

**Dynamic Linkages among the Real Economic  
Activity, Asset Prices and Macroeconomic Policy in  
Turkey**

**Evrım Tören**

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Approval of the Institute of Graduate Studies and Research

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Prof. Dr. Ali Hakan Ulusoy  
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Doctor of Philosophy in Economics.

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Prof. Dr. Mehmet Balcılar  
Chair, Department of Economics

We certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality as a thesis for the degree of Doctor of Philosophy in Economics.

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Prof. Dr. Mehmet Balcılar  
Supervisor

---

Examining Committee

1. Prof. Dr. Neşe Algan
2. Prof. Dr. Mehmet Balcılar
3. Prof. Dr. Hasan Güngör
4. Prof. Dr. Mehmet Özmen
5. Assoc. Prof. Dr. Çağay Coşkuner

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## ABSTRACT

The purpose of this study is to analyze dynamic linkages among the real economic activity, asset prices, and monetary policy in Turkey. Thus, the effect of stock prices on consumption and interest rate through a time-varying vector autoregressive model is firstly examined for the period of 1987:Q1 and 2013:Q3. Then, the study investigates the relationship between asset prices and fiscal policy shocks for the period of 1988:Q1 and 2014:Q2 through Bayesian vector autoregressive model. Finally, the study employs the generalized autoregressive conditional heteroscedasticity volatility modelling to test the influence of Federal Market Committee minutes on asset prices in BRICS and Turkey for different time periods. As a result of the analyses, the research findings confirm that a positive shock to real stock price positively affects consumption. There are also significant effects regarding the impact of stock prices on interest rate and consumption for the years 1994, 2000, 2007, and 2011 in Turkey. The results obtained from the second method confirm that fiscal policy shocks significantly affect house and stock price indexes. The results of the final model reveal that the influence of FOMC releases is very strong in Brazil, Russia, South Africa and Turkey. There is also a negative return effect in Turkey when there is volatility in both India and China.

Lastly, policy recommendations are presented to improve macroeconomic stabilization and eliminate macroeconomic fluctuations for the Turkish economy.

**Keywords:** Macroeconomic policy, TVP-VAR, Bayesian VAR, GARCH Volatility, Turkey

## ÖZ

Çalışma, Türkiye’deki gerçek ekonomik aktivite, hisse senedi fiyatları ve para politikası arasında yer alan dinamik bağlantıları incelemeyi hedeflemektedir. Bu nedenle, hisse senedi fiyatlarının tüketim ve faiz oranları üzerine olan etkisi 1987 ve 2013 yılları arasında yer alan üç aylık veriler için zaman değişkenli vektör özbağlanımlı model ile analiz edilmiştir. Sonra, çalışma hisse senedi fiyatları ve maliye politikası şokları arasındaki ilişkiyi 1988 ve 2014 yılları arasında yer alan üç aylık veriler için bayes vektör özbağlanımlı model ile araştırmaktadır. Son olarak, çalışma, genelleştirilmiş özbağlanımlı koşullu değişen varyans oynaklığı modeli ile BRICS ülkeleri ve Türkiye için FOMC açıklamalarının hisse senedi fiyatları üzerine etkisini farklı dönemler için incelemektedir. Analizlerin sonucu hisse senedi fiyatı için belirlenen pozitif şokun tüketimi olumlu olarak etkilediğini göstermektedir. Ayrıca, hisse senedi fiyatlarının faiz oranları ve tüketim üzerine anlamlı etkileri 1994, 200, 2007 ve 2011 yılları için de yer almaktadır. İkinci metoda göre elden edilen sonuçlar maliye politikası şoklarının konut ve hisse senedi endekslerini etkilediğini göstermektedir. Son metodun bulguları FOMC açıklamalarının Brezilya, Rusya, Güney Afrika ve Türkiye’de etkin olduğunu ortaya çıkarmaktadır. Hindistan ve Çin’de değişkenlik yer alırken, Türkiye bu açıklamalardan olumsuz etkilenmiştir.

Sonuç olarak, makro ekonomik stabilizasyonu geliştirme ve makro ekonomik dalgalanmaları önlemek için Türkiye ekonomisi için politika önerileri sunulmaktadır.

**Anahtar Kelimeler:** Makro ekonomik politika, TVP-VAR, Bayesian VAR, GARCH Oynaklığı, Türkiye

To My Beloved Sister

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## LIST OF ABBREVIATIONS

BAYESIAN VAR	Bayesian Vector Autoregressive
CBRT	Central Bank Republic of Turkey
CPI	Consumer Price Index
FOMC	Federal Open Market Committee
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GDP	Gross Domestic Product
GNP	Gross National Product
IMF	International Monetary Fund
ISE	Istanbul Stock Exchange
OLG	Overlapping Generations
SVAR	Structural Vector Autoregressive
TFP	Total Factor Productivity
TVP-VAR	Time-Varying Vector Autoregressive
VECM	Vector Error Correction Model

# Chapter 1

## INTRODUCTION

Integration into the world economy has provided some countries with opportunities such as economic growth, development, employment, and poverty reduction in the world. The interaction between asset prices and the reasons for the irregular rise and fall in elements of a large-scale economic system are thus a major focus of the economic literature. When researchers concentrate on these issues, their purpose is to highlight links among these variables in the financial markets of countries as they relate to the world economy. If there is a slight difference or change in some variables such as national income, international trade, unemployment, inflation, consumption, saving, investment, interest rate, exchange rate, monetary aggregates, stock prices, industrial production, etc, then irregular rises and falls occur in the economy. Berument (2007) claims that the changes in these variables occur due to internal and external factors like real (supply) and nominal (price, money) shocks, series of cycles of economic expansion and contractions shocks, shocks arising from taxes and spending, shocks arising from policies based on a system of money in general use, global shocks, the use of innovations in external factors, governments' processes of intervening, etc. Thus, policy makers, practitioners, and monetary authorities need to increase their knowledge of these important facts.

The study focuses on macroeconomic conditions in order to assess and analyze the active linkages between the real economic activity, asset prices, and macroeconomic

policy in the Turkish economy. Turkey's economy is small enough compared to that of its trading partners; its policies are not able to alter world prices, interest rates and incomes in the world; and so its economy is specified as a small, open economy. Thus, the study includes three particular research procedures.

The literature shows that for countries characterized as small open economies, Sim's (1980) vector autoregressive (VAR) models generally enable researchers to obtain empirical measurements of macroeconomic fluctuations, asset prices in financial markets, and shocks resulting from implementation of policies, because useful VAR approaches for specific purposes take into account significant properties in the policy shocks identification for macroeconomic variables in these countries.

The case of Turkey is ideal for examining distinctive macroeconomic elements in specific time intervals. Before discussing the three aims of this study, it is important to note that in the country's history, its various governments have launched important liberalization programs to expand the economy. Liberalization is defined as a policy of opening an economy internationally by removing restrictions on the economic and political system. This implementation provides a means of achieving an increase in economic activity and value. The 1960s and 1970s in Turkey witnessed favorable change, due to government strategies supporting the necessity of domestic production instead of the country relying on foreign imports. Then, there was a formal public statement of a program at the beginning of 1980 (decisions were made on January 24), with the intention of stabilizing the production and consumption of goods and services and the supply of money, and maintaining structural adjustment for the growth of the economy in Turkey. This program

emphasized not only the importance of export practices for growth, but also the necessity of liberalizing actions between nations, in terms of trade and financial operation (Taymaz, 1998). The main objectives were to increase exports, maintain macroeconomic stability, sustain economic growth, and achieve full employment. The program included beneficial policies, but despite the positive effects of these decisions, economic problems could not be avoided, and crises started to emerge again. Just like the period before liberalization, the investment to GNP ratio, imports, price instability, inflation, and current account and capital account deficit started to increase. Thus, due to economic and political instabilities and other external factors, severe financial crises occurred, like those in 1994, 2001, etc.

In the context of these developments, this study focuses first on the influences of asset prices on two variables in Turkey, by applying a simplified identification of TVP-VAR approach in order to evaluate macroeconomic properties for the data emerging once every quarter, in the years 1987-2013 in Turkey. These two variables are interest rate and consumption, respectively.

The interaction between asset prices and fiscal policy shocks is then examined through Bayesian VAR for the data once every quarter, of the years between 1988 and 2014. This method attempts to provide reasons for the changes in house and stock price indexes in the Turkish economy; and the study determines the effect of four shocks according to the sign restrictions. The aim is to demonstrate the interactions between the banking sector, the housing sector, the credit market, and the financial market, in the Turkish economy.

Finally, this study shows how the releases of the Federal Open Market Committee (FOMC) minutes affect the asset prices of five countries defined as BRICS countries and Turkey. In the last method, GARCH (Generalized Autoregressive Conditional Heteroscedasticity) volatility modelling offers remarkable results for decision-making by financial institutions, investors and policymakers when the data for these countries is compared.

This dissertation consists of six chapters. Chapter 1 introduces the purpose of the study and the areas it will focus on. Chapter 2 looks at three areas of the Turkish economy: the importance of macroeconomic fluctuations; macroeconomic fluctuations and asset markets; and macroeconomic performance and financial markets. Chapter 3 discusses how stock prices affect two prominent variables in Turkey using the TVP-VAR model. Chapter 4 examines asset prices and fiscal policy shocks in Turkey using Bayesian VAR models. Chapter 5 provides empirical results obtained from the GARCH Volatility Modelling for the asset prices of BRICS countries and Turkey according to the FOMC minutes. Finally, Chapter 6 is devoted to discussing the findings of Chapters 3, 4, and 5, and providing recommendations accordingly.

## **1.1 Significance of the Study**

Understanding the factors which affect real economic activity, asset prices and macroeconomic policy in Turkey, is critical for understanding macroeconomic properties within the Turkish economy. This study therefore makes a contribution in three areas.

First, it provides significant results regarding the effect of asset prices on two variables for the specific years 1994, 2000, 2007 and 2011 in Turkey through the TVP-VAR model.

Second, it demonstrates the influences on house and asset (stock) prices in Turkey of policy shocks such as business cycle shock, monetary policy shocks, and government revenue and government spending shock, using Bayesian VAR models.

Third and lastly, this study reveals the effect of FOMC minutes on asset prices, through GARCH volatility modelling, comparing Turkey with BRICS countries.



## Chapter 2

### LITERATURE REVIEW

The chapter discusses the importance of macroeconomic fluctuations, macroeconomic fluctuations, and asset markets, and macroeconomic performance and financial markets in Turkey.

#### **2.1 Importance of Macroeconomic Fluctuations**

Researchers are concerned with the high significance of macroeconomic fluctuations because they provide real economic reasons for events in the economy. Sims (1980) contends that the vector autoregression (VAR) model, which is defined structurally, is efficient and effective for examining macroeconomic fluctuations. The introduction of a structural VAR (SVAR) model inherently puts a particular focus on the distinctive features of macroeconomic models. When economists and policymakers start using the SVAR model, they readily acquire good outcomes of separate macroeconomic factors because these factors have impacts on economies. There is another advantage of using the SVAR model for researchers.

Sims (1980) claims that the SVAR model makes researchers define the kind of shocks they want to combine with their methodologies, which makes it a prominent approach for the analysis of macroeconomic fluctuations. There are well-known followers of Sims (1980) who use the SVAR model; their studies on macroeconomic fluctuations are examined below.

Hoffmaister and Roldos (1996) examine the causes of macroeconomic activities during a particular period of time in Brazil and Korea. Their aim is to demonstrate important effects of factors occurring inside each country; specifically, this research identifies shocks arising from the desire of consumers, clients, employers, and so on for a particular commodity or service and the amount of that good or service offered for sale. To understand the reasons for business cycle fluctuations, their study also addresses external shocks in these countries. The results show the significance of shocks relating to the amount of a good or service offered for sale, whereas other shocks are meaningless for macroeconomic fluctuations in Brazil and Korea (Hoffmaister & Roldos, 1996).

To Bjornland (1998), the determination of real and economic shocks is the only way to assess and analyze macroeconomic fluctuations in Norway; four shocks based on velocity, fiscal, labor, and the amount of a good or service offered for sale are determined in this study. The purpose is to understand Norway's economic reaction to those shocks. The SVAR model includes all merchandise and services, wages, the value of Norway's currency for conversion purposes, and the unemployment rate. The findings demonstrate that the shocks are significant for understanding changes in GDP, unemployment, price, wages, and exchange rate between the 1970s and 1980s, even though those changes all occurred slowly. Bjornland's (1998) research reveals the prominence of macroeconomic fluctuations and the mechanisms behind currency conversion valuations.

Genberg (2003) states that SVAR is a useful economic model for examining the influences of domestic and foreign elements in Hong Kong, because that jurisdiction

has an exchange rate mechanism based on a currency board. The results obtained from the SVAR model confirm that external effects play a significant role in the fluctuations of Hong Kong's general economic factors.

Arreaza and Dorta (2004) focus on the Venezuelan economy to examine macroeconomic fluctuations. They seek to understand the consequences of shocks coming from income, domestic desire of consumers, the amount of a good or service offered for sale on inflation, increases in economic activity, and the exchange rate. The SVAR economic model in this study includes exchange rate, income, the sum total of goods and services, and an index of variation in prices known as the consumer price index (CPI). Their results show that supply shocks have a particular impact on the growth of Venezuela's economy and that nominal shocks affect changes in the CPI.

Diboglu and Aleisa (2004) identify five shocks based on the ratio of an index of Saudi Arabia's export prices to an index of its import prices, the amount of goods and services offered for sale, aggregate demand, the balance of payments, and money supply and currency policies. They use SVAR as a method to examine how oil prices and the ratio between export and import prices influence changes in the Saudi economy. They conclude that the economy is adversely affected by these structural shocks and that there is an adverse impact of supply shocks on Saudi Arabia's domestic output.

An especially valuable study by Eltony and Al-Awadi (2001) focuses on four oil-exporting countries. They identify demand shocks like nominal and real, oil price

shocks, and supply shocks to analyze macroeconomic reactions to these shocks through the use of the SVAR model and data from the four countries. The study concludes that irregular increases and decreases in output result from oil price shocks in Saudi Arabia and Kuwait. However, supply shocks are significant when there are output fluctuations in two countries, such as Indonesia and Kuwait. Lastly, there no significant result was found for Iran (Eltony & Al-Awadi, 2001).

For Hall, Blanchard, and Hubbard (1986), macroeconomic fluctuations and the market structure reinforce one another because macroeconomic fluctuations generally offer considerable information about the market structure, which can lead to the spread of macroeconomic shocks. Macroeconomic fluctuations and changes in price levels are thus important issues for economists and those responsible for formulating policies, especially in economics, while clarifying questions arising from business cycles, volatilities, and macroeconomic fluctuations in asset markets.

Agenor, McDermott, and Prasad (2020) focus on the properties of macroeconomic fluctuations in 12 developing countries. Their results confirm that the domestic output of these countries is affected by certain macroeconomic elements; the two important methodological aspects of this study relate to the sources of macroeconomic shocks and an examination of the sensitivity of correlations and other events to the procedures used for the economies of these countries.

Blanchard (1989) contends that the traditional explanation of macroeconomic fluctuations does not always hold when examining the amount of goods produced by the industries in an economy, the unemployment situation, the amount of money

required for a good or service, regular payments earned for work, and wealth. In other words, the fluctuations observed do not exist only because of demand, money, labor supply, productivity shocks, and so on. In this respect, demand shocks are cited as explaining most of the short-run fluctuations, whereas positive demand shocks lead to increases in nominal prices and wages. On the other hand, supply shocks should not only refer to declines in nominal prices and wages. Blanchard (1989) points out that unemployment and output are jointly responsible for macroeconomic fluctuations in a variety of economies.

Campbell and Mankiw (1987) argue that economists and policymakers should treat as unworthy recent findings based on persistence in real GNP when they aim to assess and analyze macroeconomic fluctuations. According to these scholars, recent research outcomes do not succeed at differentiating the business cycle from other macroeconomic fluctuations. Their study uses the unemployment rate to examine the business cycle and identify permanent and transitory components in macroeconomic fluctuations.

Goodhart, Hofmann, and Segoviano (2004) emphasize that macroeconomic cycles depend on the boom-bust cycles in the banking sector and asset prices when there is financial instability. Due to the liberalization of many countries' banking sectors in the early 1970s, people began taking greater risks. Their study suggests changes in regulations to address both national and international competition in the financial sector.

Hoffmaister, Roldos, and Wicham (1998) assert that there are differences between the origins of irregular changes that are not normal situations for the economies of 14 countries in Africa. The study benefits from panel data for these countries and applies the SVAR model. The 14 countries use either the Central African or West African CFA franc as their currency, and twelve were once ruled by France. The results confirm that external shocks play an important role in CFA franc countries due to output fluctuations and the conversion value of the currencies used in these countries. It is notable that macroeconomic fluctuations in non-CFA franc countries have similar characteristics with rapidly growing economies in Central and South America.

Using shocks and inflation in the U.S. economy, Liu, Waggoner, and Zha (2011) contend that the sources of macroeconomic fluctuations can be found by focusing on regime changes. Based on their findings, when a shock is introduced to capital depreciation in a given country, it automatically results in macroeconomic fluctuations in that nation.

Hoffman (2003) investigates the reasons for international macroeconomic fluctuations among G7 countries. According to the cross-border results, global shocks influence changes in the balance of payments of these countries. The research findings show that global factors also influence macroeconomic fluctuations. However, particular shocks for G7 countries do not follow a steady course; instead, they are liable to change rapidly and unpredictably.

Iroalo and Santos (2014) seek to identify the macroeconomic factors behind volatility in stock prices by examining the effects of price markups, the use of credit, and borrowed capital. Their model also employs total factor productivity (TFP), costs of input, interest rate principles, tax levels, and financial resistance through VAR models. These scholars suggest that price markups significantly affect stock prices, whereas other variables have less influence on those prices.

Sabir and Ahmed (2003) conducted an empirical study using SVARs to find evidence of changes in the economies of developing countries. Applying the models reveals three shocks for these economies. Thus, the study reveals the importance of shocks existing inside these countries.

Arreaza and Dorta (2004) provide another valuable study based on an examination of macroeconomic fluctuations in Venezuela. Their model describes two shocks: external (income) shocks and domestic shocks. Their results demonstrate the importance of domestic shocks for the amount of non-oil volatility. On the other hand, supply shocks are less influential. Finally, the study indicates the importance of multiple regime changes and reform for the structure of the Venezuelan economy.

If there is friction in disseminating financial information, it will lead to fluctuations in asset prices and effective business cycles around the world (Benhabib, Liu, & Wang, 2016). These scholars focus on the variables that result in output and employment booms. The research findings obtained from studying overlapping generations (OLGs) confirm that sentiment shocks emerging from financial information frictions lead to persistent challenges like output, employment, and

business cycle fluctuations that necessitate new policy implications.

Yinusa (2009) uses the SVAR model to address factors involved in irregular economic changes in 18 countries in Africa between 1980 and 2004. The research is based on the standard money demand model, which describes the principles of accounting for dollarization in Africa. The study reveals that increases in the amount of money required in payment and changes in the relative values of currencies are effective on capital account restrictions and inflation in various countries. The study suggests that there should not be vulnerability in banking systems and inefficient policies for regulating money and currency in these countries.

Siregar and Ward (2010) argue that shocks based on the combination of several elements of demand have an effect in Indonesia. Short-run relations depend on the existing limitations taking place in the same period of time, whereas money demand and policy instruments affect long-run relations. In this respect, the research findings are related to the small open economy theory. The shocks, which are identified as aggregate demand, influence changes in these economies. Siregar and Ward (2010) discuss the implications of policies needed to resolve macroeconomic fluctuations in Indonesia.

Ibrahim (2003) shows that the international effects of macroeconomic variables emerging from the U.S. economy result in unexpected changes in the economy of Malaysia. The research findings confirm that these shocks and the use of monetary policy in the United States affect Malaysia's economic activity. Ibrahim argues for the necessity of exchange rate stability to deal with macroeconomic fluctuations in



Malaysia.

Houssa, Mohimont, and Otrak (2013) examine emerging markets to understand the effects of two shocks: the amount of goods and services globally and domestically. They determine sign restrictions while applying Bayesian vector autoregression to quarterly data for South Africa and G7 countries between 1985 and 2010. The results show that supply shocks are vitally important and that shocks emerging from G7 countries affect macroeconomic fluctuations in South Africa.

Brajas, Luna, and Restrepo (2008) examine bank behavior in response to economic shocks by focusing on the balance sheets and performance of banks in Chile. Using an 18-year period, these researchers determine the influences of macroeconomic shocks on banking variables using quarterly data and the VAR model. The results show that credit fails to keep up with the business cycle and that demand deposits have the power to determine it. Moreover, when there is a shock to interest rates, there is a decrease in loans and an increase in non-performing loans. Lastly, the study suggests that, when there is a shock to the economy that affects development, there are favorable effects on lending money and the value of company shares. Thus, this study is helpful for indicating the relationship between the behavior of the banking sector and macroeconomic fluctuations.

Hartley and Whitt (1997) focus on five European economies to analyze supply and demand shocks since World War II. When the SVAR model is applied to these economies, the results show that both permanent and temporary supply and demand shocks significantly affect prices.

