NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
ECONOMICS PROGRAM

THE IMPACT OF MONETARY POLICY ON THE ECONOMIC GROWTH IN TURKEY

YOUSIF ABDULLAH

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THESIS SUPERVISORS

PROF.DR.HUSEYIN OZDESER

ASST.PROF.DR.BEHIYE CAVUSOGLU

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ACCEPTANCE/APPROVAL

We as the jury members certify the 'The impact of monetary policy on the economic growth in Turkey .' prepared by the Yousi Abdullah defended on 30/12/2019 has been found satisfactory for the award of degree of Master

JURY MEMBERS

.....
Prof.Dr. Huseyin Ozdeser (Co-Supervisor)
NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS

.....
Asst.Prof.Dr. Behiye Cavusoglu (Co-Supervisor)
NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS

.....
Assoc. Prof. Dr.Aliya Isıksal and (Head of Jury)
NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF BANKING AND ACCOUNTING

.....
Dr.Andisheh Saliminezhad (Jury Member)
NEAR EAST UNIVERSITY
GRADUATE SCHOOL OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS

.....
Prof.Dr. Mustafa SAGSAN
Graduate School of Social Sciences
Director

DECLARATION

I Yousif Abdullah, hereby declare that this dissertation entitled ‘The impact of monetary policy on the economic growth in Turkey’ has been prepared myself under the guidance and supervisions of ‘Prof.Dr.Huseyin Ozdeser and Asst.Prof.Dr.Behiye Cavusoglu’ in partial fulfilment of the Near East University, Graduate School of Social Sciences regulations and does not to the best of my knowledge breach and Law of Copyrights and has been tested

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ABSTRACT

THE IMPACT OF MONETARY POLICY ON THE ECONOMIC GROWTH IN TURKEY

This thesis aimed to find out the impact of monetary policy on the economic growth in Turkey between the years 2006-2018; quarterly secondary data were used that collected from Central Bank of the Republic of Turkey (CBRT) and World Bank. Augmented Dicky-Fuller (ADF) test was implied to test the stationary and presence of unit root of the series while the Auto Regressive Distribution Lag (ARDL) model conducted to investigate the relationship between monetary policy and economic growth in Turkey during the given period. The goal of this thesis is to examin the impacts of monetary policy on the economic growth in Turkey. In other words, whether the interest rate, inflation rate and money supply have impacts on the economic growth or not. The unit root test indicated that the variables were stationary at I(0) and I(1), accordingly the variables are qualified to apply ARDL model. The result of the F-bound test confirmed long run co-integration between the variables, the figure of ECM is positive, it means that there is no long run equilibrium converging. The study shows that monetary policy only has short-run effects on the economic growth in Turkey. Inflation in the short run is statistically insignificant, while, interest rate and money supply are statistically significant and they have negative impact on the economic growth in the short run. In contrast, in the long-run,all variables including interest rate, inflation rate and money supply are statistically insignificant, in other word they do not affects the economic growth in the long run in Turkey during the study period. The study recomends Create appropriate environment for both domestic and foreign investors by restoring confidence and economic stability to promote economic growth. As monetary policy alone is unable to effectively promote economic growth, fiscal policy also should use in line with monetary policy to accelerate economic growth.

Keywords: Monetrary policy, Economic growth, Impact, ARDL, Turkey

ÖZ

THE IMPACT OF MONETARY POLICY ON THE ECONOMIC GROWTH IN TURKEY

Bu tez, 2006-2018 yılları arasında para politikasının Türkiye'deki ekonomik büyüme üzerindeki etkisini bulmayı; Türkiye Cumhuriyet Merkez Bankası (TCMB) ve Dünya Bankası'ndan toplanan üç aylık ikincil veriler kullanılmıştır. Söz konusu dönemde Türkiye'deki para politikası ile ekonomik büyüme arasındaki ilişkiyi araştırmak için gerçekleştirilen Otomatik Regresif Dağıtım Gecikmesi (ARDL) modeli serinin sabit ve varlığını test etmek için artırılmış Dicky-Fuller (ADF) testi uygulanmıştır. Bu tezin amacı, para politikasının Türkiye'deki ekonomik büyüme üzerindeki etkilerini incelemektir. Diğer bir deyişle, faiz oranının, enflasyon oranının ve para arzının ekonomik büyüme üzerinde etkisi olup olmadığı. Birim kök testi, değişkenlerin I (0) ve I (1) 'de durağan olduğunu, bu nedenle değişkenlerin ARDL modelini uygulamaya uygun olduğunu göstermiştir. F-bağlı testin sonucu, değişkenler arasında uzun dönemli birlikte entegrasyonu doğruladı, ECM rakamı pozitif, bu da uzun dönemli denge yakınsamasının olmadığı anlamına geliyor. Çalışma, para politikasının Türkiye'deki ekonomik büyüme üzerinde sadece kısa vadeli etkileri olduğunu göstermektedir. Kısa vadede enflasyon istatistiksel olarak önemsizken, faiz ve para arzı istatistiksel olarak anlamlıdır ve kısa vadede ekonomik büyüme üzerinde olumsuz etkileri bulunmaktadır. Aksine, uzun vadede, faiz oranı, enflasyon oranı ve para arzı dahil olmak üzere tüm değişkenler istatistiksel olarak anlamsızdır, diğer bir deyişle Türkiye'de uzun vadede çalışma döneminde ekonomik büyümeyi etkilememektedir. Çalışma, ekonomik büyümeyi teşvik etmek için güven ve ekonomik istikrarı geri getirerek hem yerli hem de yabancı yatırımcılar için uygun ortam yaratmayı önermektedir. Para politikası tek başına ekonomik büyümeyi etkin bir şekilde teşvik edemediğinden, maliye politikası da ekonomik büyümeyi hızlandırmak için para politikası ile uyumlu olarak kullanılmalıdır.

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Anahtar Kelimeler: Para Politikası, Ekonomik Büyüme, Etki, ARDL, Türkiye

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ABBREVATIONS

GDP	Gross Domestic Product
FRED	Federal Reserve Economic Data
GNP	Gross National Product
C	Consumption
I	Investment
G	Government spending
NX	Next Export
G20	Group of Twenty
CBRT	Central Bank of Republic of Turkey (TCMB)
EU	European Union
USD	United State Dollar
CPI	Consumer Price Index
INTR	Interest Rate
M3	Broad Money supply
US	United State
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
VAR	Vector Auto Regression Model
ARDL	Auto Regressive Distribution Lag Model
ECM	Error Correction Model
OLS	Ordinary Least Square
BLUE	Best Linear Unbiased Estimator
CUSUM	Cumulative Sum of the Recursive Residuals
CUSUMSQ	Cumulative Sum of Squared Recursive Residual

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

A brief historical background in Turkey's monetary system is pertinent to start this chapter to give a preceding understanding of the impact of policies in Turkey prior to this time. Turkey had an antecedent of developing financial institutions and disequilibrium in the economy for the period before 2000 (Mishra et al. 2012). Further, into the new century, in 2008, the global financial crisis had its rippling effect on the Turkish financial system and economic stability. More recently, the US-Turkey bilateral relations that got worse further affected the stability of the monetary system in Turkey. The restrictions in financial markets were deep prior to the period which was characteristic of banking challenges, they gradually waned off afterwards owing to the commendable transformation in monetary sector and growth pattern in global financial institutions. These challenges detail the issues in low income nations: Huge cost of loans and poor contribution of the finance sector induced banks to guarantee optimal level of treasury base and internal public treasury bills and bonds as deposit medium widens. The financial and banking institution of Turkey had these challenges. Loans provided to private sectors were numbered and in small quantities and the rate on loans was unclear sticky prior to the new century. Accounting for huge debt, hyperinflation, and macroeconomic volatility, this outcome was not shocking (Aydin, 2007). Credit markets developed by assigning an incentive role on banks. As perceived risk and uncertainty lessened, credit channels widened causing: decline in public indebtedness, fall in interest and inflation proportions, and dominating financial

stability paved way for increase in size of bank credits. In recent times, developed private bonds advertise is still in its early stages, bank loaning stood as the major source of financing debt. Earlier investigations recommend culminates on contradictory implementation of policies. Exchange rate pass-through contains a sensibly strong power; stock advertise and credit channel intermediation isn't productive in Turkish economy while interest rate pass-through is exceptionally compelling; (Kasapoglu, 2007).

Monetary supply has been proposed to be an efficient instrument to engage monetary policy, Peker and Canbazoglu (2011) are of the opinion that size of bank credit and loan availability are effective. Past researches have shown alignment that lending rates make banks align to these monetary fluctuations and instability in the system. Moreover, it is also said be as a result of failure to responsively adjust to policy rate fluctuations pegged at rate charged on loans, which may be seen as heterogeneity in the economy (Yildirim, 2012). Aktan et al. (2014) demonstrated from his study, a positive relationship between montary expansion and the level of risk propensity from economic agents in 2002-2013 period. Subsequently, the propensity for risk dropped after policy rates were used. However, In a case where interest rates go lower than the mean of the long-run value, the relationship becomes negative or indirect.

Monetary policy plays a significant role in the economics of any country. In developing countries, monetary policy is of great significance because it helps financial institutions and the central bank to control saving, investment, interest rate, and above all manage the balance of trade (Ghandour, 2017). The main purpose of monetary policy is to increase the money supply in times of recession and reduce the same in the time of inflation. In the recession phase, the central bank adopts the monetary tools which decrease interest rate; in the inflation phase, on the other hand, the central bank increases the interest rate. This helps the central bank manage aggregate demand. Adoption of expansionary monetary policy in the recession phase increases the public spending while the adoption of tight monetary policy reduces the level of public spending.

GDP is an important economic indicator.Monetary policies affect demand and supply which causes changes in the growth of domestic output. It defines the efficiency of any economic system and helps countries and economists compare performance with others. This change can have an impact on the productivity of labor and investments. Similarly, inflation is a macroeconomic phenomenon and it means the sustained increases in the price of goods and services over the period. It can be directly controlled by the central bank. On the contrary, deflation refers to a condition where the country's wealth exceeds the value of printed money circulating in the economy. Money supply, in the long-run, is inflationary in nature and contributes to the monetary neutrality in the long-run (Odhiambo &Twinoburyo, 2018). Consequently, interest rates have also an impact on economic growth of the country. High interest-rate environments can decelerate the economic growth (Drobyshevsky et al (2016). It is also argued that, interest rates have slight but significant impact on economic growth because the lower-interest rates help in increasing the investment activities.

Monetary policy has been found to be a pivotal determinants in the control of the macro economy to foster stability and to engender development through its influence on economic variables. It is of general assumption that monetary policy influences macroeconomic variables such as GDP rise, inflation rate stability, job creation, equilibrium in balance of payment of emerging nations (Anowor &Okorie, 2016). The ability of an economy to allow the central bank operate independently greatly affects the efficient of monetary policy on improving economic development and increase in the overall demand using monetary policy tools(Alavinasab, 2016). The usage of empirical statistics and accurate data also strengthens the use of monetary policy by allowing for successful implementation in general to achieve the sustainable aggregate output. The apex institutions and policy makers are to target the intermediate variables which includes money supply, exchange rate, the short-term interest rate that are deemed as decisive and potential weapons of monetary policy (Artus&Barroux, 1990; Fasanya, Onakoya, & Agboluaje, 2013). The thesis is divided in to six chapters, which includes:

i. The introduction section

ii. Literature review/ theoretical part
iii. Analysis of Turkish economy
iv. Methodology
v. Findings, results and discussion
vi. Policy recommendation as well as conclusion

1.2 Significance of the Study

The study adds new knowledge to the existing body of literature. The study is unique because the study analyzes the impact of monetary policy on the economic growth in Turkey. Turkey is a huge economy and the inflation and interest rates varies across decades. However, the study will analyze the impact of these rates on the economic growth of Turkey from the first quarter of 2006 until the last quarter of 2018. Thus, this study will use secondary data to avoid duplication of research efforts. The monetary indicators data such as interest rate, consumer price index and money supply were collected from the Central Bank of Turkey, while the GDP per capita was collected from World Bank. To the researcher's knowledge there is no existing study that focuses on analyzing the impact of monetary policy on economic growth during 2008-09 global financial crisis and after US-Turkey bilateral relations that got worse in 2018 cuased currency crise that affected more Turkish economy.

1.3 Objectives of the study

There are a lots of study that carried out the relationship between monetary policy, economic development and economic growth. However, the objective of this study is to represent the analysis of impact of monetary policy on the economic growth in Turkey through using independent variables like money supply, interest rate, inflation rate and its impact on GDP per capita..

1.4 Research Questions

The study explores following questions to be answered:

1. How monetary policy affect macroeconomic variables as whole?

2. How the monetary policy affect economic growth?

1.5 Research Hypothesis

Given the research questions asked above, the below hypotheses tested in the course of this thesis are:

Hypotheses are stated as follows:

- **Hypothesis i**

H_0 - Monetary policy has no significant impact on economic growth.

H_1 - Monetary policy has significant impact on economic growth

- **Hypothesis ii**

H_0 -Interest rate does not affect economic growth

H_1 – Interest rates affect economic growth

- **Hypothesis iii**

H_0 -Inflation rate has no impact on economic growth

H_1 - Inflation rate has impact on economic growth

- **Hypothesis iv**

H_0 - Money supply does not affect economic growth

H_1 - - Money supply affect economic growth

1.6 Possible Outcomes

The possible outcomes of the study are monetary policy have impact on economic growth as observed in existing studies found in literature review. Therefore, this study sets an idea that good monetary policies can stimulate economic growth.

1.7 Limitations

The study aims to examin the impact of monetary policy on the economic growth of Turkey. Becuase of lack and dificulty of obtaining data, the study will use quarterly data from 2006 to 2018. The GDP per capita data were transformed from low to high frequency because of unavailable necessary

data. The study is limited to GDP per capita as an indicator for economic growth. Similarly, inflation, money supply and interest rates are fixed as indicators of monetary policy. Hence, many other factors are influenced by or have effect on economic growth and monetary but this study will not take into account these factors.

1.8 Contribution to the Knowledge

This study will contribute to the existing knowledge on the relation between economic growth and monetary policy by considering the case study of Turkey that is a huge economy. The study takes into account the variables like inflation, money supply and interest rate that are not jointly researched in existing studies to have an impact on economic growth.

CHAPTER 2

LITERATURE REVIEW

2.1 Importance of Monetary Policy in Economics

Monetary policy serves as the foundation and the course of actions put forward by the Central Banks and other apex banking institutions which are competent to act upon the financial and monetary regulations in an economy. It is an important tool which helps the central bank to reach its macroeconomic goals such as favorable balance of payment, exchange rate balance, inflation control etc. There may be some difference in the level of freedom given to the central bank. Some countries do not give complete autonomy to their central bank while central banks in some countries enjoy full autonomy and have exclusive power to the administration of monetary policies in their economic system. For example, the Reserve Bank of India acts as the country's central bank and does not have full autonomy. It works as per the stated guidelines and the instructions put forward.

However, other countries allow their central banks be autonomous and have an independent policy. The Federal Reserve Bank i.e. the central bank of the United States has its own identity and exercises full freedom in policy-making. Monetary policy is similar to the fiscal policy because both aim at achieving full employment level, improving economic conditions, and steady economic growth rate. Monetary policy, as it indicates, are policies made about money and finance in an economy. This policy talks about the amount of money circulating in the economy, the channels which transfer it, as well as other factors which affect money supply.

Monetary policy plays a significant role in the economics of any country. In developing countries, monetary policy is of great significance because it helps financial institutions and the central bank to control saving, investment, interest rate, and above all manage the balance of trade (Ghandour, 2017). The main purpose of monetary policy is to increase the money supply in times of recession and reduce the same in the time of inflation. In the recession phase, the central bank adopts the monetary tools which decrease interest rate; in boom period or expansionary phase, on the other hand, the central bank increases the interest rate. This helps the central bank manage aggregate demand. Adoption of expansionary monetary policy in the recession phase increases the public spending while the adoption of tight monetary policy reduces the level of public spending. It proves significant for the economy and helps it to reach equilibrium at full employment level or potential output level. This is not the sole purpose of the monetary policy. Developing countries across the globe also use monetary policy as a tool to increase economic growth both in the industrial and agricultural sectors.

