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MASTER'S THESIS

**MONETARY POLICY IMPACT ON CAPITAL MARKETS IN
TÜRKİYE**

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The study titled "Monetary Policy Impact on Capital Markets in Türkiye" prepared by Veysel Anıl ERKAN was found successful unanimously by the committee as a result of the defense exam held on **3/08/2024** and accepted by our committee as a **Master's Thesis** in the Economics Programme of the Department of Economics.

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ABSTRACT

MONETARY POLICY IMPACT ON CAPITAL MARKETS IN TÜRKİYE

The role of capital markets in the real economy is to promote prosperity and economic growth by facilitating risk sharing and increasing the efficiency of capital allocation. This implies that monetary policy could be a crucial factor for the economy by affecting capital markets. Monetary policy implementations could impact capital markets through the asset price channel. According to the efficient market hypothesis, these effects would be due to unexpected policy decisions because capital markets should not have an asymmetric information problem. The Central Bank of the Republic of Türkiye (CBRT) launched a “new monetary policy framework” in 2010. The CBRT thus began to pursue the financial stability goal in addition to the price stability goal and set a new tool to influence short-term interest rates in the market. The aim of this study is to discuss the impact of monetary policy on capital markets in Türkiye for the period 2010–2023 in the context of the asset price channel and the efficient market hypothesis. The study consists of four main chapters. First, the monetary policy framework is examined in a theoretical context. Second, the monetary policy implementations in Türkiye during the analysis period are examined. In the third section of the study, the empirical results of the corresponding studies in the literature are presented. The empirical results of the VAR and event study methods are demonstrated in the fourth chapter and suggest that although the asset price channel works for the stock market, the efficient market hypothesis only works for the government bonds market. As for the foreign exchange and derivatives markets, the results are unclear. The findings suggest that CBRT does not have a significant impact on the capital markets even after it begins pursuing the financial stabilization goal.

Keywords: Asset Price Channel, Efficient Market Hypothesis, Financial Markets, VAR Method, Event Study Method

ÖZET

TÜRKİYE’DE PARA POLİTİKASININ SERMAYE PİYASALARI ÜZERİNDEKİ ETKİSİ

Sermaye piyasalarının reel ekonomideki rolü, risk paylaşımını kolaylaştırarak ve sermaye tahsisinin etkinliğini artırarak refahı ve ekonomik büyümeyi teşvik etmektir. Bu, para politikasının sermaye piyasalarını etkileyerek ekonomi için önemli bir faktör olabileceği anlamına gelir. Para politikası uygulamaları, varlık fiyatları kanalı yoluyla sermaye piyasalarını etkileyebilir. Etkin piyasa hipotezine göre, sermaye piyasalarında asimetrik bilgi sorunu olmayacağından söz konusu etki beklenmedik politika kararlarından kaynaklanacaktır. Türkiye Cumhuriyet Merkez Bankası (TCMB) 2010 yılında "yeni para politikası çerçevesi" oluşturmuştur. TCMB böylece fiyat istikrarı hedefine ek olarak finansal istikrar hedefini de gözetmeye başlamış ve piyasadaki kısa vadeli faiz oranlarını etkilemek için yeni bir araç belirlemiştir. Bu çalışmanın amacı, 2010-2023 dönemi için Türkiye’de para politikasının sermaye piyasaları üzerindeki etkisini varlık fiyatları kanalı ve etkin piyasa hipotezi bağlamında tartışmaktır. Çalışma dört ana bölümden oluşmaktadır. İlk olarak, para politikası çerçevesi teorik bağlamda incelenmektedir. İkinci olarak, analiz döneminde Türkiye’deki para politikası uygulamaları incelenmiştir. Çalışmanın üçüncü bölümünde konuyla ilgili literatürde gerçekleştirilen çalışmaların ampirik sonuçları sunulmaktadır. Dördüncü bölüm, VAR ve vaka çalışması yöntemlerinin ampirik sonuçlarını içerirken varlık fiyatları kanalının hisse senedi piyasası için çalışmasına rağmen, etkin piyasa hipotezinin sadece devlet tahvili piyasası için çalıştığını göstermektedir. Döviz ve türev piyasaları için ise sonuçlar net değildir. Bulgular, TCMB’nin finansal istikrar hedefini izlemeye başladıktan sonra dahi sermaye piyasaları üzerinde önemli bir etkiye sahip olmadığını göstermektedir.

Anahtar Kelimeler: Varlık Fiyatları Kanalı, Etkin Piyasalar Hipotezi, Finansal Piyasalar, VAR Yöntemi, Vaka Çalışması Yöntemi

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LIST OF ABBRAVETION

ADF	: Augmented Dickey-Fuller
ARDL	: Autoregressive Distributed Lag
BIST	: Borsa İstanbul
CAAR	: Cumulative Average Abnormal Return
CBRT	: The Central Bank of the Republic of Türkiye
CDS	: Credit Default Swaps
CPI	: Consumer Price Index
EDDS	: Electronic Data Delivery System
EMH	: Efficient Market Hypothesis
EPS	: Earnings per Share
ES	: Event Study
EUR	: Euro
FEVD	: Forecast Error Variance Decompositions
FX	: Foreign Exchange
GMM	: Generalized Method of Moments
IPO	: Initial Public Offering
KGF	: Credit Guarantee Fund
LIBOR	: London Inter-Bank Offered Rate
LON	: Late Liquidity Window/Late Over Night
MPC	: Monetary Policy Committee
OLS	: Ordinary Least Squares
OMO	: Open Market Operations
P/E	: Price-to-Earning
ROC	: Reserve Option Coefficient
ROM	: Reserve Option Mechanism
ROR	: Reserve Option Ratio
TRY	: Turkish Lira
USD	: United States Dollar
VAR	: Vector Autoregressive
VIOP	: BIST Derivatives Market
XTUMY	: Borsa İstanbul All Shares Index
XU100	: Borsa İstanbul 100 Index
XU30C	: BIST 30 Futures
XUHIZ	: Borsa İstanbul Services Index
XUMAL	: Borsa İstanbul Financials Index
XUSIN	: Borsa İstanbul Industrial Index
XUTEK	: Borsa İstanbul Technology Index

1. INTRODUCTION

In an economy, the task of supplying funds to the real sector that suffers from liquidity constraint should lie with the capital markets. However, in the period after the 1980s, i.e. the era after financial liberalization became a common practice in the world, renders contradictory examples, since the income statement of companies in the real sector reports higher financial expenses than operating expenses. Therefore, it seems as if the real sector is now had to provide funds to the capital markets due to high borrowing costs.

The concept of monetary policy transmission mechanism and implementations of monetary policy could play a key role in restoring capital markets to their essential role as fund providers. Monetary policy is a crucial mechanism through which central banks can influence the real economy and have a positive impact on investment channels. Transmission mechanism includes various channels such as interest rate channel, credit channel, asset price channel, and exchange rate channel. These channels play a significant role in transmitting the effects of monetary policy to the real economy, affecting investment, consumption and overall economic activity. It is argued that the first stage of transmission mechanism begins in financial markets (Bernanke & Blinder, 1990). The reason for that lies in the fact that funding with overnight interest rates can only be provided by banks, while the real economy reacts to longer-term interest rates, stock prices, exchange rates and risk premiums instead of overnight interest rates.

The asset price channel of monetary policy refers to the influence of monetary policy on asset prices such as capital market instruments and real estate, which can affect investment decisions and household wealth. This channel can also impact the risk-taking behavior of economic actors and thus influence investments and financial stability. Therefore, the operation of the asset price channel in an economy implies that monetary

policy implementation will affect the real economy. The first step in testing whether this intuition is true should be to have answers to questions such as “Does monetary policy actually have an impact on capital markets” and “How strong is this influence if there was any”. In this dissertation, to answer these questions, Türkiye's monetary policy implementation and its capital markets were selected as sample.

The modern capital markets in Türkiye emerged in the late 1980s with the establishment of the Capital Markets Board as the main regulatory and supervisory authority for the securities markets and the establishment of Istanbul Stock Exchange (later Borsa Istanbul) as the sole stock exchange entity. However, the Central Bank of the Republic of Türkiye (CBRT) added the goal of financial stability to its objective function almost three decades later, in 2010. In the light of the questions mentioned above, it will be examined whether the CBRT actually takes financial stability into account in its monetary policy implementations or to what extent the new goal is being pursued. Therefore, the analysis period 2010 and 2023 was chosen in this dissertation because while the CBRT introduced financial stability as a new monetary policy goal in 2010, as an inflation targeter central bank it also added one-week repo rate to its instruments kit to influence short-term interest rates in the same year.

In studies of the effects of monetary policy on financial markets, central banks' policy interest rates are not directly included in the models. Instead, the variables that reflects short-term interest rate movements are chosen as a proxy variable for the policy interest rates. Those variables include: interbank interest rates, one-month treasury bill rates, future contracts on policy variable rates, LIBOR interest rates, loan interest rates, spreads etc. In this study, Over/Night Interest Rates on the BIST is chosen as a proxy variable for the policy rate of the CBRT.

The literature argues that financial markets and monetary policy exhibit bidirectional causality. Accordingly, the selection process of the best econometric methods focuses on simultaneity bias. Furthermore, although monetary policy impact shows itself first on the capital markets, the impact on the real economy occurs with a time lag. Due to the time lag, many other parameters could have an impact on the economy until the monetary policy impact becomes apparent. This is called the omitted variable problem and is the

main cause of simultaneity bias in this case. Regarding simultaneity bias, researchers mainly use econometric methods, namely: vector autoregressive (VAR) method, autoregressive distributed lag (ARDL) method, event study method (ES), and heteroskedasticity-based generalized method of moments (GMM).

In this dissertation, the VAR method is used to understand whether the CBRT has the power to influence the capital markets in Türkiye. The ES method is the prominent method in the literature in the context of monetary policy impact on capital markets. While the VAR method is expected to give a mechanical understanding of the impact of monetary policy on the capital markets in Türkiye, the ES method is also expected to reveal the extent of the CBRT's power impacting the capital markets. Therefore, in addition to the VAR method, the ES method is also implemented in this study.

The main motivation of this study is to find out whether asset prices respond to monetary policy changes in Türkiye following the addition of the financial stability goal in the objective function of the CBRT. This research is important because it examines stock market, foreign exchange market, derivatives market and treasury bonds market simultaneously using different econometric methods. It is expected that decision-makers can benefit from the results of this study.

This study proceeds as follows: The theoretical framework of monetary policy is presented in Section 2 and the implementation of monetary policy by the CBRT in Section 3. The relevant literature review is offered in Section 4. The methods and empirical results are presented in Section 5. Finally, the conclusion is summarized in Section 6.

2. THE THEORETICAL FRAMEWORK OF MONETARY POLICY

Monetary policy is considered one of the most important topics in economics. Economists are turning their attentions to the topic because of its potential to influence society and decision-makers. Monetary policy could affect the unemployment rate, growth rate, inflation and many other macroeconomic variables (Irum & Ali, 2008; Sargent & Wallace, 1976). This section examines the theory of monetary policy.

2.1. The Importance of Monetary Policy

Public authority uses fiscal and monetary policy to achieve economic goals. Until the 1930s, monetary policy was considered the only instrument for implementing economic goals. After The Great Depression, people lost faith in monetary policy. The general opinion was that monetary policy could not prevent the crisis. However, after the 1980s, monetary policy regained popularity due to its rapid implementation ability in a more integrated world.

Monetary policy is an economic tool that prohibits the use of bank lending and other monetary manipulation by lawfully authorized monetary authorities, most commonly a central bank, to promote specific economic objectives.

Since achieving the highest possible economic outcome is the primary goal of monetary policy, interest rates and the money supply are used to influence the level of economic activity. For example, governments lower the interest rate or increase the money supply when they want to stimulate economic activity in the recession cycle, or raise the interest rate or decrease the money supply to control the economy in the expansion cycle.

2.2. Instruments of Monetary Policy

Governments use monetary policy to influence the economy when it is in a cycle that diverges from the acceptable level of the business cycle. To achieve this, monetary

policy has three traditional tools: open market operations, discount rates, reserve requirement ratio. These three instruments are examined in this subsection.

2.2.1. Open Market Operations (OMO):

OMO is the most effective tool as it can influence the monetary base and interest rates in the economy. Generally, government bonds are bought or sold under this instrument. In order to use this tool effectively there is a need for a well-organized and developed financial system (Yay, 2015).

Central banks typically enter into agreements in which securities are sold to the counterparty and agree to buy them back later at a higher price in the scope of open market operations. Before the purchase and repurchase process, the repo ratio or the repurchase agreement ratio is decided by central banks. The repos usually have a maturity of two weeks. So, it has ability to affect short term interest rates.

Let's say the government wants to boost economic activity and uses open market operations to achieve this goal. The central bank sells the government bonds to the financial markets participants, causing the monetary base to swell, meaning the supply of money in the economy increases and, as a result, short-term interest rates in the financial markets decrease. However, if the government wants to reduce economic activity in the expansion phase of the economy, it must make purchases in the open market so that the monetary base deflates and the money supply in the economy decreases, which in turn causes short-term interest rates in the financial markets to increase.

Since the monetary base is assumed to be the first to be affected by OMO, it needs to be examined separately.

Monetary Base

The monetary base is also known as high powered money because changes in the monetary base have a significant impact on the money supply. The monetary base consists of reserves and money that economic agents have at their disposal.

$$MB = R + C \quad (2.1)$$

In Equation (2.1) MB stands for monetary base; R stands for total reserves and C for the currency in circulation (Mishkin, 2019). Therefore, changes in reserves and money in circulation affect the monetary base. However, the main effect arises from OMO. Because it has an initiative effect on the monetary base.

Open market operations can be divided into two types:

- 1- Changing monetary base endogenously is called Dynamic Open Market Operations and can be used to change the level of reserves and the monetary base.
- 2- When reserves and the monetary base are influenced by an exogenous variable, Defensive Open Market Operations should be used to eliminate the undesirable change in the monetary base.

So, we can say that OMO, whether dynamic or defensive, can change the monetary base. Using OMO to change the monetary base also has some advantages, such as: OMO can be precise and resilient, they are easily held in reserves, and they can also be implemented abruptly (Mishkin, 2019).

2.2.2. Discount Rate

Discount rate changes are another instrument that impacts the money supply, as they affect both the amount of loans discounted and the monetary base (Mishkin, 2019). This tool directly reflects that central banks are the lender of last resort of the financial system (Yay, 2015). A fall in the discount rate leads to an increase in discount loans and ultimately to an expansion of the monetary base and thus an increase in the money supply. An increase in the discount rate leads to a decrease in discount loans and ultimately to an expansion of the monetary base and thus and increase in the money supply.

The Discount Window is used by central banks to influence the volume of discount loans. The discount window is an opportunity provided by central banks to grant discount loans to banks. However, when a bank takes out discount loans, it can expect interest costs to come from the discount rate, and investors could question the bank's

financial health, which could lead to a bank run. Additionally, the more a bank takes out discount loans, the greater the likelihood of rejection by the central bank (Yay, 2015). There are two ways the discount window can affect the volume of discount loans: the discount rate and the loan quantity. The discount window can also offer three types of credit: adjustment credit, seasonal credit and extended credit (Mishkin, 2019).

Adjustment credit aims to alleviate short-term liquidity problems, while seasonal credit does so for seasonal liquidity shortages. Extended credit is intended for more systematic problems such as serious cash flow problems that may not be resolved in the future.

In conclusion, the discount rate is an effective tool as it provides protection against financial crises and provides a solution to banks suffering from liquidity (Yay, 2015). However, the discount rate is not attractive while the monetary authority has the ability to conduct open market operations. This is because central banks cannot force banks to take out loans, even if they have authority to change the discount rate. Additionally, discount rate changes cannot be made as easily as in the open market operations.

2.2.3 Reserve Requirement Ratio

This is the oldest and most widely used tool that central banks use to control the money supply. This tool is useful for the financial system, which is not deep enough for open market operations (Yay, 2015).

The banks in the economy have to hand over part of their deposits to the central banks. The part that is mentioned is called the reserve requirement ratio. The central banks decide on the level of the ratio.

Let's say the central bank decides to lower the reserve requirement ratio due to the economic recession. The amount of freely usable deposits in banks, so-called excess reserves, increases, which also increases the money supply in the economy. If the economy warms more than necessary, the central bank may increase the reserve requirement ratio, leading to a decline in excess reserves and ultimately a decline in the money supply.

Reserve requirement ratio instrument needs to be used carefully. Because adjusting the ratio requires delicate forecasts that must be carried out by highly qualified economists.

For this reason, this tool is used less frequently by the central banks compared to open market operations and discount rate (Yay, 2015). Using this ratio carelessly could lead to undesirable results such as liquidity problems for banks. This can lead to a bank run (Mishkin, 2019).

2.3. Modern Monetary Policy: Discussions

The origins of monetary theory go back to The Classical School. The Classics assumed that changes in the money supply affected only nominal variables. Therefore, any increase in the money supply leads to an increase in the price level and has no impact on real variables (money neutrality). After the Great Depression, Keynes proposed a new paradigm for economic policy. When it comes to monetary policy, the Keynesians, unlike the Classics, believe that monetary policy innovations have short-run effects on the economy. This discourse, which implies the effectiveness of monetary policy, also introduced the interest rate channel, one of the monetary policy transmission channels, into the literature.

These two iconic schools are the pillars of monetary policy theory, but it was the Monetarist view that initiated modern monetary policy discussions. In particular, Milton Friedman's views on monetary policy (particularly increasing the rate of money supply growth based on a set of rules independent of the conditions of economic activity) led to debates about whether monetary policy should be designed to prioritize price stability.

In this regard, many monetary policy models have been developed in the economics literature to eliminate or mitigate the dynamics that cause the inflation trend. In this context, modern monetary policy debates are analyzed in three main frameworks based on the views of the above schools: rules vs. discretion, principal-agent approach and inflation targeting regime.

2.3.1. Rules vs. Discretion

Monetary economists have long characterized strategies for conducting monetary policy as a form of “rules” or “discretion.” Rules are monetary policies that are essentially automatic and require little or no macroeconomic analysis or value judgments by monetary authorities. Gold standard and Friedman's k -percent rules could be given as

examples of such a rule. Under these strategies, the monetary authority implements its policies regardless of the current economic or financial situation. Thus, in theory, according to the rules, monetary policy literally has no goals other than following the previously established rules. This is also known pre-committing monetary policy (Bernanke et. al., 1999) The main argument of the rules' supporters is that the transmission of the effects of monetary policy on economic activity is unpredictable and occurs with long lags. Another argument is that governments are unable to formulate policies quickly and accurately because of the difficulty of obtaining complete and timely information about the economic situation and the private sector's low efficiency in understanding the correct policies and to take necessary measures accordingly, rules should be supported (Yay, 2015).

Rules are useful for tying the hands of monetary policy makers, meaning that rules could create discipline or credibility in the implementation of monetary policy. Rules also prevent opportunism, because by strictly adhering to a particular rule, the monetary authority is intended to assure the public that it will not pursue inflationary policies or otherwise abuse its powers (Bernanke et. al., 1999). The situation could ultimately lead to a reduction in inflation bias, which is linked to the problem of political credibility. Furthermore, it is also argued that rules-based policy should reduce the costs of disinflation because increased credibility leads the public to moderate their inflation expectations more quickly.

The main criticism of rules is that any discipline created by rules comes at a high cost, since a strictly followed rule deprives the central bank of its ability to deal with unusual or unexpected circumstances, let alone fundamental changes in the economy (Bernanke et. al. 1999).

A discretion-based approach is the complete opposite of a rules-based strategy. A central bank that carries out its policy-making in a purely discretionary manner has no set goals or public declarations of intent regarding its future course of action. The central bank can respond to fresh information or unexpected events, like supply shocks, with the flexibility that discretionary policymaking affords (Mishkin, 2019). It thus reserves the

right, using a "look at everything" approach, to determine monetary policy on a weekly or monthly basis based on the policymakers' evaluation of the state of affairs.

Discretion is typically criticized because it can manifest itself as a relatively undisciplined approach, resulting in policies that change depending on central bankers' personal views or the direction of the political winds. This implies the problem of time inconsistency, as monetary policy makers are always tempted to pursue discretionary monetary policy that is more expansionary than companies or people expect because such a policy would increase economic output in the short-run.

Due to the criticisms mentioned above, discretionary policies are designed to operate within a more clearly articulated framework in which policymakers' general objectives and tactics are determined in advance. An example of such a framework is often the inflation targeting system, which allows monetary policy to operate in what Bernanke et. al. (1999) calls a "restricted discretion" environment. By imposing a conceptual structure and its inherent discipline on the central bank, but without eliminating all flexibility, inflation targeting combines some of the benefits traditionally attributed to rules with those attributed to discretion.

It is acknowledged in reality that there is not a monetary policy that implements absolute policy rules or adheres strictly to a discretionary approach. Discretionary innovations by the monetary authority based on a set of rules constitute the majority of monetary policy strategies in use today, which can be categorized as hybrid models.

Policy-Ineffectiveness Proposition

The rules vs. discretionary policy discussions have led to many new developments and various new debates in monetary economics (Yay, 2015). In this context, one of the important debates is the "political ineffectiveness/impotence" theorem, which is based on the assumption of rational expectations and the Lucas aggregate supply function.

The main message of the policy ineffectiveness theorem is that an expected increase in the money supply cannot systematically influence real output, even in the short-run; therefore, activist actions will be ineffective in both the short and long run. For monetary policy to be ineffective, four assumptions are required: rational expectations, price flexibility, free markets, and finally, equal availability of information.

The assumptions also ensure that economic actors do not make systematic errors. That is, even if monetary authorities surprise the public by changing the monetary base in a sudden and random manner, the changes in output would be a one-time movement (Yay, 2015). Because the public adjusts its expectations very quickly after the initial shock of the money supply change.

Criticism of the assumptions of the principle of policy ineffectiveness can be summarized as follows: the undeniable existence of asymmetric information in the economy, the efficacy of automatic stabilizers in making the policy efficient, downward-rigidity of prices due to contracts (Yay, 2015). Thus, monetary policy could be effective if any of the mentioned factors are taken into account.

The policy ineffectiveness proposition was later developed through the Unpleasant Monetarist Arithmetic approach, which emphasizes that inflation may be beyond the control of monetary policy, and through the game-theory-based-models in which monetary policy is accepted as a strategy determined by interaction between the public and monetary authorities (Yay, 2015).

2.3.2. The Principal-Agent Approach to Monetary Policy

A moral hazard known as the "principal-agent problem" arises when managers in charge, or "agents," act against the interests of the owners, or "principals," as a result of conflicting motivations. In the context of monetary economics, governments and central banks are viewed as agents, whereas the general public is seen as the principals (Mishkin, 2019). The time-inconsistency trap in monetary policy is the reason of the adoption of principal-agent approach to monetary policy.

According to monetary economics, the time-inconsistency trap suggests that central banks are constantly tempted to adopt a discretionary monetary policy that is more expansionary than businesses or public anticipate because doing so would increase economic output in the short-run. However, the best course of action is to refrain from pursuing expansionary policy because decisions about wages and prices are a reflection of what businesses and workers expect from policy; if they witness a central bank pursuing expansionary policy, these parties will increase their expectations about inflation, which will drive up wages and prices (Mishkin, 2019). Although prices and

wages will rise, there will not be an overall increase in output; instead, inflation will rise. Thus, it is recommended that the government intentionally assign professionals with the necessary training and experience to handle the implementation of monetary policy, as this calls for skilled human capital. This transfer of power highlights the need for public sector regulation and institutional reform in order to increase the legitimacy of monetary policy.

This approach has created institutional frameworks for monetary policy that are as follows: hiring conservative central bankers, meaning that a governor gives more weight to price stability than the public and the government, setting the central bank's budget and the governor's salary depending on the fluctuations of inflation, the dismissal of the governor if inflation exceeds the target inflation, the obligation of the governor to explain to parliament why the inflation target rate was missed and finally the legal guarantee that the governor's term of office is longer than the term of office the elected government (Yay, 2015). All these institutional frameworks have led to debates about the independence of central banks.

Central Bank Independence

The first argument for central bank independence stems from the idea that control of monetary policy is too important to be left to politicians, a group that has repeatedly demonstrated a lack of expertise when it comes to make difficult decisions on issues of great economic importance, such as reducing the budget deficit or reforming the banking system (Mishkin, 2019). Therefore, the central bank should be independent of any political pressure if it is not possible to delegate monetary authority to competent economists. However, monetary policy obviously has a significant impact on the well-being of citizens and often involves trade-offs between the interests of different groups in society, so it can be assumed that close monitoring is required (Bernanke et. al., 1999). Thus, a compromise is proposed that distinguishes between goal independence and instrument independence of the central bank.