The studies discussed in this section demonstrate the wide range of sources of macroeconomic fluctuations in different countries using distinctive models, though the SVAR model is most common.

## **2.2 Macroeconomic Fluctuations and Asset Markets**

There is a wide-ranging scholarly literature that investigates the connection between macroeconomic fluctuations and asset markets. Studies that examine the link between asset markets and macroeconomic fluctuations generally emphasize that changes in asset prices adversely affect interest rates. Thus, these changes are relevant to the course of the business cycle in different economies.

Bolten and Weigand (1998) contend that the reciprocal interaction between asset markets and business cycles is crucial for analyzing the influence of business cycle factors on financial circumstances because they play a primary role in the business cycle. For Bolten and Weigand (1998), if there is a point of low activity or achievement and the aim is to recover and secure by legal process or through profit making, there are always expectations for gradual economic growth and higher future income derived from an investment or product. Due to their favorable influence on asset prices, interest rates are low in this period if there is a business cycle. Lower interest rates positively affect stock prices and housing prices. When interest rates are low, they automatically increase the value of asset payments. In addition, lower interest rates enable investors to modify their portfolios by shifting investment from low-yield assets like bonds to high-yield assets like stocks and real estate.

When the economy enjoys persistent growth and the demand for capital grows,

interest rates increase due to inflationary pressures. Even with inflation, however, there is also an increase in confidence regarding future earnings that will benefit from stable economic growth. Thus, favorable expectations for greater gains have greater influence than higher interest rates in this period of the business cycle. Therefore, there is a tendency for asset prices to increase. However, the increase in asset prices is not as rapid as it is during the early stages of economic recovery, when the amount of available money is not able to satisfy the demand for capital adequately. Thus, a tight monetary policy is applied to protect against inflation, but it not enough to lower interest rates. Additionally, a decrease in marginal productivity adversely affects earnings growth, and asset prices reach their highest point under these circumstances (Bolten & Weigand, 1998).

If there are negative economic expectations, there is a decrease in asset prices; the decrease in demand for capital reduces interest rates. As far as stock and housing prices are concerned, they continue to decline until interest rates decrease significantly. While the linkages among these variables present specific challenges in the economies of different countries, asset prices and interest rates do not have a favorable relationship regardless of the country. However, asset prices significantly affect business cycles if there are variations.

The properties discussed reveal why this section focuses on expressing the prominent relationships between asset price fluctuations and the business cycle. There are important studies investigating the links among interest rates, the housing market, the stock market, and the business cycle. For example, some experts claim that the real economy and asset market linkages are mutually related and thus affect both sides.

Some studies defend the position that progressive asset markets benefit from asset prices that lead to conditions favoring innovation and development because asset prices are accepted as indicative of the real economy. However, some researchers claim that each stage of the business cycle influences asset prices. Thus, macroeconomic variables can be used to predict asset prices.

Schwert (1989) emphasizes that certain elements determine the liability of stock prices to change rapidly and unpredictably for the worse. The study concludes that the position and quality of real economic activity is a vital factor in efficient and effective stock returns free from volatility.

According to Hamilton and Lin (1996), an interdependency is revealed if good rates of return in stocks and industrial production are both taken into consideration. Economic decline during trade and industrial activity should be eliminated in order to avoid fluctuations.

Bolten and Weigand (1998) claim that the variations in asset prices depend on the earnings and interest rates in four phases of the business cycle and that there is an economic association when the stock market and factors affecting the business cycle are taken into account for economies around the world.

Chauvet (1998) states that stock market forces determine the interactions between fluctuations in the asset market and the business cycle; indeed, the expression of those interactions is very prominent because it is a sign of the business cycle. This factor of the stock market can provide beneficial results when a decisive change in a

situation in the economy occurs.

Estrella and Mishkin (1998) identify certain financial indicators that are useful for not only policymakers but also participants in the stock and housing markets. Their study reveals that there are certain financial variables that automatically provide information about real economic activity because of their roles in the stock and housing markets: interest rates, stock prices, currency values, and so on. Estrella and Mishkin's (1998) results confirm that stock prices are reliable predictors of real economic activity.

There are studies that examine the impacts of interest rates not only on macroeconomic fluctuations but also on asset markets. Neumeyer and Perri (2005) and Sarquis (2007) define interest rates as countercyclical because interest rates act against the economy in order to reduce its force or neutralize it and therefore result in changes in the business cycle.

Borio (2006) focuses on the lack of relationship among financial variables in some countries' asset markets and finds that financial stability can be obtained when inflation is not high. Borio (2006) also contends that the pressure of excess demand provides favorable for credit and asset markets. Hence, monetary policy should strive to be effective for the well-being of asset markets and to help maintain financial stability.

According to Uribe and Yue (2006), shocks extending over a large or increasing area of the world and globally employed interest rates have several practical purposes for

evaluating the reasons for changes in the business cycle, especially macroeconomic fluctuations.

In the housing market, several studies in the literature emphasize that economies expand when their housing markets grow. Thus, it would be irresponsible to disregard the effect of the housing market on the business cycle. For Leamer (2007), housing is crucial to economic growth; if there are positive improvements in a country's housing market, that economy can expect favorable phases.

Otrok and Terronos (2005) argue that variables such as house prices and asset prices in highly developed nations affect those countries' asset markets and the level of interest rates. These industrial economies should focus on not only changes in house prices but also the link between fluctuations in housing costs and macroeconomic elements, including financial asset returns at the national level. Thus, house prices affect macroeconomic elements favorably in industrial countries. When there is a monetary shock to housing prices, there is also an increase in economic activity or value in industrial countries. Therefore, worldwide shocks are serious threats to maintaining stability around the world.

Bansal (2005) focuses on the factors that influence economic uncertainty and finds that changes in asset markets result in economic uncertainty because current prices are the main determinant of future earnings. Thus, cash flow growth should be controlled to avoid macroeconomic fluctuations. The results obtained from parametric general equilibrium models suggest that they are all vital for interpreting stock market characteristics.

Naes et al. (2010) demonstrate a vital dependency between two variables. Greater liquidity in the stock market provides favorable conditions for the real economy because it makes available ready assets to a market or company in the real economy.

Studies on elements like business cycles, asset prices, and permanent and temporary forces on those asset prices describe them as fundamental components of economies. Cochrane (1994) identifies specific forces affecting GNP and stock prices that are neither structural nor permanent. His study suggests that temporary shocks influence real, tangible changes in the amounts of growth in GDP and stock returns.

Kenourgios, Christopoulos, and Dimitriou (2013) lay out how the impacts of the 2007–2009 global financial crisis spread to affect the asset markets of different regions around the world. Using a data set of a class of variables for different countries, their study finds a significant link between asset markets in the United States and the asset markets of Brazil. It also provides valuable insights into interactions between the United States and Brazil, Russia, India, and China (the BRIC countries). There should be implications for the control of asset markets in terms of stocks, bonds, commodities, and so on.

In a study that examines the influences of the passage of time on international stock markets and returns due to changes in the structure of populations in both Asian and European countries, Börsch-Supan and Ludwig (2009) take into account market interactions between the two regions. Their study suggests that demand is insufficient for new investment for the younger generations and thus reveals an important relationship between the labor and financial markets in Europe and Asia if

the goal is to reduce macroeconomic fluctuations.

Rey (2015) states that there is only one global element that is highly effective for explaining the sources of risky assets. This study benefits from a model addressing investors in its structure; it then employs Bayesian VAR for the analyses. Since the aim is to examine the global financial cycle, this model contains real activity, financial variables, asset prices, credit flows, and so on for the U.S. economy in its structure. The results reveal extreme monetary policy spillovers emerging from the United States to the rest of the world.

Beirne and Gieck (2014) assess the interdependency and spread of close contact among the bonds, stocks, and currencies of 60 countries for the 1998–2011 period. Their goal is to understand the characteristics of distinctive fluctuations in those assets. During financial crises, U.S. equity shocks result in risk aversion for bonds in some emerging markets, whereas shocks stemming from Europe positively affect the bond market for investors.

Baumeister, Durinck, and Peersman (2010) claim that the impacts of some shocks change when the size of these shocks are more than necessary or desirable. Their results show that the influences are different because of the source of liquidity expressed by M1, M3-M1, and credit and the facts and conditions of the economy, such as booms and busts in stock prices, inflation, credit availability, monetary policy implications, and the business cycle.

According to Iacoviello (2002), housing prices are influenced by shocks that lead to macroeconomic fluctuations. This study suggests that inflation has a direct effect on



housing prices, which in turn affects other factors; collectively, they lead to fluctuations in the real economy.

Senyuz (2011) focuses on the effects of temporary and permanent forces on economic activity and asset markets in the United State, concluding that there are elements that are not permanent in both output and stock prices. The study indicates the importance of interactions between the two forces that affect performance on both sides.

The research reviewed above shows that domestic influences of financial markets, components of asset markets, and international facts or conditions connected with global financial markets all have significant effects not only on macroeconomic fluctuations in domestic markets but also on the asset markets of various countries. Changes in facts and conditions such as temporary global economic declines or financial crises can substantially affect the business cycle in any country around the world. Indeed, macroeconomic volatility emerging from a single country could result in a global crisis.

Emerging countries and small open economies are interested in the international financial markets, just as industrial countries are, and they are thus relevant when studying macroeconomic fluctuations and asset markets. However, their responses to the dynamics in international financial markets and business fluctuations are not efficient and effective enough to cope with problems that arise due to global risk factors. Emerging economies and small open economies should thus become familiar with the strategies and policies needed to resolve financial crises in a dynamic global

economy.

### **2.3 Macroeconomic Performance and Financial Markets in Turkey**

In this section of the study, macroeconomic performance and financial markets in Turkey are discussed by focusing on the prominent studies in the literature. Before discussing these studies in detail, it is valuable to point out that liberalization of the Turkish economy began in the 1980–1984 period. For Altinkemer and Ekinici (1992), the stabilization package enacted on January 24, 1980 is key to the restructuring policies seeking to liberalize the Turkish economy. When this package was implemented, multiple exchange rate practices were removed, to be replaced by daily exchange rate movements. Later, Decree 28 of December 1983 and Decree 30 of July 1984 were implemented to meet the requirements of trade liberalization. These two decrees enabled the Turkish economy to remove not only quantitative limitations on imports but also artificial pressures and forces that had affected purchasing, selling, and owning foreign exchange. Consequently, Turkey’s banking sector began to improve (Altinkemer & Ekinici, 1992).

Berument (2007) uses a VAR model with six variables to reveal characteristics and measure the impacts of Turkish policies relating to money and currency between 1986 and 2000. The study concludes that the consistency of these policies affected the amount of goods and services produced and their prices during this period.

When the reasons for inflation in Turkey are taken into account, Kibritcioglu (2002) contends that deficits adversely affect the amount of money expected, required, and given in payment for something in Turkey because inflation generally persists over a prolonged period. An important study by Dibooglu and Kibristcioglu (2002) uses the

SVAR model to examine inflation and output forces that stimulate changes in these variables in Turkey's economy. In their model, they focus on supply, demand, monetary aggregates, oil prices, and the balance of payments. The empirical findings confirm that demand, monetary aggregates, and supply disturbances significantly affected the Turkish economy in the period under study.

Research into macroeconomic variables by Kibritcioglu and Kibritcioglu (1999) points out oil price changes and their inflationary effects in Turkey; these scholars suggest that the increases in the nominal value of the Turkish currency for conversion purposes and the general increase in the CPI drove inflation from 1996 to 1998. Another study (Agenor & Hoffmaister, 1997) makes similar claims for the Turkish economy between 1980 and 1994.

Studying the 1990–2004 period in Turkey, Önis and Yılmaz (2005) use a VAR model with seven variables. Their study concludes that inflation was mainly driven by unacceptable and improper political behavior.

Ozatay (2000) investigates the reasons for the 1994 crisis in Turkey and concludes that two important shocks affected the economy and currency exchange market, both of which declined in this period, with the most extreme challenges occurring during the crisis. Ozatay and Sak (2003) emphasize that the 2000–2001 crisis in Turkey caused greater damage than the 1994 crisis, and that some of that damage was irreparable. They conclude that external shocks, U.S. dollar appreciation against European currencies, and real appreciation of the Turkish lira were the causes of this destructive crisis.

Duman's (2002) study is of interest because it compares the Turkish economy with those of five countries in Central and South America. This study examines whether Turkey's inflation-targeting monetary policies are sufficiently robust. The results confirm that fiscal dominance is an obstruction for some developing countries. The study goes on to suggest that the monetary authorities should be aware of the threat of fiscal dominance to successfully implementing an inflation-targeting strategy.

Kara (2006) examines Turkey's strategy regarding monetary policy for the 2002–2005 period. He asserts that Turkey was able to reduce inflation significantly due to the monetary policy implemented at that time, despite the existence of fiscal dominance and financial markets that were not yet fully developed. Ersel and Ozatay (2008) advocate for the same position; their study points out the importance of policies that addressed inflation for policymakers' desired outcomes in the Turkish economy.

Another study (Kara & Ogunc, 2008) examines the use of a specific policy to avoid inflation in Turkey. The policy works well because it reduces the adverse effects of the exchange rate when there is as small a change as a single percentage point, which affects exporters and importers in different ways. There is a specific issue that automatically determines import prices and leads to inflation. After Turkey adopted a regime to avoid inflation, these problems were resolved with relative ease.

As noted above, the Turkish economy has encountered multiple economic and financial crises since the 1990s. In response to the 2001 crisis, the Turkish government instituted a program that had International Monetary Fund (IMF) support. The program aimed to sustain macroeconomic stability through rigid

policies relating to government spending, taxes, money, currency values, and so on (Çetin & Gallo, 2012). First, the Turkish government began to transfer many state companies from public to private ownership and control. Second, it began making changes in the banking system to make it more open to public scrutiny. After these new strategies were implemented, Turkey's GDP rose every year between 2002 and 2007. The Turkish government was also able to reduce the public deficit and control inflation. However, there was an increase in the unemployment rate, even though overall macroeconomic performance had much to recommend it during those years, before the international financial crisis sharply devastated the Turkish economy in the period 2008 and 2009 (Çetin & Gallo, 2012).

According to Çetin and Gallo (2012), there are two types of economic crises: real sector and financial sector. The former are generally associated with a decline in the quantity and quality of production, a reduction in the employment rate, and a decrease in overall labor markets. The latter originate from disturbances to or problems with payment systems in financial markets and can diffuse rapidly throughout the global economy. Financial crises have two main causes; some result from currency issues, while others arise from the business conducted by banks, especially access to credit. Çetin and Gallo (2012) emphasize that there are three different generation crises.

The 1994 crisis took place in Turkey because of uncertainty and vulnerability in the economy. It is associated with the first generation identified by Krugman (1979). The 2001 crisis in Turkey refers to the third generation (Krugman, 1997; Radelet & Sachs, 1998), because there were disruptions in all sectors of the Turkish economy. As to the 2008 global crisis, there was a contraction in Turkey's goods and services

markets because there was a precipitous decline in the ability of short-term capital to move or be moved freely and easily. Thus, the 2008 crisis can be classified as a third-generation crisis. In these years, the use of short-term capital positively affected the economy due to high investment (Çetin & Gallo, 2012).

Rodrik (2009) claims that Turkey's experience in 2008 offers a valuable example. This global disturbance necessitated changes in Turkey's financial markets. Appropriate regimes were implemented to preserve the economy against domestic and external shocks. The recovery took place quickly, and the Turkish economy returned to growth in 2010; foreign investors started investing in the Turkish private sector, the government decreased the debt burden, and monetary authorities worked effectively to support the economy.

Karamustafa and Kucukkale (2003) show how the Turkish economy affects asset markets. Thus, the study tests the power of Turkey in a global context. They use five variables and assess the interactions among them to results confirm that stock returns depend on key elements of Turkey's macroeconomic policy. However, macroeconomic parameters are not the most important factor affecting stock returns in Turkey.

A study (Büyükalvarcı & Abdioğlu, 2010) examining asset prices and macroeconomic elements in Turkey found that the stock market is key to future development when monetary authorities and policymakers consider macroeconomic variables.

Karacaer and Kapusuzoglu (2010) analyze the dynamics behind economic performance by considering factors with macroeconomic effects in Turkey between 2003 and 2010. There is interdependency among these variables. The results confirm a significant effect among elements of the economy over the long run. However, the relationships among macroeconomic variables in the short run were found to operate in two directions.

Berument and Dincer (2004) examine monthly data between 1992 and 2001 and conclude that there is a favorable impact from the movements of money on Turkish economic activity. Their study reveals that a positive improvement in innovations for capital inflows leads to an appreciation in the value of the Turkish lira. These factors boost the process of producing goods and offering services and accelerate money circulation, which decrease price levels and interest rates. Lastly, Berument and Dincer (2004) found no effect of the exchange rate regime on capital flows.

Berument, Denaux, and Emirmahmutoglu (2015) indicate the importance of capital inflows for efficient and effective macroeconomic performance in Turkey. Their study uses prominent variables to examine interactions in the financial market. Since their purpose is to analyze the responses of these variables to capital inflow shocks, the study benefits from the VAR model for a sample from the 2000–2012 period. The study finds linkages among macroeconomic variables and capital inflows in the Turkish economy.

For Acikalin, Aktas, and Unal (2008), analyzing stock prices and macroeconomic elements in Turkey is essential. According to their findings, there are stable

relationships among these macroeconomic elements. When there is a movement in one macroeconomic variable, it favorably influences the ISE index. Another finding in this study is the positive connection between asset markets and interest rates.

Ekrem, Alp, and Yagmur (2017) emphasize that global financial crises affect economic measures such as inflation, growth, and employment. Their study measures macroeconomic performance in Turkey, Poland, and Brazil by focusing on the consumer confidence indexes in these countries. They demonstrate that macroeconomic performance depends on activities in financial markets.

Rjoub, Civcir, and Resatoglu (2017) examine the operations of Turkish banks for the 1995–2015 period and report that both macroeconomic and microeconomic variables can affect the price of Turkish bank stocks. The study also suggests that certain variables, such as asset quality and stock earnings, affect asset prices and reveals the importance of bank size when making decisions. Lastly, banks' asset prices respond negatively to economic crises.

Karatas and Uz (2009) examine macroeconomic relationships in Turkey and EU countries between 1996 and 2006. While it investigates the interactions between Turkey and these countries, the research also considers the influences of specific regimes. The results show a tendency for GDP growth rates in Turkey to decline due to macroeconomic performance between 2009 and 2017. The study also reports that Turkey is expected to grow due to both internal and external factors.



Gokbulut and Pekkaya (2014) identify two important issues for financial experts, policymakers, and practitioners in Turkey. One is volatility in financial markets, and the other is volatility in stock markets. The generalized autoregressive conditional heteroskedasticity (commonly known as GARCH) model is used to understand the dynamics in these markets between 2002 and 2014. The study reveals asymmetry, volatility, and long memory for these variables in the Turkish financial markets.

Ugurlu, Thalassinou, and Muratoglu (2014) examine unexpected volatility in asset market returns in five countries. Their results show clearly visible and readily comprehensible effects for stock returns in the Czech Republic and Hungary, whereas Poland, Turkey, and Bulgaria did not experience a significant influence. Volatility shocks are significant because they persist over a prolonged period for the Czech Republic and Hungary.

## **Chapter 3**

### **EFFECT OF STOCK PRICES ON CONSUMPTION AND INTEREST RATE IN TURKEY**

The chapter analyzes how unexpected consequences emerging from stock prices affect consumption and interest rate in Turkey. TVP-VAR model used in the study assumes that volatility of asset prices is not constant. The model enables us to capture the macroeconomic properties of Turkey because the aim is to obtain dynamics that stimulate growth, development, recession or change within the Turkish economy. In order to examine the connection among three variables, the model is determined to possess a probable time-varying characteristic of specific causes in the economy.

The sample consists of quarterly data of three variables occurring once every quarter of years between 1987 and 2013. While examining the sample data obtained from CBRT, the first purpose is to understand macroeconomic forces resulting in change or progress within the economy. Another purpose is to show whether there are spillovers or not during the crises in Turkey.

The method is applied to show how a positive shock identified for stock prices affect consumption and interest rate in Turkey. Thus, the impulse responses of the model for the years 1994, 2000, 2007 and 2011 are taken into consideration for the

significant results regarding these three variables. Therefore, this study suggests the usage of the model to variability for parameters of consumption and interest rate.

### **3.1 Introduction**

The permanent income hypothesis is generally used to explain the relationship between an increase in wealth and consumption (Friedman, 1957): the increase in wealth can come from real (stock) asset price, real estate, or other financial assets. According to Friedman (1957), if there is a general increase in stock price, it automatically raises people's wealth and consumption. Thus, there is a literature on the broad-ranging international evidence for the consequences of major spillovers from stock market to consumption in many countries in the world.

Lettau and Ludvigson (2001) contend that the influence of irregular rising and falling in variables of macroeconomics on households' the purchase of goods and services by the public and material prosperity cannot be denied when estimating stock returns in the United States; they find that these fluctuations are very useful, if investors have these returns through trading or obtaining dividends. Apergis and Miller (2004) argue that stock market wealth affects consumption in U.S asymmetrically. Fratzscher and Straub (2010) identify shocks for the asset markets to predict productivity, and they conclude that the material wealth and the value of one currency for the purpose of conversion to another are very prominent when there is heterogeneity in the transmission for 42 industrialized and emerging market countries.