It can be said that the central banks in developing countries have following three macroeconomic objectives:

1. To attain potential level of output or aggregate demand;
2. To control inflation for achieving price stability; and
3. To promote economic growth.

2.2 Monetary policy tools

The monetary policy tools can be broadly divided into following categories: market and the control of portfolio approach. The indirect market approach is also a traditional method to regulate money supply. It includes discount rate of Central Bank as well as open market operations. The direct control also known as the portfolio approach engages the use of special deposits, credit control and reserve ratio. These tools help in manipulating the volume, cost, and availability of reserves.

2.2.1 Open Market Operations (OMO)

The open market operation is the fundamental tool of indirect monetary policy. It includes the sale and purchase of Government securities within an open

market. It helps in obtaining deflationary and inflationary for current economics. The retailing of government securities in open markets controls the capacity of financial sector. It may create more opportunities for credit within a developed market environment.

2.2.2 Central Bank discount rates

Commercial banks are charged by the Central Bank for discount rate on granted loans. The commercial banks are then used to reduce and/or increase the liquidity by monetary authorities.

2.2.3 Reserve ratio

Reserve ratio is an evaluation that is adopted by monetary authorities in order to control the competence among commercial banks. The lending capacity among the commercial banks increases with the decrease in ratio. Thus, it helps the banks to swab excess funds. The reserve ratio also helps in managing liquidity and regulatory efficiency. Cash reserve ratio is one of the powerful tools of the monetary authorities for regulation of cash holding capacity among commercial banks.

2.2.4 Credit control

Credit control refers to executive arrangement by the regulatory authorities guiding the commercial banks on the volume and cost for selective sector credit. Credit control has a direct control on distribution of resources through monetary policy. This means that market forces are no longer influential.

2.3 Appraisal of Monetary Policy By different Schools of Thoughts

2.3.1 Classical Economics view

Classical economists regard money as neutral in nature. The classical theory treats money in terms of the absolute price level and regards it as an exogenous factor to which the stock of money adjusts while rate of interest, real income, and the economic activity remain unaffected (Glasner, 2000). This meant that money was just a veil and that it had no impact, whatsoever, on the economy.

Unlike the classical theory, quantity theory regards supply of money as an exogenous factor to which adjustments in price level are made. The quantity

theory of money stated that when money supply increases in an economy, its purchasing power falls, and resultantly the price of average commodity rises and vice versa. It can be concluded that money supply (M), is the main determinant of the price level (P) in the equation MV=PT, where V and T are 'the volume of money' and 'volume of transactions' respectively (Humphrey, 1974).

According to the classicic view, a change in the stock of money supply (M) causes an equal change in the price level (P), keeping the volume of money (V) and volume of the transaction (T), also called level of real output, constant. Classicists also believed that the economy will always be at the level of full-employment. They observed that events such as downward rigidity in wages can lead to unemployment. They believed that this unemployment can be corrected by adopting expansionary monetary policies. At constant level, the velocity of money (V) and the level of real output (T); the expansionary monetary policy increases the stock of money supply. This means that consumers, both households and firms, have more liquidity and spare funds with which they can consume more. This increase in the demand of goods and services thus increases the price level. The real wage reduces as a result enabling the employers to increase employment as well as output. This chain of events creates new employment opportunities and the level of unemployment reduces.

The classicists hence believed that expansionary monetary policy can help restore the level of employment in the economy. Keynes did not comply with the classicist view that the stock of money supply (M) directly affects price level (P). He was also against the classical assertion of full-employment level and said that there existed cyclical unemployment in the economy. Keynes also pointed out that the classical analysis can only work in the long-run where market forces demand moved the economy towards the level of full-employment.

2.3.2 Keynesian view

Keynesians were against the views of Classical School of Thought about full-employment. They found cyclical fluctuations in the employment pattern as

well as the level of prices and real income. The classical economists had not accounted for these cyclical fluctuations and later called them the mistakes in the regulations of money and credit by the monetary institutions. This did not prove to be a successful explanation and did not produce the desired results (Birol & Gencer, 2014). In contrast, Keynes put forward a developed and realistic macroeconomic system. He also accepted that even developed economies face unemployment to some level. Keynesians are of the view that there is no relation between the supply of money and price level as is suggested by the classical economists in the Quantity Theory of Money. They also do not agree about the assertion that the economy is near or at the natural level of GDP, which means that aggregate demand (Y) can be observed as constant in the exchange equation.

Keynes put forward his own theory called the Liquidity Preference Theory. The theory of liquidity preference had three motives; transaction motive, precautionary motive, and speculative motive. These motives explained the reasons why people wanted money in liquid form. The first, transaction motive, states that people want a liquid form of money for their daily expenses. More money required for transaction motive due to the increased level of income. High income means higher demand; hence more money is required to fulfill increased spending. This increased demand is termed as transactionary demand. Second is precautionary motive, states that people want money as a precaution so that they can cover for unforeseen future, in case of death or any emergency. The amount of money demanded, precautionary demand is also affected by the level of income. High income level means more money is required for unforeseen events. Speculative demand is affected by the level of interest rate and prices of bonds or debentures. Economic agents increase the speculative demand when the interest rate is lower while in case of increased interest rate, speculative demand for money is reduced.

The money demand is the main link between monetary policy and the real sector of the economy. The speculative money demand, according to Keynesian speculative theory, has a negative relation with the level of the interest rate. Keynes focused more on the speculative motive than on the others. He named the speculative demand for money as the liquidity

preference. The speculative money demanded is interest rate elastic and can be expressed in terms of the equation; $m^d = (M/P)^d = f(y,i)$, where m^d is the demand for real money and is a function of real income y and nominal interest rate i (Epaphra, 2017). Speculative demand behavior of both agents and banks is the determining factor which ascertains the interest rate i.e. the yield curve. There are two variables of the yield curve; the relation between bank expectations and mediators and how the central bank accounts for these expectations. Entrepreneurs compare the yield curve with marginal capital efficiency which helps them to decide whether investments will prove to be beneficial or not.

Keynes stated that interest rate is related to income. He was of the view that an increase in money causes a reduction in interest rate as this increases the investments, and vice versa (Koti & Bixho, 2016). Keynesians are of the view that a lower level of interest increases the aggregate investment expenditures and the consumption of interest-sensitive goods that cause a rise in the real GDP. This will also decrease the velocity. Keynesians reject that velocity of money is constant. However, they do believe that money supply and real GDP have an indirect link.

Despite the effect, Keynesians have a different opinion on how monetary policies are used in expansionary phases. They agree that expansionary monetary policies increase reserves in that commercial banks but this does not necessarily mean that banks will lend out all of the extra funds they have. The consumers, both households and firms, also do not take extra credit from the financial institutions. It is also not necessary that the lower interest rate will always increase investment and consumption. Keynesians are of the view that the consumption patterns of households and firms may not be dependent upon the interest rate. Due to these reasons, the Keynesians believe that monetary policy is less effective; so they support the fiscal policy more.

2.3.3 Supply Side Economics view

Ronald Reagan, the 40th President of the United States of America, was the one who suggested the supply-side economics known as Reaganomics. In supply-side economics, Reagan put forth the idea that tax benefits for

investors and entrepreneurs will have a trickle-down impact on the overall economic system. This meant that what was beneficial for the investor was also beneficial for the whole economic system.

Supply-side economics gives an insight into economics at a macro level like other economic theories. On the basis of these insights, supply-side economics try to assert policies and ways which can add to the economic stability and increase economic growth. Supply-side economics can be divided into three branches or pillars: tax policy, regulatory policy, and monetary policy.

The world had adopted the demand-side economics for a long time especially after the Great Depression of 1929. The Keynes view of demand-side economics stated that “demand creates its supply”. There were different problems which were faced in demand-side economics. Some of these problems included stagflation, taxplotation, budget deficits, reduced economic growth and a low level of productivity in both developing as well as developed countries. These factors led to the fall of demand-side economics and the rise of supply-side economics (Aktan, 1989). The supply-side economics stated that “supply created its demand”. This idea was known as Say’s Law. This is the main idea behind the three pillars of supply-side economics and it is the key factor in determining economic growth. The ideas of supply-side economics are opposite to the Keynesian theory based on demand. This meant that if consumer demand lags, the government can save the economy from recession by managing fiscal and monetary policy. So, it is clear that Keynesians believe that demand is the main stimulus for economic growth while followers of supply-side economics believe that the supply of goods and services is the main factor for economic growth.

2.3.4 New Classical view

In the year 1970, economists at the University of Chicago and Minnesota laid the foundation of a new school of thought in economics. It was called the new classical economics because it is based on the neoclassical approach and framework. It uses the standard economic principles help economists understand national output in terms of GDP. It has the most emphasis on rationality and rational expectations. It asserts that supply and demand both

arise from the rational behavior of the consumers, households, and firms. Keynesian macroeconomics did not assume that households and firms are economically rational. This meant that consumers had individual choices and there existed no specific rule based on general behavior (King, 2008). Keynes shifted his attention to the economy as a whole and not at the individual level. Without these market imperfections, aggregate demand might reduce which may result in unemployment. The excess production capacity and reduced demand in the economy will contribute to unemployment.

The New Classical Monetary Model, as adopted by the new classics, also assumed perfect competition in the economy with fully flexible prices and neutrality of monetary policy in terms of all the real variables. The assumptions which are the most significant in the New Classical model include; rational expectation, steady market clearing, imperfect information among agents, and natural rate hypothesis. The New Classical approach also assumes the dynamics of employment is stable, real interest rate and output independent of monetary policy and regards technological change to be the only driving force (Odhiambo & Twinoburyo, 2018). This served as the foundation of reconciliation between the classics and the Keynesians. Keynesian economists also explained consumption, investment, and other key elements including demand for money, in line with the assumption that individuals behave rationally and optimally.

2.3.5 New Keynesians view

Modern Keynesian economics can be described as the combination of methodological tools developed by business cycle theory with the main ideas of the Keynesian model and the theory of Keynes proposed in 1936. It is the combination of models of economic fluctuations and the ideas put forth by the real business cycle theorists. New Keynesians believe that understanding monetary policy is an important step while ignoring frictions such as inter-temporal price distortions, etc. They believe that fluctuations in employment and level of output are the direct result of fluctuations in the aggregate demand. The New Keynesians are of the view that the behavior of household and firms is the result of the optimization problem solved under the assumption of rationality.

There are three benefits of the new Keynesian approach. The first benefit is that it introduces nominal variables such as wages, prices, nominal interest rate, etc. in explicit terms. Secondly, new Keynesians economics does not have the assumption of perfect completion in goods market thus creating chances for positive price markup. Thirdly, it nominal rigidities and frictions taken from the population can adjust their prices (Galí, 2018). New Keynesians suggest that the inter-temporal economic frictions and rigidities can be removed in an economic system without reserve requirements.

These assumptions of the New Keynesians and their proposition to eliminate inter-temporal distortions mean that they are significant in anticipating the impact of long-term inflation. But money cannot be completely removed from the economic system. It has its significance especially in transactions with strangers and over long distances. Despite technological improvements and inventions, money has not been completely removed from the economy.

2.3.6 Post Keynesian view

Post-Keynesian economics recently emerged as an economic school of thought while the ideas which lay its foundation go further back in time. The post-Keynesian approach is considered more reliable as compared to other economic schools of thought. Neoclassical and neo-Keynesian approaches always regarded that growth factors and pattern within an economy were reliable despite the flaws and friction. The recession of 2009 raised many questions about the authenticity and validity of these schools of thoughts. The post-Keynesian approach always pointed out this misconception and accounted for the instability. The post-Keynesian approach gives a capitalist system of economics. It regards investment as the key variable because it is an essential element which determines employment and output levels. Entrepreneurs invest to start production of goods and services. This production employs labor and utilizes other factors. This cycle, on a major level, increases the aggregate demand.

The appropriate economic policies bring aggregate demand in line with the aggregate supply in such a way that employment level is sustained. The future is uncertain for both households and firms. Entrepreneurs are also not sure

about the future results of their present decisions. Due to the uncertainty, consumers fail to decide whether to invest money or save it. They are uncertain and fail to decide which option will be successful. Entrepreneurs always first see the prospects and choose the option which best suits them and one which is less risky. Pessimistic expectations about future increase the money increases and increase the pace of economic growth.

Theory of Interest, Employment, and Money gave the Liquidity Preference Theory and regarded it as theory of interest. This theory analyzed money as a store of value and Keynes said that the interest rate depended on the level of desire to hold money in liquid form or not in addition to the supply of money stock (Tily, 2006).

Commercial banks are also significant in addition to the central bank. Not only they allow the consumer access to the financial market but also provide them with credit and increase their liquidity. This explains the money is endogenous in nature which is a key factor for monetary policy. This fact proves that banks are not passive in their nature, as they do not only respond to money demand. Banks are commercial organizations with the motive of making a profit. They do so by providing credit and charging interest thereon. This means that greater the amount of money demanded, greater will be the interest revenue of the banks. Financial innovations and instruments allow banks to avoid authority regulations and monetary policy intentions.

The aim of monetary policy i.e. the full level of employment can be achieved if the policy successfully achieves the five goals; stability of general price level, exchange rate stability, financial system, liquidity, and expectation. The Post Keynesian monetary policy can achieve these goals by utilizing tools such as interest rate, regulation, as well as debt management. However, debt management will only be helpful if it manages to affect the yield curve at all times so that it does not become an investment-oriented yield curve. Debt management, if utilized correctly, can also help manage the interest rate and some other macroeconomic goals of monetary policy. This makes monetary policy even better and more effective.

Post-Keynesian need such instruments which are well-adjusted and more suitable for the prevailing economic condition. This can be achieved by credibility, transparency, the commitment of policymakers for the public welfare and flexible policies to adjust the instruments as per requirement. This is of great significance because monetary policy is a complex phenomenon and has a broad range of goals which need to be achieved with the utilization of very few macroeconomic tools. This means that consumers and especially entrepreneurs should have a positive expectation from the monetary policy so that they increase the demand until the required level of employment is reached.

Monetary policy is a very powerful instrument used by the central bank and other financial instruments. It can be used to increase or decrease the level of investment by shaping the yield curve without creating opportunity cost to capital goods, thus helping in the management of debt. Coordinated macroeconomic policies enable the monetary economies of production to establish a suitable and preferable environment for expectations and investment. Monetary Policy can also increase consumer credit level foster borrowings for agents to buy securities in the capital market. Post-Keynesian monetary policy has been criticized because its policies support increased aggregate demand and full-employment level (Sawyer, Dunn, & Arestis, 1999). After considering all these points, it is evident that monetary policy can prove to be a significant tool for coping with inflation and the demands of Inflation Targeting Regime. As compared to others, the Post Keynesian approach to monetary policy should be implemented, as is evident from this discussion.

2.3.7 Monetarist view

Generally, monetarists are of the view that the rate of total spending in terms of monetary expansion can be used to calculate Gross National Product (GNP). This implies that any shift or change in the spending pattern influences economic factors such as the level of output, general price level, and the level of employment. The monetarist analysis asserts that the economy is generally stable and recession and inflation do not occur often. The monetarist answer to the recession in the past is that they were the result of huge incremental change in the supply of money stock (Andersen & Carlson, 1970).

Monetarist views are against that of the Keynesians and they believe that monetary policy is not relatively ineffective. Stable economy, according to monetarist views, means that demand for money in the economy is stable and changes in the interest rate do not affect it. The stability of demand for money supply means that expansionary monetary policies create a surplus in the form of money which becomes available for spending. This surplus money increases the aggregate demand of consumers. Monetarists also oppose the classical idea that the economy always operates at full potential and full-employment level. This opposition is only in the short-run, where surplus money increases the aggregate demand and real GDP. In the long run, however, they also comply with the traditional views that the surplus money supply increases inflation while having no impact on the level of real GDP.

Monetarists are of the view that gradual inflations and deflations are the results of increased or decreased money supply in the economy. They propose that this can be managed only by adopting a general policy of constant or fixed money supply rule. This fixed money supply should coincide with the rate of real growth of the economy and should be controlled by the federal government. This implies that the fixed monetary policy changes GDP to increase without causing any change in inflation.

2.4 Effect of Monetary Policies on the Macroeconomic Variables

There are six macroeconomic variables which are directly affected by the monetary policies. These factors are; GDP, inflation rate, unemployment rate, per capita income, balance of trade, and balance of payments.

