21155	Prob. Chi-Square(2)	0.0061
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.781379	Prob. F(52,27)	0.7808
Obs*R-squared	48.06231	Prob. Chi-Square(52)	0.6295
Normality Test			
Jarque-Bera	0.286836	Probability	0.866392
R-squared	0.725127		
F-statistic	1.615127	Prob. (F-statistic)	0.081786

5.2. Macro-prudential and Monetary Policy Coordination and Financial Stability

In this part, the analysis includes the variables of the real credit (LNRC) and housing prices index (HPI) which represent financial stability as well as the overnight interest rate (ONIR) and macro-prudential measures (MPP) as financial stabilizing policies. According to the unit root tests, LNRC and MPP were found stationary at level, while both of HPI and ONIR were stationary at first difference. As a result, ARDL model which takes account of the mixed order of I(0) and I(1) variables must be applied. Firstly, the optimal lag length should be selected to determine the most appropriate model for the data. The table 5.8 shows that 3 lags are the optimal lag length for this model based on AIC, FPE and LR criterions.

Table 5.8. *The Optimal Lag Length*

Lag	LogL	LR	FPE	AIC	SC	HQ
1	72.64786	NA	2.95E-06	-1.381655	-0.912051*	-1.19311*
2	91.35646	33.76673	2.77E-06	-1.447718	-0.508511	-1.070641
3	108.1104	28.60433*	2.74e-06*	-1.466108*	-0.057297	-0.900492
4	115.5019	11.89853	3.41E-06	-1.256145	0.62227	-0.50199
5	123.1519	11.56825	4.27E-06	-1.052486	1.295533	-0.109792
6	133.507	14.6487	5.05E-06	-0.914805	1.902817	0.216427
7	149.8121	21.47496	5.24E-06	-0.922246	2.36498	0.397525
8	168.3074	22.5552	5.24E-06	-0.983106	2.773724	0.525204
9	177.2682	10.05359	6.74E-06	-0.811419	3.415015	0.88543
10	191.5238	14.60331	7.83E-06	-0.768873	3.927165	1.116515
11	210.7501	17.81954	8.32E-06	-0.847564	4.318077	1.226362

5.2.1. Impact of macro-prudential and monetary policies on the real credit

In this section, firstly, the impact of each policy on real credit were investigated separately to show to what extent each single policy could contribute in explaining the fluctuations in real credit. Then, most importantly, the effects of the joint impact of both policies were examined to measure the effectiveness of policy coordination on real credit. After setting the maximum lag as 3 for data study, ARDL method automatically determined the optimal lag length for each variable based on AIC. In addition, the trend specification of the models were adopted as restricted linear trend. Table 5.9 shows Bound test results which clarified the long run relationship among variables.

Table 5.9. *ARDL Bound Test Results: Real Credit*

Macro-prudential policy	Optimal lags: ARDL(1, 1, 3)	1% Critical values	5% Critical values	10% Critical values	F-Statistic	k
lower bound		4.99	3.88	3.38	9.333002	2
upper bound		5.85	4.61	4.02		
Monetary policy	Optimal lags: ARDL(1, 0, 3)	1% Critical values	5% Critical values	10% Critical values	F-Statistic	k
lower bound		4.99	3.88	3.38	4.925030	2
upper bound		5.85	4.61	4.02		
Policy Coordination	Optimal lags: ARDL(1, 0, 1, 3)	1% Critical values	5% Critical values	10% Critical values	F-Statistic	k
lower bound		4.3	3.38	2.97	7.428484	3
upper bound		5.23	4.23	3.74		

According to the results reported above, for all estimations, Bound test indicated that F statistics were greater than the upper bound values which it means that the null hypothesis of no co-integration was rejected at 5%. Therefore, there was a long run relationship among variables, and the ARDL model could be implemented to determine both long run and short run relationships between variables. Table 5.10 presents the results of the three estimations which explained the long run dynamics between policies and real credit.