Consistent with these studies, Koivu (2012), analyzing the macroeconomic dynamics in China, contends that there can be an increase in stock prices when China makes

the policy based on money and currency less strict. In addition, a positive shock, which is identified for housing prices in China, increases consumption even though the change in stock prices is very small. Sousa (2010) also illustrates the impact of wealth on consumption by using sample data for European countries. Sousa's results confirm that wealth effects are particular for shares, currency and deposits and mutual funds. Thus, consumption reacts quickly and positively to the financial liabilities and mortgage loans in the euro area.

Where Turkey is concerned, there are only limited studies. They generally examine dynamics of stock market and its influences on consumption in Turkey. There is a study on the link between wealth and consumption when real estate increases by a single percentage point (Binay and Salman, 2008). From their research findings, they conclude that a single percentage point difference in asset market raises consumption.

Aydede (2007) investigates the impact of a policy implementation for social security on consumption. There are two papers that focus on an increase in economic activity or value for the economy in Turkey: both studies use vector autoregressive (VAR) models to show how private consumption depends on short-term capital inflows. These studies also emphasize that the economic theory predicts effects through changes in supply and demand of funds for interest rates (Uluengin and Yentürk, 2001; Çimenoğlu and Yentürk, 2005).

Campbell (1987) argues that stock market and interest rate are related because variables because stock returns are linked to excess surplus returns via interest rate

changes. Economic theory emphasizes three channels (for a survey of the theory on this, see Elmendorf, 1996) when interest rate and consumption are considered. The first effect arises from the well-known *intertemporal substitution* effect. When the interest rate rises, this fact leads to an increase in consumption in future. Thus, current consumption decreases. By increasing the future consumption gain for a dollar of saving, the interest rate increase makes the present purchase of goods and services costly. Therefore, people start consuming less and saving more. Second, there is a decrease in the current discounted monetary worth of consumption in future due to the increase in interest rate (Wilcox, 1993). In other words, when there is an increase in interest rates, this situation diminishes the amount of dollars which is necessary to purchase goods and services in future. Therefore, the purchase of goods and services becomes cheaper in real terms for people's future operations. Hence, people start consuming more and decreasing saving today. It is expressed as the *income effect* and its direction is opposite. Third, there is a decrease in income in future, if interest rates rise, i.e. discounted present value of the lifetime wealth decreases. There can be also a decrease in capital, representing a lower value of accumulated financial assets. These events adversely affect people's life time wealth, and this *wealth effect* should cause people to consume less today (Deaton, 1992; Wilcox, 1993), and opposite effect to substitution effect. Due to competing substitution effect, how interest rate effects consumption should be answered on empirical grounds. For instance, Campbell and Mankiw (1989) find that interest rate changes lead to no significant change in consumption in the US.

Foreign investors who have power over the stock market in Turkey possess a substantial share of the stocks perform buying and selling operations in Borsa

Istanbul because they have 60% of stocks for the sample of period of our study. Thus, the study may indeed significantly eliminate the wealth effect on consumption. High foreign ownership on the other may increase the effect on the interest rate because of capital inflows and outflows due to foreign ownership. Capital inflows incases the demand for Turkish lira, creating a movement toward a higher level for the interest rates. Capital outflows increase supply of Turkish lira and creates downward pressure on the interest rate. How significant these effects should be assessed on the empirical grounds. Our empirical results show that, consumption responses positively to stock price appreciations up to a quarter and no significant effect remains afterwards. When there are appreciations of stock price, do have a favorable influence over the interest rate from the end of the first quarter to the beginning of the third quarter after the change occurs, implying a capital inflow effect due to more foreigners buying in the Turkish market.

In view of these articulations, the study analyzes effects of stock prices on consumption and interest rate in Turkey. Its methodology does not rely on constant parameter models, as is the case in the literature. TVP-VARs are very useful for the analysis of macroeconomic issues, and offer a change or slight difference in the nature of the specific conditions within the economy (Nakajima, 2011); in line with this view, the study uses this model for the understading of Turkish economy.

This chapter investigates not only the influence of the unexpected consequence which is associated with spilloever for two variables such as consumption and interest rate after the identification of a shock for stock prices, but also forces

determining a change or progress among these three elements in Turkey described as a small-open economy.

The study shows some significant responses of two variables when there is a shock in the stock market shock particularly in financial crises. Therefore, large negative financial shocks lead to significant welfare reductions. Policymakers have to know welfare consequences of crashes in the stock exchange. Thus, our findings are important and contribute to the literature.

Turkey has been chosen as the country of investigation because of the serious arrangement of and relations between elements of its economy. This study is important because it applies a model to the Turkish economy to show repercussion by considering three variables. This section of the study consists of three parts. Part 2 introduces methods used in the model; Part 3 specifies properties of sample; Part 4 provides the results which are obtained by the scientific method.

### **3.2 Methodology**

Quantifying and analyzing macroeconomic fluctuations has been an important focus to the researchers. Sims (1980) introduced a vector autoregression for the investigation of macroeconomic fluctuations. Sims (1980) contends that the VAR models enable the parameters to act according to a first-order random walk process; hence the VAR models constitute not only temporary changes, but also permanent changes to the parameters.

The study uses the model proposed by Primiceri (2005). According to Nakajima (2011), TVP-VAR offers possible changes while examining the structure of the

economy, because it is both flexible and robust. The model gives opportunity for volatility to change over time. This model also includes Markov Chain Monte Carlo (MCMC) methods to avoid misspecifications.

An estimation belonging to the model can be expressed, after Nakajima (2011), as follows:

$$y_t = c_t + B_{1t}y_{t-1} + B_{st}y_{t-s} + e_t, \quad e_t \sim N(0, \Omega_t), \quad (1)$$

For  $t = s+1, \dots, T$ , where  $y_t$  is a  $(k \times 1)$  vector of observed variables,  $B_{1t}, \dots, B_{st}$  are  $(k \times k)$  matrices of time-varying coefficients, and  $\Omega_t$  is a  $(k \times k)$  matrices of time-varying covariance matrix. Through the decomposition of  $\Omega_t = A_t \Sigma_t \Sigma_t' A_t^{-1}$ ,  $A_t$  is a lower triangle matrix with diagonal elements equal to one, and  $\Sigma_t = \text{diag}(\sigma_{1t}, \dots, \sigma_{kt})$ .  $\beta_t$  is the stacked row vector of  $B_{1t}, \dots, B_{st}$ ;  $a_t$  is the stacked row vector of the free lower-triangular elements of  $A_t$ . In addition,  $h_t$  is defined as  $h_t = (h_{1t}, \dots, h_{kt})$  and  $h_{jt} = \log \sigma_{jt}^2$ .

In this study, the time-varying parameters follow a random walk process:

$$\begin{aligned} \beta_{t+1} &= \beta_t + v_{\beta t}, \\ a_{t+1} &= a_t + v_{at}, \\ h_{t+1} &= h_t + v_{ht}, \end{aligned} \quad \begin{pmatrix} \varepsilon_t \\ v_{\beta t} \\ v_{at} \\ v_{ht} \end{pmatrix} \sim N \left( 0, \begin{pmatrix} I & 0 & 0 & 0 \\ 0 & \Sigma_\beta & 0 & 0 \\ 0 & 0 & \Sigma_a & 0 \\ 0 & 0 & 0 & \Sigma_h \end{pmatrix} \right), \quad (2)$$

For  $t = s+1, \dots, T$  with  $e_t = A_t^{-1} \Sigma_t \varepsilon_t$  where  $\Sigma_a$  and  $\Sigma_h$  are diagonal,

$$\beta_{s+1} \sim N(\mu_{\beta_0}, \Sigma_{\beta_0}), a_{s+1} \sim N(\mu_{a0}, \Sigma_{a0}), h_{s+1} \sim N(\mu_{ho}, \Sigma_{ho}).$$



In order for the identification of the shocks let  $var(e_t) = H_t$ . Then, we factor the variance-covariance matrix as:

$$var(e_t) = \Omega_t = A_t^{-1}H_t(A_t^{-1})' \quad (3)$$

These time varying matrices are defined as:

$$H_t = \begin{bmatrix} h_{1,t} & 0 & 0 \\ 0 & h_{2,t} & 0 \\ 0 & 0 & h_{3,t} \end{bmatrix} \quad \text{and} \quad A_t = \begin{bmatrix} 1 & 0 & 0 \\ \alpha_{21,t} & 1 & 0 \\ \alpha_{31,t} & \alpha_{32,t} & 1 \end{bmatrix} \quad (4)$$

Thus, we identify all three shocks by imposing three restrictions on the matrix  $A_t$  in equation (4). The equation (4) is compatible with the focus of the study. Our interest is to analyze how changes in stock prices affect interest rates and consumption. The restrictions assume that asset price changes will first induce its effects in money markets and interest rate changes will be the first to respond to the conditions in money markets. Second, consumption will respond to both interest rate changes and changes asset levels. This identification scheme is compatible with theory and aim of the study. However, how well the theory fits reality is an empirical question that we take up as the focus of this study.

The parameters of the TVP-VAR are roughly calculated through the Bayesian approach of Primceri (2005) and Nakajima (2011). The existence of a Bayesian inference enables estimation of the model. As it has been stated before, the MCMC methods are used for the evaluation of the joint posterior distributions of the unknown parameters of focus and hidden variables (Nakajima, 2011).

The parameters of the model is calculated by including Bayesian inference via MCMC. While applying the MCMC methods, the goal is to evaluate the unknown parameters of the model defined in equations (1)-(4). In order for the evaluation of joint posterior distributions, one needs to set certain priors for them, except for the state variables (changing time-to-time) which are estimated recursively given the initial states. Following Nakajima (2011) we use the following priors:  $\Sigma_{\beta} \sim IW(25, 0.01I)$ ,  $(\Sigma_a)_i^{-1} \sim G(4, 0.02)$ ,  $(\Sigma_h)_i^{-1} \sim G(4, 0.02)$ , where  $(\Sigma_a)_i$  and  $(\Sigma_h)_i$  are the  $i$ -th diagonal elements of  $(\Sigma_a)_i$  and  $(\Sigma_h)_i$ , respectively.  $IW$  and  $G$  represent the inverse Wishart and gamma distributions, respectively. For the initialization of the TVPs, we use flat priors by setting  $\mu_{\beta 0} = \mu_{a0} = \mu_{h0} = 0$  and  $\Sigma_{\beta 0} = \Sigma_{a0} = \Sigma = 10 \times I$ .

### 3.3 Data

While examining Turkey, sample data has been obtained from the CBRT. Data between the period 1987:Q1 and 2013:Q3 includes three variables. Two of the variables have real values such as consumption and stock prices. Consumption is seasonally adjusted in the model. The third variable, which is interest rate is used in nominal values. The aim is to evaluate macroeconomic dynamics in Turkey. In order to test non-stationary of a time series variable and the possession of a root specified as unit, some tests are used in the study.

Results of unit root tests illustrated in Table 3.1 show that all tests fail to reject nonstationarity of all three series in the levels about reject the nonstationarity when the first differences are considered. Thus, all variables refer to first order nonstationary or they have a unit root.

Two variables which take place in real values are non-stationary; therefore corresponding growth rates of these variables are obtained, and named as *DRSP* and *DRC* for the research findings. The third variable which has nominal values is also non-stationary according to the results of tests. In this respect, the movement in this variable refers to *DR*.

Since all variables are stationary, they may be cointegrated. We use multivariate VAR based on trace and maximal eigenvalue tests of Johansen (1988, 1991) and Johansen and Juselius (1990) in order test for cointegration. In order test for cointegration, we first us lag-length tests such as LR test statistics, the Akaike information criterion, and the Schwarz information criterion to determine the lag order of the VAR. We use Akaike information criterion to select the lag length since we have a relatively small sample and Akaike information criterion has better performance in small samples (Enders, 2015). The order of the VAR is determined as four by the Akaike information criterion, which is used in the cointegration test and the TVP-VAR model estimation.

Table 3.1: Unit Root Tests

	Real stock price	Real consumption	Nominal Interest rate	5% critical value
<b>ADF</b>				
Level	-3.38	-2.07	-2.27	-3.46
First Differences	-8.71*	-2.91*	-11.38*	-2.89
<b>PP</b>				
Level	-0.43	-3.09	-1.63	-3.46
First Differences	-8.95*	-10.45*	-20.45*	-2.89
<b>DF-GLS</b>				
Level	-2.19	-2.85	-1.04	-3.02
First Differences	-8.27*	-4.37*	-11.01*	-2.89
<b>KPSS</b>				
Level	0.82*	0.17*	0.88*	0.15
First Differences	0.04	0.05	0.36	0.46

<b>ERS</b>				
Level	5.81	6.36	5.72	5.64
First Differences	1.72*	0.81*	1.76*	3.11
<b>NP-MZt</b>				
Level	-2.19	-2.66	-2.70	-2.91
First Differences	-4.97*	-3.57*	-2.46*	-1.98
<b>NP-MPt</b>				
Level	5.75	6.44	5.77	5.48
First Differences	0.61*	0.97*	1.77*	3.17

Table 3.2 illustrates the outcomes of cointegration tests. We use a constant in the VAR specification of Johansen and Juselius (1990) to check cointegration. According to the results in Table 3.2, we reject the null hypothesis of “no cointegration” at the 5 percent level by both the trace and maximum eigenvalue tests.

Both the trace and maximal eigenvalue tests statistics indicate that there is no cointegration relationship at the 5% significance level.

Table 3.2: Cointegration Test Results

<b>Trace test</b>				
Hypothesized cointegration vectors	Eigenvalue	Trace Statistic	5% Critical Value	<i>p</i> -value
None	0.1325	24.9032	29.7971	0.1649
At most 1	0.0887	9.8399	15.4947	0.2932
At most 2	0.0000	0.0001	3.8415	0.9937
<b>Maximal eigenvalue test</b>				
Hypothesized cointegration vectors	Eigenvalue	Max. Eigen. Statistics	5% Critical Value	<i>p</i> -value
None	0.1325	15.0634	21.1316	0.2845
At most 1	0.0887	9.8398	14.2646	0.2227
At most 2	0.0000	0.0001	3.8415	0.9937

**Note:** The table reports the Johansen trace and maximal eigenvalue tests for zero to two cointegration vectors among the three series.

In sum, the real stock prices, real consumption and the nominal interest rate series are not cointegrated. Therefore, in order obtain a stable TVP-VAR model, the variables are first differenced and the TVP-VAR model is specified with the vector  $y_t = (DSP_t, DR_t, DRC_t)'$ .

### 3.4 Empirical Results

The posterior estimates are computed through the process of drawing  $M = 10,000$  samples. According to the results in Table 3.3, The CD statistics confirm that the null hypothesis is not rejected at the 5 percent level of significance. Therefore, we conclude that 10,000 posterior draws were sufficient for the accuracy of the estimates. When the efficiency factors are taken into consideration, Table 3.3 shows that in general they are not so high. Since the 95 percent confidence intervals include the estimated posterior mean for every parameter in TVP-VAR model, the MCMC algorithm efficiently provides posterior draws.

Table 3.3: Estimation Results of The Parameters

Parameter	Mean	Std. Dev.	95% U	95% L	CD	Inefficiency
$(\Sigma_\beta)_1$	0.1258	0.0638	0.0545	0.3002	0.959	158.98
$(\Sigma_\beta)_2$	0.0809	0.0431	0.0247	0.1924	0.177	129.10
$(\Sigma_a)_1$	0.0056	0.0015	0.0035	0.0092	0.950	46.28
$(\Sigma_a)_2$	0.0056	0.0015	0.0035	0.0095	0.000	20.24
$(\Sigma_h)_1$	0.0054	0.0014	0.0033	0.0087	0.981	30.77
$(\Sigma_a)_2$	0.0059	0.0017	0.0036	0.0101	0.012	37.06

Figure 3.1 presents the data of the three variables ( $DR$ ,  $DRSP$ ,  $DRC$ ), at the top of the figure. Turkey had the long chronic high and fluctuating inflation history from the beginning of the sample until mid 2000s. This situation makes the nominal interest rate highly volatile. Domestic and international macroeconomic instabilities result in

four major crises between 1990 and 2011. According to the results, fluctuations in consumption growth in Turkey begin to be highly volatile and peaks around in 2001. In addition, fluctuations of consumption are also highly volatile in 1994 and 2007 because of the financial crisis and global crisis, respectively. However, they are not highly volatile both for early period of the sample until 1994, and for the period between 2001 and 2008. The low stochastic volatility can be regarded as reflecting certainty in the consumption period, due to the economic and political environment in Turkey. The real stock returns represent high fluctuations at the beginning of the sample. The highest volatility is observed around 1994 because of the decrease economic crises in this period.

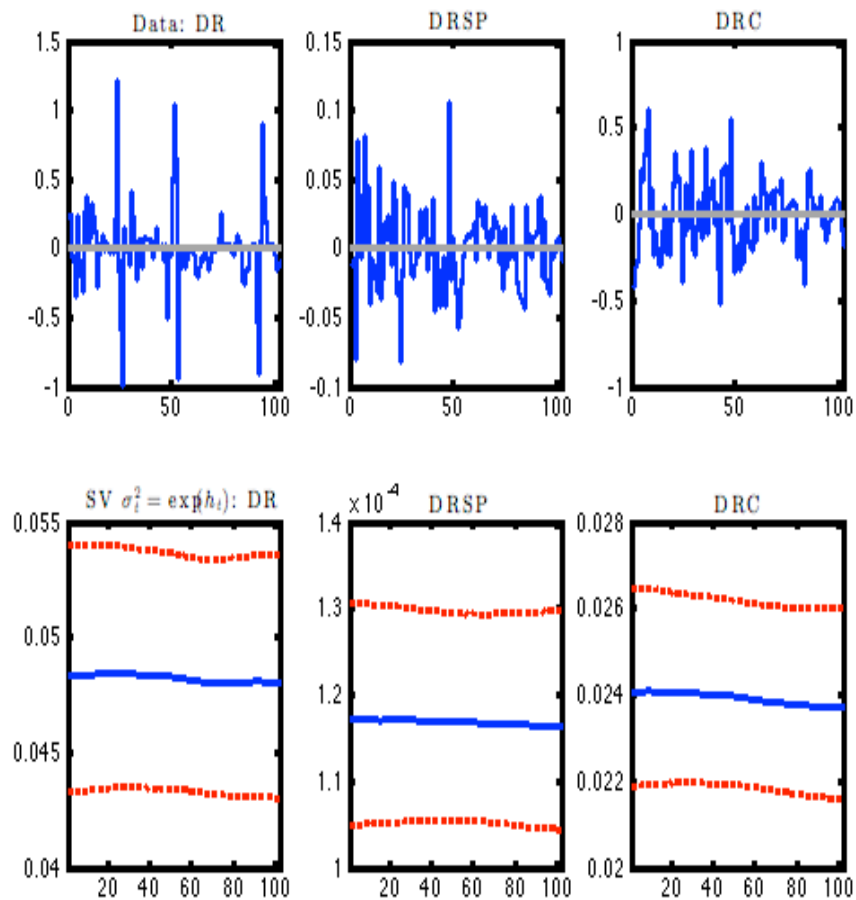


Figure 3.1: The Posterior Estimates in the TVP-VAR model

While simulating the impulse responses, this study follows two ways. In the first way, they are computed by settling the size of shock at the beginning. In the second way, the impulse responses are computed by analyzing the concurrent relations at each point. The aim is to maintain the comparability of the model (Nakajima, 2011).

Figure 3.2 illustrates reaction of three variables according to the model. These responses are affected by a shock determined for stock price for 1-step ahead. The average of the posterior draws is shown with the 16<sup>th</sup> and 84<sup>th</sup> percentiles.

The impact of shock is positive in most cases, but there are periods with negative responses as well. The effect is always significant in figure 3.2. However, this positive real stock price shock affects consumption positively for the whole period. The influence of a price shock on consumption is observed as significant at 1-step ahead. When the nominal interest rate is taken into consideration, this variable shows an interesting behavior.

When there stock price increases, the impact is insignificant for interest rate responses at the 1-step ahead horizon. Moreover, the effect of interest rate shock on consumption is negative and significant until mid 1990, but it becomes insignificant afterwards. In addition, if there is a shock identified for interest rate, the impact is positive.