2.4.1 Effect of Monetary Policy on GDP

GDP is the sum of money or market values of all the finished goods and services produced within a specific region during a particular period. It serves as an effective measure to calculate a country's total domestic production and tells about the prevailing condition of a country's economy. It is equal to the sum of consumption (C), investment (I), government spending (G), and the value of net exports (exports minus imports NX). This can be shown in the equation as:

$$GDP = C + I + G + NX$$

GDP is a key tool to predict economic behavior because it tells whether demand in increased or decreased with the introduction of new goods and services or with the improvement in the goods and services already present. It also represents the country's standard of living. It can be said that GDP is an important economic indicator which tells about the efficiency of any economic system and helps countries and economists compare performance with others. Monetary policy and other policies affect demand and supply which causes changes in the growth of domestic output. This change can have an impact on the productivity of labor and investments. Monetary policy can affect GDP in two ways. One is by using the interest rate as a tool which affects the exchange rate. The change in the exchange rate increases or decreases the value of net exports (NX) thus having a direct impact on the value of GDP. Secondly, the interest rate can also affect the demand thus disturbing the value of domestic consumption (C). Expansionary money supply increases the aggregate demand due to surplus money stock now available to the consumer. This is responsible for growth in the real GDP (Hameed & Ume-Amen, 2011).

Depending on the factors which are incorporated while calculating GDP, it can be divided into certain categories. Nominal GDP is the measurement of the changes in market prices that have occurred during the year of consideration due to inflation or deflation. It only accounts for the net amount of money which is spent. It is sometimes referred to as money GDP. Real GDP is the most commonly used indicator. It is also called inflation-corrected GDP. The real GDP is the inflation-adjusted nominal GDP that enables economists and governments to historically compare data such as economic output, etc.

Economists do not agree on the point that monetary policy is the only tool which should be used by the central banks and other financial institutions for stabilizing the economy. Many economists believe that fiscal policy is also needed along with the monetary policy for stabilizing the economy and controlling the level of inflation. In terms of monetary policy, the short-term interest rate can prove to be significant for controlling inflation.

2.4.2 Effect of Monetary Policy on Unemployment Rate

Monetary policy aims to reduce the level of unemployment. It is one of the macroeconomic goals of monetary policy to reach the level of full employment. This is just a theoretical perspective because economists fail to cover for voluntary unemployment in the economy at any stage. They usually prefer the expansionary policies because this increases the stock of money supply in the economy and makes the availability of credit easier. The presumption behind the idea is that with surplus money supply and credit available on easy terms, entrepreneurs will be able to expand their business. This expansion will create new employment opportunities and also add to economic growth. In practice, monetary policy changes have had a very small impact on the real economy in terms of unemployment as well as industrial production (Odhiambo & Twinoburyo, 2018). If the monetary policy is able to impact the real interest rates in the long-run, it can affect the capital accumulation in such a way that cost of capital is impacted which contributes to the added demand for labor. This increased demand for labor supply reduces the level of unemployment.

2.4.3 Effect of Monetary Policy on Inflation Rate

Inflation is a macroeconomic phenomenon and it means the continuous increase in the price level over the period. This is because the currency devalues and this devaluation is because of printing money in excess of the country's original wealth. This is a monetary phenomenon which is directly controlled by the central bank. Monetary policy is expected to influence the level of money supply to a level of stability in such a way that the strength of the money supply and the value of the domestic product should match. Excess of it causes inflation leading to some economic problems such as general rise in prices. Money supply, in the long-run, is inflationary in nature and contributes to the monetary neutrality in the long-run (Odhiambo & Twinoburyo, 2018).

2.4.4 Effect of Monetary Policy on per capita income

Per capita income refers to the amount of income earned by each individual within a certain area (country, state, city, etc.) in a given period. The formula for calculating per capita income can be written as dividing the total income of an area with the total number of individuals living there. Higher the income per capita, higher will be the purchasing power of the individuals (Irfan, 2011).

Studies have shown that money supply positively effect GDP per capita growth, but the strength of impact is relatively weak, while change in interest rate do not affect economic growth, interest rate has no impact on GDP per capita growth (Irfan, 2011).

2.4.5 Effect of Monetary Policy on Balance of Trade

Balance of trade is an important and key part of the current account of any country. It is the difference between imports from exports. This gives the value of the balance of trade which is also used in the calculation of GDP. A positive balance of trade creates an overall trade surplus while negative balance, imports greater than exports, creates a trade deficit. The trade surplus is important in the recession phase so that demand can be increased and so is the employment level. A trade deficit is beneficial in the expansionary economy as imports create competition which reduces the price level. The central bank controls these factors by adopting an expansionary monetary policy in the recession phase while the opposite in times of recession. Studies have found that monetary policies are only limited to trade surplus sectors and they have less scope in the deficit (Nizamani, Karim, Zaidi, & Khalid, 2017).

2.4.6 Effect of Monetary Policy on Balance of Payments

Every country aims to achieve macroeconomic objectives and goals which are in accordance with the balance of payments (Salubi & Okoye, 2016). Central banks achieve this objective by managing tools of monetary policy including interest rate, money supply, and especially exchange rate. Empirical analyses show that monetary policy resented by money supply has a positive impact on Balance of Payment BOP and growth of GDP (Ismaila, 2015). The estimated results show a positive association between the BOP and the monetary variables of Money Supply, Interest Rate and Exchange Rate (Imoughele, 2015).

2.5 Central Banks Influence Money Supply

Central banks and financial institutions prefer using monetary control and tools to influence money supply instead of physically printing it. The US central bank has changed its management policy regarding money supply from controlling the bills to controlling the factors such as interest rate, etc. This is an effective

tool which influences consumption, saving and investment. High-interest rate means more investment and less spending while the borrowing becomes expensive.

2.6 Increasing and Decreasing Aggregate Demand

It can be inferred that monetary policy is an efficient method despite the criticisms. Monetary policy is used by the Central banks to control economic factors such as unemployment, aggregate demand, inflation, the level of productive output, etc. Monetary policy has now become a key indicator of the prevailing economic condition in a country. Central banks can control the money stock by controlling injections and withdrawals. This control is established by using different tools of monetary policy. This helps central banks to control the level of inflation using monetary policy instruments for macroeconomic objectives.

2.7 Existing Literature

Monetary policy is very endogenic. This means that computing the effect of monetary policy is very important. The monetary establishment react to the macroeconomic conditions increases this endogeneity. Thus, it is important to solve the endogeneity problem before analyzing the impact of monetary policy on other macroeconomic variables. Friedman and Schwartz (1963) used a method to control exogenous shocks of monetary policy (Romer & Romer, 1994; Boschen & Mills, 1991). The existing literature describes the impact of monetary policy on economic growth through different macroeconomic variables. The impact of monetary policy on economic growth is analyzed through macroeconomic indicators like, interest rate, money supply, inflation, and exchange rates while the economic growth can be studied from different variables like GDP etc.

Kryeziu (2019) conducted a study to investigate the impact of inflation rate on th economic growth in Eurozone countries . The researcher collected the data for period (1997-2017). Linear Regression Model was used to find the relationship between the variables. The results of the study show that there is positive relationship between inflation and economic growth. In comparison, the study conducted by Hakeem (2015) outlined the relationship between GDP

growth and other macroeconomic variables. The researcher used ARDL to investigate the relationship in context of Nigeria for period 2001-2013. The results of the study outlined that inflation has a negative effect on economic growth. Bakare et al. (2015) also revealed that inflation and growth rate is negatively related using OLS. Hasanov (2011) outlined that inflation below 13% (the optimal level) will show positive growth in GDP. However, inflation above 13% threshold will decrease GDP growth by 3% in Azerbaijan for period 2000-2009.

Marbuah (2010) conducted a study to examine inflation and growth nexus for Ghana during 1955-2009. The researcher conducted Bound Tests to outline the extent of relationship. The results of the study outlined that inflation thresholds of 6% and 10% were obtained without considering the structural breaks in the proposed study. In comparison, considering the structural breaks, 10% was obtained as an optimal threshold. Chughtai et al. (2015) conducted a study to explore the effect of macroeconomic variables on growth. The researcher investigated the relationship in context of Pakistan for period 1981-2013. The researcher used Multiple Linear Regression Model and the results of the study outlined that inflation and interest rate have a negative relationship with GDP.

Drobyshevsky et al. (2016) explored the relationship between interest rates and economic growth. The study observed the degree to which interest rates may affect the growth. The analysis considered theoretical concepts as well as international practices in high-interest-rate environments to justify the relationship between interest rate and economic growth through VAR model in Russia. The study found that high nominal and real interest rates may not affect economic growth if there is low inflation is expected. Similarly, if the economy is attractive to foreign investors, technological transfer and domestic savings also play an important role in stabilizing the economic growth in presence of high nominal interest rates.

Onyeiwu (2012) conducted a study to outline the relationship between the monetary policy and economic growth in Nigeria. The researcher used Ordinary Least Square Method OLS to analyze the data between 1981 and

2008. The results of the study outlined that money supply positively impact GDP and BOPs. The study found that money supply is negatively related to rate of inflation. Thus, the study recommended that there must be a favorable environment for investment through interest and exchange rate as well as liquidity. Similarly, Gul, Mughal, and Rahim (2012) outlined the relationship between economic growth and monetary instruments. The study focused on GDP, money supply, interest rates, exchange rates, and inflation. The researcher used OLS model to investigate the relationship between economic growth and monetary instruments. The results of the study outlined that increase in interest rate is negatively related with economic growth.

Us (2004) investigated the dynamics of inflation in the Turkish Economy. Turkish economy has experienced high level of inflation over a huge period. The researcher used a VAR and variance decomposition (VDC) model to examine the relationship. The results of the study outline that inertial inflation has no relationship with monetary phenomenon in Turkey. Therefore, it is more of a fiscal dominance.

Sun (2017), investigate if the monetary policy affect the economic development in Laos. The researcher used annual time series data from 1989-2016. Johansen Co-integration and Error Correction Model been applied. Outlined that money supply, interest rate and inflation rate had negative impact in the long-run on the real GDP per capita, real exchange rate was the only variable that has a positive sign. Evans (2018) revealed that money supply positively impacts on GDP per capita, while interest rate has negative effects. The study conducted to investigation of the relative impacts of monetary and fiscal policies on economic development in Africa for period between 1995 to 2016 by using St. Louis equation and Generalized Method of Moment (GMM) approach.

2.7.1 Summary of the literature reviews

Table 2.1: Summary of the literature reviews

Author	The aim of the study	Data and Country	methodology	Results
Kryeziu (2019)	Investigate the inflation rate and its impact on the economic growth	Eurozone countries The data for period (1997-2017)	Linear Regression Model	The results indicated that there is a positive impact of inflation rate on the economic growth
Hakeem (2015)	Investigation relationship between GDP growth and other macroeconomic variables	Nigeria Data for period (2001-2013)	ARDL	The results of the study outlined that inflation has a negative effect on economic growth
Bakare et al. (2015)	The purpose of the study is to examine the impacts of inflation on growth	Nigeria Data for period (1986-2014)	OLS	Revealed that inflation and growth rate is negatively
Hasanov (2011)	The study tried to uncover threshold effect of inflation on growth	Azerbaijan Data for period (2000-2009)	Threshold Regression Model	Outlined that inflation below 13% (the optimal level) will show positive growth in GDP. However, inflation above 13% threshold will decrease GDP growth by 3% in Azerbaijan for period 2000-2009.
Marbuah (2010)	Examine inflation and growth nexus	Ghana Data during (1955-2009)	Bound Tests	The results of the study outlined that inflation thresholds of 6% and 10% were obtained without considering the structural breaks in the proposed study. In comparison, considering the structural breaks,

				10% was obtained as an optimal threshold
Chughtai et al. (2015)	Explore the effect of macroeconomic variables on growth	Pakistan Data for period (1981-2013)	Multiple Linear Regression Model	The results of the study outlined that inflation and interest rate have a negative relationship with GDP.
Drobyshevsky et al. (2016)	Explored the relationship between interest rates and economic growth.	Russia Data for period (2010-2015)	VAR Model	The study found that high nominal and real interest rates may not affect economic growth if there is low inflation is expected. Similarly, if the economy is attractive to foreign investors, technological transfer and domestic savings also play an important role in stabilizing the economic growth in presence of high nominal interest rates.
Onyeiwu (2012)	Conducted a study to outline the relationship between the monetary policy and economic growth	Nigeria The data for period (1981-2008)	OLS	The results of the study outlined that money supply positively impact GDP and BOPs. The study found that money supply is negatively related to rate of inflation
Gul, Mughal, and Rahim (2012)	The relationship between economic growth and monetary instruments	Pakistan Data for period (1995-2010)	OLS	The results of the study outlined that increase in interest rate is negatively related with economic growth.

Us (2004)	Investigated the dynamics of inflation	Turkish	VAR and variance decomposition (VDC) model	The results of the study outline that inertial inflation has no relationship with monetary phenomenon in Turkey. Therefore, it is more of a fiscal dominance.
(Sun,2017)	Investigate if the monetary policy affects the economic development	Laos Data from (1989-2016)	Johansen Cointegration and Error Correction Model	Outlined that money supply, interest rate and inflation rate had negative impact in the long-run on the real GDP per capita, real exchange rate was the only variable that has a positive sign.
(Evans,2018)	Investigation the relative impact of monetary policy and fiscal policy on economic development	Africa The data for period (1995-2016)	St. Louis equation and (GMM) approach	Revealed that money supply positively impacts on GDP per capita, while interest rate has negative effects

CHAPTER 3

ANALYSIS OF TURKISH ECONOMY

3.1 General Analysis of Turkish Economy

The Turkish economy somehow managed to survive in the great depression of 2009. The economic activity reduced and the economy went into the recession phase but the currency and/or the economy did not collapse. Unlike the 1990s crisis, the crisis of 2009 was more of international nature and not the domestic ones which majorly affected the Turkish economy back then. This analysis shows that the economy managed to correct its internal lacking and defects.The dirigisme in the Turkish economy resulted in suboptimal allocation of resources which meant that the speed of economic growth will be less. This poor economic planning caused the GDP to fall from 3.3 in the 1950s to 2.7 in 1990s. Despite the boom in many European countries, Turkey failed to bridge the economic gap mainly due to strong state-interventionist and inward oriented-economic policies (Macovei, 2009).

3.1.1 Economy during 2000-2016

After the start of the year 2000 and especially in the last decade, Turkey has become a major economy with a lot of potential for growth and development. The economic and banking reforms which were implemented during the period of 5 years i.e. from 2002 to 2007 were the major contributing factors for this boom in the economy. This made the economy more stable and made it attractive for both foreign and domestic investments. This stability was also seen in the 2007 crisis when the international economy was deeply affected. Turkey managed to grow and prosper in those days and was not majorly disturbed by international economics. The country which struggled in the

economic sector due to poor economic policies and strategies has managed to secure a place in the list of G20 countries. However, the growth rate has slowed down after 2010. The major decrease was seen in 2016 when it fell from 6.1% to only 2.9%. This was even below the country's historical average (Ketenci, N., & Aydoğan, E. T. 2019).

3.2 Future Expectations:

Turkey wants to climb to the league of top ten economies in the world by the year 2023. The revised economic policies may have proved to be beneficial in the past but in the future new problems have arisen. Problems like geopolitical risk, law and order situations, security, the war against terrorism, corruption, and reduced transparency judicial independence have all posed threats on the economy (Keefe, P. R. 2013). International relations, especially tensions with the European Union on changing to a presidential system of government, negatively impact consumption and investments are also reduced. For meeting its objective to become one of the top ten economies, Turkey will require major economic reforms and also needs to counter all the political and social problems.