Table 5.10. *Long-run Coefficients Based on ARDL Models: Real Credit*

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Monetary policy ARDL(1, 1, 3)	**ONIR**	-0.007222	0.002307	-3.130316	0.0024
	HPI	-0.001642	0.000397	-4.132104	0.0001
	@TREND	0.010092	0.000766	13.176523	0.0000
Macro-prudential policy ARDL(1, 0, 3)	**MPP**	0.006913	0.004699	1.471327	0.145
	HPI	-0.001599	0.000519	-3.078724	0.0028
	@TREND	0.009665	0.001038	9.313183	0.0000
Macro-prudential & Monetary Policy Coordination ARDL(1, 0, 1, 3)	**MPP**	0.003613	0.00351	1.029188	0.3065
	ONIR	-0.006647	0.002218	-2.997033	0.0036
	HPI	-0.001601	0.000386	-4.146174	0.0001
	@TREND	0.010035	0.000741	13.535797	0.0000

In ARDL (1,1,3) model, monetary policy had a negative impact on real credit with 1% level of significance. This result was broadly in line with previous studies such as Zdzienicka et al. (2015) and Laseen et al. (2015) studies which found a significant negative relationship between monetary policy and credit growth. However, ARDL (1,0,3) model showed insignificant long run impact of macro-prudential policy on credit growth. On the other side ARDL (1,0,1,3) equation which takes account of effects of both monetary and macro-prudential polices found a significant negative impact of monetary policy on real credit, while macro-prudential policy showed insignificant impact on real credit. This findings were consistent with Zdzienicka et al. (2015) study which estimated the influence of macro-prudential and monetary policy shocks on credit growth. This study found that monetary policy shocks have significant and persistent effects in long run, while the effects of macro-prudential is significantly larger in the short

run than in long-run. These findings suggested that monetary policy still have a crucial rule in containing financial risks in comparison to the weak influence of macro-prudential policy and ineffective coordination among policies in long run. Finally, it was clear that there was a significant negative relationship between housing prices and credit growth which could indicate that a rise in housing prices index enhances the government to absorb this increasing by pushing down credit growth.

The findings of error correction and short run relationships between variables are reported in table 5.11.

Table 5.11. *The Error Correction and Short-run Coefficients Based on ARDL Models: Real credit*

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Monetary policy ARDL(1, 1, 3)	**D(ONIR)**	0.000515	0.000731	0.704037	0.4834
	D(HPI)	0.000722	0.001098	0.65749	0.5127
	D(HPI(-1))	-0.000071	0.001208	-0.058607	0.9534
	D(HPI(-2))	0.003034	0.001099	2.759963	0.0071
	C	1.690875	0.269985	6.262842	0.0000
	CointEq(-1)	-0.191941	0.030848	-6.222112	0.0000
Macro-prudential policy ARDL(1, 0, 3)					
	D(MPP)	0.001025	0.000541	1.895561	0.0615
	D(HPI)	-0.000061	0.001153	-0.052764	0.958
	D(HPI(-1))	-0.000555	0.001307	-0.42468	0.6722
	D(HPI(-2))	0.00344	0.001216	2.828724	0.0059
	C	1.399877	0.292777	4.781381	0.0000
	CointEq(-1)	-0.159234	0.033565	-4.743985	0.0000
Macro-prudential & Monetary Policy Coordination ARDL(1, 0, 1, 3)					
	D(MPP)	0.000857	0.000494	1.733428	0.0869
	D(ONIR)	0.000524	0.000735	0.712721	0.4781
	D(HPI)	0.000789	0.001105	0.714321	0.4771
	D(HPI(-1))	-0.000273	0.001222	-0.223627	0.8236
	D(HPI(-2))	0.003324	0.001114	2.98374	0.0038
	C	1.758117	0.277931	6.32574	0.0000
	CointEq(-1)	-0.19978	0.03178	-6.286365	0.0000

According to table 5.11, in the ARDL(1,1,3) equation, the coefficient of the error corrections term was negatively significant and indicated that 19% of fluctuations in t-1 period was adjusted every month to reach the long equilibrium. However, monetary policy had no significant effects on real credit in the short run. In ARDL (1,0,3) model, the coefficient of the lagged error correction term was also significantly negative which

showed that 15% of fluctuations in short run were eliminated in the long run. Most interestingly, Macro-prudential policy in this model had a positive impact on real credit at 10% level of significance. This result confirmed what Zdzienicka et al. (2015) study which showed the impact of macro-prudential policy seems to be more immediate, but short-lasting, as well as Elliott et al. (2013), who found that while macro-prudential policy tends to decrease credit growth in the short term, it has limited effects in the long term. Finally, ARDL (1,0,1,3) model which examined the impact of both monetary and macro-prudential policies together showed only a significant positive links between macro-prudential policy and real credit in short run, while monetary policy was not. The error correction term coefficient was also negative and statistically significant and indicated that about 19% of fluctuations in the short run were eliminated in the long run. In tables 5.12, diagnostic tests are reported for the study models.