Under goal independence the central bank is allowed to establish its own policy goals, including inflation targets. Under instrument independence, the central bank is the only entity in charge of determining the instrument settings required to carry out the policy

goals that are set by the government, either alone or in conjunction with the central bank. Policy objectives should be set by elected officials because, in the end, they must represent the will of the people in a democracy (Bernanke et. al., 1999). Thus, suitable choice for both democracy and economy is that should the central bank practice instrument independence not goal independence. Furthermore, instrument independence would probably maximize central bank accountability and reduce short-term political meddling while maintaining the ability for democratic processes to determine the ultimate objectives of policy. Nonetheless, a crucial requirement for the efficacy of instrument independence is a central bank's financial and administrative independence as well as its immunity from political influence.

It is accepted in mainstream economics that the instrument independence increases the credibility of policy and the central bank, which in turn increases the effectiveness of monetary policy and economic performance. However, since these instruments also include macroprudential instruments, an instrument-independent-central-bank could only use these unconventional instruments to protect financial institutions that are “too big to fail” from collapse, even at the expense of the public. This implies the problem of moral hazard, and because of this problem it is proposed to leave the implementation of macroprudential tools (especially in times of crisis) to a public administration other than the central bank (Yay, 2015).

2.3.3. Inflation Targeting Regime

The final and best-known argument in modern monetary policy debates is inflation targeting. The recognition that price stability should be the primary long-term goal of monetary policy and that a nominal anchor is a valuable tool for achieving this goal has led to a monetary policy strategy known as inflation targeting (Bernanke et. al. 1999).

The first step in designing an inflation targeting system is to determine the price index at which the rate of change should be targeted (Bernanke et. al. 1999). All inflation targeters have chosen to measure the inflation rate using a version of the Consumer Price Index, often a version of the index that excludes certain volatile components in order to focus on core inflation. Moreover, to ensure policy credibility, it is suggested that the inflation rate should be calculated by an agency that is independent of the central bank.

Next, a public announcement of medium-term numerical inflation targets is required (Mishkin, 2019). The most common type of target currently used is band inflation targeting. This represents both a lower limit and an upper limit for the movement of the inflation rate. The aims of the existence of a target range are to reduce the impact of uncertainties in inflation targeting in the short-run, to ensure that the inflation is not exceeded the target range and to provide flexibility to the central bank. While the target range gives the central bank more flexibility, it could also damage credibility, as the width of the target range could well lead the public and markets to doubt central bankers' commitment to inflation targeting regime (Yay, 2015). The target range implied by the band should also not include zero. Due to the zero lower bound problem, the cost of disinflation, and the upward bias in consumer price indices, all inflation targeters have set their inflation targets above zero.

As can be seen from the above definition of the inflation targeting regime, the nominal anchoring function of inflation targeting is crucial. Because price stability is so critical to the long-run health of an economy, since it eliminates uncertainty in the economy, the use of a nominal anchor (e.g. inflation rate or money supply) that ties down the price level to achieve price stability is a central element of successful monetary policy (Bernanke et. al., 1999). A more subtle reason for the importance of a nominal anchor is that it can limit the time inconsistency trap.

Most central banks that implement inflation targeting regime currently conduct their monetary policy by setting a target for short-term interest rates (Yay, 2015), such as overnight interest rates. The inflation targeting system assumes that monetary aggregates have little or no influence on inflation dynamics in the short-run, in contrast to short-term interest rates. The interest rate target is usually chosen using the Tolor rule.

$$r = r_0 + \alpha(\pi - \pi^*) + \beta(y - y^*), \quad 0 < \alpha, \beta < 1 \quad (2.2)$$

In Equation 2.2, $(\pi - \pi^*)$ represents the inflation gap, current inflation minus a target rate, $(y - y^*)$ represents the output gap, the percentage deviation of real GDP from an estimate of its potential level. r is the real interest rate, r_0 is the potential interest rate. The value of the coefficients α and β depends on the weights of the inflation deviations

and production deviations in the central bank's objective function. A central bank implementing an inflation targeting system is assumed to take an absolute value of α that is greater than β .

Therefore, an important feature of Taylor rule is that the coefficient of α is positive (Mishkin, 2019). If the inflation rate deviates from the target by one percentage point, the short-term interest rate (e.g. r , overnight rate) will be increased by more than one percentage point, meaning that interest rates will increase by more than a one-to-one ratio. The principle that monetary authorities should increase short-term interest rates by more than the increase in the rate of inflation is called the Taylor principle. It is argued that serious instability occurs when an inflation-targeting central bank fails to follow the Taylor principle, as a rise in inflation leads to effective easing of monetary policy, which then leads to even higher inflation in the future (Mishkin, 2019). Therefore, it is again important to recognize that nominal anchoring in an inflation targeting regime keeps the economy stable in the long-run.

Since it is widely acknowledged in the field of economics that the inflation rate is the only macroeconomic variable that the central bank can systematically influence over the long-run, price stability must be the primary long-run goal of monetary policy (Bernanke et. al. 1999). This is the fundamental tenet of inflation targeting. It is not implied by this, however, that the monetary authority should only focus on controlling inflation to attain price stability through a rule-like monetary policy. Thus, the inflation targeting regime allows central banks to consider output, employment, exchange rates, and other macroeconomic variables in addition to inflation. This can be seen as a broader interpretation of the term dual mandate. A significant amount of policy discretion is encouraged by inflation targeting regime, allowing the central bank to react to changes in the economy quite flexibly in the short-run as long as it stays within the bounds of long-run price stability.

The central banks' communication strategies have also been institutionalized by the inflation targeting regime. Communication policy implies that a successful monetary policy, in addition to successfully controlling short-term interest rates, should also effectively manage market expectations, which could serve as an anchor (Yay, 2015).

The inflation-targeting framework fosters better public-central bank relations by increasing communication between monetary-decision-makers and the general public. This transparency promotes monetary policy discipline and accountability. As a result, the inflation targeting regime also increases the central bank's ability to persuade the public that exogenous factors, like supply shocks, will only result in a temporary increase in the level of prices rather than a continuous rise in the inflation rate. Again, this suggests that inflation targeting regime offers protection against external shocks through flexibility. Furthermore, it can break inflation expectations because of its forward-looking targeting feature.

The general prospects of economies implementing an inflation targeting regime are as follows: to escape the policy trilemma, a flexible exchange rate system is introduced; central banks are given independence and short-term interest rates are chosen as a policy instrument.

Although the theoretical foundations of inflation targeting are as described, its effectiveness in practice and the purpose it actually serves are often questioned in the literature (Rochon & Rossi, 2006). Naturally, the initial debates focus in particular on the outcomes of the inflation targeting regime on the inflation trend. While there is a general consensus that inflation targeting regime has led to lower inflation rates, many researchers also argue that inflation rates were already declining in the inflation targeter economies by the time inflation targeting regime was introduced.

In addition, inflation targeting regime requires a high degree of institutional strength, such as the existence of well-developed domestic financial markets, which are lacking in developing countries. There are serious doubts that the inflation targeting regime helps to ensure financial stability even in economies with deep and strong financial markets. Furthermore, the independence of the central bank is accepted as a necessary condition for the inflation targeting regime at the expense of the moral hazard problem. Consequently, this supports the idea that the argument of the central bank independence simply serves as guarantee to prevent the decline in the interest returns on investments in financial markets (Durmuş, 2016).

Most importantly, it is widely recognized that the inflation targeting regime does not reduce the costs of disinflation in the short-run and in the long-run inflation targeting regime often accompanies high interest rate policy which could lead to distributional biases. These distortions are manifested in a decrease in the share of wages in income and an increase in the share of financial profits compared to industrial profits (Altunbas & Thornton, 2022; Birkan, 2012). The recent studies showed that the inflation targeting regime in developing countries will have contractionary effects on the rate of profit, the rate of capacity utilization, the rate of accumulation and the real wage, accompanied by an increase in the unemployment rate and a shift in distribution to rentiers. Finally, there are studies that indicate that an inflation targeting regime is associated with instability in the long-run for developing countries (Altunbas & Thornton, 2022).

2.4. The Transmission Mechanism of Monetary Policy

The study of the impact of monetary innovations implemented within the framework of monetary policy on the real economy is called the transmission mechanism of monetary policy. The transmission mechanism of monetary policy explains how policy induced changes in the money supply or the political interest rate affect real variables such as total output and the unemployment rate (Mishkin, 2019).

It is important to understand the mechanism that monetary policy exerts on the real economy because monetary policy is considered an effective tool to influence the economy. The transmission mechanism is examined using four main channels: Interest Rate Channel, Exchange Rate Channel, Credit Channel and Other Asset Price Channel.

2.4.1. Interest Rate Channel

This channel of monetary policy transmission comes from The Keynesian Model. The interest rate channel is considered the most important and plainest channel. When interest rates in the economy tend to rise, the cost of borrowing increases, causing liquidity-constrained economic agents to consume less and credit-constrained economic agents to invest less. This situation leads to a decline in economic activity. Additionally, the price of bonds decreases when the interest rate increases. This also leads to economic agents consuming or investing less due to the diminishing wealth effect.

The interest rate channel of the monetary policy transmission mechanism is considered a key component of how monetary innovations transmit their effects to the economy. Under contractionary monetary policy, short-term interest rates rise and, as a result, long-term interest rates also rise. This reduces investments and therefore reduces output level of the economy (Mishkin 2019).

2.4.2. Exchange Rate Channel

As part of the free movement of capital and the flexible exchange rate system, central banks can decide on the level of short-term interest rates. As the global economy becomes more integrated day by day, the exchange rate channel of monetary policy has attracted the attention of policymakers. Central banks could influence the exchange rate by changing their policy interest rate. When short-term interest rates rise, the flow of capital into the country increases, making the local currency more attractive, making the domestic currency more valuable than foreign currencies, thereby reducing net exports and ultimately reducing the level of output in the country.

2.4.3. Credit Rate Channel

The credit channel can be divided into “narrow credit” and “broad credit” according to its impact (Kuttner, 2001). Narrow lending affects monetary policy and shifts banks' credit supply, which influences real activity by changing the investment behavior of credit-constrained borrowers. Based on the number of borrowers with credit constraints and the quantitative effect of monetary policy on banks' credit supply, the importance of the bank credit channel is determined (Mishkin, 2019). The second effect is the broad credit channel, which affects real activity through the fact that monetary policy affects the financial stability of companies.

Because the credit channel has the potential to change the impact of monetary policy on the real economy, it is important for both the financial innovation and the process of monetary transmission mechanism. This means that the real interest rate may not be a sufficiently good indicator of the direction of monetary policy, that any shock in the credit system could lead to changes in the economy, and that a change in the terms of monetary policy would have an impact on the credit. For example, contractionary

monetary policy leads to an increase in interest rates, a decrease in investment spending, a decrease in credit demand, and a decrease in bank and non-bank financing measured in quantity (Bernanke & Gertler, 1995).

There are two different channels that follow the monetary policy transmission mechanism of the credit channel.

2.4.3.1. Bank Lending Channel

Banks play a crucial role in the financial system. The bank credit channel highlights the role of banks in the system. Small businesses in particular rely on loans from banks in order to make investments in the economy. The level of lending is a face of the monetary policy stance (Gibson, 1997). When central banks tighten the money supply, banks cut their loans to investors. This has implications for changing in macroeconomic variables.

This channel is also based on the assumption that shocks from tight monetary policy lead to an increase in banks' funding costs. On the other hand, contractionary monetary policy could lead to the marginal cost of financing falling. This is because secured deposits may work. In addition, a bank needs more borrowed capital to compensate for the decline in liabilities.

Thus, monetary policy through the bank credit channel could influence both the demand and supply sides of credit, which in turn affects the monetary policy stance on investment and consumption. In addition, the bank's lending channel is subject to two assumptions. Marginal financing costs rise with interest rates and a large proportion of companies rely on bank loans. This means that the credit channel may obscure the idea of quantity adjustment.

2.4.3.2. Companies Balance Sheet Channel

This channel affects the net worth of companies in the economy. The changes in the policy interest rate affect the net assets of the companies. When interest rates fall, companies' balance sheets strengthen as stock prices rise, increasing the net worth of companies. This expands the borrowing capacity of companies, so that companies invest

more than their balance sheet allows and thus level of production in the economy increases (Kashyap & Stein, 2000).

The balance channel also refers to moral hazard and adverse selection biases in the market. Under the moral hazard theme, companies tend to involve risky investment projects as their net worth decreases. If the companies make a risky investment and do not have sufficient collateral, the banks could face with credit default as companies that make risky investments will suffer from the investment decision due to adverse selection (Mishkin, 2019).

2.4.3.3. Household Balance Sheet Channel

The focus of this channel is household spending on durable goods and housing. Durable goods and houses are classified as illiquid assets. When households retain financial assets during times of financial distress, they feel more secure because financial assets are more liquid than durable goods and houses. Additionally, times of financial distress provide the opportunity for the value of illiquid assets to be more favorable than in other times. This causes households to spend more on illiquid assets as their real wealth increases due to rising prices of household financial assets. In return, total consumption and thus also total output level increase (Mishkin, 1978).

2.4.4. Asset Price Channel

The Keynesians assume that there are only two instruments for investing in the economy: money and bonds. The Monetarists argue that there are several other options for investors to preserve the value of their money. Therefore, the transmission mechanism of money into the real economy should also be examined from the perspective of asset prices. Furthermore, this transmission mechanism is directly related to the scope of this study.

2.4.3.3. Equity Price Channel

When the money supply decreases, economic agents find that they have less money than they actually need. Therefore, they would want to reduce their expenditures. One of the first place to take cash from is the financial markets, as instruments such as stocks are

liquid assets. This reduces the demand for stocks and their prices fall. This in turn leads to companies invest less and thus the total output level falls.

Tobin's q is the theoretical basis for the equity price channel. Tobin's q is equal to the market value of the firm over the firm's investment costs. If a company's Tobin's Q is greater than one, it means the company could issue equity at a higher price. The higher valued stocks are attractive to the investors because investors assume that the cost of investment for the company would be lower if the company decides to make a new investment. The cash flow that flows into the company through newly issued equities ensures that the company could invest more. Finally, the output level of the economy also increases.

Another path the channel follows is through the relative prices of bonds and stocks. When interest rates rise the bond prices fall, economic agents would want to have more bonds, so they sell stocks to meet their money demand for bonds. As a result, stock prices fall and companies would not want to invest, this makes output level to fall (Tang et al., 2013).

2.4.3.3. Wealth Channel

When the policy rate changes, the prices of assets owned by households also change. The transmission mechanism through the wealth channel is often examined using real estate prices.

Let's assume that the central bank decides to lower interest rates. The price of real estate increases as the value of houses increases due to increasing demand. Economic agents who own houses increase their consumption levels as their wealth increases due to high real estate prices. The high level of consumption is generally driving an increase in the economy's output (Cloyne et al., 2018).

2.5. Capital Markets

There are two different types of investments: financial and real investments, each with unique characteristics and outcomes. Allocating funds into various financial instruments such as stocks, bonds or derivatives is commonly referred to as financial investment. Real investments, on the other hand, are the distribution of money into physical assets

such as infrastructure, machinery or real estate with the aim of generating capital growth or income.

Real investments are associated with physical assets that have the ability to generate profits through real estate growth, rental income, or operational efficiency (Chan et al., 1990). Financial investments, on the other hand, are the acquisition of assets that represent a claim on the earnings and property of a company or government entity (Demir, 2009). Real investments can have a longer investment horizon and provide direct control over the underlying assets, whereas financial investments are typically more liquid and easier to trade in financial markets.

Compared to financial investments, real investments are generally considered to be less liquid and more vulnerable to market fluctuations (Chan et al., 1990). As Fisher et al., (2021) mentioned, real estate is not as liquid as stocks and bonds and its value is subject to local market fluctuations and property-specific factors. However, investments in financial instruments may be more vulnerable to systemic risks associated with financial markets and market volatility (Titman & Warga, 1986).

Physical and financial investments can also have a significant impact on the economy. According to Widarni and Bawono (2021), there is a possibility that real investments such as capital expenditure and infrastructure development will promote productivity and long-term economic growth. On the capital market side, businesses and governments can raise capital through financial investments, but these can also involve speculative activities and short-run market dynamics that may not lead to real economic development (Love, 2001).

Real investments and financial investments differ in terms of underlying assets, associated risks, liquidity and influences on economic growth. Real investment is out of the working field of this study, therefore, capital markets that encompass the financial investments is examined thoroughly.

2.5.1. Capital Market Assets

The financial markets used for buying and selling long-run debt or equity-backed securities are called capital markets. These markets help investors transfer money to

companies, governments and other organizations to finance long-run investments and growth. Stocks, bonds and derivatives are examples of financial assets or securities traded on capital markets. While bonds are debt securities issued by governments or companies to raise capital, stocks represent ownership of a company. Financial contracts whose value depends on an underlying asset, an index or an interest rate are called derivatives.

Stocks serve as financial instruments that symbolize ownership of a company and grant the owner a share of the company's assets and profits. Stock exchanges allow investors to buy and sell stocks, also known as stocks or shares. They are an essential part of the capital market as they provide companies with the opportunity to raise money for various things such as development, expansion and research. Stocks are a popular choice among investors because they are purchased in anticipation of capital appreciation and potential dividends. In order for investors to participate in the ownership of listed companies and benefit from their performance, the stock exchange is a necessary place for the exchange of shares (O'Sullivan & Arthur, 2007).

In financial markets, bonds are debt instruments used by governments and companies to raise capital. Essentially, an organization is borrowing money from investors when it issues bonds. Bonds typically have a maturity date that must be met by repaying the principal and a predetermined interest rate, called the coupon rate. Because the bondholder receives regular interest payments, they are considered fixed income securities as they provide a consistent source of income. When the bond matures, the bondholder receives his capital back. In order to be able to finance a large number of projects and initiatives in the long-run, bonds are an important part of the capital market. For investors looking for consistent income and portfolio diversification, the bond market - which includes the issuance, trading and valuation of bonds - is an important resource.

Financial contracts whose value is derived from an underlying unit of reference - which can be almost anything - such as interest rates, loans, stocks, foreign exchange, the weather or the price of carbon - are called derivatives in financial markets. Derivatives are important source of financing for economies and play a crucial role in risk

management. One of the most significant contemporary instruments in the global financial market is the derivatives market, which represents the most dynamic area of the securities market. In addition, it is important to remember that derivatives can effectively reduce moral hazard caused by information asymmetry in financial markets, increase opportunities for risk transfer, and reduce operating costs. Financial derivatives can be useful to share and control unwanted risks through well-structured hedging strategies when used in accordance with the evidence from financial markets.

The capital market instruments have a major influence on the financial system and the economy. Because they provide a venue for issuing and trading long-term securities. Capital markets are crucial for companies' access to capital and liquidity, which promotes economic development and growth. Furthermore, symmetrical information and the smooth functioning of capital markets are necessary for resource allocation and market efficiency.

Factors that influence capital structure decisions, such as the type of assets a company owns, can impact the capital markets. Investors and shareholders can monitor business conditions and make informed decisions by using the capital structure, which reflects a company's policy in the debt capital market and shows its stability and effectiveness in using equity capital. Moreover, a trade-off between moral hazard and basis risk can determine the success of capital market assets (Mushtaq et al., 2020).

Securities, bonds and derivatives are among the instruments traded in these markets, which are essential for channeling capital into investment and economic growth.

2.5.2. Capital Markets vs. Money Markets

Capital markets and money markets are two separate but interrelated parts of the financial system that include different types of instruments and have different functions. The primary focus of money markets is short-term debt securities and the provision of liquidity and financing to corporations, financial institutions and governments. Money market instruments with maturities of one year or less include commercial paper, certificates of deposit and treasury bills. Because of their high liquidity and low risk,

money market instruments are a good choice for those looking for short-term investment opportunities or for companies that need short-term financing.

The purchase and sale of long-term debt and equity instruments is facilitated by capital markets designed for long-term investment and financing. Securities such as stocks, bonds and derivatives are traded on capital markets and used by governments and companies to raise long-term capital. Capital market instruments are essential for financing large-scale projects and long-term growth initiatives as they have longer maturities and are used for long-term investments and capital allocation.

The way money markets and capital markets respond to changes in interest rates and monetary policy also differ. While bond markets within capital markets are more sensitive to contractionary monetary policy, money markets are more sensitive to changes in monetary policy, particularly in response to expansionary monetary policy (Van Horne, 2002). In the context of monetary policy transmission mechanisms, this distinction reflects the different functions and characteristics of short-term and long-term financial instruments.

The maturity and liquidity of the instruments traded, as well as their corresponding role in providing long-term and short-term financing, make the difference between money markets and capital markets. Investors, financial institutions and legislators need to understand these differences in order to manage liquidity, obtain funding and make wise investment decisions.

2.5.3. Stock Market

The stock market, commonly referred to as the stock exchange, is a crucial part of the financial system where stocks of listed companies are bought, sold and issued. It allows companies to access finance and gives investors a stake in the company with the opportunity to profit depending on how well the company performs in the future. The primary market and the secondary market are the two main segments of the stock market (Yay, 2015).

New securities are issued and initially made available to the public on the primary market. An initial public offering (IPO) is a process that allows companies to raise

money by selling investor shares. For companies looking to raise capital for research and development, expansion, or other purposes, the primary market is critical. The direct purchase of shares by investors from the issuing company has a direct impact on the company's capital structure and financing.

On the other hand, existing securities are exchanged among investors on the secondary market without the participation of the issuing companies (Yay, 2015). The majority of people are familiar with this area of the stock market as it involves buying and selling stocks through stock exchanges or over-the-counter markets. Thanks to the liquidity of the secondary market, investors can buy and sell stocks according to their investment goals. The dynamics of supply and demand determine stock prices in the secondary market, which are an indicator of investors' expectations of a company's future.

Thus, there are two different markets within the stock market: the primary market, which is used for issuing new securities, and the secondary market, which is used for trading existing securities between investors which also makes the field of interest for this study. These market segments are critical to enabling investors to participate in the ownership of listed companies, facilitating capital formation and providing liquidity.

2.5.3.1. Corporate Stocks

Corporate stocks/Company shares are an essential part of the capital market and represent ownership shares in a company. These shares can be divided into several categories according to their characteristics and associated rights (Van Horne, 2002). Typical categories of corporate stock include:

1. **Common Stock:** Common stock is a symbol of a company's ownership and typically comes with voting rights that allow shareholders to influence corporate decisions such as major corporate actions and board elections. Dividends to common shareholders are also possible, but are typically paid after preferred shareholders receive their dividends and are not guaranteed.
2. **Preferred Stock:** Compared to common stock, preferred stock has a greater claim on assets and earnings, but typically does not carry voting rights. Preferred shareholders have the right to recover their investment before common shareholders in the event of

liquidation, and they also have priority over common shareholders in receiving dividends. Preferred shares offer shareholders a range of features and rights and can be cumulative, non-cumulative, convertible or participatory.

3. Dual-Class Stocks: Some companies offer dual-class shares, which are divided into several classes of shares with different voting rights. For example, Class A shares could have more voting rights per share than Class B shares. When raising money from public investors, this structure allows the company's founders and insiders to maintain control.

4. Treasury Stock: A company's treasury shares that have been issued and then repurchased are called treasury shares. These are not outstanding shares and there is no entitlement to dividends or voting rights. The company may decide to withdraw or reissue its own shares in the future.

5. Value Stock and Growth Stock: There are not separate classes of stocks but represent different investment approaches. Growth stocks are stocks of companies that are expected to grow faster than the average rate of other companies. These companies typically reinvest their profits instead of paying dividends. Conversely, value stocks are investments in companies that are considered undervalued according to fundamental analysis. They often offer dividend payments and have a lower price-to-earnings ratio.

2.5.3.2. The Endogenous Factors that Influence Changes in Stock Prices

There are many different economic, financial and market factors that contribute to the equilibrium of stock prices endogenously. Important factors include:

The price-to-earnings (P/E) ratio, which compares a company's current stock price to its earnings per share (EPS), is a financial ratio. The calculation uses the market price per share divided by the earnings per share. The P/E ratio is commonly used as a measure of market expectations of a company's potential earnings growth and is a measure of valuation.

Investors' willingness to pay for a company's earnings can be derived from the P/E ratio (Jitmaneeroj, 2017). If the P/E ratio is low, it could indicate undervaluation or lower growth expectations, whereas a high ratio could indicate that investors expect higher

earnings growth in the future. When evaluating a company's P/E ratio, the industry, growth prospects, and general market conditions should be considered.