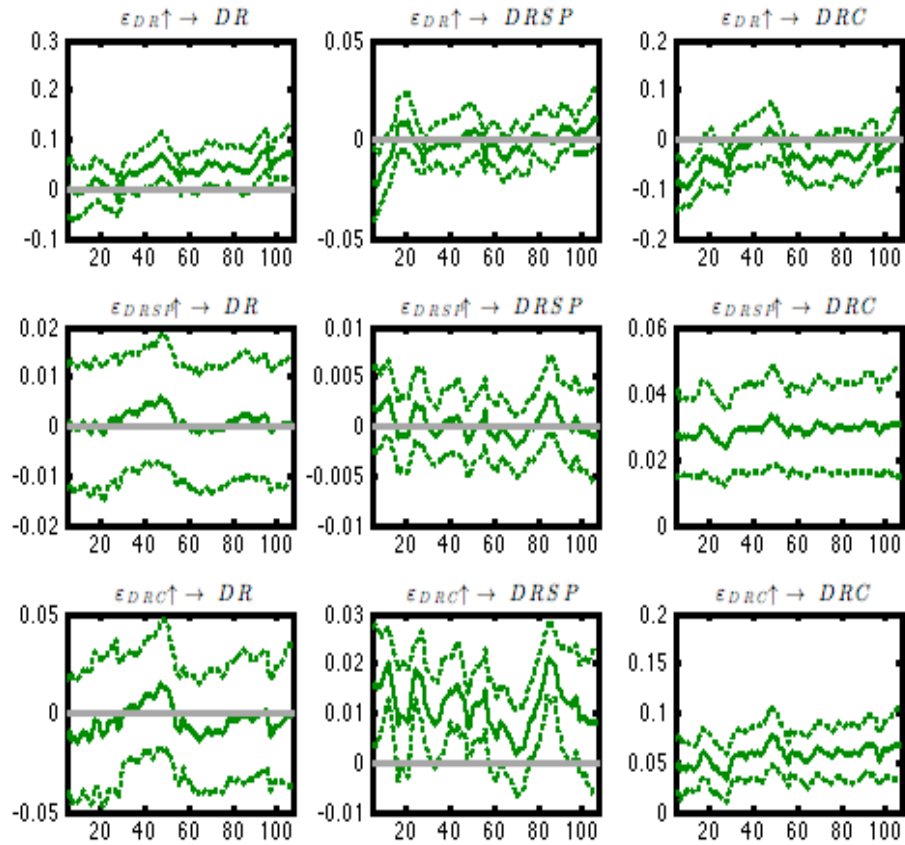


Figure 3.2: Impulse Responses of The Model for 1-step ahead

As is seen in Figure 3.3, when a real stock price follows a shock, in general this shock does not influence the stock price itself, as the responses are insignificant. However, a shock determined for stock price positively affects the interest rate. Where consumption is concerned, for the four-quarters ahead, the impulse responses are negative at the beginning. Then, they are positive, especially for the period around 1993, 2000 and 2008. However, the response of the consumption to stock market shock is generally insignificant.



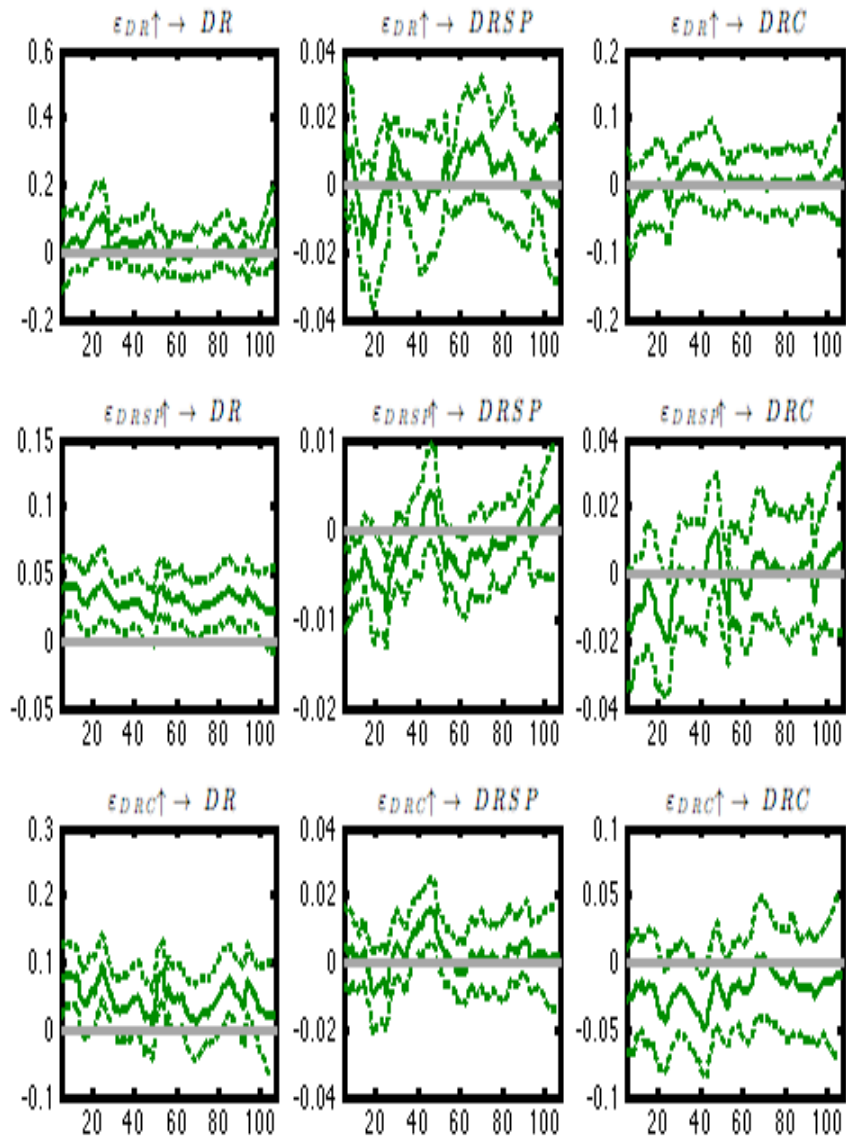


Figure 3.3: Impulse Responses of The Model for 4-steps ahead

The impulse responses at 8-steps ahead are presented in Figure 3.4. If a real stock price is experienced with a positive shock, the impulse responses illustrate the positive effect. However, the impact is insignificant. In addition, if there is a positive shock determined for stock prices, there are interesting effects both on consumption and interest rate. As is seen in this figure, although in general the impulse responses are mostly positive, they are insignificant for the sample data.

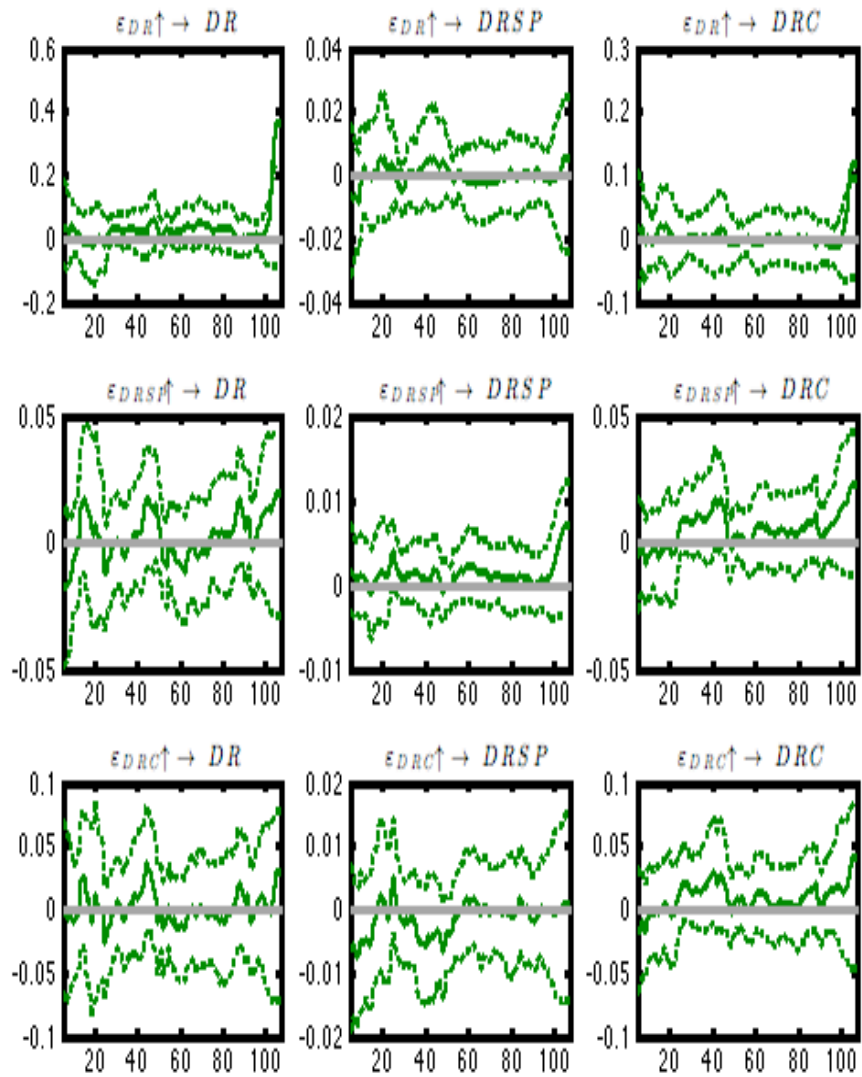


Figure 3.4: Impulse Responses of The Model for 8-Steps ahead

The impulse responses depict a pattern dissimilar to the 12-quarters ahead horizon, because the effects are not greater at longer horizons, as it is seen in Figure 3.5. When the time-varying response trajectories for the three variables are considered, the positive shock of real stock price results in significant influences on consumption and interest rate.

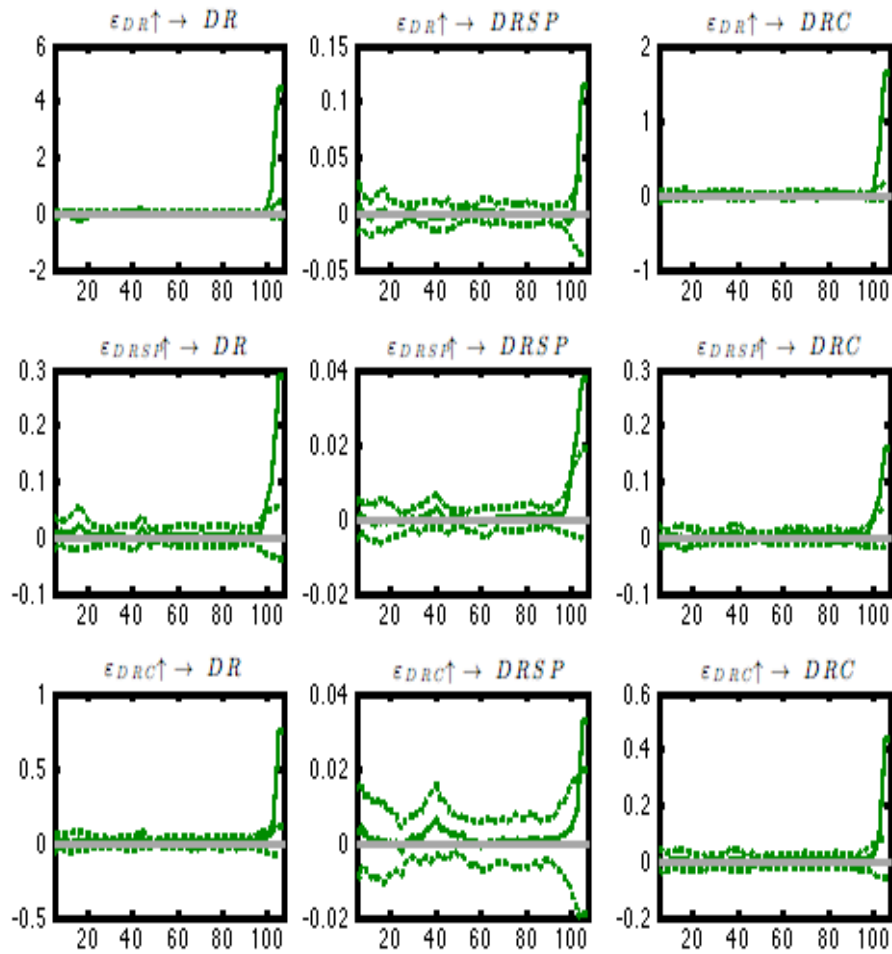


Figure 3.5: Impulse Responses of the Model for 12-steps ahead

There is an illustration of impulse responses at 1994:Q1 in Figure 3.6. Rodrik (2012) contends that a faulty decision on having interest rate low caused a sudden capital outflow in Turkey in 1994. Before the crisis hit the economy, a general picture showed that there was a poor fiscal stance, deficit in current account, overvaluation of currency, illiquidity of the government, and the weak operations in banks (Özatay, 2000). For Özatay (2000), the crisis was unexpected because of the stable foreign exchange reserve levels and interest differentials in the period before the crisis.

In light of these statements, the impulse responses for 1994 in Figure 3.6 confirm that when the real stock price is experienced with a positive shock, the impact on

itself is positive and then becomes insignificant in two quarters. This positive shock also increases consumption, followed by a shrink in consumption, but this decrease is insignificant. However, the interest rate, which follows a real stock price shock, depicts a positive significant effect from second to the fifth quarter. We point out that, the actual stock market shock was a large negative shock, thus these effects on consumption will be negative for a negative shock.

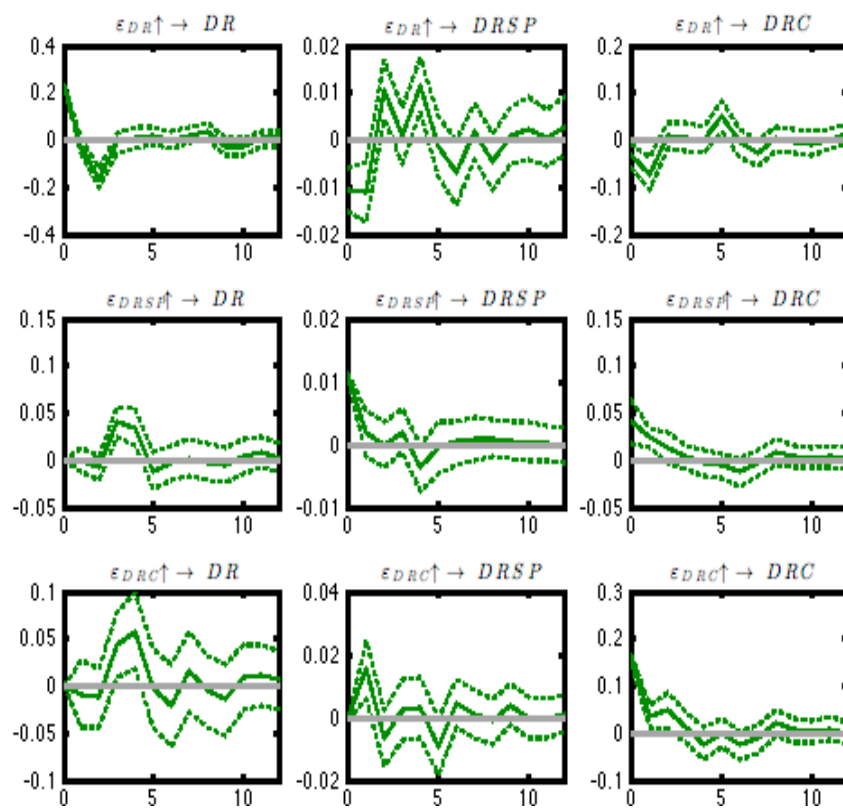


Figure 3.6: Impulse Responses of The Model at 1994:Q1

As it is seen in Figure 3.7, illustrations of at 2000:Q4 show another destructive financial crisis, which is more severe than the 1994 crisis. The Turkish economy was in a severe political and financial crisis on February 19, 2001. Özatay and Sak (2003) contends that the borrowing, the debt burden, an excess of expenditure, general rise in price levels, and the proportion of the responsibilities of the financial sector are

very greater than normal during the final quarter of 2000. Thus, in Figure 3.7, when the stock price is experienced with a positive shock, the impulse responses illustrate the positive effect on it. The effect is also significant for the entire year. This positive shock also leads consumption to respond positively, so the influence over consumption is important at 2000:Q1. If interest rate is concerned, the illustrations are insignificant at the beginning. Later, they are positive and sufficiently great between the second quarter and fifth quarter due to the shock.

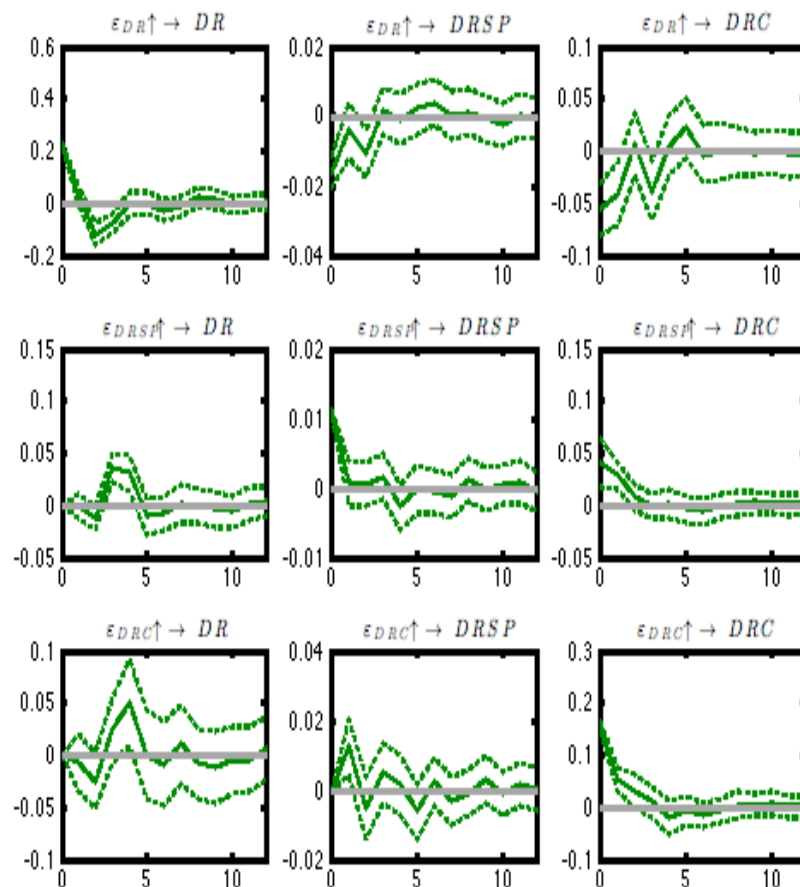


Figure 3.7: Impulse Responses of The Model at 2000:Q4

The depictions belonging to 2007:Q1 in Figure 3.8 caused by a great disturbance in the United States' financial markets in that year. According to Krugman (2009), the financial troubles which led to a time of intense difficulty in the market place of

financial assets in the United States of America one year ago before 2008, consequently created a full-fledged global crisis in 2008. This crisis developed gradually, and evolved into a global crisis that significantly hit the Turkish economy. In this view, the impulse responses at 2007:Q1 are presented in Figure 3.8 when the three variables are experienced with the positive shocks. As is seen, if the stock price is experienced with a positive shock, consumption is affected in a positive way. This positive shock also results in a rise in the reaction of stock price. However, there are insignificant impulse responses for the interest rate at the beginning. Later, there is a sufficiently great and positive response when three quarters between the second quarter and the fifth quarter because of the shock.

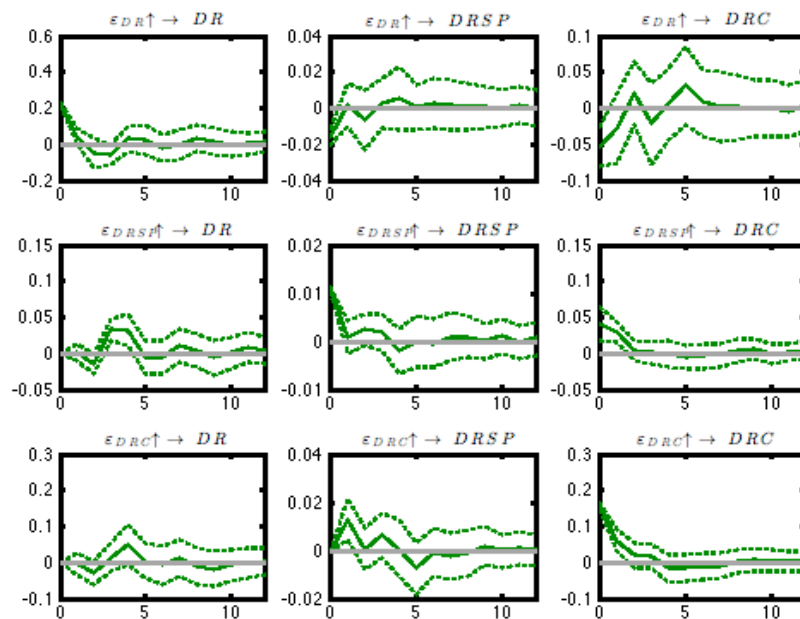


Figure 3.8: Impulse Responses of The Model at 2007:Q1

Due to the adverse effect of debt-ceiling crisis existing in the U.S. in 2011, Figure 3.9 depicts impulse responses for three variables at 2011:Q1. If the stock price is experienced with a positive shock, the impulse responses illustrate the positive effect

on consumption. Thus, there is a significant influence. If there is a positive shock determined for stock price, the responses are positive in the initial stage. Then, impulse responses are insignificant for both consumption and stock prices. The effect is not always significant in 2011. However, if the stock price is experienced with a positive shock, this shock affects interest rate positively between the second quarter and the fifth quarter after a distance causing instability is realized.