Table 5.12. *Diagnostic Tests for the equations: Real Credit*

Diagnostic Tests	Monetary policy	Macro-prudential policy	Macro-prudential & Monetary Policy Coordination
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.083939	0.013949	0.266837
Obs*R-squared	0.190849	0.031374	0.611594
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.361077	0.929093	1.326702
Obs*R-squared	10.66482	6.613609	11.68833
Normality Test			
Jarque-Bera	0.355747	1.610911	0.364489
Ramsey RESET Test			
F-statistic	2.552764	0.224167	1.628380
R-squared	0.999420	0.999334	0.999427
F-statistic	0.000000	0.000000	0.000000

****, **, and * denote statistical significance at 1%, 5%, and 10% level of significance, respectively.*

In the serial correlation LM test, F-statistic was less than the critical one in which the null hypothesis of no serial correlation in residual was not rejected

for all equations. Breusch-Pagan-Godfrey test also accepted the null hypothesis of homogenous residual for all equations. In terms of normality test, Jarque-Bera indicates that residual were normal distributed. Concurrently, according to the Ramsey Reset test showed that model satisfies the stability conditions. As a result, the models were significantly robust and there was no any spurious relationship among the variables. R^2 of each estimation showed a high value of 99%, while F-statistic clarified that the whole model of each estimation was statistically significant at 1%.

5.2.2. Effects of macro-prudential and monetary policy on the housing prices

This section analyzed the impact of macro-prudential and monetary policy represented by MPP and ONIR respectively on housing price which is approximated by HPI. Firstly, the impact of each policy were investigated separately. Then, due to the importance of monetary and macro-prudential policy coordination, the joint impact of both policies was examined. The maximum lag length was set 3 lags as in the first section and ARDL method automatically determined the optimal lag length for each variable based on AIC. The trend specification of the models were adopted as unrestricted constant. Table 5.13 shows Bound test results of the long run relationship among variables.

Table 5.13. *ARDL Bound Test Results: Housing prices*

Macro-prudential policy	Optimal lags: ARDL(2, 1, 3)	1% Critical values	5% Critical values	10% Critical values	F-Statistic	k
lower bound		5.15	3.79	3.17	7.312206	2
upper bound		6.36	4.85	4.14		
Monetary policy	Optimal lags: ARDL(2, 0, 0)	1% Critical values	5% Critical values	10% Critical values	F-Statistic	k
lower bound		5.15	3.79	3.17	5.625444	2
upper bound		6.36	4.85	4.14		
Policy Coordination	Optimal lags: ARDL(2, 1, 1, 0)	1% Critical values	5% Critical values	10% Critical values	F-Statistic	k
lower bound		4.29	3.23	2.72	5.251857	3
upper bound		5.61	4.35	3.77		

According to Bound test results in table 5.13, the null hypothesis of no co-integration was rejected at 5% for all equations because F statistics were greater than the upper

bound values, and hence there was a long run relationship among variables. In Table 5.14, ARDL method showed to what extent the coefficients of the variables were significant in long run.

Table 5.14. *Long-run Coefficients Based on ARDL Models: Housing prices*

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Monetary policy ARDL(2, 0, 0)	**ONIR**	8.205398	4.859458	1.688542	0.0952
	LNRC	366.803788	84.220639	4.355272	0.0000
Macro-prudential policy ARDL(2, 1, 3)	**MPP**	-9.401926	11.900105	-0.790071	0.4317
	LNRC	462.19437	197.537887	2.339776	0.0216
Macro-prudential & Monetary Policy ARDL(2, 1, 1, 0)	**MPP**	9.83388	7.869029	1.249694	0.2149
	ONIR	14.135559	19.808813	0.713599	0.4775
	LNRC	415.059357	155.712344	2.665552	0.0092

In the first model in which monetary policy is the only policy affecting housing prices, it was found that there was not a significant positive impact of ONIR on HPI at 5% level. Although this result was not in line with previous studies such as Laseen et al. (2015) and Jorda et al. (2011) which showed that monetary policy has a negative impact on housing prices, it might be more realistic for housing market in Turkish case. Since 2012, Turkey has experienced a mounting inflation rate, in which the monetary authority had to increase interest rate to be able to manage prices, however, housing prices have continued to raise even faster than before. The possible reason behind is the continuous depreciation in Turkish currency which enhances public to look for alternative store of value such as, houses and other properties which in turn leads to higher prices. In ARDL(2,1,3) model, macro-prudential policy had insignificant impact on housing prices while both policies showed also statistically insignificant effect on HPI in policy coordination ARDL (2,1,1,0) model. These findings showed that nor macro-prudential policy neither monetary policy could control the movements of housing market prices. In addition, even with taking account of the coordination between policies, it was not found any significant impact on housing prices index. Finally, we could notice a positive relationship between real credit and housing

prices, in which any rise in real credit was accompanied with an increase in housing prices in Turkish market, indicating that public might tend to invest more in housing market, considering houses as a safe property and reliable resort for their own investments. In table 5.15, the results of Short run relationships among variables and error corrections are reported.