Investor sentiment affects the stock prices in a way that demand and supply of a stock in the secondary market. The trading tactics used by investors anticipate and react to market information. Investor sentiment assumes that guesses and rumors have the power to influence short-term price fluctuations. Under this framework, investors may purchase a stock based on hearsay or assumptions about likely favorable events, such as upcoming product launches, acquisitions, or unexpected financial results.

The stock price may rise due to increased demand caused by expected good news or events. After the official announcement or confirmation of the expected news, traders may decide to liquidate their holdings to benefit from the rumored-price-increase as the news are already reflected in the stock price. This implies that once the news becomes public it can lead to a decline in the stock price as supply of the stock in the secondary market increases. However, market reaction to news can be unpredictable and rumors may not come true as expected. Therefore, there are risks associated with investor sentiment (Chau et al., 2016).

The amount of lots issued in the IPO phase can also determine the share price. Corporates usually do not IPO their all shares that represents the full amount of their equities. Generally, a portion of corporate shares, in which would not have effective vote deciding the business ventures of the corporate, is offered to the public. The remaining shares that are not offered to the public make headquarters to decide business ventures while the offered shares create cash flow to the corporate.

Particularly in shallow capital markets, which are known for their low liquidity, the amount of lots issued have an influence on the share price. A large shareholder can significantly change stock prices if they want to sell a bulk of shares in a market with low liquidity because there were not enough shares is offered to the public in the IPO phase. In addition, when a larger buy order enters a market with fewer sellers the stock price would likely to change again because of the same reason.

2.5.3.3. The Exogenous Factors that Influence Changes in Stock Prices

A variety of factors, such as external macroeconomic indicators, the price of crude oil, market sentiment and corporate financial market stance could determine the movements of stock prices (Abuoliem et al.,2019).

The dividend policy of a corporate has been found to influence stock price volatility under the corporate financial stance factors. An increase in dividend yield is accompanied by a decrease in the standard deviation of stock price fluctuations (Lashgari & Mousa, 2014). Moreover, internal business attributes such as earnings per share and dividend per share have also been identified as key drivers of stock prices that impact investors' decisions and market outcomes (Velankar et al., 2017).

Studies have shown that long-term stock price movements are largely driven by economic fundamentals and that short-term stock markets serve as leading economic indicators of future economic growth. In that regard, Liu and Sinclair (2008) argues that GDP level and stock prices have positive relationship.

Another factor that has to be mentioned under exogenous factors that influences the stock prices is the crude oil prices. There is a wealth of research on the relationship between oil prices and stock prices, and the results offer different perspectives on the topic. The currently available literature discussing the impact of oil prices on stock prices encompasses a variety of approaches, empirical findings and regional contexts.

It is known that the relationship between oil price shocks and stock market volatility is dynamic and nonlinear. Researches have shown the complex and dynamic nature of the relationship between oil prices and stock returns, and it has found that changes in the oil prices has negative relationship, and stock prices respond more to increase in the oil prices than the decrease in oil prices (Khan&Teng, 2019), also the stock markets in oil-exporter-countries is more sensitive to changes in the crude oil price than the stock markets in oil-importer-countries as evidenced by Youssef and Mokni (2019).

The one of the biggest exogenous factors that have influence on the changes in stock prices showed itself recent years: COVID-19 pandemic. It is known that emerging of great events such as COVID-19 have negative relationship with the stock prices.

Additionally, factors that have been shown to impact stock price volatility and fluctuations include ownership structure, corporate accounting disclosure, and international financial integration. As a company discloses more information about its accounting, volatility of the stock price decreases. Regarding ownership of shares, if state-owned shares are more than the institutionally-owned shares in a company, the stock price volatility of that company decreases. Furthermore, as international financial integration rises the stock price stability decreases.

Finally, it is largely accepted that monetary policy innovations have impact on the stock prices (Bjørnland&Jacobsen, 2013). Because of this study focuses on that subject, monetary policy impact on capital markets will be examined thoroughly in the forthcoming sections.

2.5.4. Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) assumes that asset prices accurately reflect all available information and that financial markets are information efficient (Van Horne, 2002). This theory states that investors are regularly unable to achieve returns above the average market return because capital market instruments already take into account all relevant information, making it impossible to gain an advantage by analyzing information that is readily available to the public.

The theoretical basis of the EMH is laid by the “Random Walk of Prices”. A random walk suggests that if subsequent numbers in a series are unrelated, then the observable fluctuations in the numbers are also unrelated. Therefore, random walk of prices follows the logic that information related to today's news is reflected only in today's capital market instruments prices. Freshly received information can only change the price momentum, but has no effect on the tomorrow price changes. Thus, the EMH suggests that investors cannot generate profit by predicting future prices based on past prices.

The EMH has three forms: weak, semi-strong and strong. According to the weak form, technical analysis cannot provide any advantage by paying attention to the news as prices already take into account all historical trading information quicker than an analysis responds to them. On the semi-strong form, prices accurately reflect all

information available to the public, meaning that fundamental analysis cannot generate abnormal returns because those returns are related to public information. The strong form claims that instrument prices represent all available information, both public and private, implying that even insider information cannot be used as an advantage to gain profit on average (Asiriand&Alzeera, 2013).

In the fields of finance and economics, the EMH has been the focus of numerous studies and discussions. A number of studies have questioned the validity of the EMH, particularly with regard to market anomalies as financial crisis are known for their repetitive nature.

3. MONETARY POLICY IMPLEMENTATIONS IN TÜRKİYE DURING THE PERIOD 2010-2023

The Central Bank of the Republic of Türkiye (CBRT) is the authority responsible for conducting and implementing monetary policy in Türkiye. According to law no. 1211, the main objective of the CBRT is to ensure price stability and financial stability within the framework of inflation targeting regime. While the main task of the CBRT is this, 2010 is the year that is considered as a turning point in the CBRT's monetary policy implementations, since the CBRT explicitly began to taking into account financial stability as an objective call (CBRT, 2011).

Although the CBRT employs complex funding system from time to time, one-week repo auction rate is its policy interest rate to target short-term interest rates in the market as of May, 2010 (CBRT, 2011). In addition, the CBRT uses the interest rate corridor to prevent market interest rates from deviating drastically from the policy rate (Bayir & Abdioglu, 2020). The range between the CBRT's borrowing and lending rates is called interest rate corridor.

The CBRT uses a floating exchange rate system and therefore has no exchange rate target. However, if unhealthy exchange rate pricing occurs due to market depth losses, the CBRT directly intervenes in the foreign exchange market. The CBRT also tries to strengthen its reserves since Türkiye has an economy that is not inelastic to the rapid changes in external capital flows. It is known that international reserves enable central banks to respond more flexible to fluctuations in these capital movements (CBRT, 2024).

After laying out the theoretical framework of the monetary policy transmission mechanism in the first section, this section examines the monetary policy decisions that the CBRT makes to trigger the transmission channels. To this end, this section examines the CBRT's responses to the anomalies in the economy in the three sub-periods: 2010-2015, 2015-2020 and 2020-2023.

3.1. Phase I: 2010-2015

Beginning from 2010 the CBRT applied a new monetary policy approach due to effects of the 2008 global financial crisis (CBRT, 2011). One of the first modern monetary policy tools that was used by the CBRT was the forward guidance. Since, to dampen the effects of the crisis, the CBRT announced that it would keep policy interest rates consistently low which made a rise in risk appetite and provide capital inflow to the country. As a consequence of easing policy, market interest rates fell to historically low levels for the period of right after the crisis. The aim of the CBRT was to limit the negative impact of the global financial crisis on economic activity through discretionary monetary policy without compromising its main objective of price stability (CBRT, 2011).

Two years after the global financial crisis, the economy began to regain its pace in 2010. In parallel with the economic recovery process, on April 14, 2010, the CBRT announced its exit strategy from unconventional measures that are taken during the crisis. Exit strategy implied a normalization of the monetary policy (CBRT, 2011).

Taking into account the positive developments in the credit market and the recovery trend in economic activity, the exit strategy first included the withdrawal of the liquidity measures used during the crisis. In this context, the CBRT increased the required reserve ratios while gradually reducing the excess liquidity made available to the market (CBRT, 2011).

Given the liquidity conditions in the market, the second step was the technical interest rate adjustment which was taken in May. In this regard one-week repo auction rates were chosen as the policy rate to control the short-term interest rates (CBRT, 2011). Also, within the scope of technical interest rate adjustment, it was decided to increase the difference between the one-week repo auction rate and overnight borrowing rate by 25 basis points in September. With this decision, the CBRT continued its loose monetary policy by widening the interest rate corridor.

Moreover, in order to ensure that the required reserve ratios can be used more effectively as one of the tools to reduce macroeconomic and financial risks in an over-liquified market, the practice of paying interest on the required reserve ratios of the Turkish lira

(TRY) was discarded in September (CBRT, 2011). The CBRT ended the practice to ensure more effective use of alternative policy instruments and to limit risks to financial stability. As normalization became more apparent on the world markets, the required reserve ratio for foreign currencies was increased by a total of 2 percentage points to 11 percent with the regulations made in April, July and September. Also, in September and November the TRY's reserve requirement ratio was increased by 0.50 points bringing the rate to 6 percent.

Considering the contribution of financial stability to price stability, the CBRT saw an opportunity to increase its international reserves and accelerate reserve accumulation in a liquidity-abundant environment (CBRT, 2011). In the fourth quarter of 2010, a total of 5.85 billion united states dollar (USD) was purchased from the market through foreign exchange (FX) purchase auctions and in return TRY 7.97 billion liquidity was provided to the market. In addition, the maturity of FX deposit operations that banks can receive from the CBRT within the credit limits granted to them had been reduced to one week, as before October 2008.

In November and December of 2010, a number of new measures was taken to direct the capital inflows into long-run investments (CBRT, 2011). In this regard, it was decided that to reduce the overnight borrowing rate from 5.75 percent to 1.50 percent and increased the lending rate by 25 basis points to 9 percent.

Looking at the monetary policy innovations in 2010, it can be said the CBRT followed the path of other central banks and did not use policy interest rates more than quantitative methods. The CBRT's monetary policy stance in the first quarter of 2010 was to maintain the policy interest rate at its current level for a while and to keep it at low levels for a longer period. In addition, due to credit expansion accelerating in the second half of the year and the continuation of quantitative easing policies in the US and European economies, increasing capital inflows brought macro-financial risks to the agenda. Although the wide interest rate corridor implemented by the CBRT cannot be seen as a precaution against these risks, the CBRT's efforts to strengthen its reserves show that it was taking into account a possible systemic risk arising from rapid capital movements.

Numerous and cost-effective short-term foreign funding options continue to be available in 2011. This led to rapid credit expansion and appreciation of the TRY, which led to the accumulation of macro-financial risks and external imbalances beginning from the second half of 2010. In this context, the CBRT had implemented a strategy aimed, on the one hand, at discouraging capital inflows by keeping short-term interest rates low, and, on the other hand, at keeping the credit growth rate and domestic demand under control by increasing required reserve ratios (CBRT, 2012). Also, the practice of holding FX purchase auctions continued due to the strong capital inflows into Türkiye. With this, the CBRT aimed to leverage short-term capital flows to bolster the reserves as much as possible.

The one-week repo rate, i.e. the policy interest rate, was reduced from 7 percent to 6.25 percent with the decisions in December 2010 and January 2011. These policy cuts allowed the interest rates on the overnight market, i.e. interbank interest rate, to be below the policy interest rate. Which enables to increase the downward volatility of overnight interest rates and reduce short-term capital inflows.

The continued rapid rise in oil and other commodity prices in the first quarter of 2011 increased upside risks to inflation and, accordingly, the CBRT forecasted that additional monetary tightening would be required to limit secondary effects. The CBRT considered that making the tightening in question via required reserves instead of the policy rate would more effectively reduce the macro-financial risks arising from the divergence of domestic and external demand (CBRT, 2012). Thus, the decisions taken in January, March and April 2011 achieved a sharp increase in the weighted average reserve ratio of the TRY. In addition, in April the reserve requirement ratios for foreign currencies were differentiated according to maturity, as if it had been made for TRY a year before, and the required reserve ratios for short-term foreign currencies were increased to a limited extent.

The increasing concerns about global growth and the sovereign debt problem in some European countries since August 2011 had increased the risk of a renewed slowdown in the global economy. The CBRT thought that this situation could had a negative impact on external demand and forecasted that the slowdown in domestic demand may continue

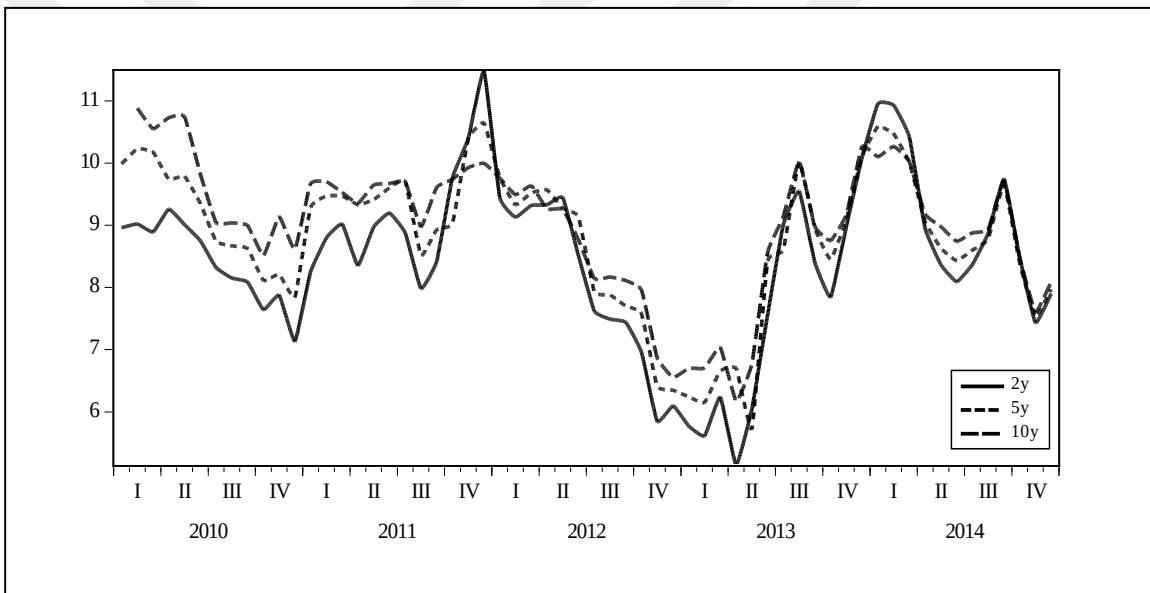
due to increasing global uncertainty and therefore the slowdown in economic activity observed for some time will continue (CBRT, 2012). Thus, the CBRT held an extraordinary meeting on August 4, 2011 and cut the policy interest rate by 50 basis points. In order to ensure that compensatory liquidity measures could be effectively implemented in the event of a further deterioration in risk appetite, the interest rate corridor was narrowed by increasing the overnight interest rates. In order to provide FX liquidity to the market amid uncertainty, from August 5, 2011, the CBRT began organizing FX sales auctions on certain days as needed.

In addition, there were unhealthy price formations on October 18 and December 30, 2011. Due to the loss of market depth, fluctuations in the exchange rates were observed, so that direct intervention was made in the market to sell. In order to provide FX liquidity to the market, the FX required reserve ratios were reduced in July and August, and in August, the interest rates on one-week FX deposits that banks can purchase in the foreign exchange deposit market were moderately reduced within the accepted borrowing limits. Also, a December decision increased the maturity of FX deposits that banks can receive from the CBRT from one week to one month, within the credit limits granted in the market. In addition, from September 16, 2011, banks were allowed to hold part of their required reserves for TRY liabilities in USD and euro (EUR) in order to support and utilize FX reserves in a timely, controlled and effective manner. Furthermore, as a new flexibility of the banking system, it was made possible to hold the entire required reserve requirement for precious metal deposits and up to 10 percent of the required reserves for foreign currency liabilities, excluding precious metal deposits, in gold. Effective October 28, 2011, it was also possible to hold up to 10 percent of the required reserves for Turkish lira liabilities in gold. It is also important to note that the CBRT used rediscount credits tool effectively especially in the last quarter of 2011.

The CBRT expected the rise in inflation to be faster than expected in the short-run due to the extreme devaluation of the TRY caused by the deterioration in global risk appetite since August (CBRT, 2012). The adjustments to the administered-price products in the last quarter of the year also contributed to the distortion of inflation expectations. To prevent this situation from affecting medium-term inflation expectations and prospects, the CBRT extended the interest rate corridor upwards by significantly increasing lending

rates in October (CBRT, 2012). By adjusting funding to the market, the CBRT enabled interbank interest rate to be above the policy interest rate. On the other hand, reserve requirements for the TRY were lowered in October to prevent the rise in interbank interest rate from leading to an undesirable tightening of liquidity conditions. With the tightening of monetary policy, the yield curve showed an upward movement in all maturities, especially in the short-term. Which can be seen in Figure 3.1. The monthly rates of two-year (2y) i.e. benchmark rate, 5-year (5y) and 10-year (10y) government bonds for the period 2010-2014 are shown in the figure.

Figure 3.1. Government Bonds Yield (%) 2010-2014



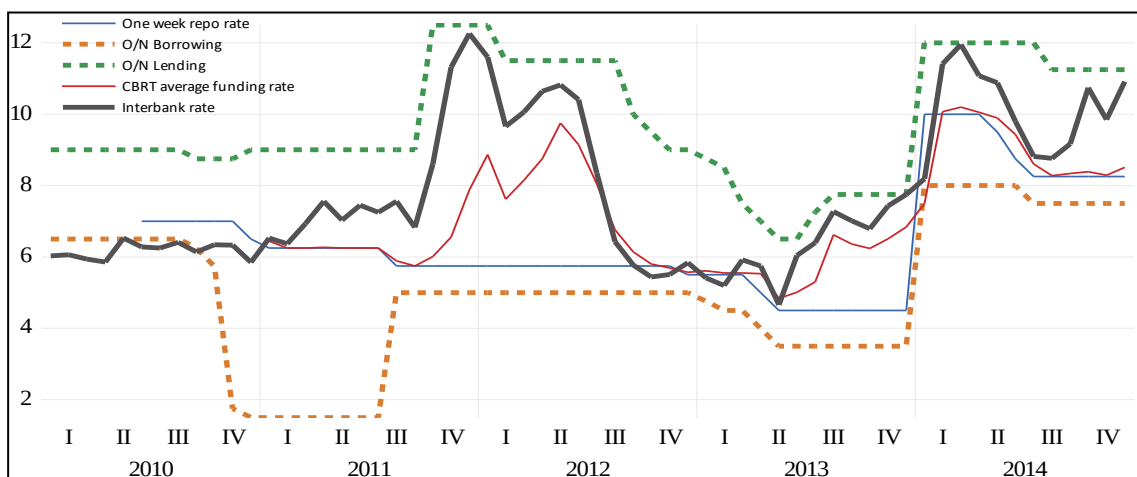
According to Figure 3.1, it can be concluded that the yield curve moved inverted in the last quarter of 2021 due to the CBRT's innovations.

The interest rate corridor is one of the main monetary policy tools that the CBRT frequently uses to influence market interest rates and liquidity. However, with the primary aim of reducing the negative impact of excessive capital movement volatility on macro-financial stability, the CBRT developed the Reserve Option Mechanism (ROM) in 2012 (CBRT, 2013). The required reserves of TRY could be held in foreign currency and gold by the banks with the help of this instrument. The reserve option ratio (ROR) indicates how much can be attained with this facility. Reserve Option Coefficients (ROCs) are defined as coefficients that illustrate the amount of foreign exchange or gold

that must be held per unit of TRY reserve requirements. The primary use of the ROM was as an automatic stabilizer (CBRT, 2013). Compared to other tools used in FX liquidity management, the ROM is considered to be more efficient as this concept allows each bank to carry out its own optimization given its own limitations. If necessary, the system's parameters can be used as a cycling tool to adapt to ongoing changes in the domestic and external environment (Yay, 2015).

At the beginning of 2012, the CBRT pursued a cautious monetary policy due to the continued high risks of rising cost factors. Therefore, the upper limit of the interest rate corridor was lowered by 100 basis points in February (CBRT, 2013). However, to prevent rising oil prices and other cost factors from distorting inflation expectations, the percentage of required reserves for TRY that can be held in gold was increased from 10% to 20% in March and the weighted average liquidity rate in the market was increased by the reduction in the one-week repo funding amount quoted at the policy interest rate. Although in the second quarter inflation exceeded the target, the easy monetary policy stance continued although this could pose a risk to pricing behavior. The CBRT cut the overnight lending rates by 150 basis points in September and 50 basis points in October to narrow the interest rate corridor in light of the decisions by central banks of advanced economies to conduct further monetary tightening in the third quarter of the year, which may accelerate capital flows. The look on the interest rate corridor after the rate cuts can be observed in Figure 3.2.

Figure 3.2. Short-term Interest Rates (%) 2010-2014



Slight recovery in final domestic demand also played a role in the easing policy, and accordingly, to support financial stability, in the MPC meetings that were held in September and October, the ROCs for all tranches were increased by 0.2 and 0.1 percentage points, respectively. The CBRT believed that risk perceptions about Turkish economy had improved in the last quarter (CBRT, 2013). As a result, the overnight lending rate and the policy rate were lowered by 50 and 25 basis points, respectively. Taking into account the innovations of the CBRT in 2012, it can be said that the monetary policy stance was extremely flexible.

The CBRT maintained its flexible monetary policy practices until May 2013. During this period, low short-term interest rates maintained to address risks to financial stability as credit expansion exceeded expectations due to robust capital flows. In order to offset risks to financial stability, the policy interest rate, the overnight borrowing and lending rates were each reduced by 50 basis points in April.

Financial markets experienced increased uncertainty after May 2013 as concerns about global monetary policy emerged. This was mainly due to the monetary policies of developed countries. Significant exchange rate volatility was noted and there was capital outflow from both Türkiye and emerging markets. Given these circumstances, the CBRT adopted a cautious approach to manage macro-financial risks and contain the worsening inflation outlook (CBRT, 2014). Due to high exchange rate volatility and credit expansion above the reference value, the CBRT was forced to conduct short-term monetary tightening, and to amplify the impact of the tightening, it started to conduct FX sales auctions. Accordingly, the CBRT had announced that non-sterilized intraday FX sales auctions could be held, if necessary, which eventually held in 11 June 2013.

Returning to the interest rate side, in July and August, the upper limit on the interest rate corridor was raised by 75 and 50 basis points, respectively, to prevent overall pricing behavior from being negatively affected by global uncertainties, the depreciation of the TRY and high inflation. During this period the CBRT reduced the amount of liquidity injected into the market through quantity auctions, forcing banks to resort to expensive overnight credit facilities. In addition, on days when the financial system continued to be stressed, it was decided not to conduct auctions for the sale of FX and not to fund banks

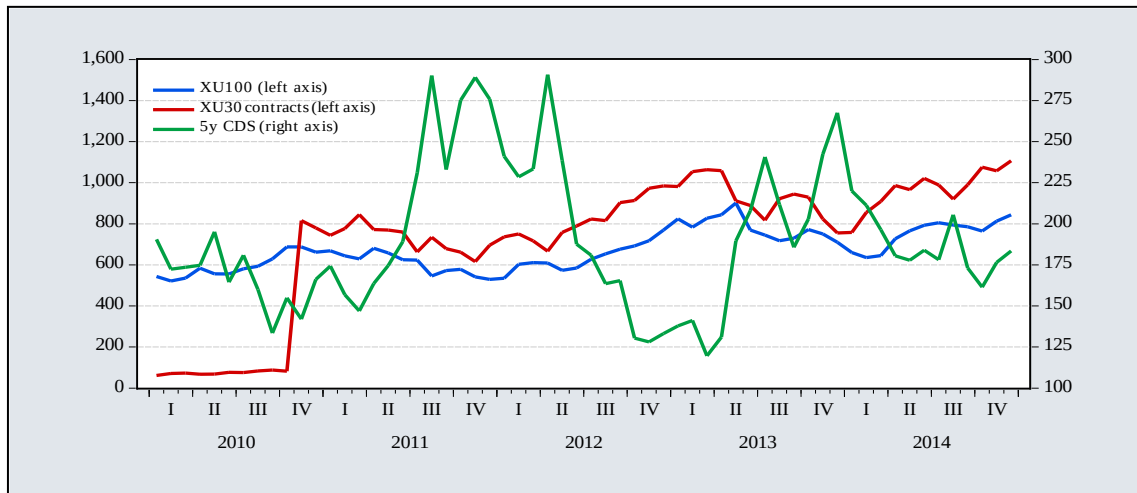
through the primary dealer facility. As a result of these measures, the BIST overnight repo rates, i.e. interbank interest rates, had reached the upper limit of the interest rate corridor which can be seen in Figure 3.2. At the same time, uncertainty about the Fed's policy caused an opaque interest rate pattern in the third quarter. To avoid this, the CBRT began to announce the total number and remaining days of additional monetary tightening, and decided to hold FX sales auctions on additional monetary tightening days.