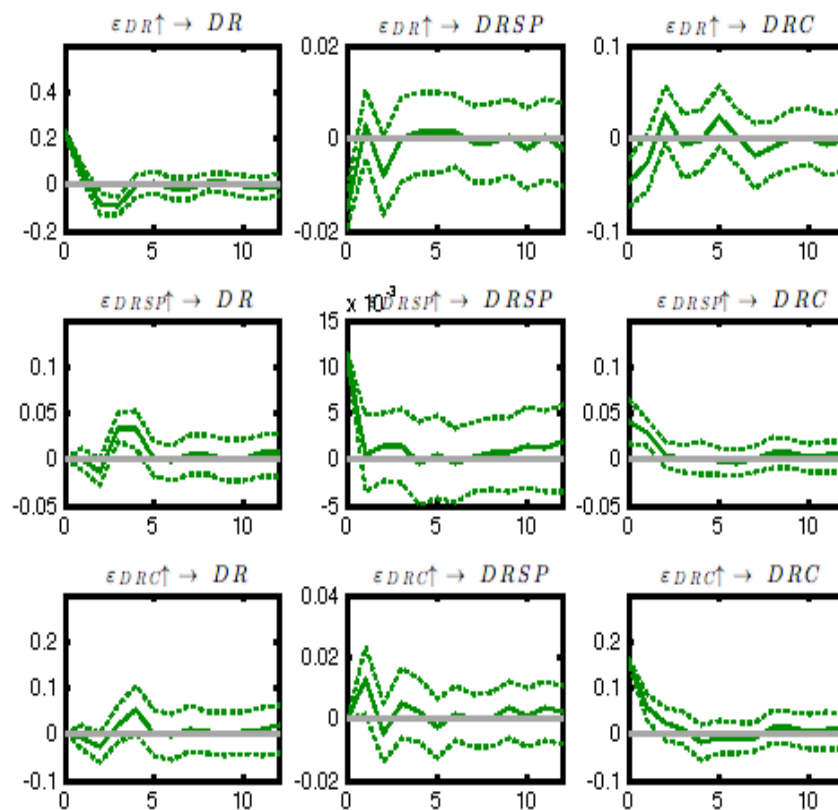


Figure 3.9: Impulse Responses of The Model at 2011:Q1

In conclusion, the model examining three variables relies on the volatility of asset prices that is not constant in the study. The aim is to demonstrate how stock prices affect consumption and interest rate for Turkey over the quarterly period of 1987:Q1-2013:Q3. The study provides unexpected repercussion for two variables such as

interest rate and consumption due to the financial disturbance and implementation of policy based on money and currency in Turkey. The results of the research findings confirm that if the stock price is experienced with a positive shock, it affects the purchase of goods and services by the public positively. The effect is mostly significant. In addition, the model, which analyzes the years 1994, 2000, 2007 and 2011 offer significant results regarding the influential effect of stock prices on interest rate and consumption. Thus, this study suggests the usage of the model which is based on time-varying approach to capture variability for the parameters like interest rate and consumption.



## **Chapter 4**

# **INVESTIGATING THE LINK BETWEEN ASSET PRICES AND FISCAL POLICY SHOCKS IN TURKEY**

The chapter presents characteristics of asset markets and the amount of money required in payment for something in these markets. These issues are important elements for organizations founded in financial markets, households, policymakers, etc. This section analyzed sample data gathered from the CBRT by using Bayesian vector autoregressive models. The purpose is to analyze the effect of policy based on government spending and taxes on the dynamics of asset markets. Thus, the study determines four shocks to demonstrate how they affect house and stock price indexes. As its specific aim was to understand how fiscal spending shocks affect stock and housing prices, the data covered the period between 1988:Q1 and 2014:Q2.

### **4.1 Introduction**

Macroeconomic stability is influenced by two different cycles in asset prices which are the boom cycle and the bust cycle. The boom cycle is associated with wealth, profitability, an increase in economic activity or value, etc. in a specific time period. Thus, the boom cycle affects not only output, but also price stability in the economy. On the other hand, the bust cycle refers to the hardships, problems, a long and severe recession in the economy, and therefore also has a dramatic effect in these areas. The financial crisis which recently has taken place is a result of these two cycles in the global world: the unexpected decline in economic, business and financial markets has increased awareness of the business cycle among macroeconomists, whose

objective is to examine an effect that follows after the primary action of the significant current financial and economic disturbances.

The business cycle movements are generally affected by the housing and stock markets (Stock and Watson 2003; Leamer 2007) even though there are false signals from the stock market – for example, interest rates were increased to succeed in dealing with the general increase in prices throughout the World War II period, and the higher interest rates led to a temporary problem for the housing and stock markets in those years. This is an example of how a continuous decline in strength of economic activity can occur automatically.

There are researchers who study the effect of policy implications on markets where people buy and sell real and financial assets. These studies claim that policy implications by the central bank for the economy are prominent factors for the elements of series of cycles of economic expansion and contraction. (Bjornlord and Leitema, 2009). However, fiscal policy is also influential for the nominal interest rate is at or near zero managed through monetary policy, as was the case in the Great Recession (Feldstein, 2009).

In addition, the persistent incentives belonging to fiscal policy create conditions that are unsustainable for bonds representing loans determined by the investors in financial markets (Poterba and Rueben, 1999). In dealing with the recent financial crisis, researchers have resolved the impact of this situation on the connection between monetary and fiscal stability by focusing on business cycle fluctuations (Stock and Watson, 1999).

As it has been stated before, properties of assets markets are very important because homeowners, producers, consumers, government officials and enterprises use these values when they are making decisions. The nexus between the marketplace including financial assets and the set of procedures in banks exerts strong influences throughout a state of financial disturbance and uncertainty (Afonso and Sousa, 2011); both the credit and housing market also demonstrate crucial effects on such situations. It is for this reason that research is being done on the connection between the variables belonging to macroeconomics, material prosperity and stock returns (Lettau and Ludwingson, 2001).

The process of transmitting innovations of policy adopted by the government for the asset prices in asset markets is restricted (Aye, Balcilar, et al., 2013). In this connection, there are some studies which examine the European and the US markets and show that the distinct channels which come from fiscal policy are influential over two markets where stocks and houses are sold and purchased (Musso, Neri and Stracca, 2011).

Fiscal policy is influential in terms of risk spreads in stock markets; and it has both a direct effect on homeowners due to the taxes and subsidies determined by the government. Since homeowners perform their activities in the housing markets, they are under the influence of this policy. In addition, an indirect impact on these markets through changes in macroeconomic variables automatically affects them. Research in this area therefore needs to focus on the role of policy determined for government spending and taxes while revealing relevant facts about the advancement of two markets such as stock and housing, respectively.

Although the studies examine the macroeconomic influences over many economic elements, tools of policies, and interaction between distinctive variables, the studies do not consider actions of fiscal policy and improvements in asset prices for small-open economies. There is a study that analyzes fiscal policy through vector autoregressions for the sample data between 1955 and 2000. The results confirm that tools of fiscal policy result in beneficial consequences for improving the GDP of the US economy (Mountford and Uhlig, 2009).

The results obtained by Afonso and Sousa (2011, 2012), who examined the four developed countries, confirmed that there is a small effect on gross domestic product (GDP), if the government spending is experienced with a shock. However, there are great changes in housing markets and a shrink in stock prices. Some studies show that the experience of government revenue with shocks reveals a distinctive influence on prices in the housing markets, and a positive and small effect on prices in stock markets.

And in research by Aye, Balcilar, et al. (2013) which focused on South Africa is successful in revealing relevant facts about housing developments and the stock market. Their study suggests that spending shocks emerging from fiscal policy affect stock prices. In South Africa, stock prices were also seen to be under the effect of spending and revenue shocks, while revenue shocks were affecting house prices (Aye, Balcilar, et al. 2013).

This study analyzes Turkey, where the economy has undergone an extraordinary period of growth since 2003. Coskun (2011) contends that Turkey has experienced

this economic growth for several reasons, including the country's candidacy for full EU membership, its development for the sustained growth, and the increase investments in different markets. Coskun (2011) also asserts that Turkish households generally invest in real estate even though other investment alternatives exist in the country for them.

Turkey has the highest house price growth, 14% of all twenty G20 member countries between 2013 and 2014, according to an index generated by the international property consultant Knight Frank.<sup>1</sup> For Coskun (2011), this behavior comes from the changes in demographics, urbanization, industrialization, and immigration from rural to urban areas. Throughout the recent global financial crisis, Turkey has also encountered negative effects: according to Coskun (2011), the housing markets<sup>1</sup> in Turkey can provide the developments needed for the country's growth and development process; however, because of the volatility of the financial markets since 2013, there has been a dramatic adverse effect of reverse capital flow on the Turkish economy. Today, Turkey's growth potential is affected by current account deficits and uncertainty in politics.

When the disturbance causing instability in an economy is examined, the studies claim that there are three reasons of the disturbance. These three reasons are associated with implications of policies and phases of business cycle. Sim's (1980) method is very useful not only for examining standpoint of policies, but also for identification of shocks.

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<sup>1</sup> See <http://content.knightfrank.com/research/84/documents/en/q2-2014-2331.pdf>.

The present study used Mountford and Uhlig's (2009) specific method to analyze macroeconomic variables such as the amount of money given in payment for houses and stocks for the quarterly data between 1988:Q1 and 2014:Q4 in Turkey when fiscal policy is experienced with shocks. The variables in the VAR are real stock and house prices, real consumption of households, real nonresidential investment, real gross domestic product (GDP), government expenditure, government revenue, the real wage, the interest rate and an index of the variation in prices for retail goods and other items while determining shocks belonging to the policy adopted by the government. The identification of sign restrictions enables an understanding of policy scenarios for Turkey defined as small-open economy.

Where Turkey is concerned, a few limited studies have been done based on the concern discussed especially for the variables that are specified in the VAR above; the present study is the first to provide analyses of simultaneous influences of various shocks over prices of stocks in Turkey. Some existing research addresses how fiscal policy and policies relating to macroeconomic issues affect wealth, stock prices and housing returns in Turkey (Caporale and Sousa 2015; Yeldan 1997; Voyvoda and Erinc 2005; Berument and Tasci 2004; Duran, Ozcan, et al. 2011; Ertugrul and Selcuk 200). Other researchers examine forces influencing housing markets in Turkey by taking into consideration wealth effects, macroeconomic activity and determinants of house prices (Sari, Ewing, and Aydin 2007; Ozsan, Konut, et al 2005; Selim 2009; Baslevent and Dayoglu 2005; Ozsan and Karakas 2005). The results of these studies generally suggest that fiscal and monetary policies positively affect two variables like stock and house prices, if they are adapted in a truthful way for the Turkish economy.

This study takes a wider approach to the shocks arising from implications of policies and a series of cycles of economic expansion and contraction in Turkey while examining price levels and the macroeconomic variables. Thus, the particular econometric procedure is determined in the next section. Then, the chapter determines the characteristics belonging to sample data used. Lastly, the chapter discusses outcome and provides a brief conclusion.

## **4.2 Methodology**

Analyzing fiscal shocks has been an important concern for researchers. Thus, Mountford and Uhlig's (2009) approach enables them to take several issues into account. Their approach has first of all made it possible for this study to unite the influences of shocks for a common purpose. In other words, the aim is to understand reactions to the shocks because of the changes in variables of fiscal policy. To analyze this effect, first the shocks associated with the series of cycles of economic expansion and contraction, and policy based on money and currency were specified. Later, shocks belonging to fiscal policy that exist orthogonally were calculated. Following Mountford and Uhlig's (2009) approach to fiscal policy shocks, these were defined as revenue shocks and spending shocks of the government, respectively.

The sign restrictions used by Mountford and Uhlig (2009) are presented in Table 4.1. The standard procedure used in VAR models is followed here to identify shocks through the use of sign restrictions. A shock is determined for the series of cycles of economic expansion and contraction in the method of the study. This shock acts together with output, government revenue, investment and consumption similarly for the existing quarters when the shock takes place.

Due to the orthogonality assumption, government revenue avoids the process of being linked for unexpected tax cuts. If there is an increase in taxes, this influence results in the correlated and similar movements of government revenue and output in the model. Thus, the orthogonality assumption prevents the strength of fiscal policy from influencing the economy when the effects of a fiscal shock are analyzed.

Table 4.1: Sign Restrictions

	Govt. Revenue	Govt. Spending	GDP Consumption Nonresidential Investment	Interest Rate	CPI Real Wage	Asset Price
Shocks:						
Business Cycle	+		+			
Monetary Policy				+	-	
Govt. Revenue	+					
Govt. Spending		+				

Table 4.1 illustrates the limiting conditions for the shocks. Using “Govt” as an abbreviation in Table 4.1 indicates the government in Turkey. The “+” sign is used to show the positive limitation: this response is positive for 4 quarters after the shock and it employs quarter of impact. In contrast, a “-“ sign is used to indicate a negative restriction. If there is a blank in Table 4.1, it means that there is no limitation.

Following Uhlig’s (2005) sign restrictions for monetary policy shocks, this study presents a limiting condition for the interest rate. This limitation is positive. On the other hand, it specifies a limiting condition for the interest rate and price level by specifying a negative restriction. The orthogonality assumption makes it possible to prevent the fiscal changes of endogenous responses, which affect shocks except



shocks determined for fiscal policy. Additionally, shocks belonging to the policy adopted by the government are specified according to the restrictions on the variables of this policy such as spending and revenue; these fiscal shocks identify a positive restriction, which puts a limit on 4 quarters after the fiscal policy shocks.

### **4.3 Data**

Sample data for Turkey was gathered from the CBRT to analyze a period between 1988:Q1 and 2014:Q2 in Turkey. The data was examined through Bayesian vector autoregressive models for the analyses of asset prices and shocks in a small open economy. The components of the data were: Turkish national income including gross domestic product (GDP), the purchase of goods and services, investment for commercial premises, and expenditure and revenue of government. The data also included wage income, interest rate, stock prices and an index of the variation in prices for retail goods and other items. Additionally, the house price index was used in the study. All components of the variables in the sample data were indicated in real per capita terms, which are obtained when the CPI divides the nominal values of the variables.

Ten variables were used, transformed into real per capita terms for the analyses in the VAR system. According to the Schwartz Bayesian Information Criterion, the VAR model is acquired on four lags. The model disregards a time trend. The model includes logarithm for nine variables except the interest rate. In addition, the series were seasonally adjusted where they were moving slightly in order to achieve the desired fit.

A series of procedures was conducted for the analyses of the ten variables between 1988:Q1 and 2014:Q2. As it is stated before, the shocks are expressed according to the sign restriction. These shocks were determined for each draw from the posterior by plotting the 16th, 50th and 80th quantiles in the chapter.

#### **4.4 Empirical Results**

In this section, four figures are presented to discuss the impulse responses of sample data covering the period between 1988:Q1 and 2014:Q4. Throughout the discussion, the aim is to demonstrate how the responsiveness of the ten variables to the four shocks varies. As it is stated before, these four shocks are shown in Table 4.1 according to their characteristics. The impulse responses for four shocks are depicted for ten variables in four different figures, each illustrating the graphs showing the quantiles (16th, 50th and 84th). The calculation is made at each horizon by identifying the quarters between zero and twenty-four after the shocks exist.

##### ***Business Cycle Shocks***

When the reactions of ten variables are analyzed in the model, taking into consideration the influences of a business cycle (see Figure 4.1), the figure shows that stock prices respond positively for the entire sample. The stock prices firstly move to a higher level. Later, they decrease because of traders' strong belief.

If there is an increase in future dividends and a decrease in discount rates, these events automatically increase stock prices. After the fourth year, the initial business cycle shock leads to a decrease in future dividends, because of the existing risk on an increase in equity investment. Hence the real stock prices for Turkey shrink.

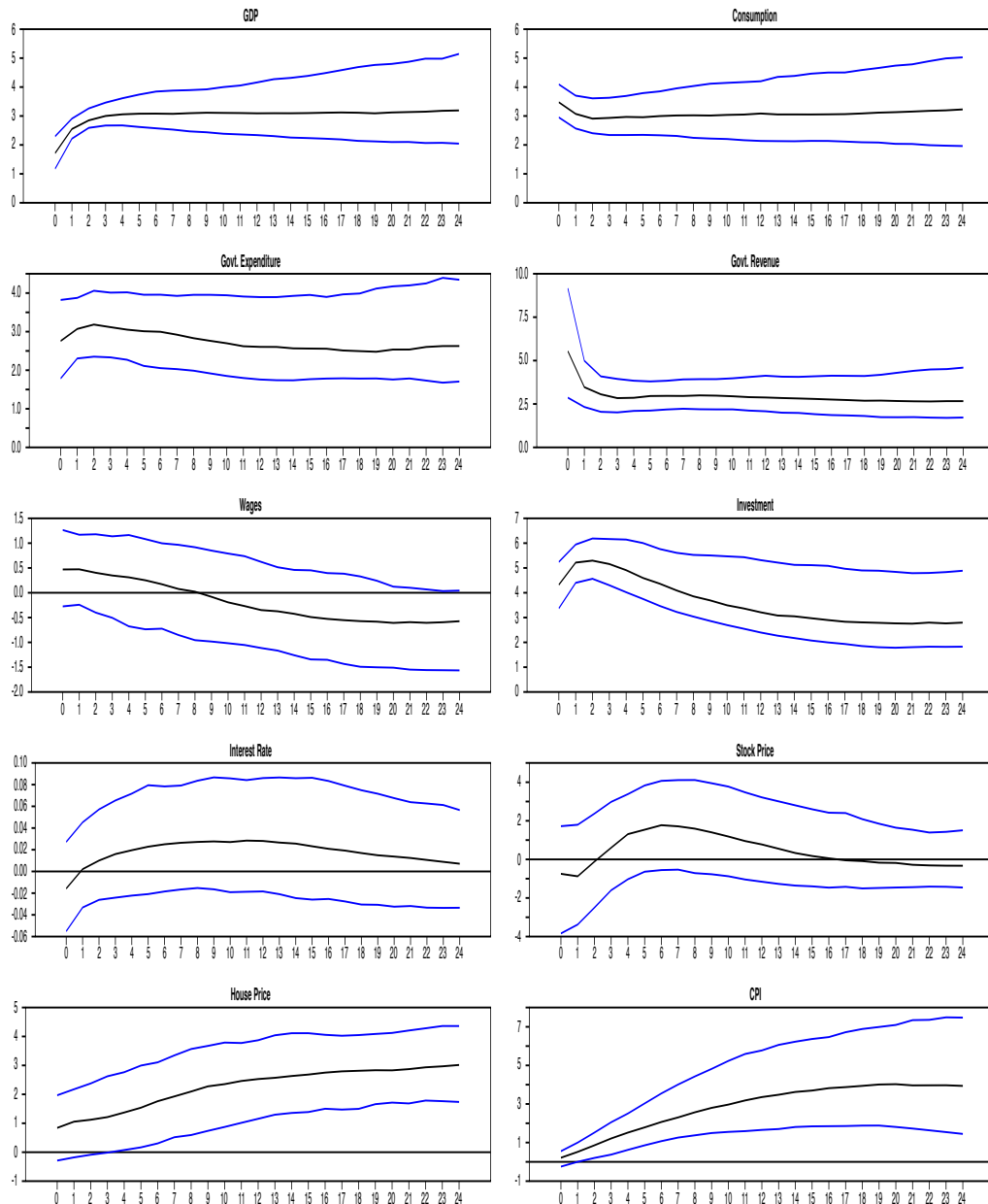


Figure 4.1: Business Cycle Shock

The real house prices significantly respond positively when the shock takes place. Thus, the impact of a business cycle shock on the real house prices cannot be eliminated. In this respect, the interaction between house prices and policy implications of policy adopted by the government is very strong and fiscal policy exerts significant impact on real house prices. The CPI also responds positively to the shock arising from business cycle, because of an increase in demand.

Where a positive business cycle shock occurs, it causes an improvement on tax; this effect leads to an increase in revenue and GDP (Schoeman and Swanepoel, 2003). In this respect, the action of spending funds by the government generally reacts quickly in a positive way. The response to the shock is significant after the first year, and the impulse shows this influence for the other years as well. When the response of government expenditure is analyzed, it is seen that the response is significantly positive, due to the procyclical movements. In addition, the GDP, consumption and nonresidential investment respond positively when there is a shock arising from business cycle (Figure 4.1). They all continue to exist as significantly positive. The interest rate and wages respond positively and when sample specifications are examined, but the response of the wages becomes negative after the second quarter.

### ***Monetary Policy Shocks***

This part of the chapter provides the influences on the ten variables due to the shocks identified for the policy relating to money and currency. The reactions to the shock are illustrated in Figure 4.2. The real stock prices react negatively. This shock leads to a decline in activities, in which future cash flows are under the adverse effect of a rise in the discount factor. The real house prices exhibit a positive but not significant initial reaction in order to make conditions of credit market better. The house price response turns to negative after the fourth year. In this respect, the link between the policy relating to money and currency and house prices is a very important factor while determining the circumstances of the credit market.