Table 5.15. *The Error Correction and Short-run Coefficients Based on ARDL Models: Housing Prices*

	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Monetary policy ARDL(2, 1, 3)	**D(HPI(-1))**	0.430069	0.091949	4.677252	0.0000
	D(ONIR)	-0.089459	0.067217	-1.330902	0.187
	D(LNRC)	7.909844	9.084264	0.870719	0.3865
	D(LNRC(-1))	-0.736271	8.823881	-0.083441	0.9337
	D(LNRC(-2))	20.953552	8.762182	2.391362	0.0191
	C	-28.168781	6.059264	-4.648878	0.0000
	CointEq(-1)	-0.009081	0.001915	-4.741125	0.0000
Macro-prudential policy ARDL(2, 0, 0)					
	D(HPI(-1))	0.476976	0.095229	5.008703	0.0000
	D(MPP)	-0.091734	0.0464	-1.977009	0.0512
	D(LNRC)	2.725232	9.11118	0.299109	0.7656
	C	-20.622519	5.706187	-3.614063	0.0005
	CointEq(-1)	-0.005384	0.001454	-3.704009	0.0004
Macro-prudential & Monetary Policy Coordination ARDL(2, 1, 1, 0)					
	D(HPI(-1))	0.421744	0.091332	4.617703	0.0000
	D(ONIR)	-0.104165	0.067671	-1.539295	0.1275
	D(MPP)	-0.025869	0.045778	-0.565092	0.5735
	D(LNRC)	9.093949	9.058898	1.003869	0.3184
	C	-23.272168	5.069259	-4.590843	0.0000
	CointEq(-1)	-0.006667	0.001421	-4.692603	0.0000

For all estimations, the coefficient of the error corrections term was negatively significant, but it seemed very slow in eliminating the short run fluctuations every month to reach the long equilibrium. While monetary policy had no significant effects on housing prices in the short run in ARDL (2,1,3) model, in ARDL (2,0,0) model, macro-prudent policy showed a negative impact on housing market which was one more time in line with Zdzienicka et al. (2015) who concluded that the impact of macro-prudential policy on housing market last

only for short run. Most importantly, ARDL (2,1,1,0) model which examined the joint impact of both monetary and macro-prudential policies did not show any significant links between policies and HPI in the short run. These results indicated that although macro-prudential policy played an important role in stabilizing housing prices in short run, the interaction between both policies was still not effective sufficiently to take responsibility for controlling the movements of housing market. To testing the spuriousness of the models, table 5.16 presents the results of diagnostic tests.

Table 5.16. *Diagnostic Tests for the equations: Housing Prices*

Diagnostic Tests	Monetary policy	Macro-prudential policy	Macro-prudential & Monetary Policy Coordination
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.242723	0.984819	0.644318
Obs*R-squared	2.745154	2.084888	1.425056
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.019361	2.690130	1.475839
Obs*R-squared	8.232189	10.11990	10.07287
Normality Test			
Jarque-Bera	6.549142**	2.457890	4.211161
Ramsey RESET Test			
F-statistic	0.775896	2.855521	1.176438
R-squared	0.999903	0.999892	0.999902
F-statistic	0.000000	0.000000	0.000000

****, **, and denote statistical significance at 1% and 5% level of significance, respectively.*

The serial correlation test showed that F-statistic was less than the critical one in which the null hypothesis of no serial correlation in residual was accepted for all equations. Breusch-Pagan-Godfrey test also did not reject the null hypothesis of homogenous residual for all equations. Concurrently, according to the Ramsey Reset test showed that model satisfies the stability conditions. As a

result, the models were significantly robust and there was no any spurious relationship among the variables. In each model, R^2 showed a high value of 99%, while F-statistics clarified that models were statistically significant at 1%.