While the CBRT was able to maintain interbank interest rates near the upper band of the corridor thanks to tight liquidity policy, the CBRT's average funding rate started to diverge from the upper bound. Therefore, one-month repo auctions were discontinued to reduce interest rate volatility. Furthermore, a liquidity management strategy was implemented that aimed to fund the market primarily through overnight maturities. As result of these measures, the announcement made by the CBRT that it would keep average funding rate remain at or above 6.75 percent to improve interest rate predictability, had been realized as average funding rate roamed around the target which can be seen in Figure 3.2.

The Fed began implementing its exit strategy of quantitative easing in December 2013, which was previously announced in May. The announcement had caused financial stress around the world by the time it was made which is known as the “taper tantrum”. As a result of taper tantrum, and an investigation conducted in Türkiye which is called “December 17-25 Corruption and Bribery Operation,” the Turkish lira's volatility increased more than that of its peer countries' currencies.

The mentioned events of late 2013 caused a noticeable hike in Türkiye's risk premium indicators. This can be seen in Figure 3.3. below.

Figure 3.3. Monthly Movements of Financial Instruments 2010-2014



In Figure 3.3. the blue line represents the main index of the Borsa Istanbul (BIST) which called as BIST 100 index (XU100), the blue line shows the movements of the BIST 30 Index Contracts (XU30 contracts) which are traded under the BIST derivatives market (VIOP), finally the green line highlights the movements of Türkiye 5 Years CDS (Credit Default Swap) which is a financial instrument used to measure the credit risk of Türkiye over a five-year period. Figure 3.3. demonstrates that both of the instruments which are XU100 and XU30 contracts decreased significantly while the CDS move upward in late 2013.

Türkiye began 2014 with extremely volatile exchange rate movements and a dimming forecast for inflation. Figure 3.4. shows annual CPI inflation and USD/TRY foreign exchange rates changes by the corresponding months for the period 2010-2014.

Figure 3.4 Annual Inflation and FX Rates (%) 2010-2014



As can be seen in Figure 3.4. despite the moderate increase in inflation, the USD/TRY exchange rate rose almost to 25% annually in the first quarter of 2014, which was the second largest change after 29% in the last quarter of 2011.

As a result of FX movements, the MPC increased the one-week repo rate from 4.5 percent to 10 percent through the aggressive and front-loaded monetary tightening that was put into work on January 28, 2014 which can be observed in Figure 3.2. In addition, the CBRT chose to use the one-week repo rate rather than the marginal funding rate, i.e. overnight lending rate, as its primary liquidity provider in order to streamline the operational framework (CBRT, 2015).

Thanks to monetary tightening the second quarter of 2014 saw a decline in risk premiums (in Figure 3.3.), improving global liquidity conditions, a slowing inflation trend and a fading cumulative effect of exchange rate depreciation on inflation (in Figure 3.4.). These factors led the CBRT to decide to implement gradual rate cuts. In April there was a reduction in the lending interest rate for the late liquidity window by 150 basis points. Subsequently, in May, June and July, the one-week repo rate was reduced by fifty, seventy-five and fifty basis points as shown in Figure 3.2.

Following the Kobane protests in Türkiye in October 2014, there was a rise in geopolitical tensions and resulting economic instability. BIST overnight repo rates were in flux around the one-week repo auction rate in July and August 2014; However, as the CBRT implemented a tight liquidity policy, interbank interest rates eventually stabilized at the upper end of the interest rate corridor (in Figure 3.2.).

About the TRY side, the CBRT decided to pay interest the TRY component of the required reserves of financial institutions as an incentive. On the other hand, stemming from “lender of last resort” duty, interest rates for one-week borrowing from the CBRT for USD and EUR were reduced from 10 percent to 7.5 percent and to 6.5 percent respectively. The CBRT also increased banks' transaction limits in the FX and banknote markets. For the real economy: The CBRT increased export rediscount loans limits and reduced borrowing costs on October 20, 2014 to support balanced growth (CBRT, 2015)

Notwithstanding, the measures taken to prevent the TRY from falling in value did not work, as the volatility of the TRY showed a greater increase in 2014 than in other

emerging markets. At the end of the year, as can be seen in Figure 3.4. the TRY depreciated around 9% against the USD.

3.2. Phase II: 2015-2020

After May 2013, the significant depreciation of the TRY had a negative impact on inflation and inflation expectations. The deterioration in inflation expectations and price behavior continued in 2015. The CBRT viewed its monetary policy stance as tight, although there was no significant recovery in inflation. The CBRT assumed that, as a result of its tight monetary policy, in particular inflation indicators (excluding energy and food inflation) and inflation expectations had improved, and that falling commodity prices, particularly oil prices, had contributed to the improvements (CBRT, 2016). Therefore, the CBRT expected that core inflation would continue to fall, so the one-week repo auction rate was reduced from 8.25 to 7.75 percent in January and to 7.5 percent in February. Along with the policy rate cuts, the CBRT implemented modest interest rate cuts amid the improving outlook for core inflation. For this purpose, the marginal funding rate had been revised from 11.25 percent to 10.75 percent, the interest rate on borrowing facilities provided to primary dealers through repurchase agreements had been revised from 10.75 percent to 10.25 percent and the borrowing rate had been revised from 7.5 percent reduced to 7.25 percent and finally the late liquidity window CBRT lending rate was reduced from 12.75 percent to 12.25 percent.

Although the CBRT made the aforementioned rate cuts, it concluded that a more sustained reduction in inflation was needed, so the prudent monetary policy stance should also be maintained. Therefore, a tightening of liquidity policy was implemented - as the CBRT practically always does after a rate cut - by gradually increasing the average funding rate while keeping the interest rate corridor unchanged. At the same time, the CBRT continued to provide funds primarily through one-week repo auctions, with the proportion of marginal funding, i.e. overnight funding quoted at the upper limit of the corridor, gradually increasing. As a consequence, the yield curve remained essentially flat throughout 2015.

Global risk appetite remained low despite the tight monetary policy due to expectations of a Fed rate hike by the end of 2015. Similar to other developing countries, Türkiye experienced a sharp increase in CDS in 2015. As a result, investments left emerging markets and investments made in Türkiye deviated sharply from the average of previous years. This led to increased exchange rate volatility in Türkiye.

The CBRT took a number of measures related to FX liquidity in the first half of 2015 to prevent inflationary effects of cumulative exchange rate effects. In order to meet the short-term FX liquidity needs of the banking sector and to reduce TRY-denominated intermediation costs, the ROCs of the lowest ROM tranches was lowered, while the ROCs of the top five tranches of one percent were increased and, the interest rate on required reserves held in TRY was increased by 150 basis points in total in 2015. Also, banks' one-week foreign currency loan interest rates at the CBRT were reduced on March 10, April 24, April 10, June 9. The interest rate at the beginning of the year was 7.5 percent for USD and 6.5 percent for EUR and at the end of the year it was 2.75 percent for USD and 1.25 percent for EUR. Some technical changes had also been made, such as: increasing the FX sales auction amount to certain values above the pre-announced minimum amount (CBRT, 2016). Due to the implementation of technical changes, the CBRT's FX reserves were starting to decline. To bolster its reserves, the CBRT began paying daily interest on the USD-denominated required reserves, ROM and free reserves held in the CBRT as an incentive.

In the second half of the year on August 18, 2015, the CBRT published a roadmap of actions that should be taken to prevent financial markets from being negatively impacted by unclear global monetary policy. The communication tool continued with the CBRT stated in its press release dated August 29, 2015 that it would continue to implement FX-related innovations. In this context, interest payments on required reserves held in TRY increased again by 50 basis points each in September, October and December of the year. In addition, on and July 27, 2015, banks' one-week foreign currency loan interest rates at the CBRT were reduced. The CBRT changed the reserve requirements for non-core FX liabilities for financial institutions that are established after August 28, 2015 in a way that to encourage the extension of maturities beyond three years. This adjustment was in line with the trend of extending the maturities of non-core liabilities. To support

FX liquidity, banks' transaction limits in the CBRT foreign exchange and banknote markets were increased by about 130 percent in September.

With a very complicated funding structure, the CBRT generally maintained a tight monetary policy stance in 2015. In 2016, the funding of the system remained largely the same as in 2015. With Türkiye facing an unprecedented sovereign risk premium in 2016, the CBRT's main concern was liquidity management.

Türkiye experienced a significant portfolio outflow because of its rising CDS. To prevent the mid-July turmoil from spreading to financial markets, the CBRT implemented a series of liquidity measures following the attempted coup in Türkiye in July 2016. In light of this, the intraday liquidity facility commission was reduced to zero and deposit transactions in TRY were allowed to provide unlimited liquidity. On August 3, 2016, the CBRT launched the Late Liquidity Window Repo Facility (LON Repo) with the aim of expanding the range of instruments available to banks to raise liquidity in TRY (CBRT, 2017). This facility is based on the LON lending rate. Banks were also allowed to pledge unlimited FX reserves as collateral to provide liquidity to the TRY. In addition, the composition of securities pledged as collateral for the CBRT's TRY liquidity facilities was also changed. Due to the turmoil in mid-July, banks had difficulty finding contracts. However, mentioned changes in the collateral framework provided an alternative to currency swap transactions, thereby reducing the need for swap contracts. In addition, the terms of the export rediscount credits were extended and the interest payments of export rediscount credits allowed to pay in TRY until the end of the year, which increased the liquidity of the FX market (CBRT, 2017). Required reserve ratios and ROCs for foreign currencies were also gradually reduced throughout the year.

Between March and September 2016, there was a 250-basis point reduction in the upper bound on the interest rate corridor. The overnight lending interest rates, which refers to the upper bound of the corridor, fell from 10.75 in March to 8.25 in September. Which implies that the corridor width was 350 basis points in March; in September it was only 100 basis points. Considering the FX fluctuations and inflation path, the narrow corridor implies an easy monetary stance. The one-week repo rate which represents policy rate and the overnight borrowing rate which represents the lower bound of the corridor were

maintained constant at 7.50 percent and at 7.25 percent respectively during this period. Throughout the year, the CBRT provided a significant portion of liquidity from the marginal funding rate rather than the policy rate. Given the width of the corridor, it can be concluded that a change in the source of funding would not lead to significant differences. Regarding reserve requirements, TRY reserve ratios fell by a total of 100 basis points in August and September.

As the effects of the mid-July turmoil subsided, there was a brief opportunity for the CBRT to refocus its attention on its core task of maintaining price stability by curbing the inflation rate. Therefore, the CBRT tightened its monetary policy in November. As a result, the one-week repo rate increased by 50 basis points and the CBRT overnight lending rate increased by 25 basis points. While the CBRT lending and borrowing rates were unchanged at 8.50 percent, 7.25 percent the one-week repo rate was also unchanged at 8 percent in December 2016. Which implies that the CBRT did not take actions regarding interest rates. This was because the CBRT assumed that aggregate demand was low despite positive risks to the inflation outlook and pricing behavior.

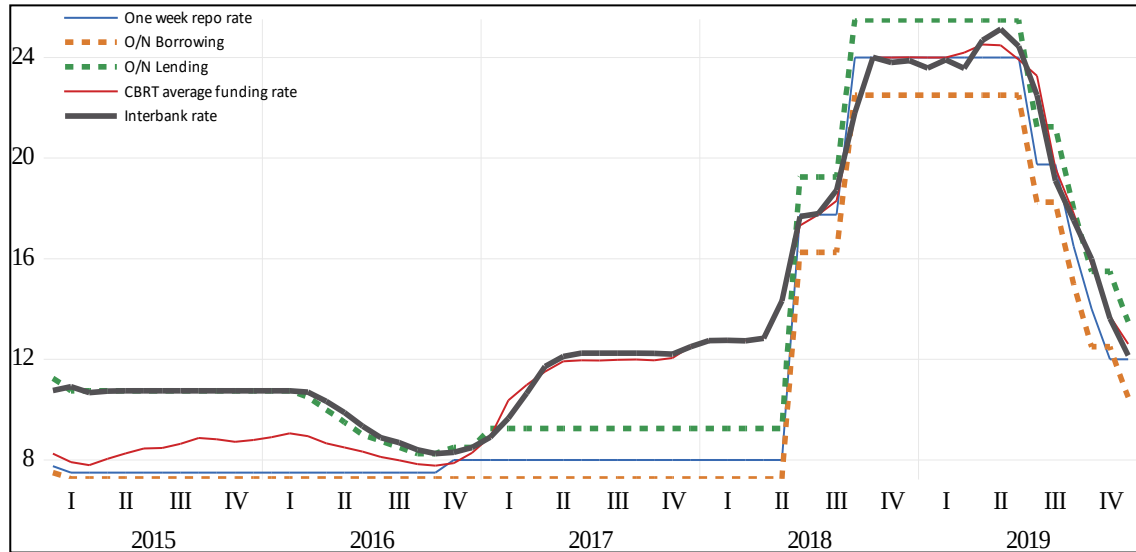
The government introduced a number of macroprudential innovations in 2017, including the Finance Ministry-backed Credit Guarantee Fund (KGF), which raised from economic growth concerns which was continued since 2016. Since the annual inflation rate was 11.92 percent at the end of 2017, outside the uncertainty range, it can be said that mentioned innovations regarding economic growth had a negative impact on the inflation outlook and pricing behavior.

As a result of deterioration in the inflation path, an uncontrollably high level of economic uncertainty was emerging in 2017. In this regard, on January 12, 2017, the CBRT began using the LON repo facility to fund the market, replacing its one-week repo auctions. In addition, to arrest the decline in the inflation outlook, the CBRT increased its LON lending rate from 10% to 11% and its overnight lending rate from 8.5 to 9.5%. Inflation was further exacerbated by exchange rate volatility. For this reason, at the MPC meeting in March, the CBRT increased its LON lending rate from 11% to 11.75%. The rise in core inflation had move the CBRT to decide a further tightening as it increased LON lending rate to 12.25% in April (CBRT, 2018). As of May 3, 2017, the

CBRT suspended funding through the BIST interbank repo/reverse repo market channel in order to narrow the option of liquidity facilities to manage the growing economic uncertainties easily.

About the management of FX liquidity, the CBRT began conducting forward FX auctions with settlement in TRY on November 20, 2017. Nevertheless, the CBRT did not directly intervene in the market in 2017, nor did it conduct outright auctions, despite significant increases in exchange rate volatility. It only provided temporary FX liquidity to the market (CBRT, 2018). At the end of the year, both the expectations and the risks of pricing behavior were exacerbated by the high inflation rates and expectations. For this reason, the CBRT changed the LON lending rate from 12.25 percent to 12.75 percent to further tighten its monetary policy stance in December. Using LON lending rate as a policy rate moved interest rate corridor outside of policy instrument set since the linkage between the corridor market interest rates had disappeared. This can be deduced in Figure 3.5. below.

Figure 3.5. Short-term Interest Rates (%) 2015-2019



Overall remarks regarding the CBRT’s innovations in 2017 follow as: Uncertainties on financial markets extended to a level that the CBRT had to squeeze the funding to the system almost in an intraday frequency as it used LON repo facility and intraday liquidity facility together and ceased one-week repo auctions in 2017. The CBRT aimed to simplify and make collateral conditions in TRY operations more transparent.

However, the system of funding channels became even more complex, making it difficult to decide on the monetary policy course of the CBRT. Finally, FX volatility came to a point that the CBRT even agreed to allow companies to repay their liabilities from the use of rediscount loans in TRY.

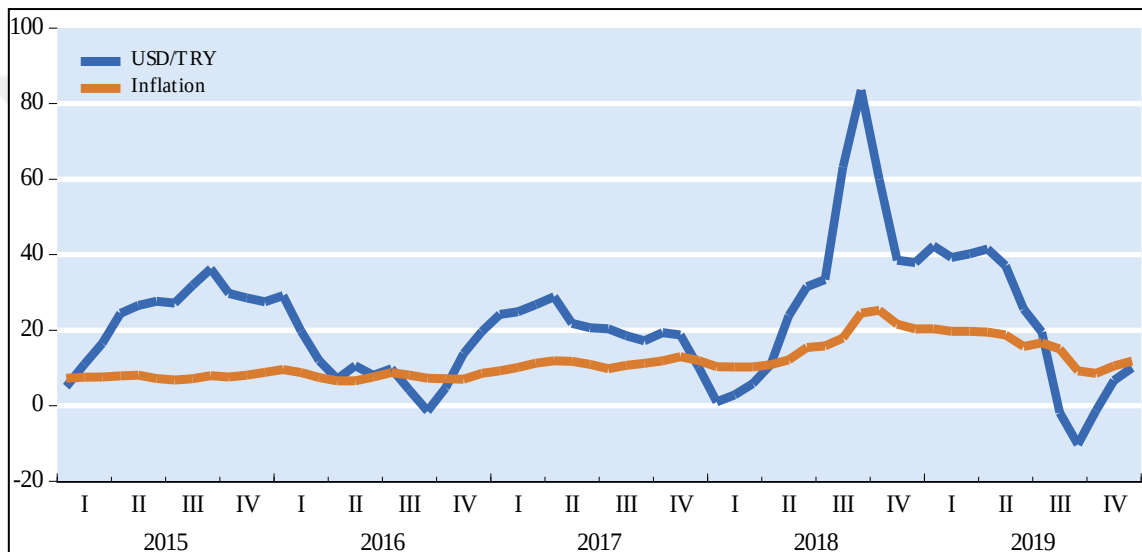
According to CBRT, the weakening of the TRY, pressure on producer prices caused by import prices and deteriorating pricing behavior contributed to the rise in consumer inflation in the first quarter of 2018 (CBRT, 2019). Against this backdrop, the CBRT conducted a slight monetary tightening during the April MPC meeting by increasing the LNO lending rate from 12.75 to 13.5%.

In the second quarter, additional tightening was undertaken in May due to risks related to unsound pricing in markets and the continued rise in inflation expectations (CBRT, 2019). As a result, the LNO lending rate was increased from 13.5 percent to 16.5 percent. On May 28, 2018, the CBRT introduced a simplification process in accordance with the monetary policy operational framework to improve the predictability of monetary policy and maintain the effectiveness of the monetary policy transmission mechanism (CBRT, 2019). Against this background, the policy interest rate was set again as one-week repo rate at 16.5% effective from June 1, 2018 (in Figure 3.5). In June MPC meeting, it emphasized that risks to pricing behavior continued to be associated with elevated inflation levels and higher inflation expectations. Consequently, the policy interest rate was raised by 125 basis points to 17.75 percent in June, in line with the tight monetary stance. Additionally, the upper limit percentage for the FX maintenance within the ROM had had reduced to 45 from 55% in May in order to provide the liquidity demand.

The 2018 presidential elections took place in Türkiye on June 24, 2018. After the election, Türkiye's parliamentary system of government was replaced with a presidential system of government. In the third quarter, Türkiye experienced several market shocks after the system change. As the one-week repo rate was once again chosen as the policy rate, the CBRT resorted to one-week repo auctions to provide liquidity to the system, with overnight interest rates hovering around the policy rate. Nevertheless, exchange rate volatility was once again the primary economic problem. As a result, on August 13,

2018, the CBRT initiated a series of measures to maintain market effectiveness and promote financial stability (CBRT, 2019). On August 13, 2018, the CBRT returned to its role as an intermediary in the FX deposit market. On August 17, 2018, a swap agreement was signed between the Central Bank of Qatar and the CBRT. As it can be seen in Figure 3.6. the agreement did not reduce exchange rate volatility but rather served as balance sheet makeover.

Figure 3.6. Annual Inflation and FX Rates (%) 2015-2019



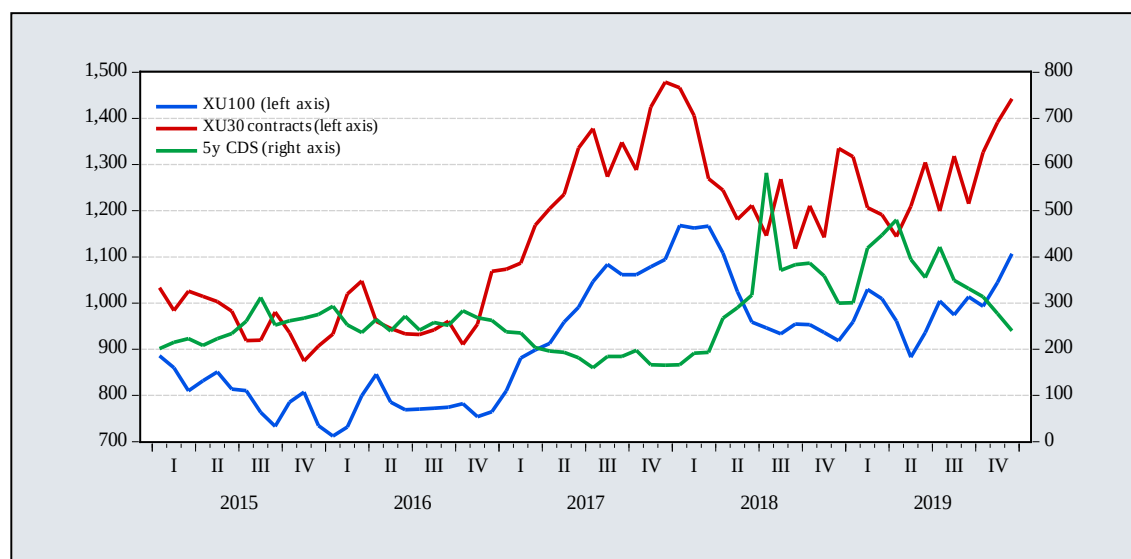
The innovations continued by reducing 250 basis point in reserve requirements for the TRY across all maturities and by reducing 400 basis point in reserve requirements for non-core FX liabilities with maturities up to three years. The upper limit reduction from 45 percent to 40 percent also applied to the FX maintenance facility within the ROM in August. Furthermore, to facilitate the efficient operation of the FX markets, the CBRT began conducting TRY-settled forward FX transactions on the VIOP, operating under the BIST, on August 31, 2018. However, these attempts were ineffective as in 2018 the TRY lost almost 40% of its value against the USD (in Figure 3.6.).

The inflation outlook for the fourth quarter was impacted by significant financial market volatility, cost pressures and their knock-on effects (CBRT, 2019). To improve price stability, the CBRT decided to significantly tighten monetary policy in September and increased the one-week repo auctions rate to 24 percent. To robust the effectiveness of FX liquidity management, all currency-related market transactions in the CBRT markets

were consolidated into a single collateral system which means FX market transactions added to the common collateral system as of November 30, 2018. The CBRT did not engage in any FX buying or selling activities in 2018, either directly, as in 2017, or through auctions (CBRT, 2019). Since the depreciation of the TRY reached unprecedented levels at the end of the year (in Figure 3.6.), the interest rate paid for the required TRY reserves rose from 4 percent to 13 percent. Through amendment introduced in December to promote the development and efficiency of financial markets, all funds raised from repo transactions at BIST were excluded from the reserve requirement. The number of banks and financing companies using the ROM facility increased significantly in 2018 as the CBRT began accepting required reserves in EUR in addition to USD (CBRT, 2019).

The major achievement of the CBRT was the simplification of interest rates and liquidity management processes in 2018. However, based on an analysis of economic data for the entire year 2018, it could be concluded that the CBRT had not achieved the financial and price stability required by the law. Figure 3.7. demonstrates the high fluctuations in VIOP through XU30 contracts movements, and high-risk premium level as CDS almost reached USD 600 in 2018.

Figure 3.7. Monthly Movements of Financial Instruments 2015-2019



Under open market operations (OMO), the CBRT provided funds through the Primary Dealer Liquidity Facility and one-week repo auctions in 2019. The CBRT maintained

the policy interest rate in the first half of 2019 as domestic demand was weak due to the significant increase in the policy interest rate that was made in September 2018.