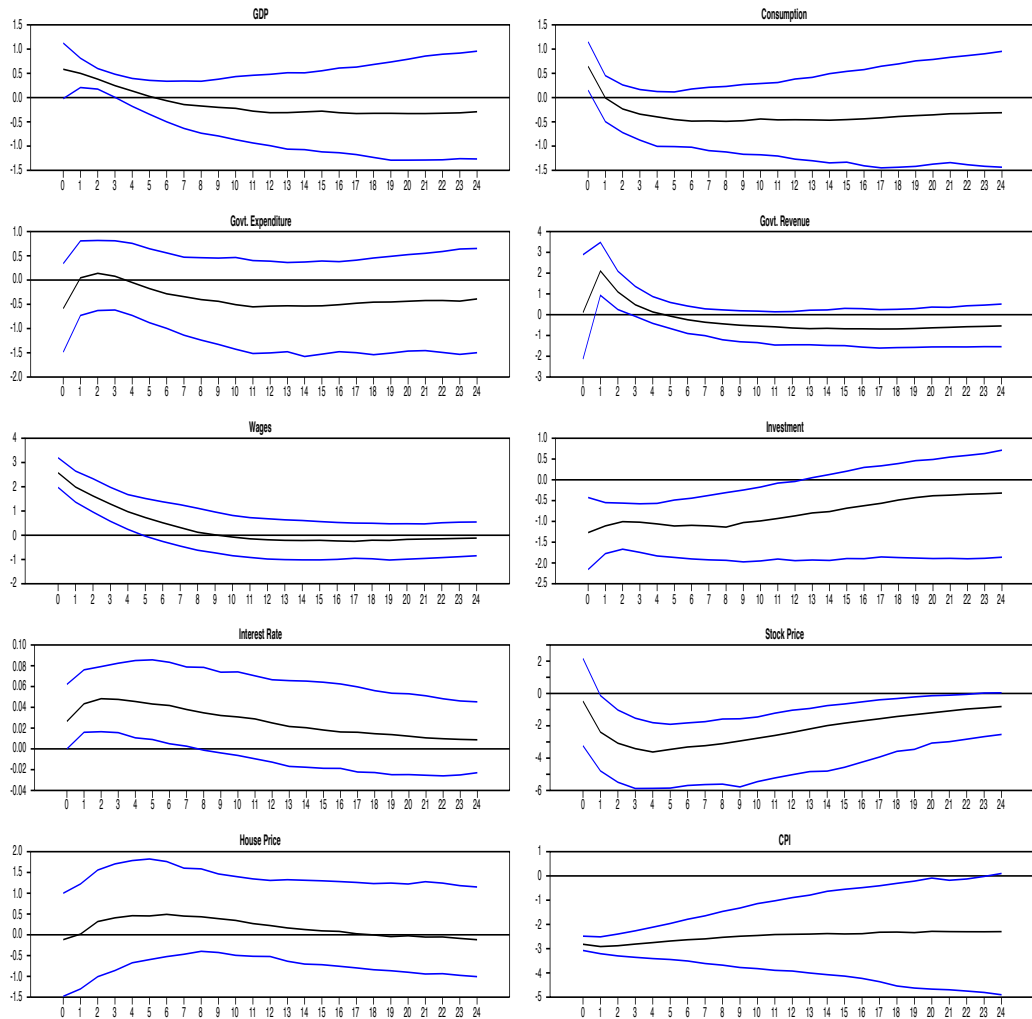


Figure 4.2: Monetary Policy Shock

The variables, which are nonresidential investment and CPI, respond significantly and negatively through the first year. On the other hand, the reactions of GDP, consumption, wages and interest rate, are significant and positive. However, they all die off after the second year and become insignificant. The influence of this shock on government expenditure shows that its response is significant and positive through the first year. The impact on the government expenditures is however insignificant and only positive during the first year.

### Government Revenue Shock

As noted before, this study adopted the orthogonality assumption. Throughout the analyses of the shock arising from government revenue, the orthogonality assumption was used to construct government revenue shock as a resting position. Thus, ten variables in the method are depicted by presenting their impulse responses in Figure 4.3.

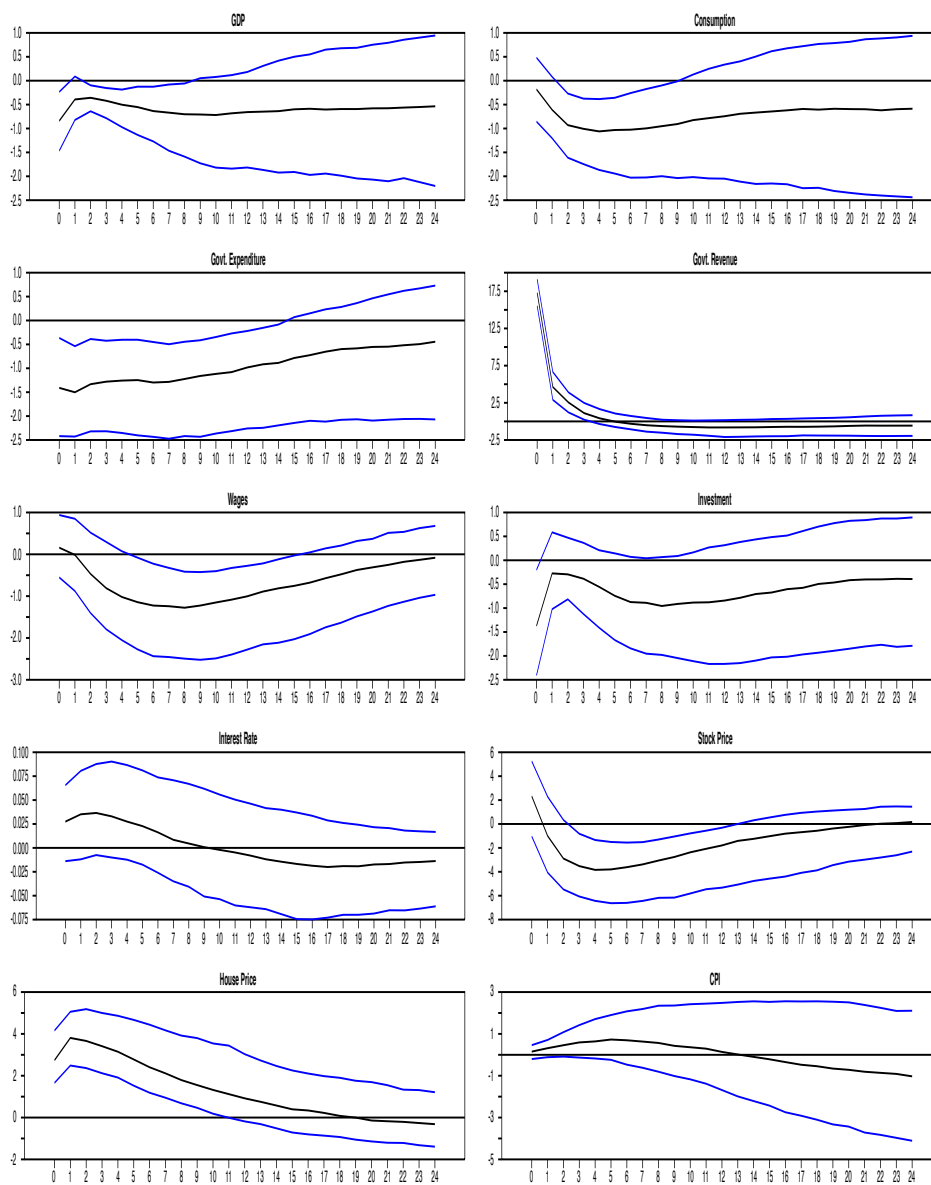


Figure 4.3: Government Revenue Shock

Where government revenue is experienced with a positive shock, there is a contractionary impact of this shock on the economy. The reactions of variables such as GDP, nonresidential investment for commercial premises, wages and consumption to the government revenue shock are significant and negative. The government revenue shock leads to the largest adverse influence on GDP, and then the adverse influence of the shock is observed in consumption. The initial responses of real house price is significant and positive; however, after the shock exists, the index start to fall significantly for the sample and become insignificant after three years. The impact on the stock price is positive and insignificant, but stock prices respond negatively.

Since the government revenue shock reduces the deficit of fiscal policy, this effect automatically results in a fall in treasury bill price and an increase in interest rate. Thus, interest rate and CPI respond positively to the government revenue shock. Due to the adverse effect of the shock, there is a decrease in GDP. This contraction therefore diminishes stock prices, while the nonresidential investment is affected unfavorably by the government revenue shock. In other words, there is a fall in the processes of the stock market and funds drawn from stock market due to weak stock prices are allocated the real estate sector, driving up the house prices.

### ***Government Spending Shock***

This shock is associated with the fiscal spending shock. In this study, it was constructed to exhibit a persistent increase after the shock exists. Thus, In order to discuss the influence of government spending, reactions of ten variables to the shock are depicted in Figure 4.4.

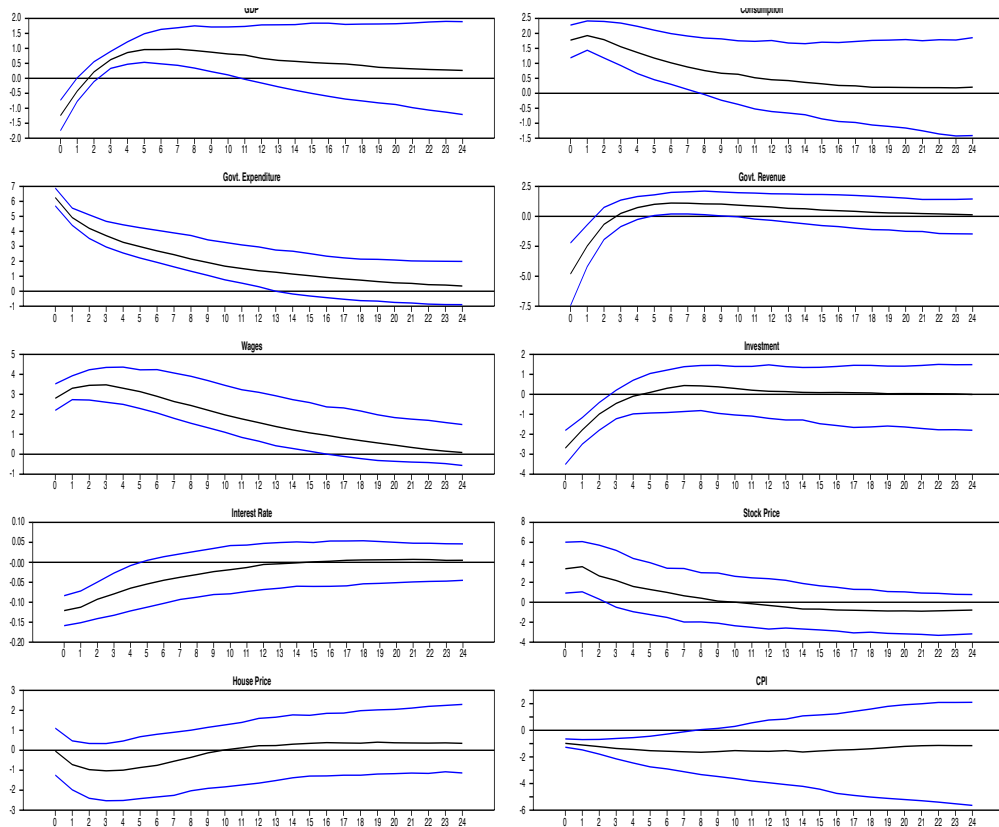


Figure 4.4: Government Spending Shock

If the government spending is experienced with a positive shock, then there are expansionary influences on the economy. Due to government spending, consumption and wages respond positively: although the initial response of GDP is not in a positive way, the GDP starts to respond positively and significantly after the second quarter. The positive impact on the GDP is long lasting and statistically significant up to three years.

When the impulse response of nonresidential investment is analyzed, it is seen that the initial response of this variable is also negative. The increase in nonresidential investment is initially negative and significant for about one year and not significant afterwards because of the crowding-out effect. The real house prices responds negatively but the effect is insignificant. In addition, stock prices respond



significantly and positively if government spending is experienced with a positive shock in Turkey for the period between 1988:Q1 and 2014:Q2.

In this study, the effects of shocks on stock and house prices have been examined through the Bayesian vector autoregressive models. While analyzing impacts of implications belonging to fiscal policy, the business cycle shocks and monetary policy shocks were controlled for Turkey's quarterly data between 1988 and 2014. Ten variables were considered: GDP, consumption, government expenditure, government revenue, wages, nonresidential investment, stock prices, house prices and interest rate. Nine variables (excepting interest rate) were calculated in real per capita terms in the VAR system that was applied. Throughout the analyses, the specific procedure based on the sign restrictions was used to determine four shocks used in the study. There was no restriction while identifying the signs of the specific variables.

According to the research findings, if the business cycle is experienced with a positive shock, both stock and house prices respond significantly and positively. Where there is a positive monetary shock, it adversely affects the real stock prices. Although the real house prices initially respond positively, this response is not always significant for the entire sample if monetary policy is experienced with a positive shock. Since this policy results in a contraction in Turkey, its influence cannot be disregarded. Additionally, when government revenue is experienced with a positive shock leads to a decline in real stock prices and a rise in house prices. If government spending is experienced with a positive shock, the real stock prices respond positively, whereas the real house prices are not influenced significantly.

The results confirm that the spending shocks coming from fiscal policy affect stock prices. The fiscal shocks, which are classified as shocks from government spending and government revenue, are very influential on real stock prices. When the fiscal policy is experienced with a positive shock, the results show that the government revenue shock has more influence on real house prices than the government spending shock does. In this respect, it is very hard to provide a balance for policy-makers by using particular dynamics of fiscal policy. The reactions of stock prices to shocks determined for fiscal policy vary when the other variables' reactions are analyzed, so it is not easy to acquire asset markets which are properly stabilized.

In order to resolve this problem, first, the objectives of the asset market should be identified clearly. Second, the economic compromises regarding the government revenue and government spending shocks should be understood correctly and satisfactorily. This study has produced remarkable results for the monetary policy shocks: monetary policy reveals more direct influences when the dynamics of asset prices are analyzed; a positive monetary policy shock causes a violent economic atmosphere due to the severe decline in real stock prices, nonresidential investment and CPI.

In brief, this examination of the shocks in Turkey opens up new directions for researchers in this field, as it indicates the value of taking into consideration the influences of various shocks not only on asset prices, but on concurrent macroeconomic variables as well.

## **Chapter 5**

# **INFLUENCE OF FOMC MINUTES ON ASSET PRICES IN BRICS COUNTRIES AND TURKEY**

This section attempts to examine the impact of releases of FOMC minutes on the asset prices of BRICS countries and Turkey. The study considers the novel data from minutes, which is set by the Federal Open Market Committee. This data is taken into account for the FOMC announcements. The sample data for the study also includes asset prices of these countries. In order to measure the volatility, the methodology of GARCH modelling is used in this study. The empirical findings provide important impacts of those FOMC announcements on the mean and volatility of asset prices. The GARCH volatility modelling offers remarkable results in decision-making for financial institutions, investors and policymakers.

### **5.1 Introduction**

The study examines the influences of the releases of FOMC minutes on the high frequency asset prices in BRICS countries and Turkey. These releases are disseminated by the Federal Reserve. Apergis (2014) emphasizes that these minutes are prominent for the understanding of changes in the central bank's implications. The emphases of the central bank are not only based on reactions of asset prices for a short period, but also based on the economic prospect for the bright future by focusing on vital elements in a country. Since these concerns discussed above are influential on the investors' decisions for the economy in these countries, the study offers remarkable results for the market participants and policymakers while making

adjustments based on dynamics of monetary policy, output, growth and inflation.

Responses of asset prices have particular characteristics. These characteristics come from the changes, which are not regarded as likely to happen in monetary policy implications. Since asset prices act in response to these changes, the reactions are progressive when they include innovation and development. According to Bernanke and Kuttner (2005), the decisions, which are made about monetary policy, enable the market participants to reconsider their expectations. In this respect, they are influential over volatility in financial market.

Blinder, Ehrmann, et al. (2008) emphasize that communication is a key to development and an important element of the central bank's activities for a certain purpose. Through the use of effective communication, the financial markets can go in a specified direction to manage the economic objectives of central banks. When there are high expectations for the future central bank behaviors, the linkage between interest rates in short run and interest rates in long run can be easily assessed. Therefore, the role of the interest rates is very important in a country while making decisions about investment, consumption and economic output. There are studies on the examination of responses of the asset market to news about the policy based on money and currency and variety of decisions made on monetary policy due to expectations.

The asset markets in which people purchase and sell financial and real assets in the US respond significantly to news about the actions undertaken by the Fed (Gurkaynak, Sack and Swanson, 2005; Wongswan, 2006). In addition, Anderson and

Bollerslev (2005) emphasize that volatility of US long- term bond yields increases because of implications of policy based on money and currency in the U.S.

For Apergis (2014), FOMC is responsible for offering transparency to increase the well-being of markets in the US. When the transparency is maintained, the policy actions can be easily anticipated in the future. According to Apergis (2014), the FOMC announcements consist of three main steps. The first announcement is determined for the policy practices accepted in the meeting. The second formal public statement is based on the federal funds rate. Lastly, the third announcement is about the releases that can be accomplished more quickly (Apergis, 2014).

In light of the articulations above, financial markets can receive an advantage and a profit through the use of releases of FOMC minutes that determines the nature of expectations about the interest rates in the future. In other words, individuals taking part in financial markets can reconsider expectations of the influence over asset prices due to interest rates, if they are aware of the releases of FOMC minutes. Rosa's (2013) survey on the prices of real and financial assets in asset markets in the US due to the FOMC minutes shows that there is a shrink in asset prices due to global financial crisis, whereas asset price volatility increases because of the FOMC minutes.

Researchers examining not only the central banks' implications, but also asset price responses to FOMC announcements provide remarkable results in the literature. However, a few limited studies have been done based on the link between asset prices and FOMC minutes. For Frino and Hill (2001), there have been eight formal

public statements for the policy relating to currency and money. They all influence the Australian asset market. Bernanke and Kuttner (2005) contend that the formal public statements for monetary policy inevitably affect prices of equity. Craine and Martin (2008) focus on the asset markets of the U.S. and Australia. They state that the asset prices in Australia respond significantly in a positive way, if the policy based on money circulation and currency is experienced with a positive shock in the U.S.

Moreover, there exists another research path which analyzes the influences of formal public statements determined for the monetary policy. These announcements including target and path surprises are defined as a two-factor model for the analyses. In this respect, Andersson (2010) articulates that if interest rates vary, it is associated with the target factor in short run. When interest rates change rapidly in long run, it is identified with changes in expectations. Additionally, the future trends for banking sector are predicted by using minutes disseminated by central bank in Sweden (Apel and Blix-Grimaldi, 2012). According to Forest (2012), the unexpected monetary policy decisions significantly have an influence on the Treasury rates in the developed countries. There is also a study based on Australian Reserve Bank. The study demonstrates how implications of policy based on money and currency influence interest rate. Results confirm that the interest rate features respond significantly to the announcements (Smales, 2012).

When the studies based on the BRICS and Turkey are taken into consideration, there are a few researches demonstrates how the releases of FOMC minutes determine asset prices. According to Danker and Luecke (2005), FOMC minutes consist of the emphasis on economic conditions and rational ideas for the policy decision in

emerging markets. To Rosa (2013), the releases of FOMC minutes influence both the volatility of asset prices and trading volume in the US. According to Santos, Garcia and Medeiros (2011), there is an impact of the macroeconomic announcements on price changes in Brazil. Their results confirm that the price reactions depend on both the side of economy and bid-ask spreads in Brazil (Santos, Garcia, and Medeiros, 2011).

Travis, Berge and Cao (2014) emphasize that a variety of implications in monetary policy in the US depends on the rise and fall in asset prices both in the US and abroad, including European countries and Latin American countries. Thus, their study provides global effects.

When the emerging market economies are analyzed Travis and Cao (2014) find that Mexico, Brazil and Turkey react significantly to the formal public statements of monetary policy in terms of FOMC minutes. Moreover, for Divakaran and Gireeshkumar (2014) the release of FOMC minutes is one of the major reasons for the rupee fall in India and the adverse influences within the Indian economy.

Mishra, Moriyama, et al. (2014) note that there is a little significant linkage between equity prices and country characteristics around the releases of FOMC announcements for 21 countries, including, China, Russia, South Africa, Turkey, etc.

The study takes a wider approach to examine the asset prices in BRICS countries and Turkey according to the FOMC minutes by using a General Autoregressive Conditional Heteroscedastic (GARCH) volatility modeling. Thus, the study presents

important results regarding the influences of FOMC minutes in these countries. In this chapter, the next part identifies the particular methodology of GARCH modeling. Then, part 3 introduces the characteristics of data. Lastly, part 4 provides the results and provides a brief conclusion.

## **5.2 Methodology**

Examining volatility has been a prominent concern. Bollerslev (1986) enables researchers to measure volatility through the use of GARCH modelling. The methodology of GARCH modelling makes it possible for the study to form the regression identification for a function of the mean including a variance. Since the variance varies stochastically over the sample period, heteroscedasticity takes place as a variance in the model. In this respect, the methodology offers a time-series approach while analyzing the sample data.