6. CONCLUSION, DISCUSSION AND SUGGESTIONS

This thesis empirically analyzed the effectiveness of both macroeconomic and macro-prudential policies on financial markets in Turkey during the period of 2010:01-2017:09. The interesting part of this study was not only to investigate the effectiveness of each policy, but also to assess the role of policy coordination and interaction on financial stability. This study was divided into two parts. The first part examined the impact of monetary and fiscal policy on both stock prices and bond yields using VEC model. Most importantly, it considered the importance of interaction among monetary and fiscal policies on financial markets. In the second part, the effects of the monetary and macro-prudential policy coordination on real credit and housing prices was investigated, employing ARDL model.

6.1. Conclusion and Discussion

The findings of the first part of this study showed that in the long run fiscal policy has a significant positive impact on both LNBISTI and LNBY. This positive relationship might indicate the supportive role of fiscal policy in promoting private investments through improving and developing the investment environment, while the positive impact on bond yields implies a decrease in bond prices resulting from the expansionary fiscal policy. Therefore, we can conclude that the symmetry of financial market response to fiscal policy was not homogenous. On the other side, a significant effect of monetary policy on financial markets in the long run was not found. As a result, the impact of fiscal policy was more effective on both stock prices and bond yields than monetary policy which could result

from the permanent argument between monetary and fiscal authorities on the interest rate approach. However, in terms of the short run relationship, and according to F-statistic, Wald test showed a significant impact of fiscal policy at 5% level on stock prices, while monetary policy could not refer to any significant effect on stock prices. Most importantly, although the impact of monetary and fiscal policy coordination was appeared to be significant at 5% in terms of Chi-square, the F-statistic indicated that the relationship was not significant. The last result showed that the interdependence between policies is not efficient, and hence a real active policy cooperation can have a real effect on stock prices is needed.

In the case of bond yields, the findings were more positive in the short run. Wald test implied that each of the monetary and fiscal policy affected bond yields at 5% significance level. Most interestedly, the joint impact of monetary and fiscal policy on bond yields was significant at 10% level, but it was less effective than impact of each policy alone. As a result, by comparison, although the impact of policy coordination was more significant for bond yields than stock prices, generally the interaction between policies requires a serious regulation which promotes the independence of CBRT and support more effective policy cooperation.

The main findings in the second part showed the following: while monetary policy has a negative impact on LNRC at %1 level of significance in the long run in which interest rate plays an important role in controlling real credit, there is no any significant effect in the short run. On the other side, unlike monetary policy, no significant effect of macro-prudential policy on real credit in the long run was founded, however, in the short run, it responded positively at 10% level of significance, pushing up real credit which was also consistent with the recent easing macro-prudential measures. These results could be explained that in the case of Turkey, monetary policy was more influence on LNRC in long run whereas macro-prudential policy is more effective in the short run. Furthermore, considering the coordination between both monetary and macro-prudential policies, the results showed no significant difference, only the impact of

monetary policy was statistically significant, which affected real credit negatively in the long run whereas macro-prudential tools responded positively in the short run.

In terms of the effects of the policies on housing price index, unlike the impact of ONIR on LNRC, monetary policy seemed to have no significant impact on HPI at 5% in both the long and short run. This could be interpreted that the rise in interest rate was not sufficient to affect house prices index, therefore, the growing inflation rate in the recent years pushes house prices to rise more and more. Also, the recent sharp depreciation of Turkish lira makes property and especially housing sector more a favorable opportunity for investment. In addition, macro-prudential policy had no effects on HPI in long run, however, it could affect the HPI negatively and significantly so it controlled its movement in the short run. Moreover, the joint impact of macro-prudential and monetary policy was not effective significantly on HPI which explains the reason behind the soaring prices in Turkey.

6.2. Suggestions and Future Work

The key findings in this study suggest that policy coordination has not enough significant impact on financial markets. Therefore, Turkey should work on improving the interaction between policies through : 1) adopting disciplined fiscal policy which sustains the economic performance and maintains the macroeconomic stability, and 2) promoting the independence of CBRT in which it can ensure both price and financial stability away from political considerations, and 3) the important role of the FSC in developing more efficient macro-prudential tools and supporting the monetary and macro-prudential policy coordination in containing the financial risk.