There was a high market liquidity due to the loose monetary policies of advanced economies in 2019. As a result, with announcements on March 22, 2019 and May 9, 2019, the one-week repo auctions were suspended twice (CBRT, 2020). The reserve ratios for FX liabilities were increased by 100 basis points for all maturities in early May and the upper limit for the FX servicing facility within the ROC mechanism was reduced from 40 percent to 30 percent. In addition, banks requested more TRY funds from the CBRT, and Turkish lira foreign exchange deposit auctions were suspended after it was determined that they were no longer necessary. During this period, the CBRT's TRY swap market saw a gradual increase in the overall TRY swap sales limit for non-matured swap transactions from 10% to 40%, with the aim of reducing the negative impact of supply-demand in foreign swap markets on swap rates (CBRT, 2020). On May 27, 2019, the CBRT began conducting overnight reverse repo transactions in addition to overnight repo transactions on the BIST Committed Transactions Market, where TRY-denominated lease certificates are traded which issued by the Ministry of Treasury and Finance and asset-leasing companies that are operated by public companies. The reserve requirement ratios for FX deposits were further increased by 200 basis points for all maturities at the end of May. Starting in May, the Borsa Istanbul Swap Market began to process swap transactions in USD and EUR with maturities longer than one week, in parallel with the CBRT's policy interest rate. The Turkish Lira Gold Swap Market was opened in May with the aim of improving the efficiency of banks' liquidity management and facilitating the inflow of gold savings into the financial system. Also, for companies with net sales of more than TRY 5 billion in the previous fiscal year, rediscount credit limits had been doubled (CBRT, 2020).

After June 2019, credit demand in the economy increased. According to CBRT, the main reason for the increase in credit demand was the improvement in inflation expectations. In July, the CBRT decided to cut the policy interest rate by 425 basis points. Although the decision increased attractiveness of borrowing, the innovation was made due to the belief that the inflation outlook reduces the risk of rising credit demand. About the FX management, reserve ratios for FX deposits funds increased by 100 basis

points for all maturities in July, making this the third increment that was made for FX reserve requirement ratios. Balancing set of innovations came on August 5, 2019 as the interest rate for required reserves, reserve options and free deposits in USD at the CBRT was reduced from 2 percent to 1 percent.

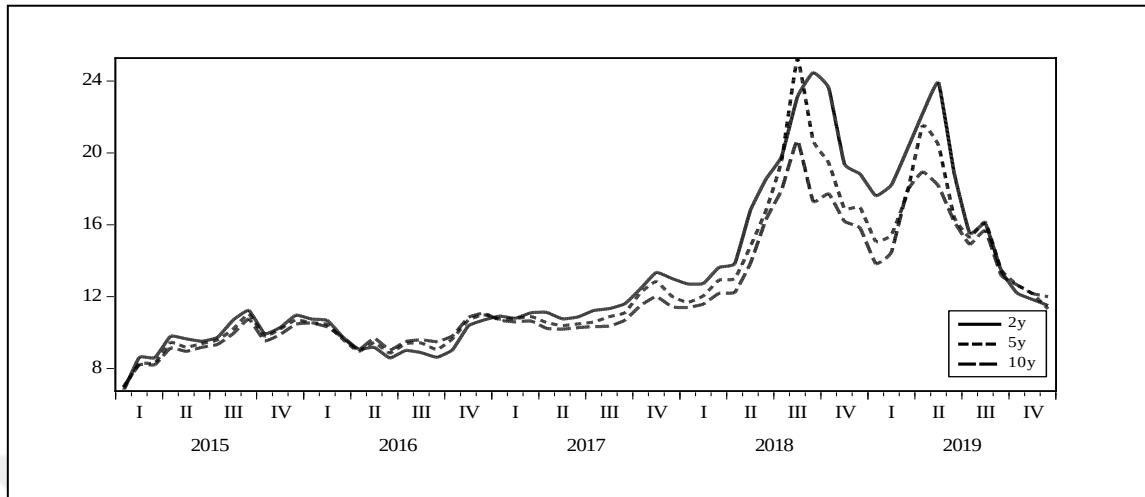
Further policy rate cut implemented in September as the CBRT noted that the inflation outlook continued to improve. In addition, the reserve ratios for FX deposits were increased by 100 basis points for all maturities, resulting in USD 1.4 billion of liquidity being withdrawn from the market (CBRT, 2020). At the MPC meeting in October, it was decided to cut the policy interest rate by 250 basis points to 14 percent due to the strong base effect and the significant decline in consumer inflation in September, especially in core goods and food groups (CBRT, 2020). In October, Foreign Exchange Gold Swap Market was also launched with the aim of improving banks' liquidity management and facilitating the inflow of gold savings into the financial system.

Given the moderate development of core inflation indicators, the CBRT decided to cut the policy interest rate by 200 basis points in December. By the end of December, reserve requirements for FX deposits were increased by 200 basis points. However, banks that met the credit growth conditions did not feel any impact from this increase, so the ratios for these banks were set 200 basis points lower (CBRT, 2020).

The level of the real exchange rate in 2019 kept import demand under pressure, especially after the sharp depreciation of the TRY in 2018. For the first time since 2002, the current account balance was reached a positive value during 2019 (CBRT, 2020).

After peaking at 20.30 percent at the end of 2018, consumer inflation began to decline sharply in 2019, ending at 11.84 percent (in Figure 3.6.). Given the improving inflation outlook, the CBRT cut the policy interest rate to 12 percent in the second half of the year. From Figure 3.8. it can be concluded that yield curve was almost flat at the end of the year.

Figure 3.8. Government Bonds Yield (%) 2015-2019



The decline in inflation as mentioned by the CBRT was mainly attributed to changes in exchange rates, softening pricing behavior and a downward trend in medium-term inflation expectations. However, as subsequent years showed that this was primarily due to the base effect that caused by 2018 metrics rather than improvements in the inflation dynamics.

3.3. Phase III: 2020-2023

The CBRT continued the policy rate cuts that began in July 2019 after noting that the path of inflation was in line with year-end forecasts (CBRT, 2021). The policy rate cuts in January and February 2020 totaled 125 basis points, resulting in the one-week repo rate being set at 10.75 percent. The CBRT stuck to its strategy of introducing gold savings into the country. The ROM facility's upper limit standard gold storage was reduced from 30% to 20% of the TRY required reserves in January. Likewise, the facility's upper limit on storing gold was increased from 10% to 15% of the TRY required reserve.

The weight of consumer credit in the calculation of credit growth, which is taken into account in the practice of credit growth-based reserve requirements, was reduced in early March to direct credit supply towards productive and production-oriented sectors that support sustainable growth rather than consumption (CBRT, 2021). Also, instead of commercial loans, loans granted to the selected sectors were now also taken into account

in the credit growth-based reserve requirements. The impact of the pandemic on domestic demand, travel and international trade caused the economy to begin contracting from mid-March. A number of measures declared by the CBRT were aimed at mitigating the negative consequences of the coronavirus pandemic on the economy. Given the pandemic condition and the growing risks to year-end inflation forecasts, the CBRT cut interest rates by 200 basis points in March and April (CBRT, 2021). The funding to the market was carried out through repo transactions under the standing liquidity facilities, which was offered at an interest rate of 150 basis points below the policy rate and with a maximum maturity of 91 days to mitigate the liquidity risk associated with the Covid-19 pandemic. In addition, as stated in the CBRT's March 31 press release, the CBRT purchased domestic government debt securities with a face value of TRY 12.2 billion within the scope of the opportunity provided to primary dealer banks to sell the domestic government debt securities they purchased from the Unemployment Insurance Fund (CBRT, 2021). The CBRT conducted auctions for TRY currency swap quantities. The auctions were conducted against USD and EUR, with the one-year term rate set at 100 basis points below the CBRT's policy rate and the six-month term rate at 125 basis points below the policy rate. The interest on reserve requirement rate maintained in TRY was reduced by 200 basis points to 8% for banks meeting real credit growth requirements, while remaining at 0% for the other banks. In addition, across all liability types and all maturity brackets, FX reserve ratios for banks that meet real credit growth requirements had had been reduced by 500 basis points. Under the rediscount credits tool, it was decided to extend TRY-denominated rediscount credits at an interest rate 150 basis points below the policy rate, with a maximum term of 360 days until the end of 2020. A further extension of the term of rediscount credits was granted to over a thousand companies made.

The maximum limit for the ratio of the nominal size of the OMO portfolio to total assets in the analytical balance sheet of the CBRT was set at 5% for 2020 in the text on monetary and exchange rate policy for 2020 (CBRT, 2021). However, in order to revive the soared economic activity, it was revised to 10% in April. In order to reduce the transaction cost of reaching to the liquidity, asset-backed, asset-guaranteed and mortgage-backed securities had had also been accepted as collateral for TRY and

foreign currency transactions. In April, the maximum number of outstanding transactions in the TRY-FX swap market carried out through the quotation method was increased from 20% to 30% of banks' total transaction limits in the FX and banknote markets. This increase was made taking into account banks' maturity and liquidity management requirements as well as the need to provide FX liquidity to the market (CBRT, 2021).

Although global mobility restrictions were eased in May and June 2020 and supportive measures taken during the pandemic led to a better-than-expected economic recovery and partially reduced uncertainties, deteriorated inflation expectations and global uncertainties reinforced the dollarization trend and negatively impacted external trade balance after June. Particularly consumer prices were under pressure, due to increased cost inflation caused primarily by exchange rates (CBRT, 2021). In addition, there was a negative impact on inflation expectations and the inflation outlook in the second half of the year due to demand-side factors which triggered by the strong credit stimulus. These developments led to widespread price increases, which led to high levels of core inflation indicators. Given the gradual easing of coronavirus restrictions since mid-May, the CBRT acknowledged the increase in unit costs due to declining production and sales and estimated that inflation could pick up slightly in the near future. Notwithstanding, the policy interest rate was cut sharply by 50 basis points to 8.25 percent in May after the CBRT found that the disinflationary impact of aggregate demand conditions had intensified.

The CBRT noted in June that the trend of core inflation indicators was increasing due to the pandemic-related deterioration in unit costs, although overall demand conditions were limited. The policy interest rate therefore remained untouched. As the pandemic led to a slowdown in the economy and an increase in the inflation outlook, the CBRT continued to look for ways to support growth aside from its main task which is maintaining price stability. Accordingly, the issuance of advance loans for real investment was began on June 5, 2020 (CBRT, 2021). The purpose of this kind of loans is to support highly efficient investments that reduce imports and increase exports, reduce external dependence, reduce the current account deficit problem and support sustainable growth. Advanced loans introduced to the market through development and

investment banks channel. The loans had a maximum term of 10 years and a grace period of two years and were granted to strategically important sectors in exchange for receipt of bills denominated in TRY. Enforcement of the rule requiring banks with a real annual credit growth rate above 15 percent to have an adjusted real credit growth rate below 15 percent was also suspended until the end of the year to give banks more leeway in meeting credit demand from individuals and businesses due to their disrupted cash flows during the pandemic. These measures resulted in economic activity recovering more than expected and uncertainty reducing. The economy experienced a strong recovery, supported by exports, as pent-up domestic demand recovered quickly amid significant easing of financial conditions and a strong credit stimulus (CBRT, 2021).

There had been an upward trend in inflation since July, which had worsened the inflation outlook. However, the CBRT's inflation forecast did not take into account the soaring inflation outlook as it continued to support TRY liquidity through innovations such as reducing the interest rate on required reserves held in TRY by 100 basis points to 7% for banks that met the requirements for real loan growth and leave it at 0% for other banks at the beginning of July. But in mid-July, as part of normalization, all banks' FX reserve ratios were raised by 300 basis points across all liability categories and maturities. From early August, the CBRT finally coordinated steps to tighten pandemic-related measures as the rapid economic recovery driven by credit stimulus measures appeared to have a detrimental impact on inflation expectations. In the scope of the tightening, bank borrowing limits in the interbank money market were halved in August, primary dealer repo transactions were phase-out, restrictions were implemented on BIST repo transactions, traditional one-month auction-style repo auctions were conducted again, and finally transactions in the late liquidity window were introduced to the market. Further tightening included increasing FX required reserve ratios by 700 basis points for precious metals deposit accounts and by 200 basis points for all other FX liabilities across all maturities to ensure banks meet real credit growth requirements. In addition, the TRY rediscount credits interest rate was changed on August 12, 2020 to reflect the CBRT policy rate (CBRT, 2021). It was also decided to limit the availability of these loans to small and medium-sized businesses. Beside decreasing 13-week commercial

loan growth, these actions were not sufficient enough to limit indebtedness because of the growth-oriented monetary policy implementations that was made early in the year, as the financial debt ratio of companies in the corporate sector increase by 13 percentage points to 69 percent in August 2020 from 56 percent in January 2020 (CBRT, 2021).

Although normalization steps were taken the gold prices were increasing based on the uncertainties regarding economy. The CBRT launched gold sales transactions against FX in the BIST precious metals and diamond market on September 25, 2020. The purchase of domestically mined gold against TRY was also put on hold on October 8, 2020. To further reduce uncertainty and to strengthen the mechanism channel, interest rate on reserve requirements was increased by 200 basis points for banks meeting real credit growth conditions bringing the rate to 9%. For other banks the rate was set at 2% in October.

One sector that was hit hard by the pandemic was the aviation industry. Although credit restrictive measures were implemented in the second half of the year on October 27, 2020 the CBRT decided not to apply the clause for aviation companies, in which firms may only use a maximum of 60% of their company limits of rediscount credits with maturities of 121 days or longer loans until December 31, 2021

With respect to the FX amounts held in the required reserve and termination deposit accounts with the CBRT, the annual commission rate applied to the FX amounts held in EUR and USD applies to the portion to be held against non-USD foreign currency deposit fund liabilities were reduced. This was done to make it easier to obtain FX liquidity and prevent TRY depreciation. In addition, the commission rate on the amount of FX held in USD for the portion that must be held against deposits in USD fund liabilities had also been reduced.

Inflation remained almost unchanged at around 12 percent in the first ten months of the year. As a result, the CBRT loudly proclaimed a policy approach that took into account current risks and prioritized the decline in inflation from the first week of November (CBRT, 2021). In line with this statement, the CBRT tightened monetary policy to eliminate risks to the inflation outlook, contain inflation expectations and quickly resume the disinflation process. This was done in November by suspending overnight

repo transactions through the quotation method against TRY-denominated lease certificates under OMO and by removing banks' borrowing limits in the interbank money market. In addition, the policy interest rate raised from 10.25 percent to 15 percent. In November the CBRT made another attempt and decided to allocate all funds at the policy interest rate, i.e. the one-week repo auction rate, as part of its ongoing efforts to tighten its monetary policy framework. In the context of inflation outlook, the introduction of accommodative measures to reduce the risk of the pandemic on economic activity were ineffective, as shown by the rise in annual consumer inflation to 14.60% in December. Furthermore, producer inflation reached 25.15 percent by December, suggesting that cost pressures on consumer inflation will continue in the near term. In this regard, at the MPC meeting in December it was decided to increase the policy interest rate by 200 basis points in order to tighten monetary policy even further.

As mentioned above the annual CPI inflation rate was 14.60 at the end of the year 2020. The CBRT assessed its monetary policy as tight, with the policy interest rate remaining constant at 17% in January 2021. In February, TRY ratios for all liability types and maturities were increased by 200 basis points to support the goal of sustainable price stability. Additionally, holding FX liability rate reduced from 30% to 20% of TRY required reserves, while the ROM for holding standard gold reduced from 20% to 15% of TRY required reserves. These changes were made to improve the effectiveness of the monetary transmission mechanism. A later announcement said the gold facility would be gradually reduced and phased out after reducing the rate to 10 percent (CBRT, 2022).

March saw an improvement in global growth prospects and an increase in global commodity prices due to the impact of expansionary monetary and fiscal policies and positive developments in the vaccination process. The increase in economic activity in the services and related sectors, especially with the easing of restrictions due to the pandemic, and with the help of the mentioned global economic conditions, led to a strong trajectory of economic activity in Türkiye. Accordingly, pricing behavior and the inflation outlook were negatively impacted by rising import prices as well as strong domestic demand, which benefited from the cumulative effects of high credit growth during the pandemic. In addition, the medium-term inflation outlook also deteriorated due to the targeted price adjustments caused by the obvious supply constraints. With all

these improvements, inflation expectations had worsened. Therefore, with the decision taken at the MPC meeting in March, the CBRT decided to carry out a front-loaded and strong additional tightening of monetary policy by increasing the policy interest rate to 19%.

Following this rate adjustment, the CBRT governor was abruptly sacked and the CDS premium subsequently exceeded USD 450, as shown in Figure 3.9.

Figure 3.9. Monthly Movements of Financial Instruments 2020-2023



The CBRT announced in the second quarter of 2021 that it would maintain its tight monetary policy to ensure the achievement of medium-term objectives and accelerate the process of disinflation (CBRT, 2022). Therefore, although inflation tended to rise, the policy interest rate remained unchanged from April to August.

In line with its primary objective of achieving price stability, the CBRT updated the reserve requirement regulation, which was announced along with a press release on July 1, 2021. This scope would reduce the maximum capacity of the ROM facility to store FX for TRY reserve requirements. The ROM would be reduced from 20 percent to 10 percent starting from the maintenance period beginning August 6, 2021. This would ultimately lead to the closure of the facility in October. In August, reserve requirements for FX deposits were increased by 200 basis points for all maturities. Further increases at the same pace were put into effect until the next month. In addition, from June 25, 2021, FX deposits converted into TRY deposits with a maturity of one month or longer after that date would be exempt from the reserve requirement and banks would receive

additional compensation for the same converted amount. This would reduce the share of FX in total deposits and increase the share of TRY in banks' balance sheets (CBRT, 2022).

After the MPC meeting in September, the CBRT revised its assessment on price stability and started to observe the path of core inflation more than that of headline inflation. This ultimately reflected to the policy interest rate as it was reduced by 100 basis points to 18 percent, taking into account supply shocks and the development of core inflation rather than headline inflation. In October, the policy interest rate was further reduced against the same background. In addition, the CBRT decided in October to rationalize interest rates and terms for rediscount loans in order to strengthen the channel of the monetary transmission mechanism reaching the real economy. In this context, FX loans with zero interest and additional sales guarantee also had terms of 181 to 360 days, depending on whether the additional FX sales guarantee was doubled. Under the new agreement, if a company wanted to borrow TRY rediscount loans with a maturity of 181 to 360 days, it had had to sell twice as much additional foreign currency. The interest on these loans was calculated as the base rate minus 400 basis points. Within two months of taking out a loan, the company had to sell at least as much as the additional proceeds from FX exports; Within six months of taking out the loan, at least as much as the remaining guarantee had to be sold (CBRT, 2022).

All of these de-dollarization initiatives were in vain as the growing net short-term FX position surplus of companies in the real sector reached USD 61 billion in November. The ratio of short-term FX liabilities to FX deposits, a liquid asset that companies hold to hedge against FX risk, remained elevated compared to pre-pandemic levels. Due to exchange rate changes, corporate financial debt to GDP rose to 71.3% in November. As of November 2021, the total FX financial debt held by companies was USD 243 billion, of which USD 140 billion and USD 103 billion came from domestic and FX loans, respectively (CBRT, 2022). In November this year, the rollover rate of external corporate debt was 108 percent, while domestic corporate loans decreased and the share of external loans in total financial debt increased during this period.

Although the CBRT announced at the beginning of the year that it would maintain its tight monetary policy stance until strong indicators point to a sustained decline in inflation and price stability, the CBRT cut the policy interest rate by 100 basis points to 14 percent at its closing meeting of the year (CBRT, 2022). Alternatively, the CBRT noted limited scope for price increases, suggested by the temporary effects of supply-side factors and other variables outside the control of monetary policy.

Apart from the economic shutdown in May, annual consumer inflation continued its upward trend in 2021, although the CBRT framework at the beginning of the year suggested that the impact of the drastic monetary policy tightening carried out in the last two months of 2020 would become more noticeable. At the end of the year, inflation reached 36.08 percent contrary to the CBRT's expectation that it would have a gradual decline due to cost and demand factors (CBRT, 2022). The CBRT linked this to deteriorating pricing behavior beyond the cost effect due to unhealthy pricing in the FX market. As a result, the CBRT made five separate market injections in a single month in December when it intervened in the FX market through direct sales.

In December, the CBRT contributed to extreme, non-traditional practices never seen before due to the high volatility in FX prices that brought uncertainties in the economy to unprecedented levels. In this regard, the system of FX-protected accounts (KKM) was introduced by Ministry of Treasury and Finance in cooperation with the CBRT. The KKM was aimed to deal with the currency shock and prevent the depreciation of the TRY against foreign currencies. In fact, the KKM essentially was a product of an unorthodox policy in Türkiye aimed at filling the gap created by the nonapplication of policy interest rates by the CBRT for various purposes. KKM was to provide depositors with additional returns based on exchange rate differences, in addition to the interest or profit shares they would receive when their deposits matured. The impact of the KKM system on exchange rates was significant, with USD/TRY rate falling by almost 15% following the announcement of the KKM system on December 21, 2021. However, the impact was temporary in nature as the USD/TRY exchange rate started rising again from where it left off on the same day that the KKM announcement was made. Moreover, this instrument had been recognized as a controversial instrument due to the effects of the privileges of the KKM system on the state budget and the CBRT's balance sheet.

As stated in the press releases dated December 21 and 29, 2021, the CBRT decided to provide support to holders of deposits in the event that their FX deposit, as well as gold-denominated deposits, are damaged at the request of the account holder in TRY time accounts can be converted. This was done in line with the KKM system and with the aim of supporting financial stability by increasing the share of TRY in total deposits in the banking system. The innovations included the following persons who qualified for the incentive: resident individuals who already owned gold deposits by December 20, 2021 or who were thereafter required to open gold deposits against gold holdings on that date and converted these accounts to TRY term deposit accounts; These individuals also qualified for the incentive if they already had an FX deposit account denominated in USD, EUR or British pounds. Apart from the above provisions, banks received additional interest for maintaining a required reserve facility under the ROM for each resident individual account converted into TRY term deposits. These accounts were also exempt from required reserve liability. In addition, on December 29, 2021, the CBRT started to transactions under the VIOP, and it launched sales auctions on TRY-settled FX futures to help importers and exporters manage their FX risk (CBRT, 2022).

Despite the FX-price-oriented policies of 2021, the TRY lost about 80% of its value against the USD in January 2022 compared to the same month last year. In this context, the CBRT presented its assessment suggesting unhealthy pricing in the FX market, exchange rate-indexed pricing behavior, supply-side factors such as the rise in global food and agricultural commodity prices, rising energy costs as a result of geopolitical developments and supply constraints, as well as demand developments were the main drivers of inflation. Supply-side factors also included the temporary impact of pricing that was not supported by economic fundamentals (CBRT, 2023a).

On January 27, 2022, the CBRT issued a press release introducing the liraization strategy (LS) in response to the sharp depreciation of the TRY. The LS was based on a comprehensive strategy that focuses on the creation of new financial products, the diversification of collateral and the use of liquidity management techniques to leverage the TRY in the system. In order to increase the efficiency of the monetary policy transmission mechanism during the year, the CBRT implemented a number of measures as part of this strategy. As the main elements of the then current TRY liquidity

management, the size of OMO and swap transactions as well as their share in the total financing, distribution by facilities and collateralization were the focus of the measures carried out under the LS.

The commission charged on required reserve amounts that banks have to keep track of on their FX deposits liabilities had been revised under the LS. In this case, there was a sharp increase in commission rates in the required reserves created for FX deposits liabilities. Conversely, it was explained that banks would only be charged commissions when their conversion rates from FX deposits to TRY time deposits could not reach the rates assigned by CBRT until the end of the year (CBRT, 2023a).

The CBRT terminated FX futures sales transactions settled in TRY, which was introduced in December 2021, which helped importers and exporters manage their FX risk using the auction method. This was a further step in pursuing the liraization that took place in February.

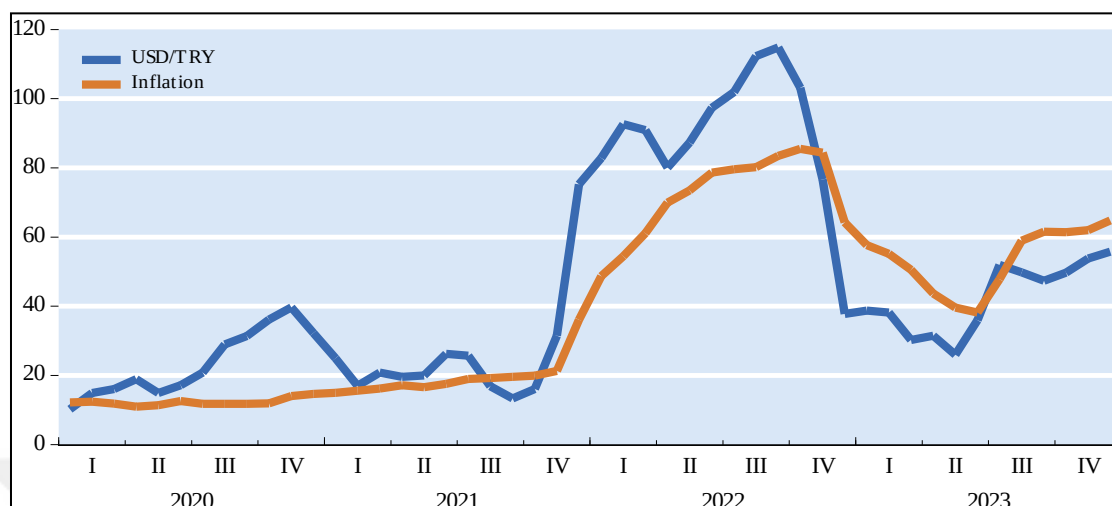
The collateral discount rate for indexed securities, FX and gold-denominated assets was increased from 5% to 15% on May 27, 2022, as part of the LS. On September 2, 2022, the rate rose to 60%. The purpose of this agreement was to increase the share of TRY assets in the collateral system. The list of securities accepted as collateral for OMO repo transactions had been changed by an additional agreement. Specifically, the facility that allowed institutional investors to use gold and FX-denominated government bonds as collateral in repo transactions was terminated by the CBRT on June 24, 2022.