There are two prominent steps followed by the researchers in the GARCH (1,1) modelling. The initial step is based on creating a description for the series of the mean whereas another step employs a model for the residuals' conditional variance (Apergis, 2014). To obtain the mean equations, the ARMA modelling is used in this study. There are two components in the ARMA models. The first part is identified as the autoregressive (AR) element of the modelling, which demonstrates the relationship between the present values and past values of the sample data. The second element called the moving average (MA) which is used to show the time during the effect of an unknown shock. In addition, the omitted variables bias is removed in this study because of the inclusion of high frequency data. According to Fleming and Piazzesi (2005), the macroeconomic variables, which are at high frequencies, cannot be influential over the decisions made in policy based on money



and currency.

In light of the articulations above, the methodology is based on a model proposed by Apergis (2014). The model provides:

$$f(L) r_t = m + q(L) \varepsilon_t + a_1 \text{MIN} + \varepsilon_t \quad (1)$$

where  $f(L) = (1 - f_1 L - f_2 L^2 - \dots - f_p L^p)$ ,  $q(L) = 1 + q_1 L + q_2 L^2 + \dots + q_q L^q$ .

The AR part is associated with lag  $p$ , the moving average part is identified with lag  $q$ ,  $\varepsilon_t \sim N(0, h_t)$ .

$h_t$  indicates the conditional variance at time  $t$ . It is obtained through the use of identifications in equation (2):

$$h_t = c_0 + c_1 h_{t-1} + c_2 \varepsilon_{t-1}^2 + c_3 \text{MIN} \quad (2)$$

where  $\varepsilon_{t-1}^2$  shows the lagged value.

In equation (2),  $c_0 \geq 0$ , and  $c_1$  is the GARCH coefficient.  $c_2$  is the coefficient on the lagged value of the squared prediction error. The MIN is the dummy variable to check the volatility impact of releases of FOMC minutes. The constraints, which are  $c_1 \geq 0$  and  $c_2 \geq 0$ , automatically enable  $h_t$  to be positive in the methodology.

### 5.3 Data

The study examines data on asset prices for the countries including BRICS and Turkey. Data is gathered from Thomson Reuters DataStream for the examination of asset prices. Indexes are available on a daily basis and the analyses are performed properly. The releases of FOMC minutes belong to between January 1973 and March

2015. While examining FOMC minutes' influences on asset prices in Brazil, data covers the period between 1.08.1992 and 12.06.2014. For the analyses based on Russia, the high frequency data includes 5527 adjustments for the period between 9.07.1995 and 11.05.2015. When India is considered, the period between 1.05.1990 and 11.06.2015 is used for the analyses. In case of China, the study deals with the period between 8.02.1993 and 11.07.2015. When South Africa is taken into account, the study carries out the period between 1.08.1973 and 11.05.2015. Finally, the sample data covers the period between 1.07.1988 and 11.11.2016 for Turkey while using the particular econometric procedure called GARCH volatility modelling.

#### **5.4 Empirical Findings**

The high frequency data for these countries used to indicate the state of being a unit root for asset prices at the 1% significance level. After employing an efficient unit root test, the ARMA models for asset prices in these countries are obtained. According to the results of the GARCH (1, 1), the models for these countries are presented in Table 5.1. There are different ARMA models, which are obtained in this study. For example, the ARMA model is specified as ARMA–GARCH (1,1) for Brazil, ARMA (2,4)-GARHC (1,1) for Russia, ARMA (2,4)-GARCH (1,1) for India, ARMA (3,3)-GARCH (1,1) for China, ARMA (3,4)- GARCH (1,1) for South Africa and ARMA (1,3)-GARCH (1,1) for Turkey.

The study attempts to show the impact of the releases of FOMC minutes on both the mean and the volatility of asset prices. The estimates belonging to the asset prices, which are stock prices of the countries, show the influence of releases of FOMC minutes in terms of the volatility of asset prices and the mean. The coefficients, which belong to the mean and the conditional volatility, are statistically significant at

the 1% level for the BRICS countries and Turkey.

As stated above, the FOMC minutes are influential when asset prices of these countries are considered. In this respect, announcements of FOMC minutes are very important for people who perform activities in financial markets. In other words, they can use information based on releases of FOMC minutes not only to make a proper decision, but also to modify their consideration about economic activities.

Since there is an existence of different time zones across regions, the releases of FOMC announcements are taken into account in 2 different forms in this study. For Russia, India, South Africa, China and Turkey, the releases of FOMC minutes are specified as FOMC (-1) in the model whereas the releases of FOMC minutes are identified as FOMC for Brazil.

The study employs LM tests that are used to evaluate the arch effects that can replace in the residuals. The information based on the Q statistics is also taken into consideration while evaluating the serial correlation in the variance equation. The results confirm that serial correlation and the arch effect don't exist in the model.

Table 5.1: GARCH (1,1) Estimates for BRICS and Turkey

<b>Brazil</b>			<b>Russia</b>		
Variable	Coefficient	p-value	Variable	Coefficient	p-value
C	0.093696	[0.0000]	C	-0.456918	[0.0000]
FOMC	0.382179	[0.0019]	FOMC(-1)	1.055493	[0.0000]
AR(1)	0.268503	[0.0000]	AR(1)	0.172038	[0.1730]
AR(2)	0.444583	[0.0000]	AR(2)	0.110312	[0.1417]
AR(3)	0.136102	[0.0011]	MA(1)	0.129024	[0.2815]
AR(4)	-0.918057	[0.0000]	MA(2)	0.170955	[0.0888]
MA(1)	-0.262489	[0.0000]	MA(3)	0.120456	[0.0767]
MA(2)	-0.453723	[0.0000]	MA(4)	-0.292255	[0.0000]

MA(3)	-0.136369	[0.0009]			
MA(4)	0.921357	[0.0000]			
C	0.05332	[0.0000]	C	1.572541	[0.0000]
RESID(-1) <sup>2</sup>	0.083966	[0.0000]	RESID(-1) <sup>2</sup>	0.574774	[0.0000]
GARCH(-1)	0.906087	[0.0000]	GARCH(-1)	0.542665	[0.0000]
FOMC	0.487455	[0.0320]	FOMC(-1)	3.20214	[0.0000]
<b>India</b>			<b>South Africa</b>		
Variable	Coefficient	p-value	Variable	Coefficient	p-value
C	0.036657	[0.3378]	C	0.062527	[0.0000]
FOMC(-1)	-0.036594	[0.6434]	FOMC(-1)	0.14979	[0.0023]
AR(1)	0.009673	[0.9943]	AR(1)	0.511367	[0.1250]
AR(2)	0.013584	[0.9883]	AR(2)	-0.759395	[0.0000]
MA(1)	0.097406	[0.9427]	AR(3)	0.556511	[0.0703]
MA(2)	0.011131	[0.9895]	MA(1)	-0.399839	[0.2315]
MA(3)	0.010262	[0.9032]	MA(2)	0.708721	[0.0000]
MA(4)	0.012737	[0.5858]	MA(3)	-0.470346	[0.1279]
C	1.63303	[0.0000]	MA(4)	-0.04579	[0.2455]
RESID(-1) <sup>2</sup>	0.051689	[0.0000]	C	0.06286	[0.0000]
GARCH(-1)	0.574335	[0.0000]	RESID(-1) <sup>2</sup>	0.119216	[0.0000]
FOMC(-1)	2.441127	[0.0000]	GARCH(-1)	0.839887	[0.0000]
			FOMC(-1)	0.168355	[0.0000]
<b>China</b>			<b>Turkey</b>		
Variable	Coefficient	p-value	Variable	Coefficient	p-value
C	0.043284	[0.0333]	C	0.075139	[0.0006]
FOMC(-1)	-0.042224	[0.6707]	FOMC	-0.150293	[0.0870]
AR(1)	0.360815	[0.4580]	AR(1)	0.023587	[0.9860]
AR(2)	0.324329	[0.5800]	MA(1)	0.052164	[0.9690]
AR(3)	-0.209273	[0.1730]	MA(2)	0.009903	[0.9231]
MA(1)	-0.253025	[0.6025]	MA(3)	0.006285	[0.7542]
MA(2)	-0.341932	[0.5602]	C	0.029509	[0.0000]
MA(3)	0.180294	[0.1406]	RESID(-1)	0.085928	[0.0000]
C	0.044893	[0.0000]	GARCH(-1)	0.914564	[0.0000]
RESID(-1)	0.08412	[0.0000]	FOMC(-1)	0.378232	[0.0000]
GARCH(-1)	0.905449	[0.0000]			
FOMC	0.352066	[0.0075]			

According to Table 5.1, the asset price responses vary from one country to another country. There is a significant positive impact on both return and volatility in Brazil, Russia, South Africa and Turkey. The results belonging to Turkey also demonstrate

that there is a negative return effect in Turkey. Finally, there exists a volatility effect not only in India but also in China.

The study analyzes the high frequency data set including asset prices and the releases of FOMC minute's announcements. The purpose is to demonstrate the effect of FOMC minutes on the asset prices of countries which are BRICS and Turkey. Since there are a few studies examining the effects in these countries, this study aims to focus on the emphases on economic conditions and rational ideas for the policy decision in emerging markets such as BRICS and Turkey.

The methodology of GARCH volatility modelling makes it possible for the study to form prominent regression identification for a function of the mean including a variance. In this respect, the coefficients, which belong to the mean and the conditional volatility, are statistically significant at the 1% level for the BRICS countries and Turkey. This finding is very important because asset prices affect the real economy. In other words, the decisions about investment, consumption, and aggregate demand are influenced by this situation in these countries.

As stated before, the effect of FOMC releases is very strong in Brazil, Russia, South Africa and Turkey. In addition, there is a negative return effect in Turkey when there exists a severe volatility effect in two countries such as India and China.

The study limits itself to the relationship between FOMC minutes and asset prices (stock market prices) of Turkey and BRICS. Thus, the further study may include more variables such as the inclusion of different types of asset prices such as housing

price index, treasury bond prices and exchange rates in sample data. Therefore, interesting findings can be obtained at the end of the analysis for market participants, policymakers and financial institutions.

## **Chapter 6**

### **CONCLUSION**

This chapter not only summarizes this thesis but also provides policy recommendations. In this thesis, dynamic linkages among real economic activity, asset prices, and macroeconomic policy were studied. Before the analyses were carried out, a review of the literature on the importance of macroeconomic fluctuations was presented in Chapter 2, along with a review of macroeconomic fluctuations and asset markets and macroeconomic performance and financial markets in Turkey.

As stated above, the thesis had three goals. The first (see Chapter 3) was to discover, in the Turkish context, how stock prices affect the purchase of goods and services by the public and the amounts charged for the use of assets according to the percentage of principal. Through close examination, the study employs the permanent income hypothesis, which is generally used to explain the relationship between an increase in wealth and consumption (Friedman, 1957). According to this theory, wealth increases can come from real (stock) asset prices, real estate, or other financial assets. Thus, stock (asset) price inflation leads to an increase in both wealth and consumption. The TVP-VAR model was applied to show the market influence in Turkey, using quarterly data for the 1987–2013 period. The sample was obtained from the CBRT.

According to the research findings, there are significant economic events for consumption and interest rates caused by spillovers. Financial crises and monetary policy are also influential in this regard. Stock prices and consumption positively reinforce each other because of a positive shock to the financial asset. The effect is significant, especially for the one-step-ahead horizon. Moreover, the impulse responses of the model for the years 1994, 2000, 2007, and 2011 provide significant results according to the three variables defined in the model. Thus, the present study captures the variability in the parameters of consumption and interest rates.

Chapter 4 deals with the second goal of the thesis: analyzing the behaviors of asset markets and their prices. The behaviors of these markets are crucial factors in decision making for financial institutions and homeowners. In this section of the thesis, the phases of the business cycle are emphasized because both the asset and housing markets are influential on these movements (Leamer, 2007; Stock & Watson, 2003). Therefore, this chapter analyzed sample data gathered from the CBRT by using a Bayesian VAR model to examine fiscal policy and asset prices. As its specific aim was to understand how shocks influence prices in asset markets and housing markets, the data covered the period between 1988:Q1 and 2014:Q2. The analysis makes clear that fiscal policy shocks significantly affect prices in these two markets.

Lastly, in Chapter 5 the thesis focused on FOMC minutes and asset prices in Turkey and the BRICS countries. GARCH volatility modelling was used to reveal the influences of FOMC announcements on asset prices in these countries. The results show that the effect is significant in Brazil, Russia, South Africa, and Turkey when



both return and volatility are considered. The results for Turkey also demonstrate that there is a negative return effect in that country. Finally, a volatility effect exists in both India and China. The GARCH volatility modelling offers valuable insights for decision making by financial institutions, investors, and policymakers.

Based on the research findings obtained from the three methods reviewed above, the study suggests that Turkey should have a core structure of institutions and authorities for policies relating to government spending, taxes, money, and the currency if the country is serious about preventing uncertainty and volatility. Supportive policies should be encouraged to promote welfare growth by focusing on the currency exchange controls for markets, controlling inflation, implementing efficient and effective foreign exchange efforts, improving the national budget, raising revenue, using a transparent system of public expenditure, and preventing the exploitation of resources in Turkey (Lambertini & Rovelli, 2003).

In addition, there should be also economic laws and regulations that preserve budgetary actions, central bank facilities, strategies of international and domestic trade operations, and governance authorities to ensure Turkey's well-being in terms of macroeconomic stability. When these developments have occurred, macroeconomic fluctuations will be eliminated to the greatest extent possible, and Turkish investment, economic growth, production, employment, and living standards will begin a steady rise.

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## **APPENDICES**

## Appendix A: Tables

Table 3.1: Unit Root Tests

	Real stock price	Real consumption	Nominal Interest rate	5% critical value
<b>ADF</b>				
Level	-3.38	-2.07	-2.27	-3.46
First Differences	-8.71*	-2.91*	-11.38*	-2.89
<b>PP</b>				
Level	-0.43	-3.09	-1.63	-3.46
First Differences	-8.95*	-10.45*	-20.45*	-2.89
<b>DF-GLS</b>				
Level	-2.19	-2.85	-1.04	-3.02
First Differences	-8.27*	-4.37*	-11.01*	-2.89
<b>KPSS</b>				
Level	0.82*	0.17*	0.88*	0.15
First Differences	0.04	0.05	0.36	0.46
<b>ERS</b>				
Level	5.81	6.36	5.72	5.64
First Differences	1.72*	0.81*	1.76*	3.11
<b>NP-MZt</b>				
Level	-2.19	-2.66	-2.70	-2.91
First Differences	-4.97*	-3.57*	-2.46*	-1.98
<b>NP-MPt</b>				
Level	5.75	6.44	5.77	5.48
First Differences	0.61*	0.97*	1.77*	3.17

Table 3.2: Cointegration Test Results

<b>Trace test</b>				
Hypothesized cointegration vectors	Eigenvalue	Trace Statistic	5% Critical Value	<i>p</i> -value
None	0.1325	24.9032	29.7971	0.1649
At most 1	0.0887	9.8399	15.4947	0.2932
At most 2	0.0000	0.0001	3.8415	0.9937
<b>Maximal eigenvalue test</b>				
Hypothesized cointegration vectors	Eigenvalue	Max. Eigen. Statistics	5% Critical Value	<i>p</i> -value
None	0.1325	15.0634	21.1316	0.2845
At most 1	0.0887	9.8398	14.2646	0.2227





C	0.05332	[0.0000]	C	1.572541	[0.0000]
RESID(-1) <sup>2</sup>	0.083966	[0.0000]	RESID(-1) <sup>2</sup>	0.574774	[0.0000]
GARCH(-1)	0.906087	[0.0000]	GARCH(-1)	0.542665	[0.0000]
FOMC	0.487455	[0.0320]	FOMC(-1)	3.20214	[0.0000]

**India**

Variable	Coefficient	p-value
C	0.036657	[0.3378]
FOMC(-1)	-0.036594	[0.6434]
AR(1)	0.009673	[0.9943]
AR(2)	0.013584	[0.9883]
MA(1)	0.097406	[0.9427]
MA(2)	0.011131	[0.9895]
MA(3)	0.010262	[0.9032]
MA(4)	0.012737	[0.5858]
C	1.63303	[0.0000]
RESID(-1) <sup>2</sup>	0.051689	[0.0000]
GARCH(-1)	0.574335	[0.0000]
FOMC(-1)	2.441127	[0.0000]

**South Africa**

Variable	Coefficient	p-value
C	0.062527	[0.0000]
FOMC(-1)	0.14979	[0.0023]
AR(1)	0.511367	[0.1250]
AR(2)	-0.759395	[0.0000]
AR(3)	0.556511	[0.0703]
MA(1)	-0.399839	[0.2315]
MA(2)	0.708721	[0.0000]
MA(3)	-0.470346	[0.1279]
MA(4)	-0.04579	[0.2455]
C	0.06286	[0.0000]
RESID(-1) <sup>2</sup>	0.119216	[0.0000]
GARCH(-1)	0.839887	[0.0000]
FOMC(-1)	0.168355	[0.0000]

**China**

Variable	Coefficient	p-value
C	0.043284	[0.0333]
FOMC(-1)	-0.042224	[0.6707]
AR(1)	0.360815	[0.4580]
AR(2)	0.324329	[0.5800]
AR(3)	-0.209273	[0.1730]
MA(1)	-0.253025	[0.6025]
MA(2)	-0.341932	[0.5602]
MA(3)	0.180294	[0.1406]
C	0.044893	[0.0000]
RESID(-1)	0.08412	[0.0000]
GARCH(-1)	0.905449	[0.0000]
FOMC	0.352066	[0.0075]

**Turkey**

Variable	Coefficient	p-value
C	0.075139	[0.0006]
FOMC	-0.150293	[0.0870]
AR(1)	0.023587	[0.9860]
MA(1)	0.052164	[0.9690]
MA(2)	0.009903	[0.9231]
MA(3)	0.006285	[0.7542]
C	0.029509	[0.0000]
RESID(-1)	0.085928	[0.0000]
GARCH(-1)	0.914564	[0.0000]
FOMC(-1)	0.378232	[0.0000]