3.3 Comparison between structures of central bank of Turkey with central bank of USA

3.3.1 History and Organizational Structure

Turkish policymakers were of the view that they should have a central bank to control all the monetary policies and regulations. They wanted to reinforce economic independence as the country would then be able to formulate its monetary policies and will have control over all the factors of economics. Having a central bank meant that the country's economy can be controlled efficiently by managing tools such as interest rate, discount rate, etc. This idea was first made public in the 1923 economic conference held in İzmir. As a result of this motion put forward in this conference and after many efforts, the draft bill was finally accepted in 1927. In the years 1928 and 1929, Dr. G. Vissering (Central Bank of Netherlands) and Count Volpi (Italian Expert) respectively suggested that the creation of Turkish central bank was necessary for the betterment of the country's economy. The law for the Central Bank of the Republic of Turkey (CBRT) was passed and published in 1930. The bank

started its operations from October 3, 1931 (Central Bank of the Republic of Turkey, 2017). It was established as a joint-stock company and consists of 17 different departments. The organization chart is topped by the general assembly. On the second level, there are the auditing committee and the board of directors. The governor succeeds them and then the whole organizational network starts to divide into branches and sub-branches.

The Federal Reserve System works in the capacity of the central bank in the United States of American. Founded by the Congress in 1913, the purpose behind the creation of the Federal Reserve System was to develop a flexible, safe and stable financial system. The organizational chart of the U.S. central bank is different from that of the Central Bank of the Republic of Turkey (CBRT). It is headed by the Federal Reserve System which sub-branches into the Federal Reserve Board of Governors, 12 Federal Reserve Banks, and Federal Open Market Committee (Board of Governors of the Federal Reserve System, 2017). The Federal Reserve System is supervised by Congress.

3.3.2 Roles and Functions

The Central Bank of the Republic of Turkey is responsible for the regulation of monetary and exchange rate policies in the country. Some other duties which it performs include; price stability, financial stability, exchange rate regime, the privilege of printing and issuing currency, and payment systems (Central Bank of the Republic of Turkey, 2017). Price stability means that the interest rate is decreased to a level where it has no major impact on economic decisions. The bank has a variety of monetary tools which it uses to achieve this objective. This point refers to the fact that the central bank has complete autonomy in its operations. CBRT takes decisions to ensure that the economic and the financial system of Turkey remain stable. The bank works in close coordination with the government and through mutual consensus the exchange rate regime is decided and implemented. The central bank also keeps and manages the gold and foreign exchange reserves to benefit the country. Central Bank of the Republic of Turkey (CBRT) has complete authority for printing currency notes. It can print notes as and when required. In addition to managing financial systems and the currency, CBRT also develops new methods for carrying out transactions.

The Federal Reserve System of the United States looks after different areas of public interest so that the overall economy of the United States can grow easily and the financial system of the U.S. can stabilize. The Federal Reserve System and its three units; Federal Reserve Banks, the Board of Governors, as well as the Federal Open Market Committee, work in close coordination with the aim of developing a prosperous economy and make development and growth easy. The Federal Open Market Committee is responsible for deciding on the monetary policy as per the instruction of Congress. This helps the economy increase the level of employment, stabilize the price level, and effectively manage interest rates. The Federal Reserve System keeps a close watch on both domestic and international indicators and risks and makes effective changes in the monetary policy to save the country from the negative impact of any such event. It also monitors other financial institutions and oversees their impact on the national economy. Like the Central Bank of the Republic of Turkey (CBRT), the Federal Reserve System of the U.S. also strives to develop new, effective, and secure transaction channels. It also extends its support, both in terms of money and guidance, for the protection of consumer and development in the community (Board of Governors of the Federal Reserve System, 2019).

3.3.3 Legal Framework

The law registers the Central Bank of the Republic of Turkey (CBRT) as a joint-stock company. The law states all the rights and responsibilities of the bank (Board of Directors of the Federal Reserve System, 2017). In contrast, the U.S. Federal Reserve Act states that the key functions of the Federal Reserve System, the Board of Directors, and the Open Market Committee are to furnish elastic currency, rediscount commercial paper, supervise the banking in the United States, and for any other purpose as the Central Bank may deem fit. (Board of Directors of the Federal Reserve System, 2017).

3. Monetary Policy in Turkey

For the past few years, the Turkish economy is having a problem with inflation. Rise in the level of inflation, changing pricing behavior, and inflation expectation have affected the monetary policy assumed by the CBRT. The Monetary policy adopted in 2018 had faced challenges in controlling the level of inflation. The Turkish economy has many factors which may contribute to inflation and economists find it tricky to locate the root cause. The economy of Turkey is very dynamic and has a lot of developments and prospects for growth.

3.4 Monetary Policy 2019

As it is one of the objectives of the central bank to mediate the level of inflation, the CBRT wants to achieve it so that the economy at a whole can be stabilized and the hurdles in the path of economic growth can be removed. The monetary policy 2019 as accepted by the Central Bank of the Republic of Turkey (CBRT) has an inflation target of 5 percent. The uncertainty band around this target is fixed at 2 percent in both positive and negative directions, like in the previous years. The central bank (CBRT) has chosen to implement the floating exchange rate regime for the current period. The central bank may also take any necessary action or it may implement any other changes as it deems necessary (Central Bank of the Republic of Turkey, 2018). In the year 2018, the central bank had adopted a tight monetary policy to control the impact of inflation. The problem of exchange rate volatility and unhealthy price formations were countered by using different tools of monetary policy.

CBRT has planned to control the inflation problem so that consumption, investment, level of employment, and other economic factors are not negatively affected. This will help the economy to flourish and reach the set targets. The central bank has set the inflation target and plans to communicate with the government if the attempts to manage inflation fail or if the inflation rate cannot be successfully brought to the set target. The reason for implementing the floating exchange rate regime is that the economic elements such as the supply and demand of foreign exchange are controlled by the market indicators and are affected by the monetary and fiscal policies put in

place. The foreign exchange rate is also influenced by speculations and expectations. The CBRT has not set any target for the real or nominal exchange rate but is closely watching the ups and downs. In the monetary policy for 2019, the central bank has made sure that if the rate increases or decreases to such an extent where it can affect the economic stability, the central bank will take all the necessary actions to maintain a certain level. Any risk factor which arises during the year will be dealt with using the proper tools and the necessary techniques available.

3.5 Future Strategy

The central bank (CBRT) considers that modern trade wars and risks facing the emerging markets to be the major risk factors for the Turkish economy in 2019. However, the bank plans to counter all such risk factors and hurdles using the macroeconomic and monetary tools it has at its disposal. CBRT stated in the monetary policy for 2019 that the central bank may persist to provide support to the economy, especially to the commercial banks, both in terms of total liquidity and the foreign exchange liquidity. The central bank wants to play the role of a stabilizing agent which will support market stability and help the economy grow (CRBT, 2018). The CBRT is trying hard to achieve its objective of emerging as one of the top ten economies in the world (Soytas and Sari, 2003). The central bank is of the view that the monetary and exchange rate policy will prove to be significant for the achievement of this objective.

3.6 Analysis of Economic Growth of Turkey

Turkey, a land of 81.4 million people, is facing many issues with regards to economic growth. The country prospered and thrived even in difficult times for the past decade and a half. It even managed to recover from the global economic crisis of 2008/09. All of this was due to the idea and efficient monetary and fiscal policies and maintain good ties internationally which enabled the country to improve and prosper on economic grounds. GDP and per capita income rose while the poverty level halved from 2002 to 2015. The main reason for Turkey’s robust and fast-paced economic growth is the implementation of ambitious economic reforms. The Turkish federal government also played a key role in Turkish development by making

programs which were aimed at the betterment of the condition of weak and unattended factors. Urbanization and international trade also opened new opportunities for Turkey. Economic policies, fiscal policies, foreign trade, harmonizing laws and policies in accordance with the European Union (EU) proved very fruitful for the Turkish economy.

3.6.1 Prevailing Condition

Volatility in market and increasing financial stress has negatively affected the Turkish economy. In order to maintain the existing situation and development, it is necessary to restore stability and accelerate structural reforms. Turkish economic growth fell in 2018 to a historic low of 2.7% (World bank, 2018). The economic activity, in the last two quarters, was also not what was expected. The year 2018 had an increased level of economic turbulence which posed a negative impact on the entire Turkish economic system (Aliriza, 2019). Even in the last quarter of 2018, private consumption showed a negative sign. This was the first incident since 2009 and the private consumption made more than 50% of the GDP. The nominal effective exchange rate declined by 25% and consumer inflation exceeded 20% (World bank, 2018). The monetary policy interest rate increased three times and reached a record high of 24 percent. Government spending only showed an increase of 0.5 percent in the fourth quarter of 2018 while the annual increase in this rate was equal to 3.6 percent. Among all the negative balances, there was only one factor of net exports which showed a positive increase equal to 10.6 percent. Since the beginning of the last quarter of 2018, the exchange rate became stable to some extent. Gross international reserves have also increased 20 percent to the level of USD 99 billion. The Turkish economy showed a sudden downfall in the private consumption and investment level (World Bank, 2019). The corporate sector is severely stressed due to increasing debt levels both in foreign currency and in foreign exchange. The weak domestic demand is also a contributing factor to this stress. If imports had not been reduced given the external adjustments, the damage to the economy would have been greater.

3.6.2 Analysis

Based on the economic indicators from the year 2018, it can be predicted that overall growth can reduce by 1 percent in 2019 due to contractions in the last

quarter of 2018 to the second quarter of 2019. Private consumption is expected to increase given appropriate policies and employment support programs. The deficit, however, is forecasted to increase in 2019. Growth in government consumption will be seen in 2019 while public and private investments are thought to decrease. Import volumes will decrease further and price competitiveness will increase. Based on the economic policies and economic indicators, it can be assumed that growth will increase by 3 percent in 2020 with an increase in consumption and investment in the private sector. This growth will further rise to 4 percent in 2021. Keeping in mind the economic indicators and policies which are being adopted, it can be predicted that inflation will decrease to 10 percent mark (World Bank, 2019). The tight monetary policy will be the main factor affecting the inflation rate.

CHAPTER 4

DATA AND METHODOLOGY

4.1 Data and Model Specification

The impact of monetary policy on economic growth in Turkey is examined through quarterly time series data from 2006 to 2018. To investigate the relationship between economic growth and monetary policy, researcher has determined indicators such as GDP per capita for economic growth as explained variable and consumer pice index (CPI), interest rate (INTR) and money supply (M3) for monetary policy as explanatory variables. The data used in the study were obtained from (CBRT) Central Bank of the Republic of Turkey and World Bank. GDP per capita were transformed from low to high frequency becuase of insufficiency of data. The econometrical relationship between monetary policy and economic growth is represented in the below equation:

$$GDP\ per\ capita = \beta_0 + \beta_1 INTR + \beta_2 CPI + \beta_3 M3 + \varepsilon_t \quad (4:1)$$

$GDP\ per\ capita$ = Gross Domestic Product per capita

INTR = Interest Rate

CPI = Consumer Price Index

M3 = Money Supply

ε_t = Error Term

β_0 is the intercept, $\beta_1, \beta_2\ and\ \beta_3$ are the coefficients of the independent variables which show the elasticity of the variables.

GDP per Capita: The study used GDP per capita as proxy variable for economic growth. Peoples economic well-being in any country depends on the amount of goods as well as services produced in the country that can be obtained by measures of GDP per capita (Gross Domestic Product per capita), the formula for obtaining GDP per capita is dividing GDP by number of population in the country. It is one of the important indicator for evaluating standard living of individuals living the country, economic strengthens and performance of countries. Increasing output of goods and services in any country not only cause an increase in people's ability to purchase these output, but also an increase in GDP will tends to increase spending on non-material things that have great value for well-being for instance healthcare, education and so on. Because of that reason, it is a vital indicator for comparing economic situations and well-being of countries people. Therefore, growth in GDP has impressive role to increase or improve human well-being in any country or society (Bolt, 2014).

Interest rate: Generally banks pay interest on deposits. An interest rate is the lenders percentage of principal amount paid for the use of his cash. The principal is the lent amount of money.

Inflation rate: Inflation is a macroeconomic phenomenon and it means the persistent increase in the price of goods and services over the period. This is because the currency devalues and this devaluation is because of printing money in excess of the country's original wealth. This is a monetary phenomenon which is directly controlled by the central bank. Monetary policy is expected to influence the level of money supply to a level of stability in such a way that the strength of the money supply and the value of the domestic product should match. Excess of it causes inflation leading to some economic problems such as general rise in prices. Money supply, in the long-run, is inflationary in nature and contributes to the monetary neutrality in the long-run. Consumer Price Index (CPI) represents inflation which it measures changes in the price level of a weighted average market basket of consumer goods and services purchased by households.

Money Supply: Central banks and financial institutions prefer using monetary control and tools to influence money supply instead of physically printing it. The US central bank has changed its management policy regarding money supply from controlling the bills to controlling the factors such as interest rate, etc. This is an effective tool which influences consumption, saving and investment. M3 is abroad money that measures the money supply which includes M2 as well as Repo, money market funds and debt securities issued. M2 consist of (M1: currency in circulation + demand deposit) plus demand deposits)

4.2 Empirical Analysis

In this section the testes that are going to be use in the study will be expalin. Before decide which model would be use for the study, some primarily tests should be employ, the unit root test is the most important test should be apply to test the stationary of the series. There are several tests can be use for testing unit root, but because there is no big different between them, then the ADF test (Augmentd Dicky-Fuller Test) will be conduct. Further more, the ADF result will show us the optimal model can be use for the study. From the ADF test results the appropriate model for the study is ARDL (Auto Regressive Distrubtion Lag) model. Furthermore, Bounds test will be conduct to find out the long-run relations between the variables. Finally the most important diagnosting tests such as serial correlation to examine autocorrealtion, white test for Heteroskedasticity and the Jarqcue – Bera test for normality distribution of the residuals will be conducts. For the stability of the estimated parameters the CUSUM and CUSUMSQ tests will be conducts repectively.

4.2.1 Stationary

Stationary in econometrics refers to the time series that has statistical characteristics such as mean, variance and autocorrelation are all constant over the period. Hence, the stationary statistics are helpful in depicting the future behavior of the statistics. The mean and autocorrelation of the series must not depend on the time. Time series creates a grave problem for econometrics. Only when the mean, variance and covariance are stable and constant over the time, then the series are stationary. Stationary, non-

stationary and unit root are used interchangeably in time series studies (Wooldridge, 2013). .

Furthermore, spurious regression exists whenever two non-stationary series are regressed. The value of R square against Durbin Watson is used to detect spurious regression. If the value of R square is greater than the value of Durbin Watson, this confirms the existence of spurious regression. There are many tests that can be employed to confirm that the regression is spurious. Kwiatkoeski-Phillips-Schmidt-Shin, Augmented Dickey-Fuller, Dickey-Fuller GLS and Phillips-Perron are some of the commonly used tests to validate the spuriousness of regression. This research will employ (ADF) to verify that the regression is spurious or not during the preliminary tests. The ADF test tested the null hypothesis that a unit root is present to confirm that the time series is stationary in an autoregressive model.

4.2.2 The Augmented Dickey-Fuller (ADF)

The ADF test is an extended version of Dickey-Fuller Test. It is one of the fundamental tests that help to verify stationarity. It involves lagged terms of controlled variables with the aim to remove autocorrelation from the model. There are many selections benchmarks while conducting the lag length that a researcher may take into account, these criterions include: Akaike Information Criteria (AIC), Schwartz Bayesian Criteria (SBC) and Hannan-Quian.