The reserve requirement ratios for FX deposits were applied differently based on the conversion rate of FX accounts into TRY accounts under the LS to improve the effectiveness of monetary policy. This change would come into effect from the start of the reserve maintenance period on June 10, 2022. It was decided to impose an additional reserve requirement on banks whose conversion rates are lower than those set by the CBRT. A similar implementation was made for long-term fixed rate securities denominated in TRY, which banks were required to hold in proportion to a percentage of their total FX deposits. In this case, the CBRT would increase the holding ratio of long-term fixed rate TRY securities if the bank is unable to provide the conversion rate (CBRT, 2023a). The guidelines for securities maintenance practices were also extended

to assets. As a result, it was determined that certain TRY commercial loans that was not subject to reserve requirements would be subject to securities maintenance practices and that loans previously subject to reserve requirements would be subject to securities maintenance practices in lieu of reserve requirements but with a higher rate than that of reserve requirement. Besides that, if the loan amount exceeds a certain monthly growth rate, security maintenance would apply to that loan regardless of the type. In addition, a portion of commercial loans that are extended beyond the annual compound reference interest rate specified by the CBRT would also be subject to securities maintenance. Additionally, on June 30, 2022, the commission rate for the reserves that banks must maintain for FX deposits liabilities was increased again. Also, on August 31, 2022, it was decided to levy an annual commission of 3 percent on the required reserve amount to be fixed for FX deposits liabilities of banks whose share of TRY deposits were less than 50% in the total deposits (CBRT, 2023a).

In August, the annual inflation rate was 80.21 percent. The CBRT found that the sharp rise in global commodity and food prices due to geopolitical developments, as well as pricing behavior characterized by the movements in FX market that is disconnected from economic fundamentals, were the main drivers of the inflation trend (CBRT, 2023). Inflation dynamics were negatively impacted by supply-side factors, including rising import prices in USD terms, high global transportation costs and disruptions in the supply chain. As a result, the CBRT emphasized the need to maintain favorable financial conditions in order to maintain the dynamics of industrial production growth, the upward trend in employment and structural improvements in supply and investment capacity. Accordingly, in August, the policy interest rate was cut by 100 basis points to 13 percent. it cut the policy rate by 100 basis point to 13% in August. After the decision, as can be seen in Figure 3.9., the CDS of Türkiye reached beyond USD 800 which is its all-time high level. Figure 3.10 makes this clear that the CBRT's liraization policy of the previous two years after the August interest rate decision had become vain as the TRY fell almost 120 percent against the USD on an annual basis in August. This depreciation is the peak value for the period 2010 and 2023. By the end of the year, the policy rate had fallen to 9 percent due to same aforementioned backdrops.

Figure 3.10. Annual Inflation and FX Rates (%) 2020-2023



The annual commission rate, which was previously differentiated according to the share of TRY deposits was increased as of November 24, 2022, while the commission rate based on the conversion rate was abolished. The higher annual commission rates were broken down by the share TRY deposits. On the other hand, there was a revision of securities maintenance in December, while the reserve requirement by the conversion rate was abolished. The securities maintenance regulation was extended to other financial institutions in order to permanently increase the weight of TRY on both the liabilities and assets sides of the banking system (CBRT, 2023a).

The rediscount credit regulations followed guidelines of the LS to achieve the restricted use of foreign currencies. Consequently, for rediscount credits denominated in TRY, a regulation had been introduced that stipulates that 70% of export proceeds must be converted into TRY, of which at least 40% must be deposited with the CBRT. This requirement applied at least to the amount of the loan taken out in foreign currency (CBRT, 2023a).

Early in 2023, the CBRT kept up its efforts to raise the LS's efficacy. Consequently, the holding ratio of long-term fixed rate securities denominated in TRY that banks are required to hold in relation to a percentage of their total FX deposits was raised as of January 2023. Furthermore, it was decided to apply a discounted securities maintenance ratio to banks that surpassed the target of a 60 percent TRY deposit ratio. The CBRT decided to raise the reserve requirement ratios for TRY deposit accounts with maturities

of more than three months and for the increase of FX liabilities with maturities of more than six months, which are provided directly from abroad, to be set at zero percent in order to encourage the extension of the maturity of TL deposits. The collateral discount rate for indexed securities was also raised, and as of January, it was seventy percent (CBRT, 2023b). The CBRT launched a conversion assistance program to entice businesses to sell the foreign currency they had acquired overseas to the CBRT. Accordingly, the upper bound interest rate on conversion accounts lifted, and banks are now free to determine the interest rate that applies to these accounts as long as it doesn't fall below the rate that the CBRT sets for its one-week repo auction (CBRT, 2023b).

In response to Kahramanmaraş-centered earthquakes on February 6, the CBRT started putting certain measures into place. The CBRT was concerned about the drop in consumption and production as a result of the effects of the disaster (CBRT, 2023c). In light of this, the MPC noted at its meeting in February that there was uncertainty surrounding economic activity indicators following the earthquakes and that, in addition to their direct effects, the earthquakes would also have indirect effects due to support and reconstruction efforts, which would have a variety of sectoral and regional effects that would fluctuate over time. The CBRT lowered the policy interest rate by 50 basis points in February after realizing that maintaining favorable financial conditions was now even more crucial to sustaining the industrial production growth momentum and the upward trend in employment following the earthquakes (CBRT, 2023c).

Disaster-related measures on the real sector and financial markets kept implementing. In this respect, the duration of the obligation fulfillment as well as the terms for repayment of advance loans against investment obligations and rediscount loans extended by the CBRT without charging interest. In addition, the CBRT decided that loans to be extended by financing companies to residents of the earthquake zone and loans to be extended to non-residents of the earthquake zone but whose intended use meets certain conditions should not be subject to reserve requirements, and if these loans are provided by banks, banks should not be obliged to maintaining securities regulation regarding these loans (CBRT, 2023c). Furthermore, for the banks that will serve as intermediaries in the transfer of foreign funds to the earthquake zone, the CBRT decided to extend the

one-week duration of the quoted transactions in the Turkish lira currency swap market to longer maturities.

Meanwhile, the implementation framework for the interest spread between policy rate and commercial loans was extended to personal loans in March with the goal of improving the efficacy of the monetary transmission mechanism (CBRT, 2023c).

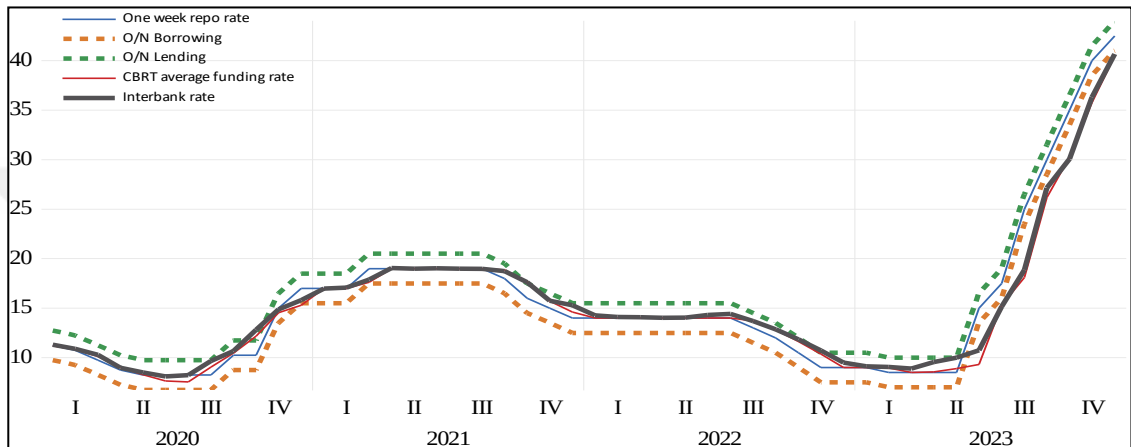
In April, additional obligations were imposed on banks that did not comply with the conversion rates set by the CBRT, while privileges were granted to banks that did so. The discount rate instrument was also used within the framework of the LS. In this context, as of April 10, 2023, the discount rates for indexed securities and assets denominated in FX and gold subject to collateralization were increased. The measures continued as the maintenance rate according to the loan types that is subject to securities maintenance regulation significantly was risen (CBRT, 2023d).

The fall in energy prices in April increased in May due to the free allocation of natural gas to consumers for a month, which had a positive impact on headline inflation, as shown in Figure 3.10. above. The 2023 parliamentary and presidential elections took place in Türkiye in May. Although inflation began to decline mainly due to managed prices, Türkiye's risk premium indicators began to rise. Figure 3.9. shows that the CDS premium reached USD 600 in May, representing the peak in 2023, due to domestic uncertainties. While the CDS began to decline from June, Türkiye's CDS premium continued to hover well above its 10-year average (CBRT, 2023d).

Figure 3.10. makes it clear that the relatively stable TRY rate in April and May was replaced by a significant depreciation in June. With the inauguration of new management in June, the CBRT switched from the unorthodox to an orthodox monetary policy. As a result, the spread between deposit rates and the CBRT weighted average funding rate, which widened due to the securities maintenance regulation, narrowed during June (CBRT, 2023e). This means that the links between the policy interest rate and market interest rates began to form again. At the June MPC meeting, given the inflation outlook and upside risks, the CBRT assessed that the current monetary policy framework should be made more effective in order to reduce inflation to the medium-term target of 5%. Therefore, a significant change in policy stance was made, as it was

necessary to create the monetary and financial conditions to ensure a decline in the underlying inflation trend. The meeting sent strong signals about restrictive monetary policy. As a result, the CBRT increased the policy interest rate from 8.5% to 15% in June (CBRT, 2023e). The view of the interest rate corridor after the decision is shown in Figure 3.11 below.

Figure 3.11. Short-term Interest Rates (%) 2020-2023



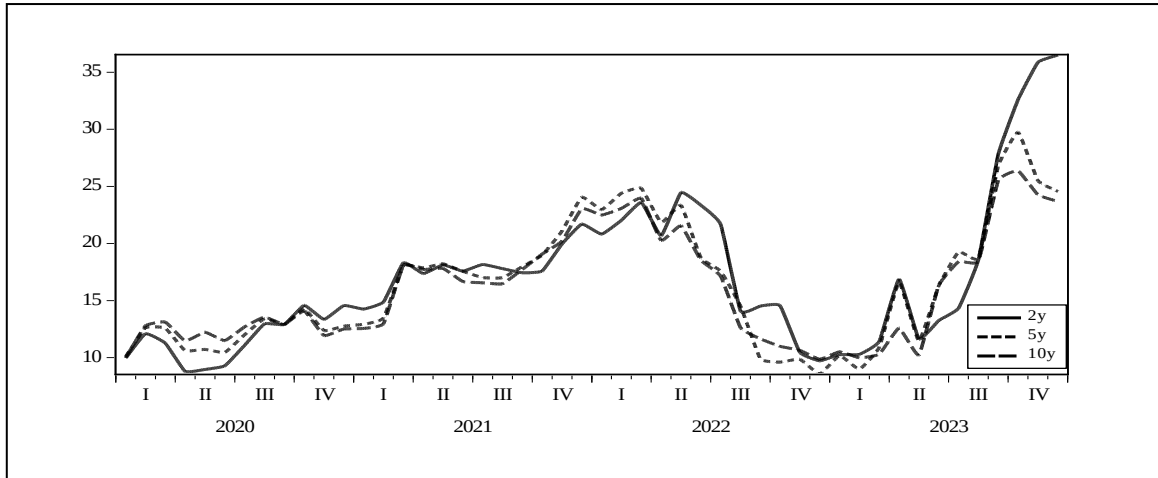
In addition, decisions on quantitative tightening and selective credit tightening were taken to support the monetary policy stance. The aim of these measures was to balance the consumption side and not the investments, without using macroprudential policies, but rather monetary tightening (CBRT, 2023e). Accordingly, the macroprudential measures simplified and aligned with their primary objectives. In this context, the required reserve ratios for KKM accounts were increased and the conversion target from FX accounts to TRY accounts was changed to from KKM accounts to TRY accounts. It was announced that the opening of KKM accounts would be restricted and this practice would be abandoned in the near future in cooperation with the government (CBRT, 2023e). The practice of holding securities and reserve requirements based on the TRY share of total deposits, whereby KKM accounts are considered TRY deposits, were abolished, along with the minimum interest rate requirement for KKM accounts originated in TRY. In order to align market interest rates with the policy rate, the securities maintenance rates applied by loan type reduced. In addition, securities maintenance regulations applicable to certain types of loans and for other financial institutions completely abolished. In the meantime, the CBRT confined the total interest cost of rediscount credits to the policy interest rate (CBRT, 2023e). In addition, the daily

rediscount credit cap for export and FX-earning services were increased to support selective credit utilization and access of exporters to finance.

The main purpose of the CBRT in returning to orthodox policies was to balance domestic demand by activating the demand channel of money transmission through monetary policy tightening. The first requirement for this goal was to repair broken expectations and subsequently improve them. Rate hikes were expected to boost savings and reduce demand-forward behavior. Therefore, the CBRT planned that investments and exports will be the main drivers of economic growth, while consumption and imports will decline (CBRT, 2023e). In addition, the CBRT assumed that tight monetary policy would make a solid contribution to the disinflation process through the expectations channel by positively influencing inflation and exchange rate expectations. Moreover, it was assumed that the reduced uncertainty and improved expectations will allow economic entities to make long-term projects and investment decisions more confidently. As a result, the plan was to achieve efficient resource allocation leading to increased productivity and strong and sustainable growth (CBRT, 2023e).

Rather than implementing macroprudential measures, the CBRT intended to tighten monetary policy, which would increase demand for financial assets denominated in TRY. It was anticipated that the increased demand for TRY-denominated financial assets and the optimistic outlook for exchange rates would also lessen the demand for gold as a store of value, thereby contributing to an improvement in the composition of the growth balance and the current account balance. Pointing to the pricing behavior and inflation expectations deteriorating more than anticipated in the second half of the year, the CBRT raised the policy interest rate from 15 percent to 42.5 percent in an effort to stabilize inflation expectations, manage the worsening price behavior, and accomplish disinflation in 2024 as scheduled (CBRT, 2024). Figure 3.12 indicates that after the rate hikes, longer-term interest rates started to decline, which implies improvement in inflation expectations.

Figure 3.12. Government Bonds Yield (%) 2020-2023



In the traditional inflation targeting system, it is desirable for overnight interest rates to be close to the policy rate in order to control long-term interest rates. Therefore, short-term market interest rates play an important role in the first stage of the monetary transmission mechanism. The CBRT significantly increased short-term interest rates through the aforementioned monetary policy rate hikes.

Towards the end of the year, thanks to monetary policy interest rate increases, demand for TRY deposits increased and the improvements on spread between credit and deposit rates were observed. TRY's one-month implied volatility declined significantly over the same period May-December (CBRT, 2024). In December, the CBRT told the public that monetary policy tightening measures would be completed as soon as possible given economic activity. However, it also announced that given the lag in the monetary policy transmission mechanism, the level of monetary tightening achieved will be maintained for as long as necessary (CBRT, 2024). In addition, to strengthen the monetary transmission mechanism and increase the variety of sterilization instruments used, as part of the quantitative tightening, the CBRT decided to conduct TRY deposit purchase auctions from December 22, 2023 which implies that excess TRY liquidity will be sterilized through one week-auctions. In order to provide further improvement in the monetary transmission mechanism, it was decided to apply quarterly interest on the required reserves for TRY deposits and KKM accounts with maturities of more than one month from deposit-taking banks that meet the required conditions. In order to continue to support technological transformation that improves the current account balance, as well as strategic investments that contribute to supply continuity and exports with the

aim of ensuring the continuity of price stability, the CBRT decided that companies could benefit from the investment commitments advance loans with the interest rate ranges between 15% and 30%, depending on the extent to which companies meet the established conditions (CBRT, 2024). The measures continued as rediscount credits tool was used to provide incentives to export and FX-earning services.



4. LITREATURE REVIEW

This section presents the empirical evidence on the effects of monetary policy on capital markets. Since the focus of this work is to examine the impact of monetary policy on capital markets in Türkiye, the emphasis is on studies in this direction. The results of the studies on the Turkish economy are presented in the first sub-section, while the findings for other countries are presented in the second sub-section.

4.1. Empirical Findings on Türkiye

Aktaş et al. (2009) examined how monetary policy decisions are transmitted to bond yields and financial markets. From 2004 to 2008, the 44 decisions of the CBRT Monetary Policy Committee are used. Then the event study (ES) methodology according to Kuttner (2001) and Gürkaynak et al. (2005) put into practice. Research on the relationship between asset prices and monetary policy using low-frequency data has shown that it is difficult to establish a causal relationship. Daily data is therefore used to determine causality. The study suggests that, in the case of daily observations, it is difficult to imagine shifts in a third factor could systematically influence policy decisions. According to the findings, long-run interest rates are primarily affected by the monetary policy innovations in the Turkish financial markets - rather than stock prices or exchange rates.

Inal (2006) also used the ES approach to measure the impact on long-run interest rates. The shortest discounted interest rates on Treasury bills were used to divide the CBRT interest rate decisions into market expected and surprise parts. The study is based on 37 interest rate decisions made by the CBRT between July 2001 and March 2006. The regression results after omitting outlier data were found to be consistent with the efficient market hypothesis. 3-month, 6-month and 12-month Treasury bills only provide a response to monetary policy surprises.

Berument and Kutan (2007) use a vector autoregression (VAR) model to examine the effect of monetary policy on stock returns in Türkiye similar to Bernanke and Blinder (1990), Christian et al. (1994), Thorbecke (1997) and Normandin and Phaneuf (2004). Although the results show that monetary policy shocks have short-lived effects and that monetary policy in Türkiye is neutral over the period 1986:01–2001:10, they find that positive innovations in short-run interest rates are associated with lower returns in BIST indices. In addition, forecast error variance decompositions (FEVD) suggest that interest rate innovation accounts for 17% of the FEVD of Services returns and 11.30% of the FEVD of Financials returns, suggesting that monetary policy has the largest influence on Finance and Services sectors.

Ozdemir and Otluglu (2015) examined the period 2006:01–2014:03 using Johansen cointegration analysis within the framework of the vector error correction (VEC) model. It is understood that there is a long-run relationship between the variables interest rate and BIST indices throughout the analysis period. Furthermore, there is a statistically significant and inverse relationship between the interest rate and the indices, which supports the results obtained in the relevant literature. According to the results of the impulse-response function, most of the effects of interest rate shocks on the indices occur after about 1.5 years and the shocks are permanent.

In Gunduz (2020), the influence of monetary policy on BIST indices is analyzed using the 3-month spread as a policy variable. The study also examines the impact of using alternative policy variables such as the 6-month spread, the interbank interest rate and the total money supply (M1) as a robustness check. In a structural vector autoregressive (SVAR) framework, neither the money supply nor the interbank interest rate is found to produce results as significant as 3-month or 6-month spreads when used as policy instruments for the analyze period of 2005:01 and 2016:02. The study shows that after an initial, insignificant increase, there is a significant and prolonged decline in overall market returns when policymakers increase the 3-month spread.

Gokalp (2016) examines the period of 2010:05–2014:11. There are 54th CBRT monetary policy committees' decisions during this period. The study follows Kara (2012) in determining the policy interest rate proxy. Therefore, the interest rate data to

be used in the study are the upper and lower bounds of the interest rate corridor. It was found that the upper limit of the corridor lies in the ability to determine banks' lending rates, and the lower limit lies in the ability to determine banks' deposit rates. Therefore, individual loan interest rates and fixed deposit interest rates on a monthly basis were used to represent the upper and lower limit interest rates, respectively. The model used in the study is the GMM model created by Rigobon and Sack (2004), which examines the impact of monetary policy decisions on asset prices, in this case BIST indices. According to the study, an increase in the upper limit of the interest rate corridor by 1% leads to an average decrease in the prices of all stocks traded on Borsa Istanbul by about 0.26%. Likewise, a 1% increase at the upper limit of the corridor leads to a 0.35% decrease in the share prices of the 100 largest companies in the BIST100 index. The study also performs ES analysis for the same period and parameters. The results are consistent with the GMM results.

The responsiveness of the CBRT policy decisions of capital markets in Türkiye is discussed by Demiralp and Yılmaz (2010). Focusing on the capital markets, the study applies the ES method to extract market expectations from policy expectation survey data which is conducted by the CBRT. The results suggest that the Turkish capital markets does not follow the efficient market hypothesis for the period of 2002-2009. Because both of the variables which are BIST100 index and benchmark interest rate only response significantly to expected policy innovations. The study highlights the importance of transparency and gradualism in strengthening central banks' authority over capital markets.

Duran et al. (2012) uses the heteroscedasticity-based GMM method to measure the response of asset prices to the CBRT's monetary policy. The sample includes 60 policy decisions from the period 2005 to 2009. The short-run interest rate, which implies the policy interest rate and is represented by the yield of government bonds with a maturity of one month. It is understood that policy innovations have a significant and positive correlation with the changes in the yield of government bonds consist of ranges from six- to thirty-six months. The policy rate has no significant influence on the TRL/USD rate. Furthermore, research shows that an increase in the policy interest rate leads to a decrease in stock prices. The stock index coefficients obtained from the ES estimation

agree with the GMM results. The analysis shows that the CBRT monetary policy transmission mechanism appears to be functional in the first phase.

Gunay and Bayraktaroglu (2022) studied the analysis of the impact of the CBRT interest rate announcements on the return of tourism index using the ES method. The authors find that policy rate announcements have little impact on stock returns in the BIST Tourism and BIST100 indices, despite their expectation that tourism companies would be sensitive to monetary policy actions due to high operating and financial risks. The study's limitations, including the use of logarithmic returns and the mean-adjusted model for expected returns, should be taken into consideration when evaluating the study's findings. The estimation period was 100 days, and the event window was seven days from 5.20.2010 to 12.25.2020. Using different event window, estimation window, and parameters could vary the results which is shown the following study.

Eren and Demireli (2023) studies an ES method for Türkiye and examine the impact of the CBRT policy interest rate decisions on deposit bank stocks traded on the Borsa Istanbul (BIST) for the period of 12.16.2010 and 12.16.2021. The estimation window consists of 130 days because if there are fewer than 126 observations in the estimation window, it is possible that parameters of the market model do not represent the real stock price movements and therefore stock returns and market returns. To capture investors' reaction to the CBRT's policy rate announcements, they use seven different short-run event windows and calculate the cumulative average abnormal return (CAAR) for the event windows. The results suggest that when the CBRT announces monetary policy easing and lowers the policy interest rate contrary to expectations, negative CAAR values are observed in all event windows. And out of 7 event windows, 3 event windows have statistically significant CAAR values. Also, the level of CAAR values suggests that bank shareholders reacted to the CBRT announcement in parallel with the BIST100 index. If the CBRT raises the policy interest rate, at this point it is seen that investors react more strongly than to rate cuts. Although the CAAR values are negative as expected, there is only one out of seven event windows that is significant.

According to Karabiyik (2021), the effects of monetary policy are not uniform and vary depending on how the current economic system is structured. The term “asymmetric

effects of monetary policy” refers to this effect. Monetary policy thus creates asymmetrical effects that depend on the regime. The aim of the study is to clarify the asymmetric effects of monetary policy – defined as the way monetary policy has different effects depending on the current bull and bear markets. This study uses quarterly data to examine the asymmetric impact of monetary policy on stock market returns using the Markov Regime Switching Model (MRSRM) for the years 1998:Q1–2020:Q1. MRSRM can accurately predict turning points in stock markets and distinguish between bull and bear markets. Interbank interest rates, sometimes called the overnight interest rate, are used to represent the monetary policy stance. One could argue that Türkiye generally adopts countercyclical monetary policy to maintain financial stability. This implies that expansionary monetary policy is used in a bear market and contractionary monetary policy is used in a bull market. The results of the research show that the CBRT monetary policy is more successful in bull markets, while expansionary monetary policy is less successful in bear markets, because the foreign currency debt of companies in bear markets deteriorates balance sheets.