## Appendix B: Figures

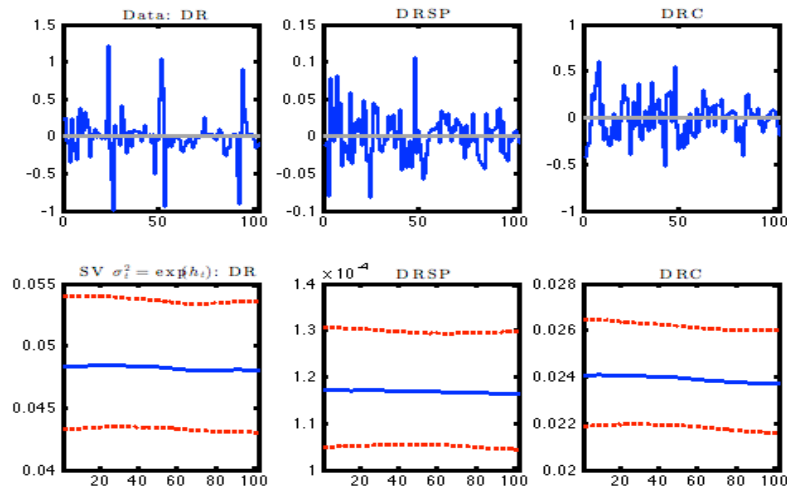


Figure 3.1: The Posterior Estimates in the TVP-VAR Model

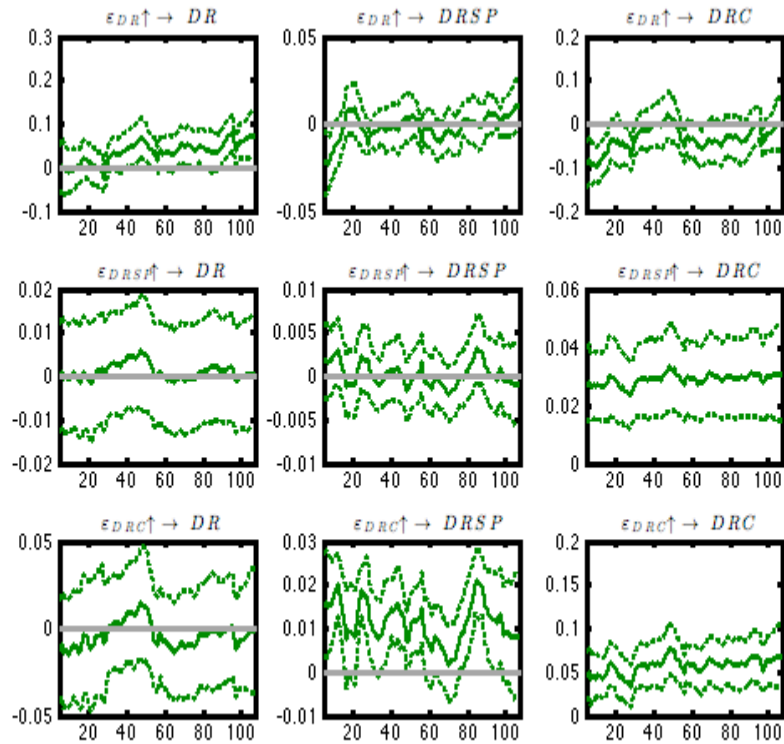


Figure 3.2: Impulse Responses of The Model for 1-step ahead

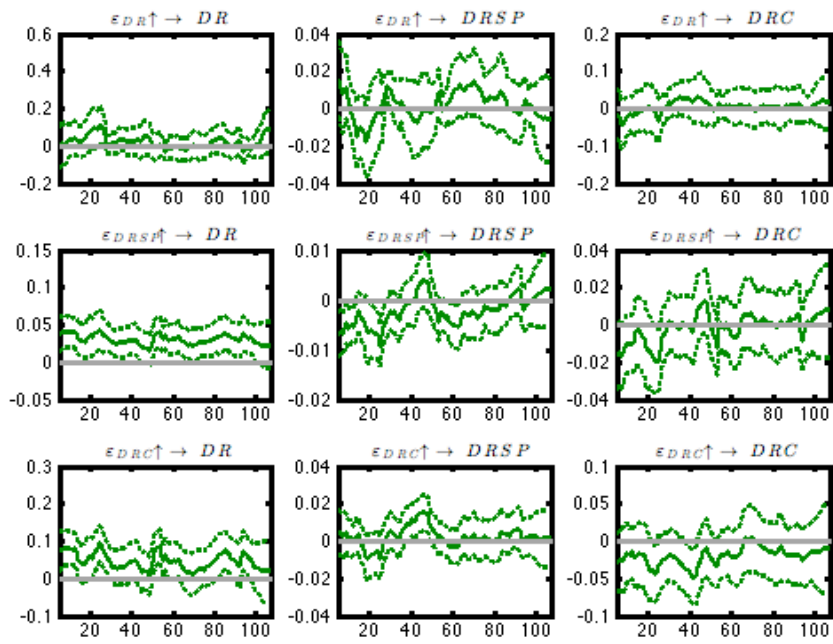


Figure 3.3: Impulse Responses of The Model for 4-steps ahead

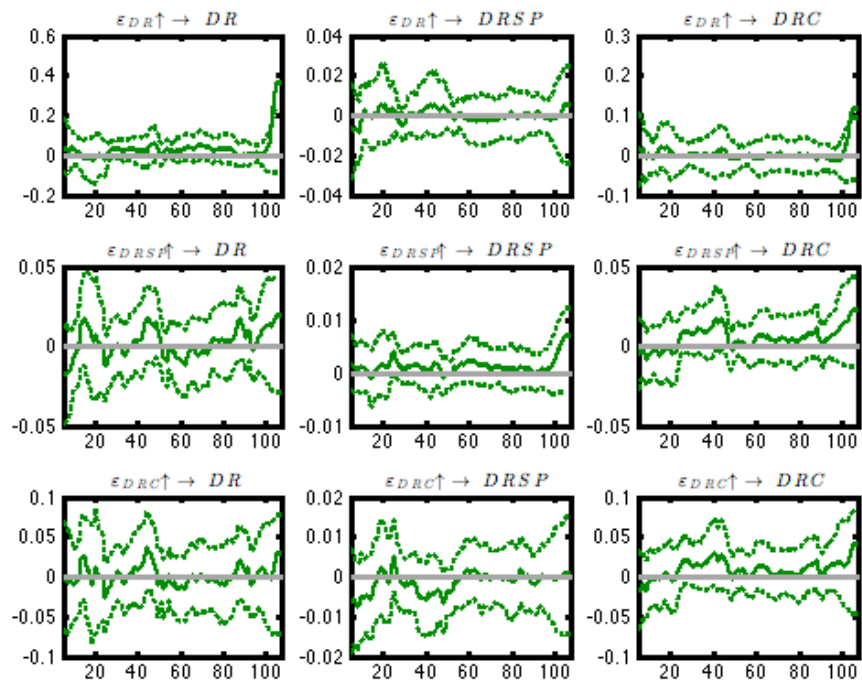


Figure 3.4: Impulse Responses of The Model for 8-Steps ahead

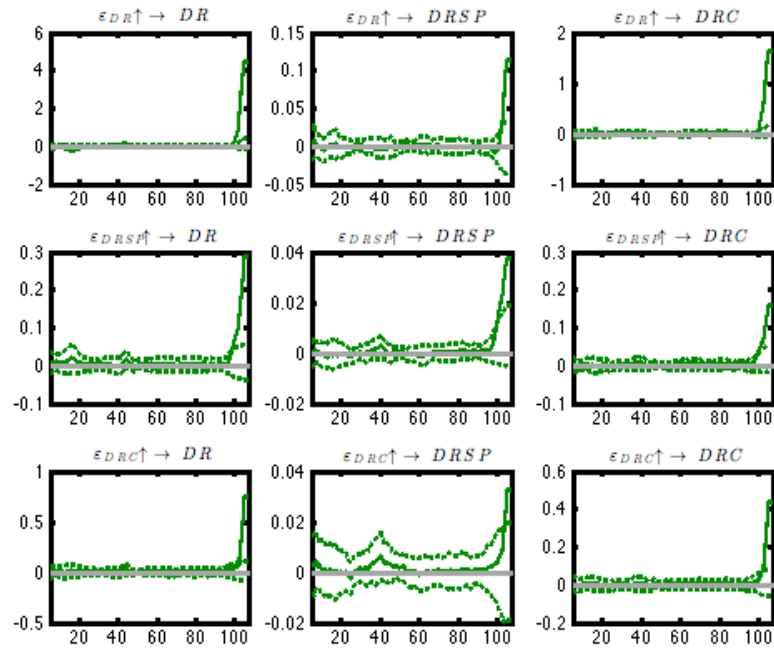


Figure 3.5: Impulse Responses of the Model for 12-steps ahead

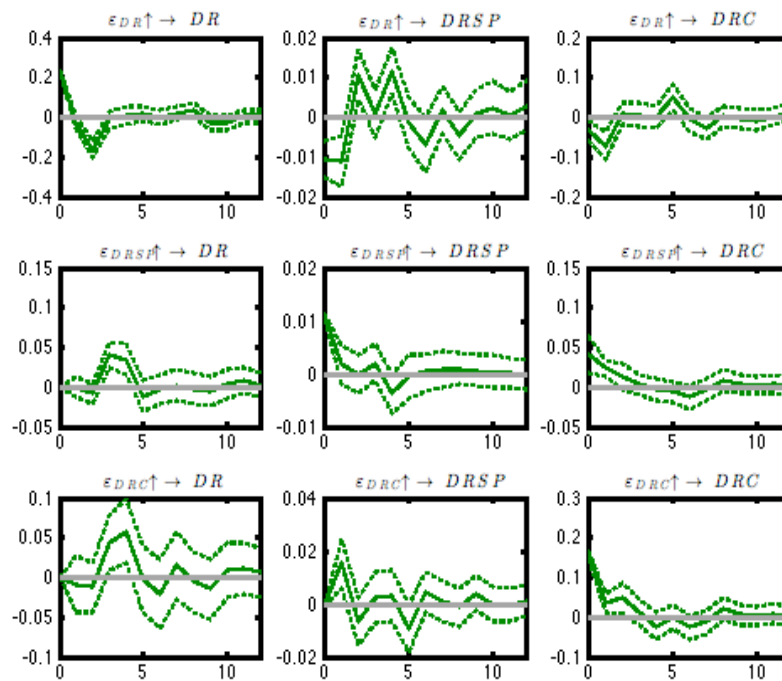


Figure 3.6: Impulse Responses of The Model at 1994:Q1

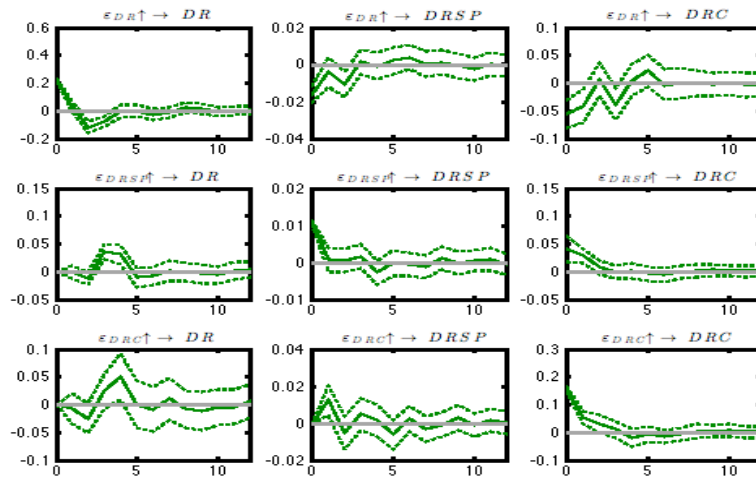


Figure 3.7: Impulse Responses of The Model at 2000:Q4

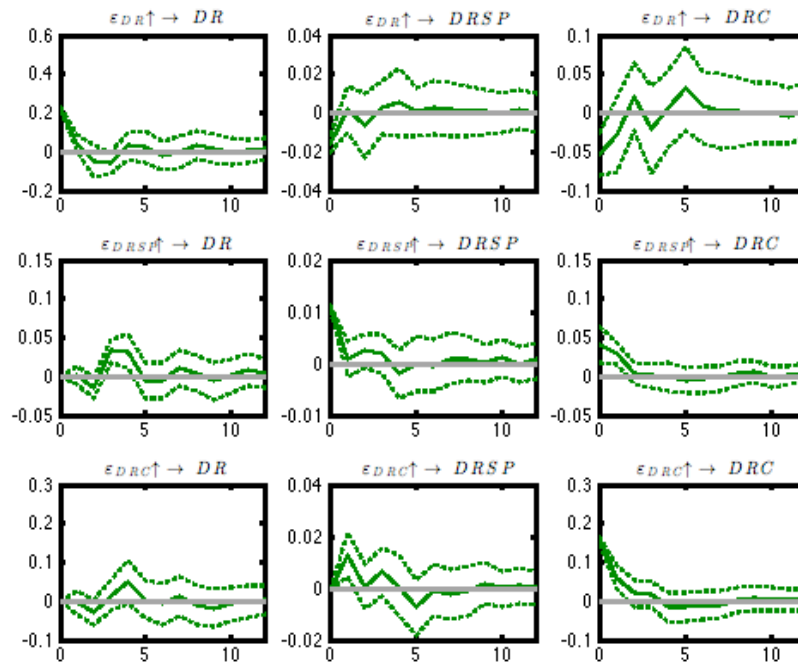


Figure 3.8: Impulse Responses of The Model at 2007:Q1

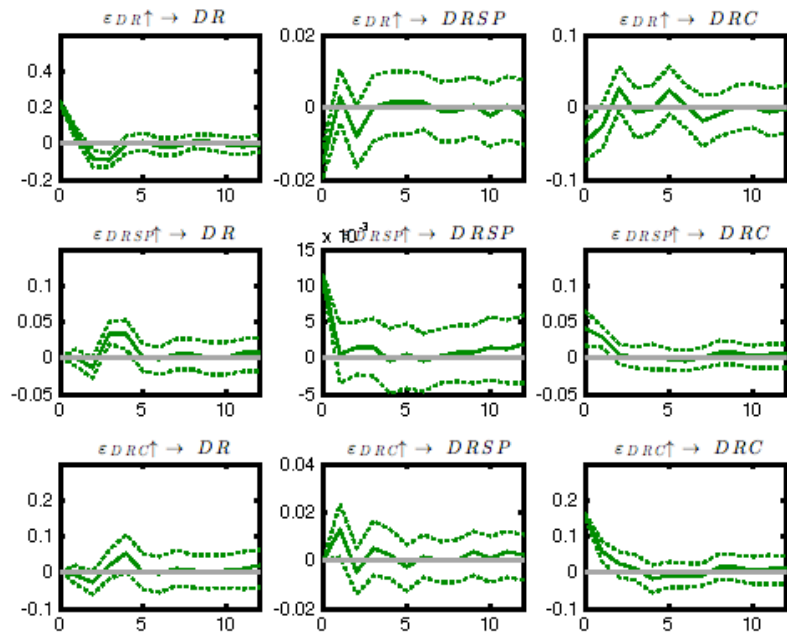


Figure 3.9: Impulse Responses of The Model at 2011:Q1

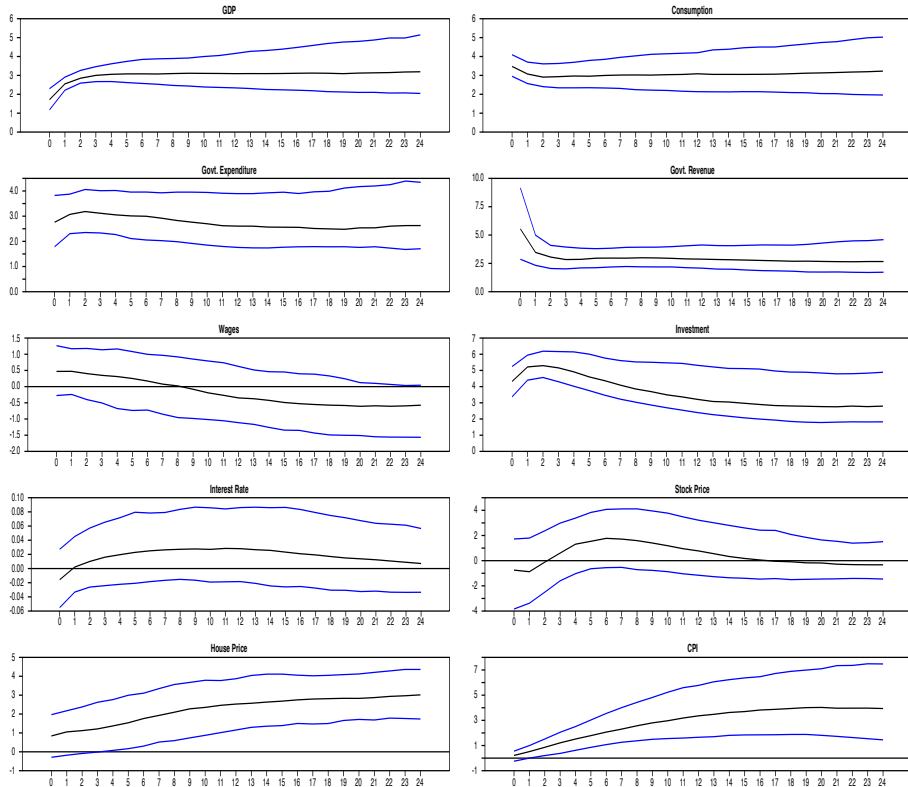


Figure 4.1: Business Cycle Shock

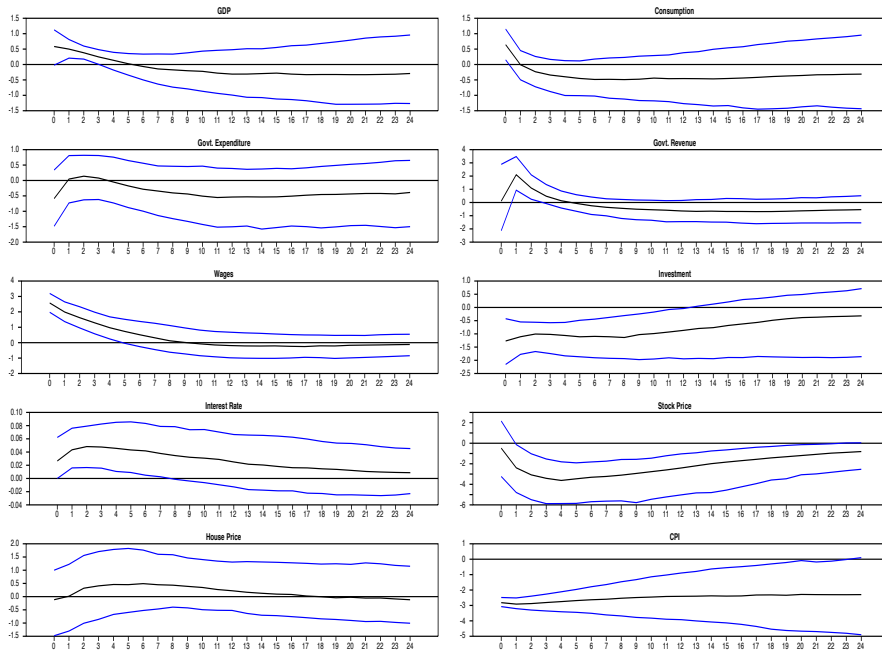


Figure 4.2: Monetary Policy Shock

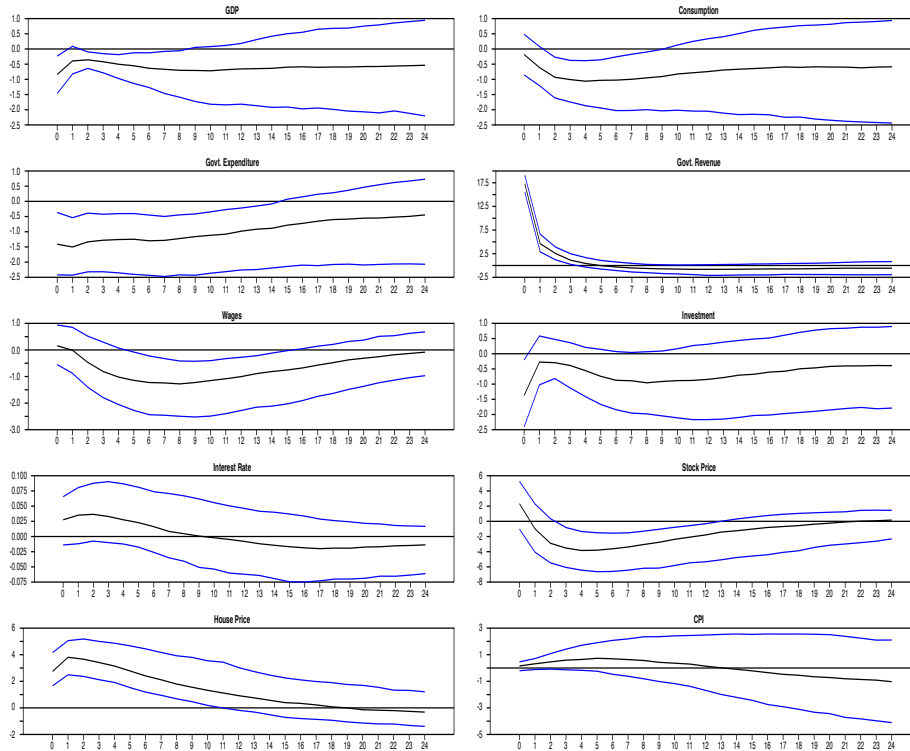


Figure 4.3: Government Revenue Shock



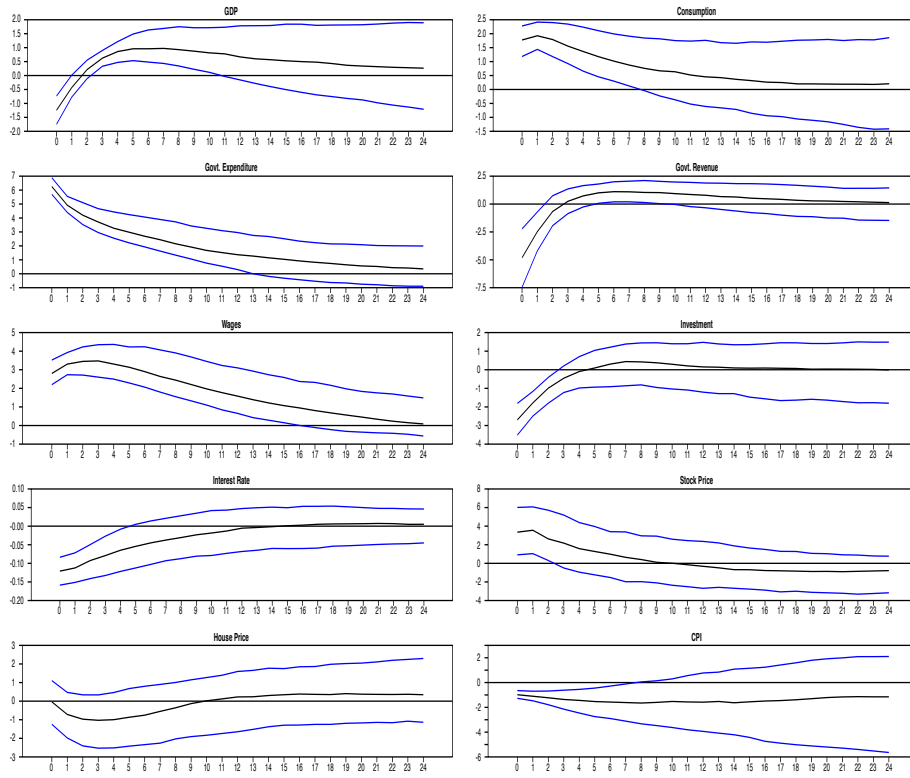


Figure 4.4: Government Spending Shock