The assumption for ADF test is that the error terms have a constant variance and are statistically independent. While conducting ADF test, it is very important to make sure to meet this basic assumption. The ADF presented in normal form is as below shown in equation 4.2.

$$\Delta y_t = \beta + \lambda_t + \emptyset y_{t-1} \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + \mu_t \quad (4:2)$$

Where β is a constant, p the chosen lag, $\emptyset$ and α the coefficients of the regression, λ_tt is a trend term and μ_t is the white noise. The unit root test has the following hypothesis test:

$H_0 : \emptyset = 0$, unit root is exist

$H_1 : \emptyset < 0$, unit root does not exist

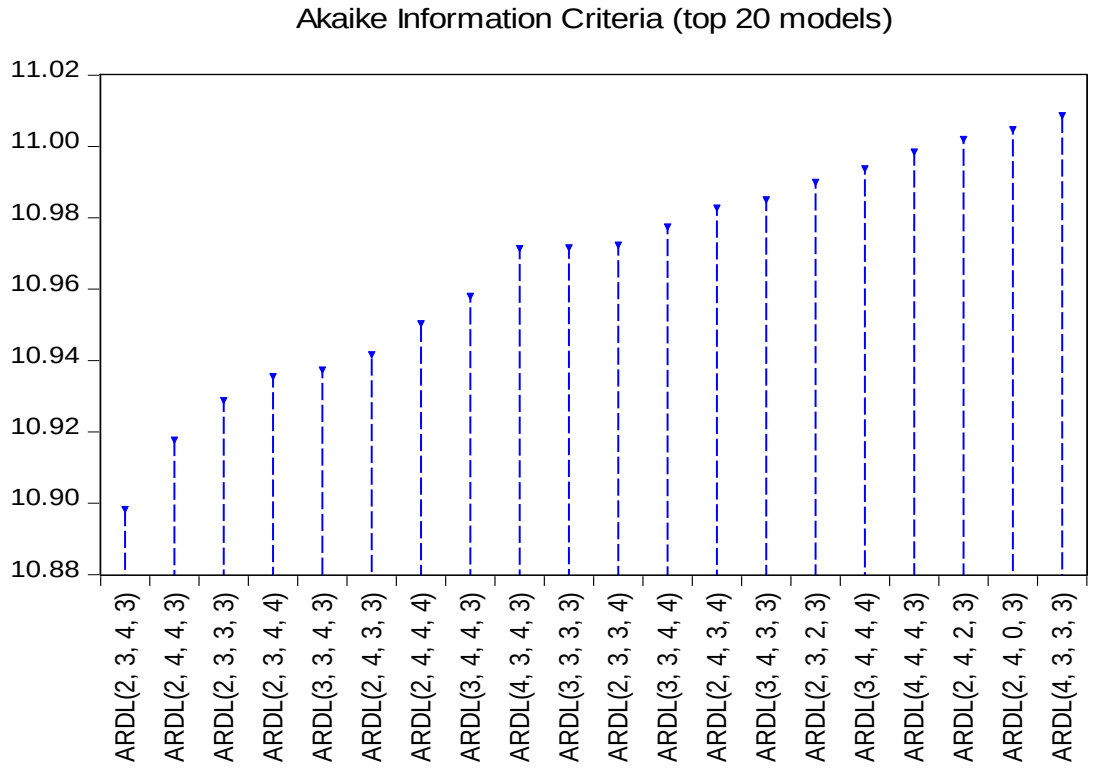
4.2.3 Akaike Information Criteria (AIC)

The study used (AIC) to find out the optimal lag length for the model as proposed by Akaike (1974). It can be expressed by the below formula:

$$AIC = 2K - 2\ln(L) \quad (4:3)$$

K is the number of parameters and L is the maximized log-likelihood. The taken model is the one, which minimizes this expression. The criteria take into account the fitness to presence *L* and seek to avoid overfitting of the model by presenting a penalty for each extra parameter *K*. The figure was used to detect top 20 separate ARDL model, the lower the AIC's value, the better the model depended on the model's benchmark analysis. As observed in Figure 4.1, it appears that the first ARDL model (1, 0, 1, 0) is preferred among all others because it's value is the lowest value of all Akaike Information Criteria Models.

Figure 4.1 Akaike Information Criteria



Source: author own computetion with Eviews 10

According to the results obtained through the AIC figure above, the (2, 3, 4, 3) are the optimal numbers that can be selected for analysis. Two lag for dependent variable (GDP per capita, three lag for interest rate (INTR), four lag for consumer price index (CPI) and three lag for money supply determined by the Akaike Infırmation Criteria.

4.3 Model Specification

4.3.1 Auto Regressive Distribution Lag Model (ARDL)

For co-integration analysis between inflation, interest rate, money supply and the GDP per capita, the study employed Auto Regressive Distributed Lag (ARDL), bound test method that developed by Pesaran and Shin (1998) because of spurious and non-spurious regression issue in time series data. While the set of variables are integrated into an order at different levels, the validity of stationarity data cannot be estimated through the traditional techniques. Granger and Newbold (1974) argued that the traditional techniques can produce inappropriate results as significant coefficients meaning that low R square values and Durbin Watson statistic act like random variables. In comparison, there is a possibility to extract valid conclusions from the proposed model even through non-stationary variables if there is co-integration between the underconsidered variables. The existence of at least one linear combination between the two sets of non-stationary I(*d*) and I(*p*) variables ensures co-integration. Hence, the existence of at least one linear combination ensures the precense of a long-term relations among the variables.

The traditional model developed by Engle and Granger (1987) and Johansen and Juselius (1990) had a methodological limitation, as it required the same order of integration for all variables involved. However, this problem was solved by the model presented by Pesaran and Shin (1998) that allowed using a mixture of I(1) and I(0) in the regression. Therefore, the model imposed that the dependent variable of the study must be I(1). This means that there is should not be any variables that have higer than one integration order. The ARDL equation can be represented as below:

$$\Delta y_t = \beta_0 + C_0 t + \sum_{i=1}^{q} \lambda_i \Delta y_{t-i} + \sum_{j=0}^{p} \varphi_j \Delta x_{t-j} + \delta_1 y_{t-1} + \delta_2 x_{t-1} + \varepsilon_t \qquad (4:4)$$

Where, β_0 is a constant, C_0 is the time trend, ε_t is the white noise error. The coefficients λ_j & φ_i for all j represents the short-run relationship while δ_1 and δ_2 corresponds to the long-run relationship.

Consequently, unit root test with ADF test was apply to find out the order of integration among GDP per capita, interest rates, money supply and inflation. Because the order of integration of the dependent variable as well as the combination of I (1) and I (0) regression supported the select of the ARDL model for the study. Thus, ARDL model can be expressed in general form as below equation 4.5 below:

$$\Delta\left(GDP_{Per\ cpaita}\right)_t = \beta_0 + \sum_{i=1}^{p0} u_i \Delta\left(GDP_{Per\ cpaita}\right)_{t-i} + \sum_{i=0}^{q1} \theta_i \Delta(INTR)_{t-i} + \sum_{i=0}^{q2} T_i \Delta(CPI)_{t-i} + \sum_{i=0}^{q3} \vartheta_i \Delta(M3)_{t-i} + \delta_{1(Real_{GDP})_{t-1}} + \delta_2(INTR)_{t-1} + \delta_3(CPI)_{t-1} + \delta_4(M3)_{t-1} + \varepsilon_t \quad (4:5)$$

Where: β is intercept, the coefficients' u, θ, T, ϑ refers to short run while, the coefficients' δ_1 to δ_4 refers to long-run parameters and ε_t is a white noise error term.

4.3.2 F- Bound tests and error correction model

The results obtained from the above equation (4:5) can help to determine if a long-term relationship is present among the variables or not. therfore, F-test is performed to validate the precense of a long-term co-integration among the variables of the study. F-test involve analysis of coefficients for one period lag variables, i.e. δ_1 to δ_4 be jointly zero. Thus the following hypothesis test is performed:

H_0 : $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$: No long-run relationship

H_1 : $\delta_1 \neq 0 \cup \delta_2 \neq 0 \cup \delta_3 \neq 0 \cup \delta_4 \neq 0$: Exists long-run relationship

F-test in ARDL framework depends on:

1. The mix of *I*(0) and *I*(1) independent variables.
2. The number of independent variables
3. If the model includes an intercept and/or trend term

F-test has a non-standard distribution in the ARDL model. The hypothesis testing in F-test involves upper and lower bounds of critical values that are divided into three different cases. Therefore, the hypothesis test is not performed regularly. Pesaran et al. (2001) tabulated critical values for upper and lower bounds to accept or reject the null hypothesis of F-test. The greater

value of F-test denotes upper bound that means rejecting null hypothesis and long-run relationship exists between the variables. Consequently, if F-value is small, it denotes lower bound that means null hypothesis will not be rejected so the co-integration is not significant. However, if F-value is between upper and lower bounds that means additional information is need to denote a relationship.

Fail to Reject H_0 < Inconclusive < Reject H_0

The test can also provide inclusive results and to observe the error correction term, Banerjee et al. (1998) and Kremers et al. (1992) provided a remedy that used a negative and significant ECM-term in a similar framework to stimulate co-integration and long-run relationship even under the inclusive case. Hence, t-test can be performed that is equivalent to the above described test to evaluate the co-integration using null hypothesis and lower upper bounds. If the F-test is inconclusive, the t-test can be carried as a complementary test.

ECM is defined as the next pace in the ARDL model. There are set of assumptions that are made when the F-bound tests produce satisfactory results and there is a possibility to establish a long-run non-spurious regression as linear of non-stationary variables thus are stationary in the OLS framework:

$$y_t = \beta_0 + \beta_1 x_1 + \varepsilon_t \qquad (4:6)$$

An error correction term is defined by ECM to capture the convergence of the model towards equilibrium as: $ECM_{t-1} = y_{t-1} - \hat{\beta}_0 - \hat{\beta}_1 x_{t-1}$ where $\hat{\beta}$s are estimators of the model as defined in above equation $(4:6)$. ECM_{t-1} Are residuals from equation$(4:6)$. Hence, if the model is approaching towards the equilibrium in the long-term, the variation between the dependent and independent variables (ECM_{t-1}) cannot increase. Therefore, the difference between the variables must decrease.

Furthermore, ECM_{t-1} becomes new data series, as x_t, y_t, β_j all given from the regression in equation $(4:5)$ short-term dynamics are determined using lagged

variables y_t, x_t with the Error Correction Term ECM_{t-1}. It can be represented in equation form below:

$$\Delta y_t = \beta_0 + \sum_{i=1}^{q} \lambda_i \Delta y_{t-i} + \sum_{j=0}^{p} \delta_j \Delta x_{t-j} + \omega ECM_{t-1} + \varepsilon_t \qquad (4:7)$$

The Error Correction Model coefficient ω must be negative and statistically significant in order converge to long-run equilibrium. A significant ECM coefficient confirms the existence of a stable long-run relationship and co integration between the independent and dependent variables. The coefficient also determines the speed of adjustment towards equilibrium.

4.4 Diagnostic Tests

Diagnostic tests are used because the ARDL model aims to detect the best linear unbiased estimator (BLUE). Tian and Ma (2010) and Hasan and Nasir (2008) outlined that the validation tests including serial correlation, heteroscadasticity, normality test and stability test are most commonly preferred tests. The study therefore conducted these tests to ensure stability of the model and the outcomes outlined that the model is valid for the analysis. Similarly, it is also important to analyze the presence of the serial correlation in the disturbance term. If there is an existence of serial correlation in the model is found than the inference made before is not valid since serial independence of the error term is a principle for the applicability of this model. The researcher conducted Breusch-Godfrey Serial Correlation LM Test to demonstrate extinction of serial correlation at 5% level. In addition, this test was also used to determine the existence of heteroskedasticity.

4.4.1 Serial correlation

Within a serial correlation Breusch-Godfrey (Godfrey, 1978) test is used for examining the autocorrelation in the regression model. The test uses residuals from the model in the regression analysis to detect autocorrelation up to the predesigned order *p*. Breusch-Godfrey test supports a broader group of regressors. For Breusch-Godfrey test, it is important that the below equation hold true: covariance ($\epsilon_i, \varepsilon_j$) = 0, ∀ *i*;j if not the series with have serial correlation. Brooks (2014) argued that existence of serial correlation will affect

the efficiency rather than the unbiased behavior of the regression estimators. Hence, the estimators of the model will not be BLUE. The residuals model under the simplest form of the Breusch-Godfrey test is:

$$\epsilon_t = \epsilon_{t-1} p + u_t, \quad u_t \sim N(0, \sigma_u^2)$$

Generally, the test has following hypothesis.

Ho: p = 0, No serial correlation

H1: $p \neq 0$, there is serial correlation

4.4.2 Heteroskedasticity test

The heteroskedasticity test refers to testing that all residuals in the designed model have a constant variance (ϵ_t) =σ^2 <$\infty, \forall\, t$. Within the regular ordinary least square OLS estimation and ARDL model, it is assumed that the residuals have a constant variance known as heteroskedasticity. Therefore, if there is no constant variance among the residuals of the model**,** the predictable coefficients will not be BLUE (is a property of OLS regression that describes that OLS is unbiased and has a minimum variance among all linear unbiased estimators. This means that the model will not possess minimum variance of the unbiased estimators. Hence, the present study used Breusch-Pagan-Godfrey test for testing heteroskedasticity. The null and alternative hypothesis in heteroskedasticity test is as below.

H_o: homoscedasticity

H_1: Heteroscedasticity

4.4.3 Normality test

The study used Jarque-Bera test for normality in the residuals. It is vital to conduct the normality test because the non-normality cause problem related to statistical inferences of coefficients. Brooks (2014) argued that the confidence intervals and significance tests may be affected by non-normality because these values are determined by normality assumption $\epsilon_t \sim N(0, \sigma^2), \forall t$. The general hypothesis for normality test is as below.

Ho: There is normality in the residual

H1: There is non-normality in the residual

4.4.4 Test for stability

The ARDL model is sensitive to structural breaks and the study used a time series data that is even receptive to the world in general. Hence, it is conciderable to ensure not only short-run but long-run stability. Brown et al. (1975) developed the short-term and long-term coefficients CUSUM and CUSUMSQ to ensure the strength of the coefficients. Consequently, the instability among the coefficients means need for increased sample size or establishing dummy variables (Juselius, 2006). The tests rely on the cumulative sum of the recursive residuals and the cumulative sum of squared recursive residuals as well as has a graphical nature whereby the residuals are reorganized recursively and are plotted alongside the break points for the 5% significance line. The coefficients of the long-run and short-run will be stable if stay within the 5% significant level of plot of CUSUMSQ and CUSUM.

CHAPTER 5

RESULTS AND DISCUSSIONS

5.1 Descriptive Statistics

After applying some tests in the preceding chapter , here the precense chapter analyze the outcomes of these tests. It will be clear to us whether our explanatory variables .i.e. interest rate, inflation rate and money supply have any impact or relationship on the real GDP.

The following Table 5.1 illustrates the descriptive statistics summary. It is important to describe the statistics prior to the econometrics estimation for a clear understanding of the variables of the study. The properties of the variables are illustrated for the model in the table 5.1.

Table 5.1: Descriptive Statistics

	GDP_PERCAPITA	INTR	CPI	M3
Mean	12273.11	15.61538	218.7693	285.6238
Median	12039.30	14.50000	205.9483	263.6650
Maximum	15068.98	27.00000	396.8767	503.4000
Minimum	9976.151	8.750000	123.8633	104.6100
Std. Dev.	1690.757	6.408760	68.89849	123.2245
Skewness	0.207863	0.511814	0.648806	0.242420
Kurtosis	1.587878	1.869733	2.631718	1.797174
Jarque-Bera	4.424118	5.038187	3.942093	3.644032
Probability	0.109475	0.080533	0.139311	0.161699
Sum	601382.5	812.0000	11376.00	14852.44
Sum Sq. Dev.	1.37E+08	2094.683	242097.1	774398.0

Observations	49	52	52	52

Source: computed by author with Eviews 10

Descriptive statistics include mean, median, maximum, minimum as well as the Jarque-Bera test for normality values of the series. The statistics also include the standard deviation with respect to the mean. It can be seen that the mean of GDP per capita for Turkey over the period 2006-2018 is $12273.11 Thousand . The interest rate mean over the given period is 15.61 Billion. The mean value for Consumer Price Index CPI is $218.7 Billion. Lastly, the mean for money supply over the given period is $285.6 Billion. The minimum GDP per capita for Turkey as observed in Quarter I for year 2009 was $ 9976.151 Thousand . The maximum GDP per capita for the country as observed in 2018 for Quarter I was $15068.98 Thousand. The difference among skewness and kurtosis was procedure by the Jarque-Bera test for the normality of distribution of the series. The null hypothesis state that the residuals are normaly distribute; however, the alternative hypothesis is that the distribution in not normal. As we can see from the table 5:1 that the probability of the Jarque-Bera test for all variables are greater than 5% (as bench mark), therfore we can not reject the null hypothesis rather than we accept it that the residuals are normally distributed.

5.2 Unit Root Test

The research applied ADF test to confirm stationary among series of the model. The ADF test results illustrated in preceding chapter. The summary of the Unit Root Test used for examning the precense of co-integration is summarized in the Table 5.2.