Sanli et al. (2021) aims to determine the sensitivity of the BIST100 stock index to interest rates, exchange rates and gold prices. The interest rates are included in the analysis as repo interest rates. Using Johansen-Juselius cointegration analysis for the period which includes daily data from April 1, 2000 to June 28, 2021, the researchers find a long-run relationship between the variables. The results of estimating normalized cointegration coefficients suggest that while exchange rates have a positive impact on BIST100 interest rates have a negative impact. And no significant relationship was found between gold prices and BIST100. After applying the vector error correction model (VECM), it was found that the error correction parameter is statistically significant and negative when the dependent variable is BIST100, which means that the error correction mechanism is working for the model, which implies that the deviations that occur in short-run disappear in the long-run. The result showed that there is a long-run causality effect for the model. Continuing the analysis, it is found that according to the Granger causality test, there is a bidirectional causality relationship between the BIST100 index and both the exchange rate and the interest rate. And there is a one-way causal relationship between BIST100 and gold prices, and there was no significant

influence of gold prices on the BIST100 index. Furthermore, the variance decomposition analysis shows that although gold contributes the least to the change in the BIST100 series, aside from the variable itself, interest rates explain the most changes in the BIST100 series. Finally, the BIST100 series showed significant reactions to an interest rate shock, but the shock is not permanent. However, the response of the BIST100 index to an interest rate shock is larger than the responses to shocks in gold prices and exchange rate variables. This finding is consistent with the result of the variance decomposition analysis.

Tastan and Gungor (2019) investigates the relationship between the slow-moving long-run component of daily frequency Turkish stock market volatility and monthly macroeconomic variables for the period of 2001:01-2019:01. The long-term component of market volatility is estimated by the combination of the models which are generalized autoregressive conditional heteroskedasticity (GARCH) model and mixed data sampling (MIDAS) model. After obtaining BIST100 long-run volatility component the study employs autoregressive distributed lag (ARDL) method to capture the relationship between the variable which are volatility of BIST100 index, interest rate, exchange rate, credit swap default (CDS) premium, real sector confidence index, S&P500 index and inflation rate. The 3-month interbank interest rates are taken as interest rate variable. After forming five different ARDL model it is found that the most important macroeconomic factor affecting the long-term volatility of the BIST100 index is the USD/TRY exchange rate. However, it was seen that a significant part of the long-run volatility of the BIST100 index was explained by the past long-run volatility of the BIST100 index and the volatility of the S&P500 index, which was included in the analysis as an external factor. It has been observed that there is a statistically significant and negative relationship between the exchange rate and the long-term volatility of the BIST100 index in all estimated models. In addition, between BIST100 index long-run volatility and other parameter which are the 3-month interbank interest rate, Türkiye's 5-year CDS risk premium, the S&P500 index volatility have a positive and statistically significant relationship. Remaining variables which are real sector confidence index and inflation rate have no significant effect on BIST100 index long-run volatility. The study

concludes that the effect of macroeconomic factors on the long-run volatility of the BIST100 index is lower than the external factors.

Yildirim and Mirasedoglu (2015) examines whether changes in stock prices affect household welfare and the level of output through investment expenditure. The analysis covers the period 2002:Q1-2014:Q2 and for this purpose the VAR method is used. In the household welfare channel, they use interest rate, BIST100 index, consumption expenditure and industrial production index variables. For the investment channel, they form another VAR model, which consists of the variables interest rate, BIST100 index, gross fixed capital formation rate and industrial production index. Interbank interest rates are used to gain an understanding of the CBRT's policy stance. According to the impulse-response analysis, it is found that stock prices do not respond to one standard deviation interest rate shock with for both channels. Therefore, the asset price transmission mechanism does not work in Türkiye.

Soylu et al. (2014) examines the effect of the CBRT interest rate announcements on the spot and futures markets for the period from February 2, 2005 to April 18, 2013 using daily data. Daily spot and futures return series of BIST30 index, USD/TRY and EUR/TRY variables are used, and the effects of interest rate announcements on average return and volatility are measured using GARCH and exponential generalized autoregressive conditional heteroscedasticity methods (EGARCH) methods. The study creates dummy variables for MPC announcements. And adding dummy variables to the conditional variance models examines whether there are significant changes in average returns and volatility on these days. The results for the BIST30 spot index show that interest rate announcements have no significant impact on either volatility or average returns. However, when they split the analysis for rate cut and rate hike announcements, they find that MPC rate cut announcements have a significant impact on market volatility. For the BIST30 futures index, there are again no significant effects from the interest rate announcements. For USD/TRY spot prices, during the CBRT interest rate announcements, it is found that the dollar exchange rate return is negative compared to other days, while the volatility on these days decreases compared to other days. Regarding the USD/TRY futures, it can be seen that the announcements have no significant impact on either the average return or volatility. However, it is emphasized

that while interest rate hike announcements have a significant and positive impact on USD/TRY futures, interest rate cut announcements have a significant and negative impact on USD/TRY futures. Kazak (2023) also uses the same methods and generally the findings correspond with Soylu et al. (2014) for the period 1.05.2015 – 12.23.2022.

Demiralp and Belliler (2023) applies the Fully Modified Ordinary Least Squares (FMOL) method to understand the impact of monetary policy innovations on financial markets. Using a relatively new cointegration test called Fourier Autoregressive Distributed Lag (FADL), they concluded that there is a cointegration with the CBRT's weighted average funding cost and the BIST100 index for the period 2011:01 - 2023:01. The FMOL regression results indicate that the cointegration coefficients resulting from FADL are significant and a 1% increase in the interest rate leads to a decrease in the BIST100 index by approximately 55 points.

Demir (2019) examines how the BIST100 is affected by interest rates, real effective exchange rates, portfolio investment inflows, foreign direct investment (FDI), and crude oil prices over the period 2003:Q1–2017:Q4. Commercial bank loan interest rates are chosen for the long-run analysis. The long-run relationship between the variables was examined using the ARDL bounds test. The results indicate a long-term cointegrating relationship between the stock market index and the factors. After estimating the model with ARDL method, the analysis states that although the BIST100 index decreases in response to rising interest rates and crude oil prices, it increases simultaneously with the real effective exchange rate, GDP level, portfolio investment inflows and FDI inflows. According to the study, the level of GDP has the greatest influence on stock market prices, as shown by the BIST100 index, which increases by 1.8% for every %1 increase in GDP. The results also suggest that the interest rate is the third most important variable after the real effective exchange rate, decreasing the BIST100 index by 0.35% for every 1% increase in interest rates.

Zengin (2020) uses daily data from 2015–2018 to analyze the impact of monetary policy on the BIST Banks Index. Exchange rates and the BIST100 index are also used as explanatory variables in multiple regression analysis using the ordinary least squares (OLS) method. The study found that the BIST Banks Index has a negative relationship

with the US dollar, a positive relationship with interest rates, which are considered the weighted average funding cost of the CBRT, a negative relationship with the Euro, and a positive relationship with the BIST100 index. All the outcomes are statistically significant.

In their 2020 study, Bayir and Abdioglu examine the impact of the interest rate corridor tool that the CBRT used between 2010:05 and 2018:05. In a VAR analysis, the study determines the dynamic relationships between variables such as the exchange rate, the interbank interest rate, BIST100 and the upper and lower bound of the corridor. As the results show, BIST100 is negatively affected by the lower bound of the corridor. However, the USD/TRY exchange rate is not significantly affected by either the lower or upper bounds of the corridor. The CBRT aims for both financial and price stability with the interest rate corridor instrument in the analyzed era. The study highlights how the lower bound of the corridor has a positive impact on the interbank interest rate and shows the effectiveness of the CBRT operations in controlling market liquidity costs. Finally, the results of the study's variance decomposition analysis suggest that changes in the exchange rate may account for a significant portion of the changes in the BIST100 index.

Senturk and Ducan (2014) studies interest and exchange rate dynamics and their impact on stock returns in Türkiye during the period 1997:01-2013:05. In the VAR model they use the BIST100 index, the 12-month deposit rate and the USD/TRY exchange rate. The order of the above variables also indicates the VAR specification. In accordance to the estimation of the VAR model, the results of the impulse-response analysis indicate that neither the interest rate nor the exchange rate has a significant impact on the BIST100 index. Furthermore, the exchange rate responds positively to a standard deviation shock in the interest rate. The study continues with the findings that the changes in the BIST100 index are mainly explained by interest rates, but after the first period, the explanatory power of the exchange rate gradually exceeds the explanatory power of the interest rate for the changes in the BIST100 index. The study concludes with the Granger causality test, which suggests that there is a unidirectional causal relationship from interest rates to exchange rates and from exchange rates to the BIST100 index.

Kucukkocaoglu et al. (2013) examines the impact of monetary policy on stock returns in Türkiye using the heteroscedasticity-based GMM technique for the period 2005-2013. The policy rate is proxied by the yield on government bonds with one-month maturity. To measure the stock returns BIST100 and BIST Banks indices and individual banks' shares are taken into account. Before May 2010 the CBRT was using interest rate corridor as a policy rate. After that date the CBRT started to use one-week repo rate as a policy variable. Therefore, researchers separate their samples as traditional monetary policy and new monetary policy taking policy rate switching date as the reference point. For the full sample the results show that a 100 basis points increase in the short-run interest rate decreases BIST100 by 2.8% and BIST Banks by 3.3%. The study also highlights the heterogeneity in the responses of individual banks to monetary policy surprises, with some banks being more affected than others. The stock returns of banks which are dependent on money market funding and for which interest payments constitute an important share in their balance sheets respond more aggressively to the changes in policy rates, whereas the stock returns of banks with higher net interest income respond less to the monetary policy rates. The findings also suggest that the significance of monetary policy surprises on MPC meeting days has decreased in the new policy episode. They conclude the study remarking that the GMM method gives consistently higher and more significant parameter estimates than the ES approach in accordance with Duran et al. (2012).

4.2. Empirical Findings on Outside of the Country

Thorbecke (1997) used the vector autoregressive (VAR) method to examine how monetary policy affected capital markets in the U.S. economy for the period 1967-1990. Because they can clearly state the policy stance of the Federal Reserve (FED), the federal funds rate and non-borrowed reserves are taken into account. The study uses the Cholesky identification scheme and places stock returns at the last position of the chain order. It has been found that stock returns are significantly influenced by the Fed's monetary policy and that contractionary monetary policy reduces stock returns. The study also mentioned that small businesses are more affected by this particular effect.

Furthermore, and event study (ES) approach pursued for the same goals, and the results support the VAR outcomes.

In another study by Rigobon and Sack (2004) for the USA, three different methods are used: the ES method, the heteroscedasticity-based instrumental variables (IV) method and the heteroskedasticity-based generalized moments method (GMM). The effects of 78 Federal Open Market Committee (FOMC) meetings and the Fed Chairman's presentations to Congress on US stock indices and bond interest rates between 1994 and 2001 are examined. The changes in the Eurodollar futures contract on the relevant announcement dates are selected as the policy variable. The study suggests that contractionary monetary policy causes stock prices to fall, the tightening increases bond interest rates. According to the results of the study, market interest rates are significantly influenced by short-term interest rates. The study, which primarily examined the validity of the assumptions of the ES method, concluded that although the ES estimated coefficients of some types of assets showed some bias, these assumptions had not been completely refuted. Since GMM makes weaker assumptions and takes endogeneity and misspecification into account, which ES does not, it therefore produces more reliable results.

The interest rates market reaction to monetary policy decisions is examined by Cook and Hahn (1989). The study examines the response of U.S. Treasury bill and bond interest rates to changes in the Fed's federal funds rate target during a one-day event window from 1974 to 1979. Although the ordinary least squares (OLS) method is used for estimation, this study is often cited in the literature as the first to use the ES method to gauge the impact of monetary policy on capital markets. It was analyzed how 75 policy interest rate changes over the study period affected Treasury bills and bonds with different maturities from three months to twenty years. All maturities showed significant reactions and moved in the same direction as the policy rate change. The results also confirm that the impact of changes in the federal fund rate target on bond yields tends to decrease as bond maturity increases.

Kuttner (2001) examined the effects of 86 policy rate decisions between 1989 and 2000 on the interest rates of US treasury bills and bonds with maturities ranging from 3

months to 30 years. The study claims that using the monetary policy tool directly is not appropriate and causes errors-in-variables problem. Therefore, instead of considering only the changes in Fed's federal funds rate target, like Cook and Hahn (1989), he separates the changes in the Fed funds rate target into two elements: expected and unexpected parts. The Fed funds future contracts are considered as the market-based measure for the expectations about the decisions of the Fed's monetary policy. The reaction of interest rates within a one-day event window is estimated with the OLS method. In the analysis, the effect of policy surprises was found to be significant and in the same direction in the term up to 10 years. While it was concluded that there are strong relationships between market interest rates and policy surprises, it was observed that the market's reactions to expected policy changes were weak. It was concluded that the findings were generally compatible with the expectations hypothesis of the maturity structure.

One of the pioneering studies in the field of the monetary policy impact on capital markets is Bernanke and Kuttner (2005). The study measures the average reaction of the stock market and analyzes the economic causes of this reaction by examining how monetary policy innovations affect stock prices. To measure the surprise element of policy rate Kuttner (2001) is followed with the event-study method (ES). By comparing the actual interest rate reported by the Federal Reserve with the expected interest rate, the authors arrive at the unexpected interest rate. Contracts for future federal funds are used as a substitute for policy interest rate. It was assumed that the unexpected changes in interest rates were reflected in the contract changes that took place during the days of the policy announcement. The study's observations are based on FOMC meetings held between 1989 and 2002. Thus, there are thirteen hundred and one observations. The study's asset prices are represented by the CRSP value-weighted stock return. The study finds that a surprise one percent interest rate cut increases stock returns by 4.68%. Furthermore, they find that expected changes in the federal fund rate have a statistically insignificant effect on stock returns, consistent with the efficient markets hypothesis, which states that the expected component of monetary policy is already priced into the market. They also used the VAR model in their research and found that monetary policy influences stock prices primarily through its impact on excess stock returns and expected

future dividends. Additionally, they find that nondurables, energy, and utilities markets are much less sensitive to interest rate surprises than the high-tech and telecommunications sectors.

Gurkaynak et al. (2005) examines the US economy from January 1990 to December 2004 using the ES method. The analysis is divided into two sections. The monetary policy measure is used in the event study analysis for both the intraday and daily data in the first section of their study, where it is selected as a surprise component for changes in the current federal funds rate target. When analyzing intraday data, a narrow window (30 minutes) and a wide window (one hour) are used. Managing high-frequency data is intended to produce more accurate results, as daily data may have problems with missing variables. However, their results show that daily data is just as effective as intraday data and produces results comparable to intraday data - with the exception of the days on which employment reports are released. The independent variable of the model is the surprise element of the federal funds rate announcement, while the dependent variable is the change in the price of financial assets (stocks) or their yield to maturity (bonds). The empirical test results show that there is a significant and negative relationship between monetary policy shocks and the stock market, with stock prices falling by 1% in response to an unexpected 25 basis point increase in the federal funds rate. However, there is a strong and positive correlation between interest rates and monetary policy shocks. In addition, in the second half of their study, they conduct regression analyzes with two variables. A combination of both federal funds futures rates and Eurodollar futures expiring in less than a year produces the current federal funds rate target, which is the first factor to consider. This factor is used to measure the surprise factor of monetary policy decisions. They also questioned whether the price reactions of financial assets in the days following the policy announcement could be adequately explained by a single factor, namely an unexpected policy decision. The future direction of policy which is the second factor therefore is put in the model. The future policy course of action derived from the statements made during policy decision days is called the path factor. The path factor derived from the FOMC announcements that influence futures interest rates for the coming year while does not make changes in the current federal funds rate. They conclude by noting that the Fed shapes market

participants' expectations of the future by using the language of statements to influence longer-term interest rates and the economy as a whole.

Korean stock prices are the subject of a study by Han and Kim (2023) on the effects of monetary policy in the USA, China and Korea. To measure the monetary policy stance of the above economies, the M2 money supply and the Fed target rate in the USA, the M2 money supply in China and the one-year loan prime rate, and the M2 money supply and the interbank interest rate in Korea are used. The study uses monthly frequency data, the analysis period extends from 2001:01 to 2020:10. By viewing Korea as a small open economy that is influenced by, but does not influence, the major economies, the authors of the study consider a structural VAR equation to model the dynamics of the Korean economy while comparing Korea's relative size to take China into account and the USA. Based on the results of the impulse-response analysis, the financial markets in Korea reacted most positively to the Chinese M2 money supply shock, but only reacted significantly to the Korean M2 money supply shock five months later positively. The impact of Korea's M2 on the market lasted for two years. In the case of the US the market reaction magnitude was in between that of China and Korea cases. Since Korea has a larger trade volume with China than with the US, the authors suggest this is the reason the market is most influenced by China's monetary policy. And due to the liquidity trap of the economy, the market does not respond to Korean policies; However, after an M2 shock, as inflation falls and industrial production rises, Korean stocks eventually respond to the M2 increase. In contrast, the market reacted only to the positive shock of the Bank of Korea's interest rate changes, while it did not react at all or at all to the shocks of the US federal funds rate and China's federal funds rate. When the interbank rate rises, the market doesn't immediately fall; It takes two to three months for the market to do this. The underlying intuition was that the complicated relationship between the policy rate and the stock market, also known as the endogenous relationship, could be the cause of the delayed response. The policy interest rate in China has limited use as a monetary policy tool, which explains why the market has had little reaction to changes in the policy interest rate. One theory for why U.S. policy changes have little impact on the market is that the Bank of Korea's high elasticity to changes in U.S. interest rates.

5. RESEARCH METHODOLOGY AND EMPIRICAL RESULTS

This section introduces the methods and tools that researchers use to generate empirical evidence on the effects of monetary policy on capital markets. Therefore, the methodology of the vector autoregressive (VAR) model is explained together with the event study model (ES).

The section also presents results of the VAR models and the ES models, which are used to analyze the impact of the CBRT's monetary policy on capital markets in Türkiye. The main reason for implementing an ES model is to verify the robustness of the VAR models results and also to gain a better understanding of the main goal of the thesis.

Section (5.1.) provides the theoretical foundation of the VAR methodology, Section (5.2.) covers the empirical findings of the VAR models estimated for this study, while Section (5.3.) provides the theoretical framework of the ES methodology Section (5.4.) reports the empirical results of the ES models estimated in this study.

5.1. Vector Autoregressive (VAR) Methodology

The VAR model developed by Sims (1980), which includes a small number of constraints on the economic structure; It is a dynamic system in which relationships exist between each variable in the system, its own value, and the past values of all other variables in the system. It is often used to analyze the dynamic effects of changes in variables within the system on other variables. According to Enders (2015), assuming that the variables y_t and z_t are influenced by both their own lagged values and the lagged values of the other variables, a first-order bivariate VAR model (i.e. VAR (1)) can be constructed as follows:

$$\begin{aligned} y_t &= \beta_{10} - \beta_{12}z_t + \gamma_{11}y_{t-1} + \gamma_{12}z_{t-1} + \varepsilon_{yt} \\ z_t &= \beta_{20} - \beta_{21}y_t + \gamma_{21}y_{t-1} + \gamma_{22}z_{t-1} + \varepsilon_{zt} \end{aligned} \tag{5.1}$$

In the system of equations (5.1), it is assumed that the series of variables y_t and z_t , whose standard deviations are σ_y and σ_z , are stationary, and the white noise (error) terms ε_{yt} and ε_{zt} are not correlated with each other. The terms ε_{yt} and ε_{zt} express the shocks to the variables y_t and z_t . The coefficient β_{12} shows the simultaneous effect of the unit change in z_t on y_t , while γ_{12} shows the simultaneous effect of the unit change in z_{t-1} on y_t . Likewise, β_{21} expresses the simultaneous effect of the unit change in y_t on z_t , and γ_{21} expresses the simultaneous effect of the unit change in y_{t-1} on z_t . If β_{21} is different from zero, ε_{yt} has a simultaneous indirect effect on z_t , and if β_{12} is different from zero, ε_{zt} has a simultaneous indirect effect on y_t .

Since the variables y_t and z_t interact simultaneously, the system (5.1) is not in reduced form. These equations are called structural VAR equations. The structural VAR equations in the system (5.1) can be converted to matrix form to become the standard VAR equation;

$$\begin{bmatrix} 1 & \beta_{12} \\ \beta_{21} & 1 \end{bmatrix} \begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

In simple terms it can be written like this:

$$Bx_t = \Gamma_0 + \Gamma_1 x_{t-1} + \varepsilon_t \quad (5.2)$$

That is,

$$B = \begin{bmatrix} 1 & \beta_{12} \\ \beta_{21} & 1 \end{bmatrix}, x_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix}, \Gamma_0 = \begin{bmatrix} \beta_{10} \\ \beta_{20} \end{bmatrix}, \Gamma_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}, \varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

Multiplying both sides of the equation (5.2) by B^{-1} yields the VAR model in standard form which is:

$$x_t = A_0 + A_1 x_{t-1} + e_t \quad (5.3)$$

In equation (5.3), $A_0 = B^{-1}\Gamma_0$, $A_1 = B^{-1}\Gamma_1$, and $e_t = B^{-1}\varepsilon_t$.

By identifying; the coefficient α_{i0} as the i^{th} element of vector A_0 , the coefficient α_{ij} as the i^{th} row and j^{th} column element of the matrix A_1 , finally the coefficient e_{it} as the i^{th} element of vector e_t , we can write the standard VAR model as follows;

$$\begin{aligned} y_t &= \alpha_{10} + \alpha_{11}y_{t-1} + \alpha_{12}z_{t-1} + e_{1t} \\ z_t &= \alpha_{20} + \alpha_{21}y_{t-1} + \alpha_{22}z_{t-1} + e_{2t} \end{aligned} \quad (5.4)$$

Here the error terms e_{1t} and e_{2t} include the two shocks ε_{yt} and ε_{zt} . The error terms e_{1t} and e_{2t} to be obtained from the system (5.4) are the one-period after estimation errors of the dependent variables. When using the VAR model as a forecasting tool, the estimation error components are not important. However, when the goal is to conduct an economic analysis using impulse-response analysis and variance decomposition techniques, the structural shocks ε_{yt} and ε_{zt} become important (Enders, 2015).

Considering that $e_t = B^{-1}\varepsilon_t$, the error terms e_{1t} and e_{2t} can be obtain as follows;

$$e_{1t} = \frac{\varepsilon_{yt} - \beta_{12}\varepsilon_{zt}}{1 - \beta_{12}\beta_{21}} \text{ and } e_{2t} = \frac{\varepsilon_{zt} - \beta_{21}\varepsilon_{yt}}{1 - \beta_{12}\beta_{21}}$$

The variance-covariance matrix of shocks e_1 and e_2 can be represented as follows;

$$\Sigma = \begin{bmatrix} Var(e_{1t}) & Cov(e_{1t}, e_{2t}) \\ Cov(e_{1t}, e_{2t}) & Var(e_{2t}) \end{bmatrix}$$

Since all elements of the matrix are time independent, they can be expressed as follows (Enders; 2015);

$$\Sigma = \begin{bmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{21} & \sigma_2^2 \end{bmatrix}$$

$$Var(e_{it}) = \sigma_i^2$$

$$\sigma_{21} = \sigma_{12} = Cov(e_{1t}, e_{2t})$$

Therefore, estimating a VAR system in a recursive structure means that solving the model with reduced form parameters.

In structural VAR models, the fact that the variable z_t is correlated with the error term ε_{yt} , and the variable y_t is correlated with the error term ε_{zt} prevents the variables from being estimated with OLS. However, in the standard VAR model it is possible to estimate the variables using OLS.

Unless the structural VAR model parameters are appropriately constrained, it is not possible to determine them using standard VAR model parameters. Because the number of parameters of the structural VAR model is larger than that of the standard VAR model. While the standard VAR model contains nine parameters ($\alpha_{10}, \alpha_{20}, \alpha_{11}, \alpha_{12}, \alpha_{21}, \alpha_{22}, \text{Var}(e_{1t}), \text{Var}(e_{2t}), \text{Cov}(e_{1t}, e_{2t})$), the structural VAR model contains ten parameters ($\beta_{10}, \beta_{20}, \beta_{12}, \beta_{21}, \gamma_{11}, \gamma_{12}, \gamma_{21}, \gamma_{22}, \sigma_x, \sigma_z$). Therefore, the restriction of one parameter in the structural VAR model allows the determination of the entire system.