In the future, it will be interesting to involve more macroeconomic variables in this study such as inflation rate, growth rate, government debt and capital flows as both economic and financial conditions may play an important role in the changes of macroeconomic and macro-prudential

polices. In this study, we used overnight interest rate as monetary policy, and government expenditure as fiscal policy. However, in the future studies, monetary policy can be represented by more than one tool, such as reserve requirements and money supply. Both the government spending and taxes can be a proxy to fiscal stance. In terms of macro-prudential policy, this empirical study used overall MPP index as macro-prudential policy stance in the analysis, however, in future work, the individual macro-prudential indexes in which each index represents a certain macro-prudential tool can be introduced. By doing so, the impact of each tool can be tested separately, determining what extent each tool can be effective for financial conditions.

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Appendix

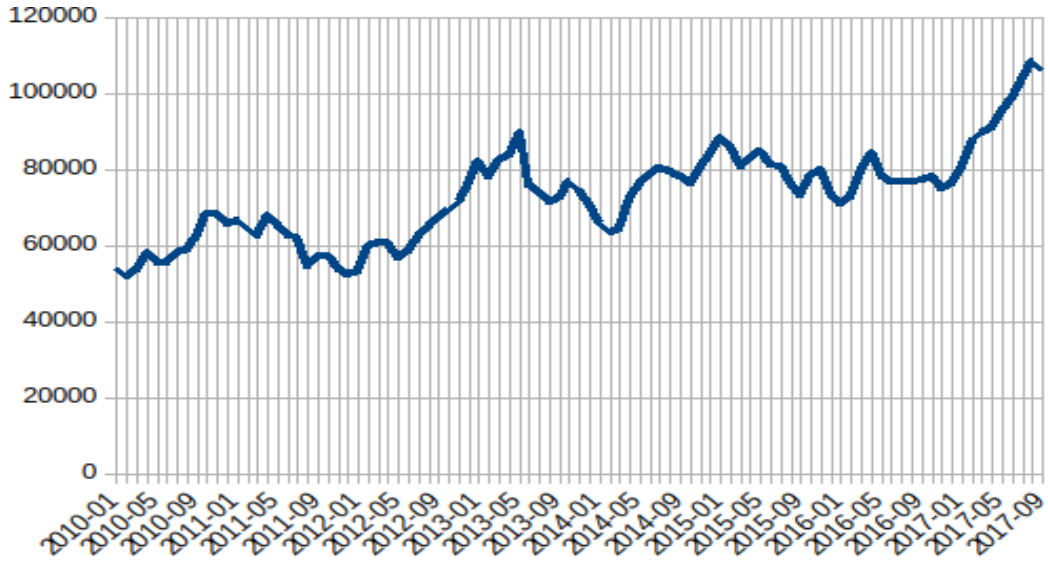

Figure 4.1. BISTI

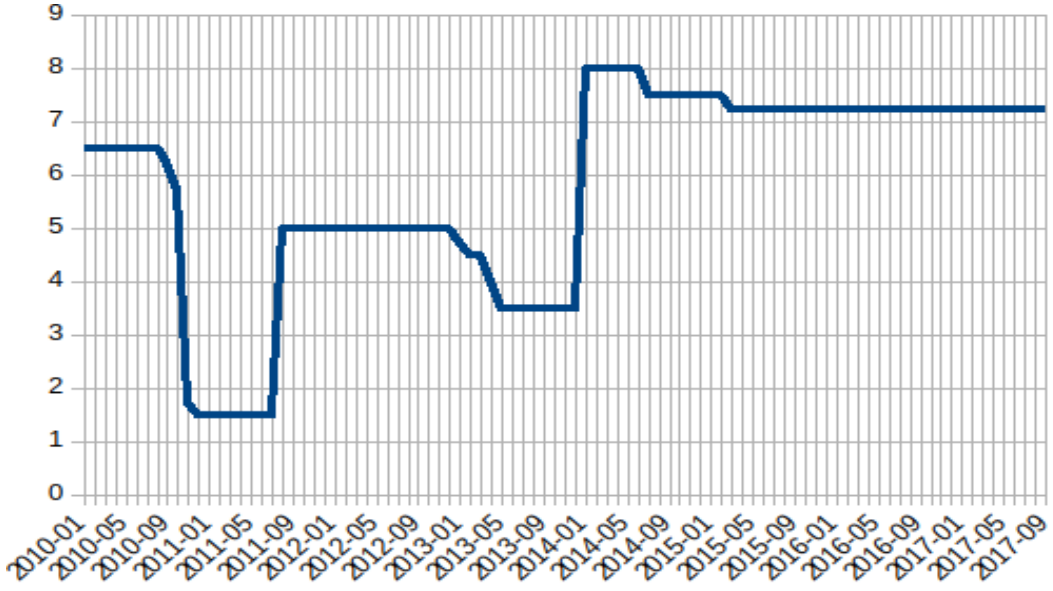

Figure 4.2. ONIR

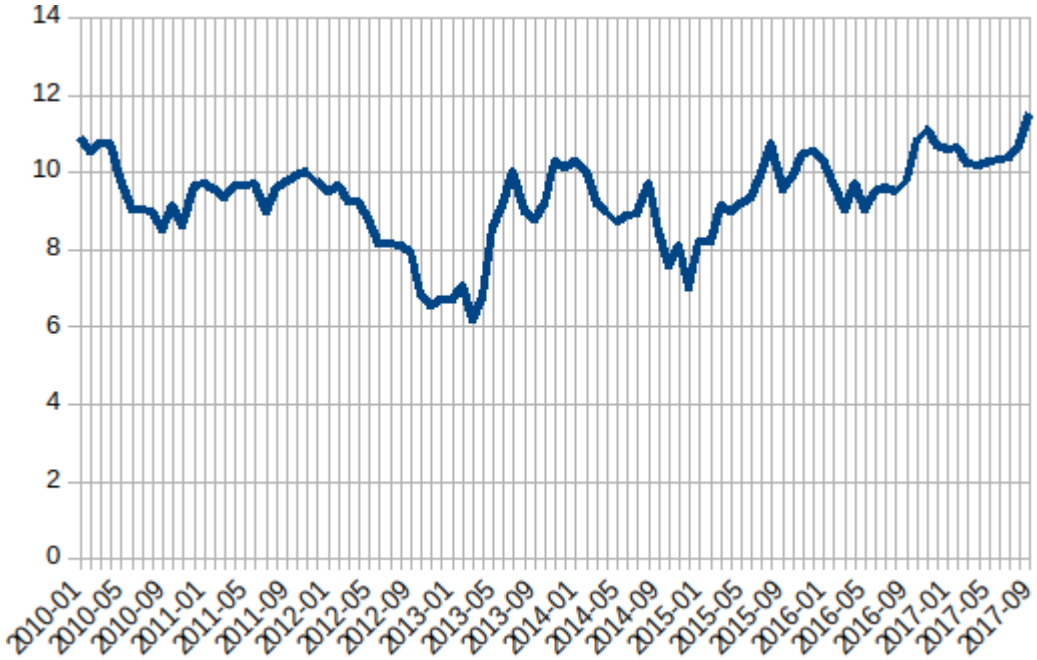

Figure 4.3. BY

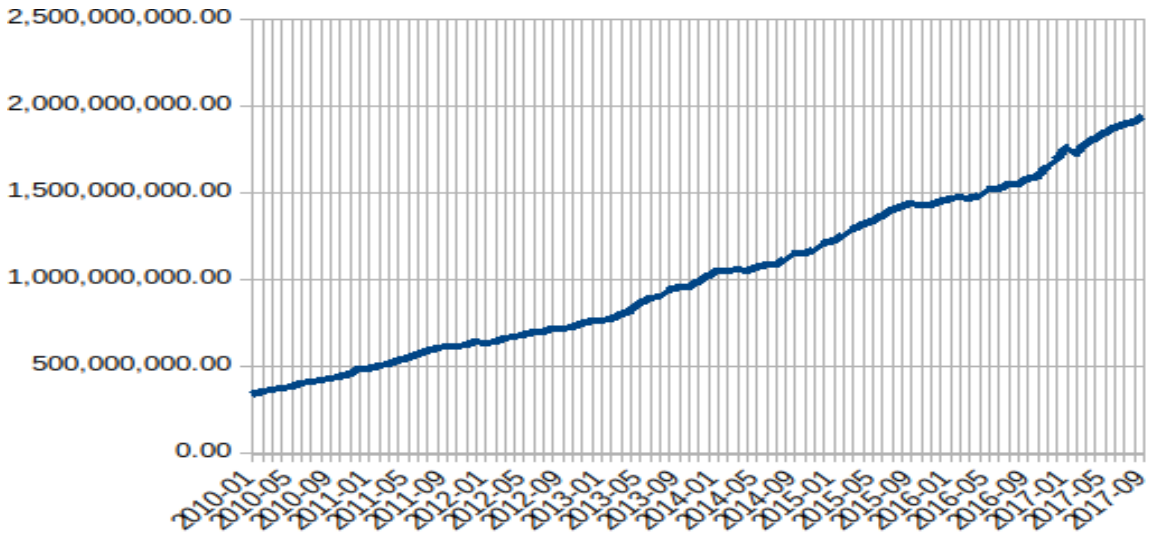

Figure 4.4. RC

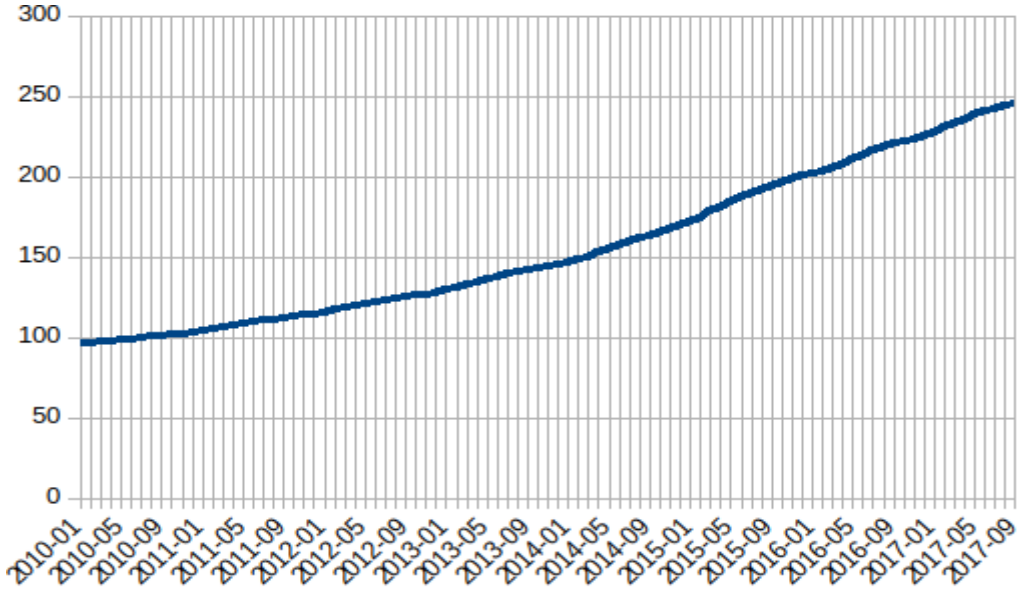

Figure 4.5. HP

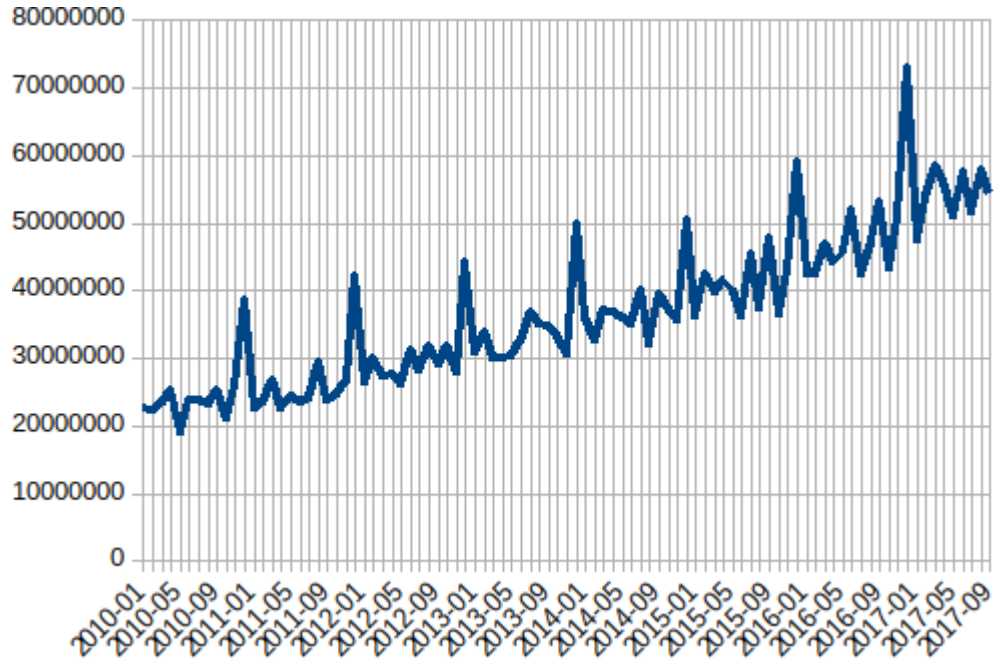

Figure 4.6. CGBE

RESUME

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