Table 5.2: Unit Root Test

UNIT ROOT TEST RESULTS TABLE (ADF)					
Null Hypothesis: the variable has a unit root					
	At Level				
		GDP_PERCAPITA	INTR	CPI	M3
With Constant	t-Statistic	0.0016	-1.3819	-1.8982	1.8874
	Prob.	***0.9535***	***0.5839***	***0.3301***	***0.9998***
		n0	n0	n0	n0

With Constant & Trend	t-Statistic	-3.7001	-0.6013	0.6730	-1.9620
	Prob.	***0.0342***	***0.9746***	***0.9994***	***0.6075***
		**	n0	n0	n0
Without Constant & Trend	t-Statistic	1.7362	-0.8109	-4.1880	11.5065
	Prob.	***0.9784***	***0.3598***	***0.0001***	***1.0000***
		n0	n0	***	n0
	At First Difference				
		d(GDP_PERCAPITA)	d(INTR)	d(CPI)	d(M3)
With Constant	t-Statistic	-2.0821	-6.9417	2.9503	-6.7520
	Prob.	***0.2526***	***0.0000***	***1.0000***	***0.0000***
		n0	***	n0	***
With Constant & Trend	t-Statistic	-2.0925	-7.1112	4.5378	-4.2199
	Prob.	***0.5352***	***0.0000***	***1.0000***	***0.0088***
		n0	***	n0	***
Without Constant & Trend	t-Statistic	-1.0863	-7.0000	1.2579	0.7914
	Prob.	***0.2469***	***0.0000***	***0.9446***	***0.8799***
		n0	***	n0	n0

Source: computed by author with Eviews 10

AIC criterion was employed for ADF to choice the lag length. Maximum lags was set to four. The singns *, ** and *** are indicate the variables which are statistically significant at 10%, 5% and 1%, respectively. Consistent with ADF unit root test, the dependent variable, GDP per capita and consumer price index (CPI) are stationary at level *I*(0) and all other independent variables including: interest rate (INTR) and money supply (M3) are stationary at first difference *I*(1). Because the variables have stationarity at different level *I*(0) and *I*(1), then the variables qualified for ARDL model.

5.3 Auto Regressive Distributed Lag (ARDL)

For co-integration analysis between monetary policy and economic growth indicators, this study employed (ARDL) bound test approach. Pesaran and Shin (1998) developed ARDL model because of spurious and non-spurious regression issue in time series data. The optimal lags were estimated through the AIC criterion. The ARDL illustrated (2, 3, 4, 3) as the lag length. The empirical results for the ARDL model demonstrated in the table 5-3.

Table 5 3: ARDL Model

Dependent Variable: GDP_PERCAPITA
Method: ARDL
Sample (adjusted): 2007Q1 2018Q1
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Fixed regressors: C
Selected Model: ARDL(2, 3, 4, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP_PERCAPITA(-1)	1.446793	0.121686	11.88961	0.0000
GDP_PERCAPITA(-2)	-0.441470	0.139956	-3.154342	0.0037
INTR	-21.21490	7.268246	-2.918848	0.0067
INTR(-1)	11.58936	8.891795	1.303376	0.2027
INTR(-2)	3.576208	7.187502	0.497559	0.6225
INTR(-3)	-17.15078	5.932092	-2.891186	0.0072
CPI	-4.255991	4.146969	-1.026289	0.3132
CPI(-1)	-4.049851	4.120312	-0.982899	0.3338
CPI(-2)	7.763372	4.242341	1.829973	0.0776
CPI(-3)	5.434613	4.098154	1.326112	0.1952
CPI(-4)	8.528521	5.677381	1.502193	0.1439
M3	-4.077972	2.554229	-1.596557	0.1212
M3(-1)	-1.707900	3.003203	-0.568693	0.5739
M3(-2)	-7.602772	2.868582	-2.650359	0.0129
M3(-3)	6.151258	2.147472	2.864418	0.0077
C	-211.4907	525.1583	-0.402718	0.6901

R-squared	0.999426	Mean dependent var	12439.80
Adjusted R-squared	0.999129	S.D. dependent var	1664.143
S.E. of regression	49.12572	Akaike info criterion	10.89839
Sum squared resid	69986.75	Schwarz criterion	11.54076
Log likelihood	-229.2137	Hannan-Quinn criter.	11.13786
F-statistic	3364.149	Durbin-Watson stat	2.218506
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection

Source: computed by author with Eviews 10

5.4 Long Run and Bound Test

To detect if there is a long-run relationship between variables of the model, the bounds test was conducted with the quarterly data. The long-run and bound test results are illustrated in Table 5.4.

Table 5 4: Long Run

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR	4357.807	32617.33	0.133604	0.8946
CPI	-2520.878	18604.16	-0.135501	0.8932
M3	1359.439	9927.999	0.136930	0.8920

EC = GDP_PERCAPITA - (4357.8073*INTR -2520.8782*CPI + 1359.4385*M3)

Source: computed by author with Eviews 10

Long-run relationship is represented in the Table 5.4, it observe from the table that all explanatory variables including, interest rate, consumer price index and money supply are statistically insignificant in the long run since their p-value are less than 5% level, it means, they do not have relationships or impact in the long run with/on the economic growth (dependent variable) proxy by GDP per capita in Turkey.

Table 5.5: F-Bounds Test

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	7.667346	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61
			Finite Sample: n=45	
Actual Sample Size	45			
		10%	2.893	3.983
		5%	3.535	4.733
		1%	4.983	6.423

Source: computed by author with Eviews 10

The outcome of the F-bound test results that illustrated in abve table, the value of F-Statistics is 7.667346 and it is higher than the Upper Bound Critical value of 4.35 at the 5% level. Accordingly, the null hypothesis of no co-integration is rejected. The value of F-statistics aproved of existed the long-run co-integration relationship between economic growth (proxy by GDP per capita as our dependent variable) and the Turkish monetary policy (proxy by interest rate, inflation and money supply) during the years 2006-2018.

5.6 Short Run and ECM -Error Correction Model

To investigate the continued existence of co-integration among the variables of the model followed Error Correction Model ECM using ARDL approach to estimate the short run coefficients and confirm if there is long run equilibrium converging. From the results of the Table 5-6, interest rate and money supply are statistically significant at 5% level, they have sort run relationship with economic growth in Turkey during the given period. However, interest rate has negative sign, it's coefficint value is (-21.21490), it means if interest rate increase one unit, GDP per capita will decrease 21.2 unit. In contrast, money supply also has negative sign, has negative relationship in the short run with GDP per capita. It's coefficient value is (-4.077972), it indicate if money supply increase one unit, the economic growth (GDP per capita) will decreas by 4.07. While, inflation (CPI) has no relationship with Gdp per capita in the short run since it is statistically insignificant.

The error correction term is the speed of adjustment, it shows the speed of converging variables to long-run equilibirium after a shock in the indicators. The results of the ECM and short run are illistrated in Table 5.6. ECM is statistically significant at 5% level. But it has a positive sign which it means that there is no converging to a long-run equilibruim among variables of the proposed model.

Table 5.6: Estimated Short-run Error Correction Model (ECM)

ARDL Error Correction Regression
Dependent Variable: D(GDP_PERCAPITA)
Selected Model: ARDL(2, 3, 4, 3)
Case 3: Unrestricted Constant and No Trend
Date: 01/06/20 Time: 16:31
Sample: 2006Q1 2018Q4
Included observations: 45

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-211.4907	49.96358	-4.232897	0.0002
D(GDP_PERCAPITA(-1))	0.441470	0.108571	4.066181	0.0003
D(INTR)	-21.21490	5.657734	-3.749717	0.0008
D(INTR(-1))	13.57457	5.685825	2.387441	0.0237
D(INTR(-2))	17.15078	5.422852	3.162686	0.0036
D(CPI)	-4.255991	2.805125	-1.517220	0.1400
D(CPI(-1))	-21.72651	4.361271	-4.981692	0.0000
D(CPI(-2))	-13.96313	4.066962	-3.433309	0.0018
D(CPI(-3))	-8.528521	3.668314	-2.324916	0.0273
D(M3)	-4.077972	1.986032	-2.053327	0.0492
D(M3(-1))	1.451514	1.911141	0.759501	0.4537
D(M3(-2))	-6.151258	1.856084	-3.314106	0.0025
CointEq(-1)*	0.005324	0.000915	5.817394	0.0000

R-squared	0.869455	Mean dependent var	100.5683
Adjusted R-squared	0.820500	S.D. dependent var	110.3827
S.E. of regression	46.76629	Akaike info criterion	10.76505
Sum squared resid	69986.75	Schwarz criterion	11.28698
Log likelihood	-229.2137	Hannan-Quinn criter.	10.95962
F-statistic	17.76048	Durbin-Watson stat	2.218506
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

Source: computed by author with Eviews 10

5.7 Diagnostic Tests

To analyze the performance of the ARDL model for long-run co-integration and short-run of the proposed model, diagnostic tests were applied and the outcomes are illustrated in the Table 5.7 for serial correlation, 5.8 for heteroskedasicity and Figure 5.1 normality values respectively.

Table 5 7: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.496957	Prob. F(2,27)	0.6138
Obs*R-squared	1.597709	Prob. Chi-Square(2)	0.4498

Source: computed by author with Eviews 10

It observed from the results presented in above table that there is no serial correlation among the variables of the proposed model since the P-value of the test is greater than 5% level, this indicates, the proposed model accepted null hypothesis that states there no serial correlation.

Table 5 8: Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.563181	Prob. F(15,29)	0.8789
Obs*R-squared	10.15142	Prob. Chi-Square(15)	0.8101
Scaled explained SS	4.196007	Prob. Chi-Square(15)	0.9970

Source: computed by author with Eviews 10

The result of White test for Heteroskedasticity presented in above table proved that there is no heterosckeasticity among the variables of the proposed model because the P-value of white test is greater than 5% level, it indicates, the proposed model accepted null hypothesis, homoskedasticity .

Figure 5.1: Normality Test

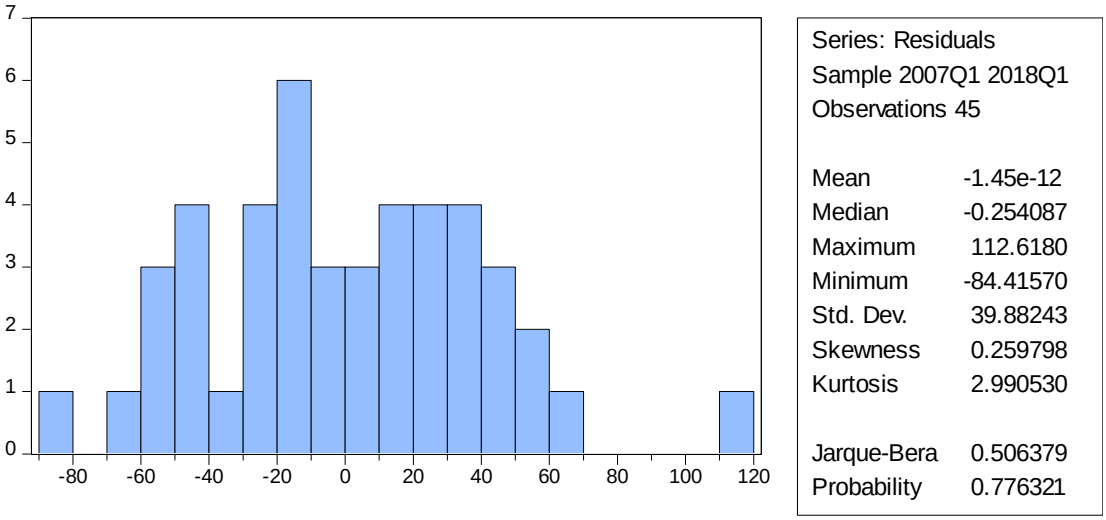


Figure 5.1 Normality Test

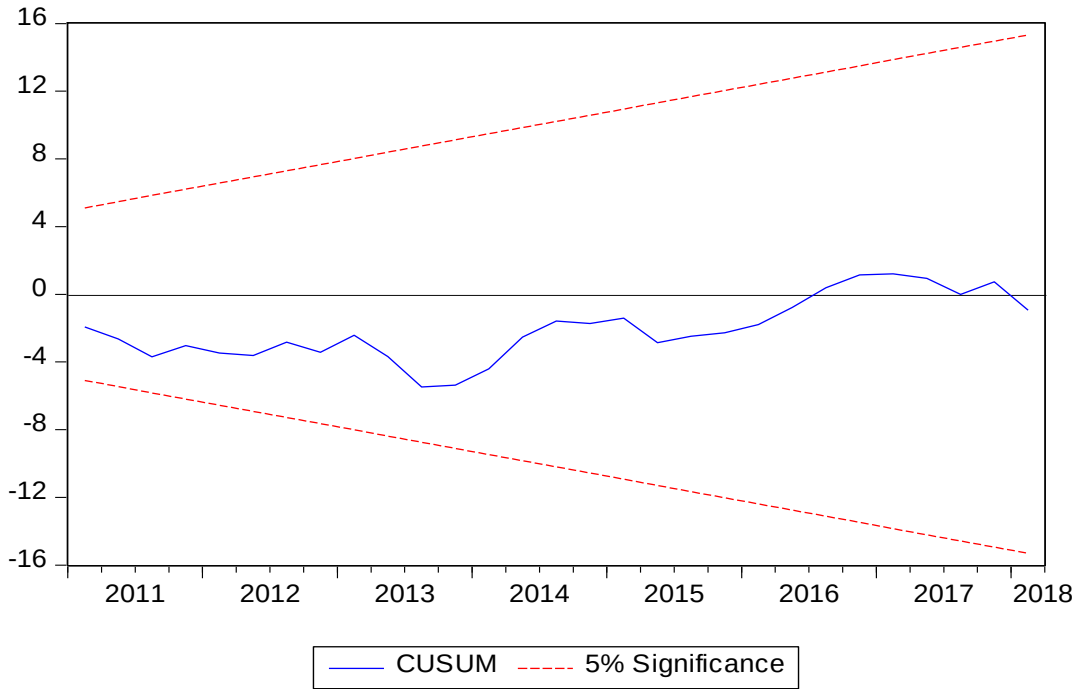
Source: computed by author with Eviews 10

Similarly, the probability of Jarque-Bera test is 0.77 which is greater than the 5% level. therfore, null hypothesis that states the residuals are normaly distribution is accepted.

5.6.1 Stability Test

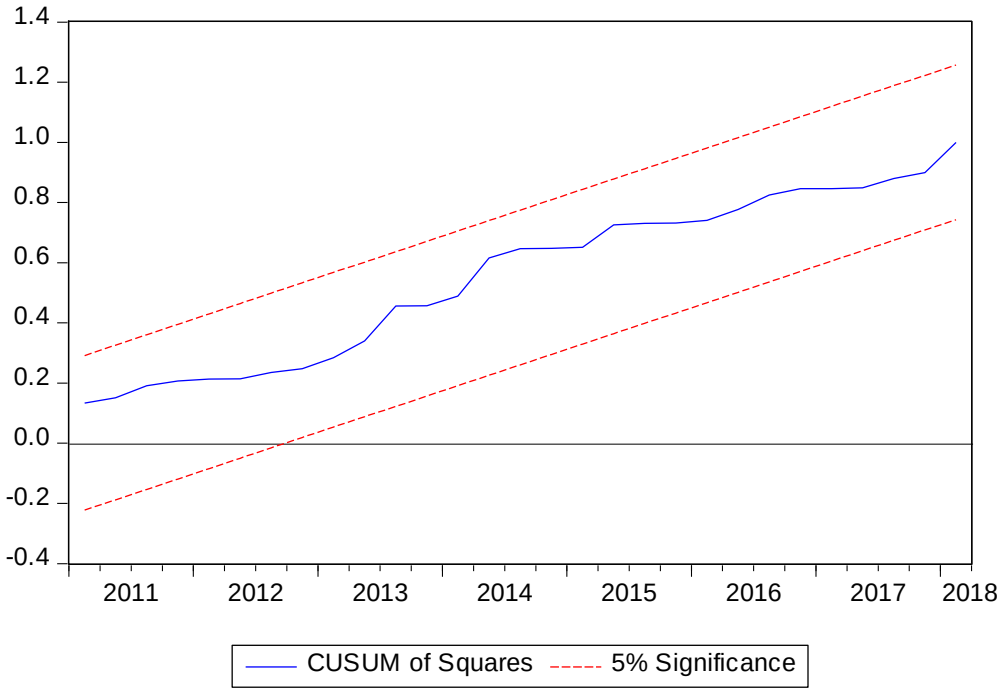
To test the stability of the proposed model, (CUSUM test) as shown in Figure 5.1. Similarly, (CUSUMSQ) is shown in Figure 5.2 illustrates the stability of estimated coefficients of the model .

Figure 5.2: CUSUM



Source: computed by author with Eviews 10

Figure 5.3: CUSUM of Squares



Source: computed by author with Eviews 10

As can be observed from above figures, the ARDL model is stable, as we seen the (CUSUM) and the (CUSUMSQ) lines are within upper and lower 5% level confidence bounds. Thus, it can be concluded that the long-run and short-run estimated coeficients are stable.

The diagnostic tests showed that the proposed mode has no serial correlation, no hetroskedasticity and the residuals are normally distributed. İn contrast, the CUSUM and CUSUMSQ tests for the stability of the model showed that the estimated model coeficints are stable, therefore, the estimated model is reliable.

5.7 Summary of ARDL model

This section summarize the results of applied ARDL model of the thesis. The Bounds test was applied to confirm if there is a long run co-integration or not. The value of F-statistic is greater than the upper value of it's critical value and this indicates that there is long run co-integration between economic growth and monetary policy in Turkey. All variables of the study are statistically insignificant in the long run, which it means that they do not affect economic growth in the long run in the considarable period in Turkey. Furthermore, in the short run, interest rate and money supply are statistically significant at 5% level, they have sort run relationship with economic growth in Turkey during the given period. However, interest rate has negative sign, it's coefficint value is -21.21490, it means if interest rate increase one unit, GDP per capita will decrease 21.2 unit. In contrast, money supply also has negative sign, has negative relationship in the short run with GDP per capita. It's coefficient value is -4.077972, it indicate if money supply increase one unit, the economic growth (GDP per capita) will decreas by 4.07. While, inflation (CPI) has no relationship with GDP per capita in the short run since it is statistically insignificant. The coefficient of the ECM has a positive sign, that means there is no converging to long run equilibrium, and statistically significant at 5% level.

CONCLUSION AND RECOMMENDATIONS

Summary

This thesis has concentrated on how the monetary policy effect on economic growth in Turkey during the period 2006-2018. Data were collected from (CBRT) (Central Bank of Republic of Turkey) and World Bank. The study also examined if there is a long-term co-integration among the variables. The variables were tested for stationarity with the aid of commonly used ADF for confirmation purposes. The unit root test showed that the parameters are stationary at level and first difference. Because the variables are stationary at different level I(0) and I(1), therefore, (ARDL) model applied to investigate the relationship between monetary policy and economic growth. Furthermore, the Bounds test conducted to know if the variables have a long-run co-integration or not. The outcome of the Bound test rejected the null hypothesis of no level relationship. The Error Correction Model (ECM) captures the speed in which short-run deviation corrected and converged to equilibrium path in the long-term. The Error Correction Model (ECM) had positive sign; it means that there is no converging to long run equilibrium after a shock in the short run. This implying that the short-run economic growth deviation will not go back to its long-term equilibrium in Turkey.

Conclusion

From the results obtained, the following findings were observed and reported:

1- Monetary policy only have short run effects on the economic growth in Turkey.
2- The interest rate has negative impact on economic growth in the short run, while in the long-run it is statistically insignificant.
3- The inflation (Consumer Price Index) was statistically insignificant in both short and long run.
4- Finally, money supply has a negative impact on economic growth and statistically significant in the short run. However, in the long-run it does not have any relationship with economic growth.

Recommendations

According to the findingd the thesis reccomends that Turkish government should create appropriate environment for both domestic and foreign investors by restoring confidence and economic stability to promote economic growth. As monetary policy alone is unable to effectively promote economic growth in Turkey. Government should impose appropriate fiscal policies to keep the inflation rate under control which situmulates the both domestic and foreign investors and accelerate economic growth in Turkey.

Adequate coordination of monetary and fiscal policies that they implements by different bodies. Central bank and government of Turkey should work in close coordination to control inflation, because high inflation means instability in economic activities and then will discourage investors to invest. In addition, central bank has to support private and financial sectors by providing liquidity in both Lira and foreign exchange to not rely on external debts for investing, and set a suitable interest rate to stimulate economic growth. Central bank independency has important effects on the implementing monetary policy in Turkey. One more factors that has great effects on Turkish economy is political instability, so the more central bank independency and structural reforms in it, and political stability means more economic stability in Turkey which attractive domestic and foreign investors to invest and increasing economic growth.

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APPENDIX

Appendix 1: Descriptive Statistic

	GDP_PERCAPITA	INTR	CPI	M3
Mean	12273.11	15.43878	209.3259	272.6051
Median	12039.30	14.00000	203.0200	249.5000
Maximum	15068.98	27.00000	333.4667	485.5000
Minimum	9976.151	8.750000	123.8633	104.6100
Std. Dev.	1690.757	6.564093	58.67180	114.6012
Skewness	0.207863	0.582621	0.407694	0.262476
Kurtosis	1.587878	1.863827	2.092976	1.839129
Jarque-Bera	4.424118	5.407714	3.037082	3.314024
Probability	0.109475	0.066947	0.219031	0.190708
Sum	601382.5	756.5000	10256.97	13357.65
Sum Sq. Dev.	1.37E+08	2068.191	165234.2	630404.6
Observations	49	49	49	49

Appendix 2: The Augmented Dickey-Fuller (ADF)

UNIT ROOT TEST RESULTS TABLE (ADF)

Null Hypothesis: the variable has a unit root

At Level

		GDP_PERCAPITA	INTR	CPI	M3
With Constant	t-Statistic	0.0016	-1.3819	-1.8982	1.8874
	Prob.	***0.9535***	***0.5839***	***0.3301***	***0.9998***
		n0	n0	n0	n0
With Constant & Trend	t-Statistic	-3.7001	-0.6013	0.6730	-1.9620
	Prob.	***0.0342***	***0.9746***	***0.9994***	***0.6075***
		**	n0	n0	n0
Without Constant & Trend	t-Statistic	1.7362	-0.8109	-4.1880	11.5065
	Prob.	***0.9784***	***0.3598***	***0.0001***	***1.0000***
		n0	n0	***	n0

At First Difference

		d(GDP_PERCAPITA)	d(INTR)	d(CPI)	d(M3)
With Constant	t-Statistic	-2.0821	-6.9417	2.9503	-6.7520
	Prob.	***0.2526***	***0.0000***	***1.0000***	***0.0000***
		n0	***	n0	***
With Constant & Trend	t-Statistic	-2.0925	-7.1112	4.5378	-4.2199
	Prob.	***0.5352***	***0.0000***	***1.0000***	***0.0088***
		n0	***	n0	***
Without Constant & Trend	t-Statistic	-1.0863	-7.0000	1.2579	0.7914
	Prob.	***0.2469***	***0.0000***	***0.9446***	***0.8799***
		n0	***	n0	n0

Notes:

a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant

b: Lag Length based on AIC

c: Probability based on MacKinnon (1996) one-sided p-values.

Appendix 4: Auto Regressive Distribution Lag Model (ARDL)

Dependent Variable: GDP_PERCAPITA
Method: ARDL
Date: 01/06/20 Time: 17:56
Sample (adjusted): 2007Q1 2018Q1
Included observations: 45 after adjustments
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic): INTR CPI M3
Fixed regressors: C
Number of models evalulated: 500
Selected Model: ARDL(2, 3, 4, 3)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP_PERCAPITA(-1)	1.446793	0.121686	11.88961	0.0000
GDP_PERCAPITA(-2)	-0.441470	0.139956	-3.154342	0.0037
INTR	-21.21490	7.268246	-2.918848	0.0067
INTR(-1)	11.58936	8.891795	1.303376	0.2027
INTR(-2)	3.576208	7.187502	0.497559	0.6225
INTR(-3)	-17.15078	5.932092	-2.891186	0.0072
CPI	-4.255991	4.146969	-1.026289	0.3132
CPI(-1)	-4.049851	4.120312	-0.982899	0.3338
CPI(-2)	7.763372	4.242341	1.829973	0.0776
CPI(-3)	5.434613	4.098154	1.326112	0.1952
CPI(-4)	8.528521	5.677381	1.502193	0.1439
M3	-4.077972	2.554229	-1.596557	0.1212
M3(-1)	-1.707900	3.003203	-0.568693	0.5739
M3(-2)	-7.602772	2.868582	-2.650359	0.0129
M3(-3)	6.151258	2.147472	2.864418	0.0077
C	-211.4907	525.1583	-0.402718	0.6901

R-squared	0.999426	Mean dependent var	12439.80
Adjusted R-squared	0.999129	S.D. dependent var	1664.143
S.E. of regression	49.12572	Akaike info criterion	10.89839
Sum squared resid	69986.75	Schwarz criterion	11.54076
Log likelihood	-229.2137	Hannan-Quinn criter.	11.13786
F-statistic	3364.149	Durbin-Watson stat	2.218506
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection

.

Appendix 4: Long Run and Bounds Test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GDP_PERCAPITA)
Selected Model: ARDL(2, 3, 4, 3)
Case 3: Unrestricted Constant and No Trend
Date: 01/06/20 Time: 17:57
Sample: 2006Q1 2018Q4
Included observations: 45

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-211.4907	525.1583	-0.402718	0.6901
GDP_PERCAPITA(-1)*	0.005324	0.040784	0.130538	0.8970
INTR(-1)	-23.20012	6.623766	-3.502557	0.0015
CPI(-1)	13.42066	5.686948	2.359906	0.0252
M3(-1)	-7.237386	3.379763	-2.141388	0.0408
D(GDP_PERCAPITA(-1))	0.441470	0.139956	3.154342	0.0037
D(INTR)	-21.21490	7.268246	-2.918848	0.0067
D(INTR(-1))	13.57457	6.253829	2.170601	0.0383
D(INTR(-2))	17.15078	5.932092	2.891186	0.0072
D(CPI)	-4.255991	4.146969	-1.026289	0.3132
D(CPI(-1))	-21.72651	7.551451	-2.877130	0.0075
D(CPI(-2))	-13.96313	5.914979	-2.360640	0.0252
D(CPI(-3))	-8.528521	5.677381	-1.502193	0.1439
D(M3)	-4.077972	2.554229	-1.596557	0.1212
D(M3(-1))	1.451514	2.252260	0.644470	0.5243
D(M3(-2))	-6.151258	2.147472	-2.864418	0.0077

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INTR	4357.807	32617.33	0.133604	0.8946
CPI	-2520.878	18604.16	-0.135501	0.8932
M3	1359.439	9927.999	0.136930	0.8920

EC = GDP_PERCAPITA - (4357.8073*INTR -2520.8782*CPI + 1359.4385*M3
)

F-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic : n=1000	
F-statistic	7.667346	10%	2.72	3.77
k	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61
			Finite Sample: n=45	
Actual Sample Size	45			
		10%	2.893	3.983
		5%	3.535	4.733
		1%	4.983	6.423

t-Bounds Test			Null Hypothesis: No levels relationship	
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	0.130538	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.5%	-3.13	-4.05
		1%	-3.43	-4.37

Appendix 5: Short run and ECM- Error Correction Regression

ARDL Error Correction Regression
Dependent Variable: D(GDP_PERCAPITA)
Selected Model: ARDL(2, 3, 4, 3)
Case 3: Unrestricted Constant and No Trend
Date: 01/06/20 Time: 17:58
Sample: 2006Q1 2018Q4
Included observations: 45

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-211.4907	49.96358	-4.232897	0.0002
D(GDP_PERCAPITA (-1))	0.441470	0.108571	4.066181	0.0003
D(INTR)	-21.21490	5.657734	-3.749717	0.0008
D(INTR(-1))	13.57457	5.685825	2.387441	0.0237
D(INTR(-2))	17.15078	5.422852	3.162686	0.0036
D(CPI)	-4.255991	2.805125	-1.517220	0.1400
D(CPI(-1))	-21.72651	4.361271	-4.981692	0.0000
D(CPI(-2))	-13.96313	4.066962	-3.433309	0.0018
D(CPI(-3))	-8.528521	3.668314	-2.324916	0.0273
D(M3)	-4.077972	1.986032	-2.053327	0.0492
D(M3(-1))	1.451514	1.911141	0.759501	0.4537
D(M3(-2))	-6.151258	1.856084	-3.314106	0.0025
CointEq(-1)*	0.005324	0.000915	5.817394	0.0000

R-squared	0.869455	Mean dependent var	100.5683
Adjusted R-squared	0.820500	S.D. dependent var	110.3827
S.E. of regression	46.76629	Akaike info criterion	10.76505
Sum squared resid	69986.75	Schwarz criterion	11.28698
Log likelihood	-229.2137	Hannan-Quinn criter.	10.95962
F-statistic	17.76048	Durbin-Watson stat	2.218506
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

Appendix 6: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.496957	Prob. F(2,27)	0.6138
Obs*R-squared	1.597709	Prob. Chi-Square(2)	0.4498

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 01/06/20 Time: 17:59
Sample: 2007Q1 2018Q1
Included observations: 45
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP_PERCAPITA(-1)	0.105588	0.169437	0.623169	0.5384
GDP_PERCAPITA(-2)	-0.114783	0.190828	-0.601500	0.5525
INTR	-0.523275	7.563808	-0.069181	0.9454
INTR(-1)	2.323669	9.748614	0.238359	0.8134
INTR(-2)	0.804568	7.368702	0.109187	0.9139
INTR(-3)	1.097440	6.149922	0.178448	0.8597
CPI	0.924685	4.420097	0.209200	0.8359
CPI(-1)	-0.020300	4.193776	-0.004841	0.9962
CPI(-2)	-0.149771	4.465115	-0.033542	0.9735
CPI(-3)	-0.999578	4.315198	-0.231641	0.8186
CPI(-4)	-1.640208	6.403871	-0.256128	0.7998
M3	-0.138751	2.806910	-0.049432	0.9609
M3(-1)	0.765835	3.156398	0.242629	0.8101
M3(-2)	0.339996	2.939981	0.115646	0.9088
M3(-3)	0.219610	2.212120	0.099276	0.9217
C	87.69240	555.0489	0.157990	0.8756
RESID(-1)	-0.262207	0.267475	-0.980306	0.3356
RESID(-2)	-0.027355	0.236649	-0.115594	0.9088

R-squared	0.035505	Mean dependent var	-1.45E-12
Adjusted R-squared	-0.571770	S.D. dependent var	39.88243
S.E. of regression	50.00070	Akaike info criterion	10.95113
Sum squared resid	67501.89	Schwarz criterion	11.67379
Log likelihood	-228.4003	Hannan-Quinn criter.	11.22053
F-statistic	0.058466	Durbin-Watson stat	1.915402
Prob(F-statistic)	1.000000		

Appendix 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

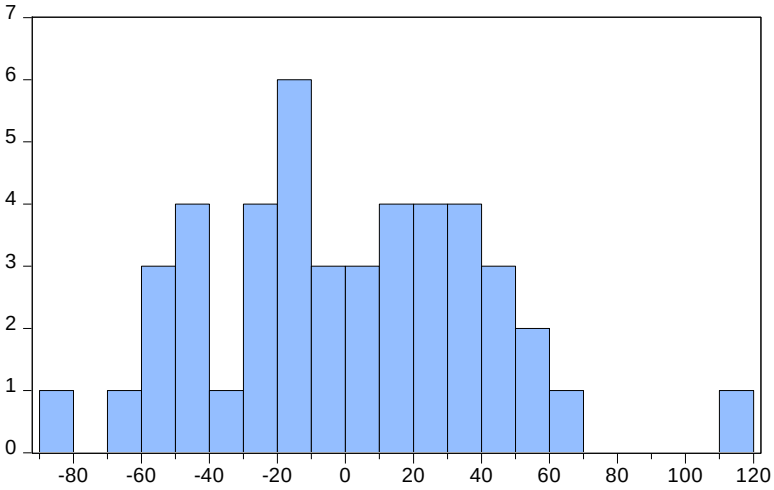
F-statistic	0.563181	Prob. F(15,29)	0.8789
Obs*R-squared	10.15142	Prob. Chi-Square(15)	0.8101
Scaled explained SS	4.196007	Prob. Chi-Square(15)	0.9970

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/06/20 Time: 18:00
Sample: 2007Q1 2018Q1
Included observations: 45

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7529.919	25713.58	-0.292838	0.7717
GDP_PERCAPITA(-1)	-3.311387	5.958148	-0.555774	0.5826
GDP_PERCAPITA(-2)	3.413048	6.852740	0.498056	0.6222
INTR	179.4573	355.8786	0.504265	0.6179
INTR(-1)	-197.4001	435.3733	-0.453404	0.6536
INTR(-2)	-411.3504	351.9251	-1.168858	0.2520
INTR(-3)	240.4540	290.4559	0.827851	0.4145
CPI	-67.38929	203.0501	-0.331885	0.7424
CPI(-1)	258.8970	201.7448	1.283289	0.2096
CPI(-2)	-27.43636	207.7198	-0.132084	0.8958
CPI(-3)	-281.4369	200.6599	-1.402556	0.1714
CPI(-4)	326.8630	277.9843	1.175833	0.2492
M3	-31.89170	125.0639	-0.255003	0.8005
M3(-1)	-65.21890	147.0473	-0.443523	0.6607
M3(-2)	73.35740	140.4558	0.522281	0.6054
M3(-3)	-91.18311	105.1477	-0.867191	0.3930

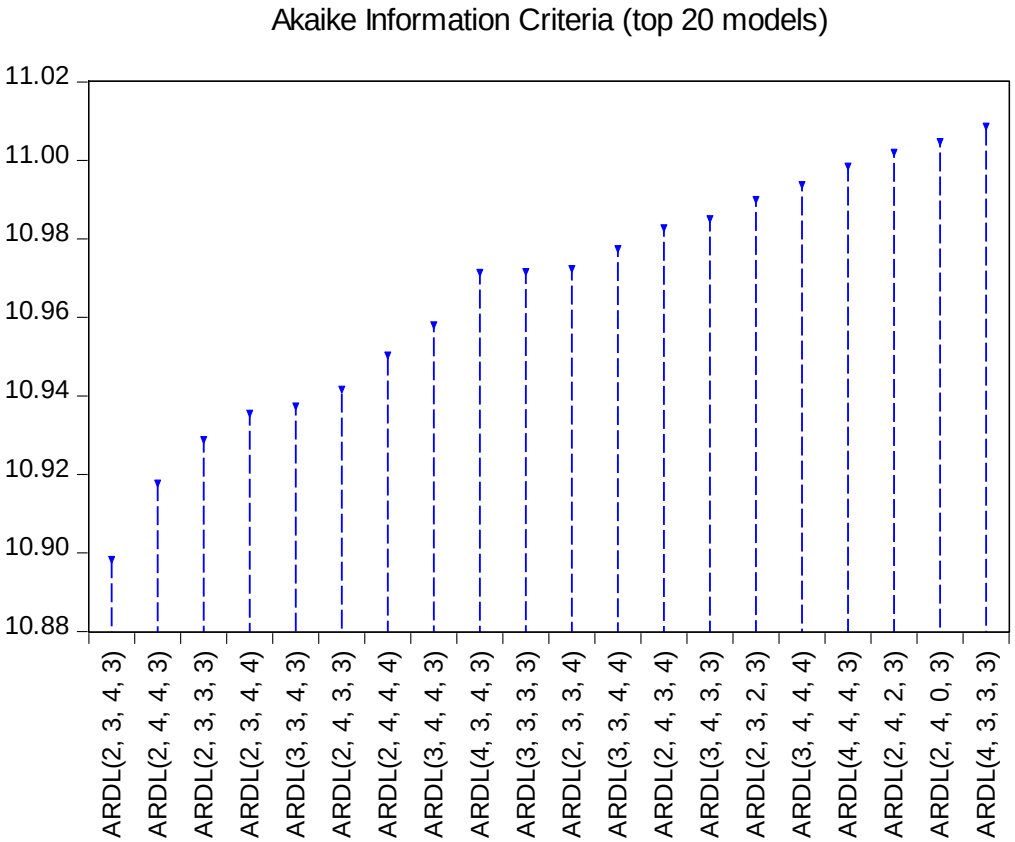
R-squared	0.225587	Mean dependent var	1555.261
Adjusted R-squared	-0.174971	S.D. dependent var	2219.052
S.E. of regression	2405.366	Akaike info criterion	18.68054
Sum squared resid	1.68E+08	Schwarz criterion	19.32291
Log likelihood	-404.3121	Hannan-Quinn criter.	18.92001
F-statistic	0.563181	Durbin-Watson stat	2.519332
Prob(F-statistic)	0.878913		

Appendix 8: Distribution Normality Test

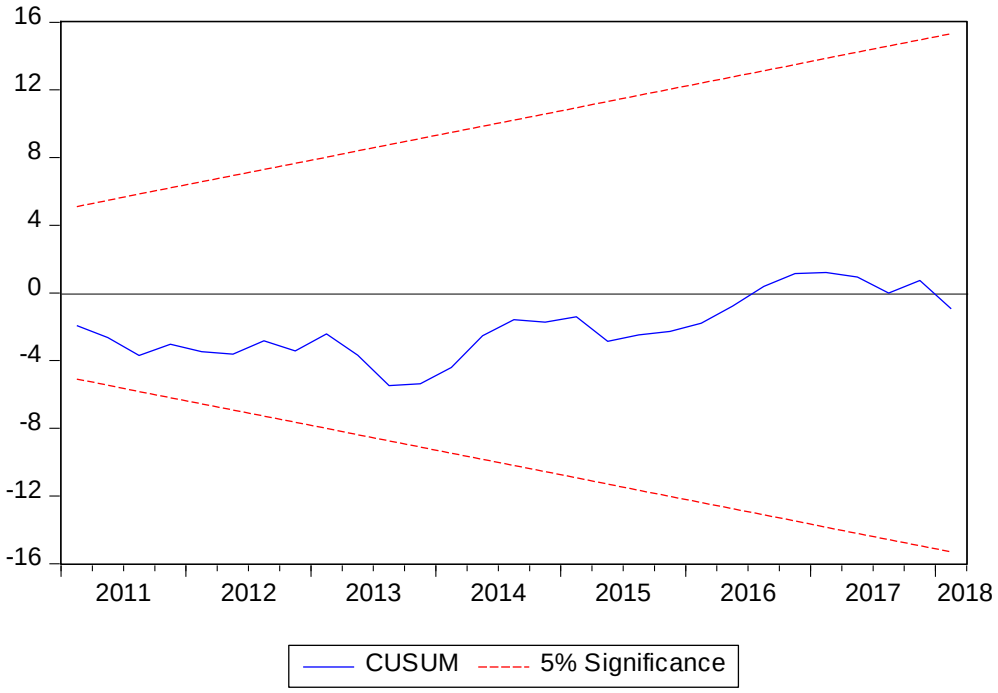


Series: Residuals	
Sample 2007Q1 2018Q1	
Observations 45	
Mean	-1.45e-12
Median	-0.254087
Maximum	112.6180
Minimum	-84.41570
Std. Dev.	39.88243
Skewness	0.259798
Kurtosis	2.990530
Jarque-Bera	0.506379
Probability	0.776321

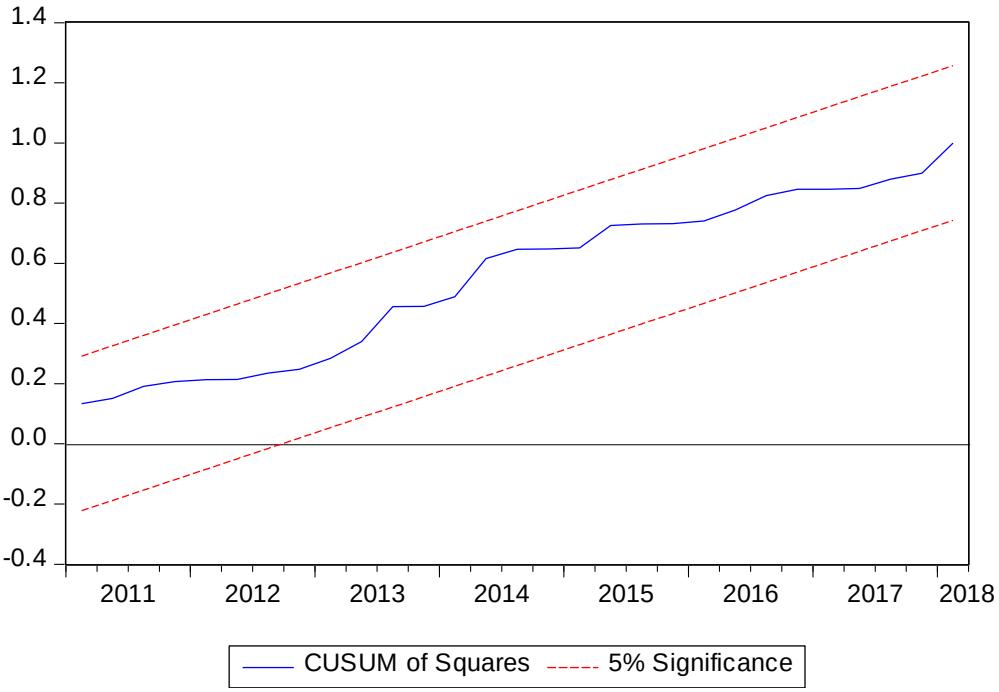
Appendix 9: Graph



Appendix 10: Graph



Appendix 11: Graph



Appendix 10: DATA

	GDP_PERCAPITA	INTR	CPI	M3
2006Q1	10252.360	23	123.8633333	104.61
2006Q2	10349.376	23	127.5566667	109.84
2006Q3	10446.391	23	129.8933333	111.77
2006Q4	10543.407	27	133.7133333	119.86
2007Q1	10640.422	27	136.6433333	124.13
2007Q2	10631.031	27	139.6833333	133.32
2007Q3	10621.639	27	139.1666667	138.24
2007Q4	10612.248	25	144.63	145.6
2008Q1	10602.856	25	148.6833333	150.59
2008Q2	10446.180	25	154.1233333	156.52
2008Q3	10289.503	25	155.38	165.23
2008Q4	10132.827	25	160.4366667	168.96
2009Q1	9976.150	25	161.1233333	170.9
2009Q2	10150.210	18	162.9033333	175.99
2009Q3	10324.269	18	163.6666667	182.8
2009Q4	10498.329	15	169.6	191.02
2010Q1	10672.389	15	176.0933333	197.25
2010Q2	10923.824	15	177.92	207.03
2010Q3	11175.260	15	177.3866667	214.71
2010Q4	11426.695	14	182.2	227.85
2011Q1	11678.130	14	183.7433333	236.76
2011Q2	11768.422	14	188.3966667	245.92
2011Q3	11858.713	14	188.69	243.61
2011Q4	11949.004	17	198.9533333	246.46
2012Q1	12039.295	17	203.02	249.5
2012Q2	12240.012	16	206.14	259.24
2012Q3	12440.729	16	205.7566667	268.09
2012Q4	12641.446	13.5	212.4233333	283.57
2013Q1	12842.163	13.5	217.6533333	289.24
2013Q2	12951.063	9.5	220.5233333	298.29
2013Q3	13059.962	9.5	222.8533333	314.22
2013Q4	13168.861	10.25	228.3033333	324.39
2014Q1	13277.760	10.25	235.0866667	329.72
2014Q2	13421.594	10.25	241.2533333	338.49
2014Q3	13565.428	10.25	243.4366667	350.16
2014Q4	13709.263	9	248.3033333	356.65
2015Q1	13853.097	9	252.64	367.04
2015Q2	13905.506	9	259.9166667	380.84
2015Q3	13957.915	9	261.21	392.95
2015Q4	14010.324	9	268.5733333	392.9
2016Q1	14062.733	9	274.3633333	402.78
2016Q2	14265.745	9	277.9233333	415.13
2016Q3	14468.758	9	282.2033333	419.67
2016Q4	14671.770	8.75	288.8933333	430.58

2017Q1	14874.782	8.75	302.3833333	435.9
2017Q2	14923.332	8.75	309.8733333	458.06
2017Q3	14971.882	8.75	311.99	467.82
2017Q4	15020.432	8.75	324.33	477.95
2018Q1	15068.982	8.75	333.4666667	485.5
2018Q2	15151.7875	18.5	349.52	496.76
2018Q3	15234.595	18.5	372.6366667	494.63
2018Q4	15317.4025	18.5	396.8766667	503.4

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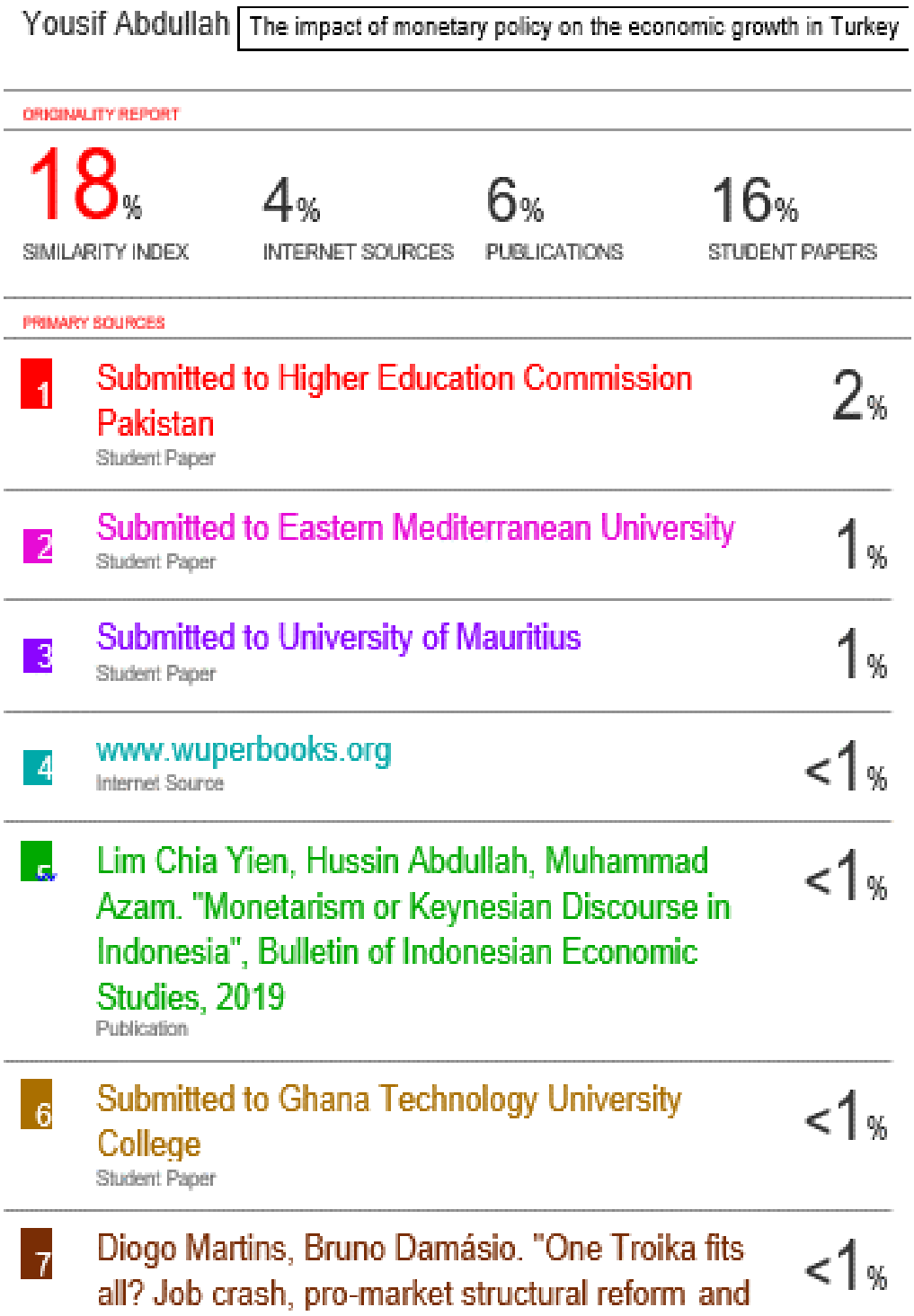

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