Sims (1980) proposed using the triangle system to determine the structural VAR model. According to this system, if the β_{21} parameter of the structural VAR model is assumed to be zero, the variable z_t has a simultaneous effect on the variable y_t , while the variable y_t has a one-period lag effect on the variable z_t .

Following can be achieved under the restriction $\beta_{21} = 0$,

$$B^{-1} = \begin{bmatrix} 1 & -\beta_{12} \\ 0 & 1 \end{bmatrix}$$

When the structural VAR model in matrix form is multiplied by B^{-1} ;

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} 1 & \beta_{12} \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \beta_{10} \\ \beta_{20} \end{bmatrix} + \begin{bmatrix} 1 & \beta_{12} \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} 1 & \beta_{12} \\ 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$$

Or,

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \beta_{10} - \beta_{12}\beta_{20} \\ \beta_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} - \beta_{12}\gamma_{21} & \gamma_{12} - \beta_{12}\gamma_{22} \\ \gamma_{21} & \gamma_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} - \beta_{12}\varepsilon_{zt} \\ \varepsilon_{zt} \end{bmatrix}$$

matrix is obtained.

When above matrix equation is associate with the VAR models that are shown in the system (5.4), the following equations can be obtained;

$$\begin{aligned}
\alpha_{10} &= \beta_{10} - \beta_{12}\beta_{20} \\
\alpha_{11} &= \gamma_{11} - \beta_{12}\gamma_{21} \\
\alpha_{12} &= \gamma_{12} - \beta_{12}\gamma_{22} \\
\alpha_{20} &= \beta_{20} \\
\alpha_{21} &= \gamma_{21} \\
\alpha_{22} &= \gamma_{22} \\
\text{Var}(e_{1t}) &= \text{Var}(\varepsilon_{yt} - \beta_{12}\varepsilon_{zt}) = \sigma_y^2 + \beta_{12}^2\sigma_z^2 \\
\text{Var}(e_{2t}) &= \sigma_z^2 \\
\text{Cov}(e_{1t}, e_{2t}) &= -\beta_{12}\sigma_z^2
\end{aligned}$$

Thus, structural VAR model parameters are estimated with the parameters estimated from the standard VAR model. With the restriction $\beta_{21} = 0$, both ε_{yt} and ε_{zt} shocks simultaneously affect the variable y_t , but only ε_{zt} shocks affect the variable z_t . Therefore, the e_{2t} values fully reflect shocks on the z_t variable; $e_{1t} = \varepsilon_{yt} - \beta_{12}\varepsilon_{zt}$ and $e_{2t} = \varepsilon_{zt}$. In the literature, this method is called Choleski decomposition (Enders, 2015).

In summary, the function of the VAR model includes the following steps:

- Making the necessary transformations in the data to ensure stationarity since the variables in the system must be stationary,
- Determining the appropriate number of lags for the system,
- Bringing the system to a reduced form with the specified lag level,
- Using orthogonal shocks to make forecasting and to produce political analysis.

5.1.1. Impulse-Response Functions

The standard VAR model system in (5.4) is written in matrix form as follows;

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \alpha_{10} \\ \alpha_{20} \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix} \begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} e_{yt} \\ e_{zt} \end{bmatrix} \quad (5.5)$$

On the other hand, when the standard VAR model in (5.3) is recursive;

$$x_t = A_0 + A_1(A_0 + A_1x_{t-2} + e_{t-1}) + e_t$$

$$x_t = (I + A_1)A_0 + A_1^2x_{t-2} + A_1e_{t-1} + e_t$$

After n recursive;

$$x_t = (I + A_1 + \dots + A_1^n)A_0 + \sum_{i=0}^n A_1^i e_{t-i} + A_1^{n+1} x_{t-n-1}$$

We can define following parameters as such;

$$\mu = \begin{bmatrix} \bar{y} \\ \bar{x} \end{bmatrix}, \bar{y} = \frac{[\alpha_{10}(1 - \alpha_{22}) + \alpha_{12}\alpha_{20}]}{\Delta}, \bar{z} = \frac{[\alpha_{20}(1 - \alpha_{11}) + \alpha_{21}\alpha_{10}]}{\Delta}$$

$$\Delta = (1 - \alpha_{11})(1 - \alpha_{22}) - \alpha_{12}\alpha_{21}$$

Finally, the vector moving averages representation of the VAR model defined in equation (5.3) can be shown as:

$$x_t = \mu + \sum_{i=0}^{\infty} A_1^i e_{t-i} \quad (5.6)$$

In equation (5.6) the variables y_t and z_t are explained using the current and past values of the shocks e_{1t} and e_{2t} . By using equation (5.6) in matrix equation (5.5), the following equation is obtained;

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{x} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix}^i \begin{bmatrix} e_{1t-i} \\ e_{2t-i} \end{bmatrix} \quad (5.7)$$

This equation describes the y_t and z_t series in terms of the e_{1t} and e_{2t} series. The notation of (5.7) in terms of ε_{1t} and ε_{2t} is as follows;

$$\begin{bmatrix} e_{1t} \\ e_{2t} \end{bmatrix} = \begin{bmatrix} 1 \\ (1 - \beta_{12}\beta_{21}) \end{bmatrix} \begin{bmatrix} 1 & -\beta_{12} \\ -\beta_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (5.8)$$

When equations (5.7) and (5.8) are combined, the following equation is obtained;

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{x} \end{bmatrix} + \begin{bmatrix} 1 \\ (1 - \beta_{12}\beta_{21}) \end{bmatrix} \sum_{i=0}^{\infty} \begin{bmatrix} \alpha_{11} & \alpha_{12} \\ \alpha_{21} & \alpha_{22} \end{bmatrix}^i \begin{bmatrix} 1 & -\beta_{12} \\ -\beta_{21} & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{zt-i} \end{bmatrix}$$

To make it easier to represent it can be defined as such;

$$\Phi_i = \left[\frac{A_1^i}{(1 - \beta_{12}\beta_{21})} \right] \begin{bmatrix} 1 & -\beta_{12} \\ -\beta_{21} & 1 \end{bmatrix}$$

Moving average representation of equations (5.7) and (5.8) in terms of ε_{yt} and ε_{zt} ;

$$\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} \bar{y} \\ \bar{z} \end{bmatrix} + \sum_{i=0}^{\infty} \begin{bmatrix} \Phi_{11}(i) & \Phi_{12}(i) \\ \Phi_{21}(i) & \Phi_{22}(i) \end{bmatrix} \begin{bmatrix} \varepsilon_{yt-i} \\ \varepsilon_{zt-i} \end{bmatrix}$$

Or, in a simpler form;

$$x_t = \mu + \sum_{i=0}^{\infty} \Phi^i \varepsilon_{t-i} \quad (5.9)$$

Moving average plotting is a tool used particularly to study the interaction of y_t and z_t series with each other. The four elements of the $\Phi_{ik}(0)$ matrix is called impulse factors and are used to distribute the effect of ε_{yt} and ε_{zt} shocks across the y_t and z_t series. For example, the $\Phi_{12}(0)$ coefficient gives the simultaneous effect of a one-unit change in the ε_{zt} shock on the y_t series, the $\Phi_{11}(1)$ coefficient gives the single-period effect of a one-unit change in the ε_{yt-1} shock on the y_t series, and the coefficient $\Phi_{12}(1)$ gives the one-period effect of a unit change in the ε_{zt-1} shock on the y_t series.

The cumulative effect of the shocks ε_{yt} and ε_{zt} results from the sum of the coefficients of the impulse-response functions. For example, after n periods, the effect of the shock ε_{zt} on the series y_{t+n} is $\Phi_{12}(n)$. To generalize: After n periods, the cumulative effect of the shock ε_{zt} on the y_t series is $\sum_{i=0}^n \Phi_{12}(i)$.

The coefficients $\Phi_{11}(i)$, $\Phi_{12}(i)$, $\Phi_{21}(i)$, $\Phi_{22}(i)$ are called impulse response functions. Impulse response function graphs are the most useful way to display the responses of y_t and z_t series to various shocks. However, here too there is the problem of determining structural VAR model parameters. Choleski decomposition can be used to overcome this problem in determining the impulse response function.

5.1.2. The Forecast Error Variance Decompositions

The vector moving averages representation of the VAR model provides great convenience in representing forecast errors in terms of ε_t series. If equation (5.9) is used to forecast x_{t+1} , the forecast error after one period is $\Phi_0 \varepsilon_{t+1}$. It is generally expressed as follows:

$$x_{t+n} = \mu + \sum_{i=0}^{\infty} \Phi_i \varepsilon_{t+n-i}$$

Considering that the forecast error is the difference between the actual value and the forecasted value, the n -period forecast error is represented as follows:

$$x_{t+n} - Ex_{t+n} = \sum_{i=0}^{n-1} \Phi_i \varepsilon_{t+n-i}$$

The forecast error after n periods only for the y_t series is as follows;

$$y_{t+n} - Ey_{t+n} = \Phi_{11}(0)\varepsilon_{yt+n} + \Phi_{11}(1)\varepsilon_{yt+n-1} + \cdots + \Phi_{11}(n-1)\varepsilon_{yt+1} + \Phi_{12}(0)\varepsilon_{zt+n} + \Phi_{12}(1)\varepsilon_{zt+n-1} + \cdots + \Phi_{12}(n-1)\varepsilon_{zt+1}$$

If the forecast error variance of y_{t+n} after n periods is defined as $\sigma_y^2(n)^2$, the following equation is obtained;

$$\sigma_y^2(n)^2 = \sigma_y^2[\Phi_{11}(0)^2 + \Phi_{11}(1)^2 + \cdots + \Phi_{11}(n-1)^2] + \sigma_z^2[\Phi_{12}(0)^2 + \Phi_{12}(1)^2 + \cdots + \Phi_{12}(n-1)^2]$$

Considering that the coefficients $\Phi_{jk}(i)^2$ cannot take a value less than zero, the forecast error variance increases as the forecast period of n increases. The contributions of the shocks in the ε_{yt} and ε_{zt} series to the variance of $\sigma_y^2(n)^2$ are respectively as follows:

$$\frac{\sigma_y^2[\Phi_{11}(0)^2 + \Phi_{11}(1)^2 + \cdots + \Phi_{11}(n-1)^2]}{\sigma_y(n)^2}, \frac{\sigma_z^2[\Phi_{12}(0)^2 + \Phi_{12}(1)^2 + \cdots + \Phi_{12}(n-1)^2]}{\sigma_z(n)^2}$$

The forecast error variance decomposition is used to analyze the changes in a series to the extent to which changes in a series occur due to their own shocks and the extent to

which other variables occur in a series. If ε_{zt} shocks do not explain any part of the forecast error variance of the y_t series for all forecast periods, the y_t series can be said to be exogenous. In this case, the y_t series is independent both of the ε_{zt} shocks and of the z_t series. On the contrary, the y_t series is completely endogenous if ε_{zt} shocks can explain the entire forecast error variance of the y_t series for all forecast periods. Therefore, the forecast error variance decomposition is a tool for measuring the impact of other variables on each variable within the system. However, the need for restrictions to determine the shocks ε_{yt} and ε_{zt} also applies here.

5.2. Estimation of the VAR Models

The structure of this subsection is as follows. We first introduce the data to be used in the VAR models and the result of the tests used to measure the statistical suitability of the data for a time series model. Next, we report the statistical robustness of a VAR model in which the main index of BIST is analyzed. This is because the remaining VAR models produce results that lead to the same conclusions regarding the statistical robustness of the VAR models. The section ends with the results of the applied VAR models.

5.2.1. Data Specifics of the VAR Models

The data selection includes monthly frequency of USD/TRY exchange rates, Consumer Price Index (CPI), the Over/Night Interest Rates on the Borsa İstanbul (BIST), BIST Indices and BIST 30 Index future contracts (XU30C) for the estimated VAR models in this study. There are six different BIST indices, so six different VAR models are estimated for stock markets, and an additional VAR model is from XU30C, which covers the derivatives markets for this study, so a total of seven VAR models are estimated.

The BIST indices include: BIST 100 (XU100), BIST All Shares (XTUMY) excluding the cooperate stocks in XU100, BIST Services (XUHIZ), BIST Financials (XUMAL), BIST Industrials (XUSIN) and BIST Technology (XUTEK).

The data of XU30C index is obtained from investing.com, the remaining data is from the CBRT's Electronic Data Delivery System (EDDS). Except for XU30C the time span for

the variables is 2010:01 – 2023:12. Since the XU30C data goes back to February 2010, this VAR model is missing an observation.

The reason for the chosen analysis period is that the CBRT included financial stability in its objective function from 2010 onwards. Monthly data is chosen for the models. Using monthly data would reduce the element of surprise in policy changes. This is for the purpose of this study to provide a mechanical result and not to make a forecast. Furthermore, monthly data better reflect the simultaneity bias as is often the case when analyzing the effects of monetary policy.

The reasons for the chosen variables are as follow. The US dollar is the main reserve currency and is the most traded currency in the FX market in Türkiye. Therefore, USD/TRY buying rates are included in the model. Another reason for the USD/TRY exchange rates in the model is that although the objective function of the CBRT does not include an exchange rate target, as shown in Section (3), the CBRT's monetary policy implementations largely consist of FX innovations because the CBRT sees exchange rates as the main driver of inflation. In addition, the US dollar is considered an investment instrument in Türkiye. Therefore, the study also examines the FX market intuitively by including the USD/TRY exchange rates in the VAR models. Over/Night interest rates or interbank interest rates are chosen as a proxy variable because these interest rates are considered to be the most applicable interest rates that can reflect the monetary stance of the CBRT. Additionally, VAR studies typically use a short-term interest rate as an indicator of monetary policy (Sims, 1992). The CPI is used to measure inflation. The imperative task of the CBRT is to ensure price stability by controlling the inflation rate within the inflation targeting regime. To eliminate the misspecification error that often occurs in the analysis of monetary policy transmission channels, the inflation rate is necessarily included in the model. BIST indices and XU30C reflect the price movements of corporate stocks and future contracts respectively. In addition to securing the main purpose of this thesis, which is to gauge the impact of monetary policy on the capital markets (in this case stock markets, derivative markets and FX markets), the inclusion of the XU30C and BIST indices in the VAR models along with the exchange rates is expected to give results to interpret as to whether the CBRT pursued its new goal during the analyzed period.

5.2.1.1. Unit Root Test

As is typically expected with time series data, the variables should be stationary so that the model can predict confidence intervals with minimal error levels. The Augmented Dickey-Fuller (ADF) unit root test is performed for all variables to decide whether the variables in the model are stationary or not. The ADF results of the variables, except for INT (Interbank interest rates) and XU30C as they are stationary for only 90% confidence interval, suggest that all variables in the model are non-stationary at their level values for all the confidence intervals.

Table 5.1. reports the results of the ADF unit root test for the level values of all variables.

Table 5.1. ADF Unit Root Test Results

Variables	Exogenous Variables	ADF Value	MacKinn One-Sided p-values		
			1% level	5% level	10% level
USD*	Constant, Linear Trend	-0.644905	-4.014635	-3.437289	-3.142837
CPI	Constant, Linear Trend	1.693402	-4.014288	-3.437122	-3.142739
INT**	Constant, Linear Trend	-3.162184	-4.014635	-3.437289	-3.142837
XU100	Constant, Linear Trend	0.475319	-4.014635	-3.437289	-3.142837
XTUMY	Constant, Linear Trend	-0.239085	-4.014288	-3.437122	-3.142739
XUHIZ	Constant, Linear Trend	0.034086	-4.014288	-3.437122	-3.142739
XUMAL	Constant, Linear Trend	0.602356	-4.014635	-3.437289	-3.142837
XUSIN	Constant, Linear Trend	0.134293	-4.014635	-3.437289	-3.142837
XUTEK	Constant, Linear Trend	-1.571256	-4.014288	-3.437122	-3.142739
XU30C	Constant, Linear Trend	-3.217766	-4.014288	-3.437122	-3.142739

**USD/TRY FX rate, **Interbank interest rate*

The results give the same conclusion when the test is performed without exogenous variables (see app. 1)

As the level values of the variables are not stationary, the data should be regressed with appropriate treatment of dynamics, e.g. using the log difference of the variable. Therefore, to bring the variables to the same level and ensure the coherence, all variables transformed into their logarithmic values. The first differences of the created logarithmic

time series are then taken. While this treatment renders growth value of variables, it is also useful for ensuring the stationarity of the variables.

After performing the necessary treatments, the ADF unit root test is applied to the variables. The result for the analysis period is shown in Table 5.1.

Table 5.2. ADF Unit Root Test Results

Variables	Exogenous Variables	ADF Value	MacKinn One-Sided p-values		
			1% level	5% level	10% level
Δ LNUSD	Constant, Linear Trend	-9.609728	-4.014635	-3.437289	-3.142837
Δ LCNPI	Constant, Linear Trend	-7.149484	-4.014288	-3.437122	-3.142739
Δ LNINT	Constant, Linear Trend	-7.885911	-4.014288	-3.437122	-3.142739
Δ LN XU100	Constant, Linear Trend	-8.973784	-4.014635	-3.437289	-3.142837
Δ LNXTUMY	Constant, Linear Trend	-9.131613	-4.014288	-3.437122	-3.142739
Δ LN XUHI Z	Constant, Linear Trend	-9.016252	-4.014288	-3.437122	-3.142739
Δ LN XUMAL	Constant, Linear Trend	-9.656937	-4.014288	-3.437122	-3.142739
Δ LN XUSIN	Constant, Linear Trend	-9.01505	-4.014635	-3.437289	-3.142837
Δ LN XUTEK	Constant, Linear Trend	-9.484145	-4.014288	-3.437122	-3.142739
Δ LN XU30C	Constant, Linear Trend	-13.47623	-4.014635	-3.437289	-3.142837

For the results without exogenous variables see app. 1

The results suggest that all variables are stationary at their first difference for all the confidence intervals. Therefore, the null hypothesis of being non-stationary cannot be accepted. These results suggest that using the transformed data no static model would encounter the spurious regression problem.

5.2.1.2. Lag Length Test

Determining the appropriate lag length influences the analysis results of the VAR model. In a VAR system that has a lag length of p and consists of n variables, each equation contains $n \cdot p$ coefficients and 1 constant term. Therefore, increasing the lag length causes the degrees of freedom to decrease rapidly. For this reason, the corresponding lag length should be short enough not to cause loss of information about the interaction of

the series with each other, but long enough not to cause autocorrelation between error terms.

To identify the monetary policy shocks, the variables in the VAR are ordered as follows (ΔLNUSD , ΔLNCPI , ΔLNINT , $\Delta \text{LNBIST}/\Delta \text{LN XU30C}$) following Berument et al. (2014). This type of ordering implies that monetary policy making does not have a simultaneous influence on exchange rate and prices, but exchange rate and price influence the policy response of the CBRT. The placement of the BIST indices and the derivative index at the end implies the hypothesis of market efficiency, that the stock market responds to all variables contemporaneously, taking into account all available information.

The lag length of the VAR specification is determined by The Akaike Information Criterion (AIC), The Final Prediction Error (FPE), and The Likelihood-Ratio Test (LR). The results are shown in the following Table 5.2.

Table 5.3. Optimal Lag Length Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1094.097	NA	2.27e-11	-13.15846	-12.23200	-12.78223
1	1240.296	262.9730	4.42e-12	-14.79617	-13.56089*	-14.29454*
2	1262.916	39.55036*	4.08e-12*	-14.87945*	-13.33535	-14.25240
3	1275.304	21.03558	4.28e-12	-14.83401	-12.98109	-14.08156
4	1290.845	25.60880	4.33e-12	-14.82824	-12.66649	-13.95038
5	1301.467	16.96838	4.67e-12	-14.76059	-12.29003	-13.75732
6	1307.432	9.229481	5.35e-12	-14.63437	-11.85498	-13.50569
7	1312.807	8.045051	6.19e-12	-14.50072	-11.41251	-13.24663
8	1322.370	13.83319	6.81e-12	-14.41975	-11.02272	-13.04025

** Indicates lag order selected by the criterion*

AIC, FPE and LR suggest that the lag length should be two. When the regression analysis was conducted, each equation had 12 monthly dummies to account for seasonal changes. Seasonal dummies allow the VAR model to capture for any potential seasonal-related patterns that may affect the behavior of the variable.

5.2.2. Diagnostic Tests

After determining the optimal lag length as two periods, it should be checked whether the VAR model estimated at this lag meets the diagnostic conditions. For convenience,

this section shows the result of the VAR model in which the main index of BIST, i.e. XU100, is analyzed. However, note that all diagnostic tests results for the remaining models lead to the same conclusion, which is explained here.

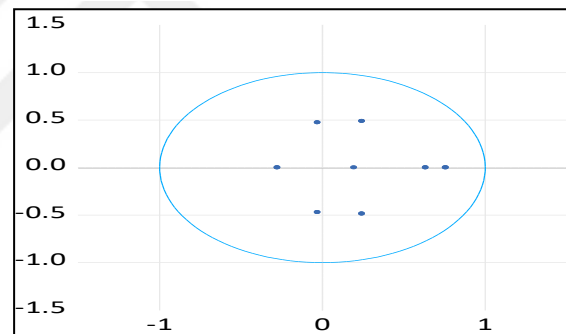
To check the stability of the model, the position of the inverse roots of the AR characteristic polynomial on the unit circle should first be taken into account. If the inverse roots are less than 1 (lie inside the unit circle), the model is considered stationary.

Table 5.3 below gives the sizes of the inverse roots of the AR characteristic polynomial, and Figure 5.1 shows the position of the inverse roots in the unit circle.

Table 5.4. Roots of Characteristic Polynomial

Root	Modulus
0.759663	0.759663
0.636466	0.636466
0.245367 - 0.486591i	0.544955
0.245367 + 0.486591i	0.544955
-0.027702 - 0.473091i	0.473902
-0.027702 + 0.473091i	0.473902
-0.274259	0.274259

Figure 5.13. Unit Circle Position of Inverse Roots of AR Characteristics



Accordingly, the modulus values of all inverse roots of the AR characteristic polynomial are less than 1 and therefore all inverse roots lie within the unit circle. Based on this result, it can be said that the two-lag VAR model (VAR (2)) is a stable and suitable model.

In addition, to support the stability of the VAR (2) model, the LM test (Lagrange multiplier) is applied to the model residuals as a diagnostic test to show whether there is an autocorrelation problem in the model. The LM test helps identify misspecification issues and guides researchers in refining the model. Table 5.4 shows the result of LM test for the VAR model.

Table 5.5. VAR Residual Serial Correlation LM Tests

Lag	LRE stat	df	Prob.	Rao F-stat	df	Prob.
1	15.16436	16	0.5126	0.948981	(16, 422.2)	0.5128
2	15.04766	16	0.5212	0.941549	(16, 422.2)	0.5213
3	23.78416	16	0.0943	1.503539	(16, 422.2)	0.0944

According to the test result, the probability value of 0.4295 is determined. Therefore, there is no autocorrelation problem in the model at the 5% significance level for the specified optimal lag length which is two. The conclusions remain the same for lags 1 and 3, therefore there is no significant serial correlation at any of the lags provided based on the p-values provided.

The result of the autocorrelation test shows that the VAR model adequately captures the dynamics of the data. This suggests that there is no need to include additional lagged terms or other variables in the model to better explain the underlying relationships.

To test the efficiency and accuracy of the model, a heteroscedasticity test should be performed. If heteroskedasticity is present, it indicates that the structure of the model may need to be changed to account for the unequal variability of the errors. Ignoring heteroskedasticity can lead to a misrepresentation of the true relationships between variables. The results of the White Heteroskedasticity test including the cross terms for the model are shown in Table 5.5 below.

Table 5.6. VAR Residual Heteroskedasticity Tests*

Joint test:					
Chi-sq	df	Prob.			
1509.696	1430	0.07			
Individual components:					
Dependent	R-squared	F(143,21)	Prob.	Chi-sq(143)	Prob.
res1*res1	0.915569	1.592479	0.1074	151.0689	0.3058
res2*res2	0.962564	3.775937	0.0004	158.8231	0.173
res3*res3	0.947425	2.646383	0.0059	156.3252	0.2107
res4*res4	0.835239	0.744459	0.8423	137.8145	0.6067
res2*res1	0.957857	3.337761	0.0011	158.0464	0.1842
res3*res1	0.916026	1.601936	0.1045	151.1443	0.3043
res3*res2	0.964894	4.036275	0.0003	159.2075	0.1677
res4*res1	0.80775	0.617012	0.9479	133.2787	0.7084
res4*res2	0.785489	0.537742	0.982	129.6057	0.7818
res4*res3	0.94094	2.339643	0.0131	155.2551	0.2284

**The results include cross terms*

Based on the results Table 5.6 provided, there is no strong evidence of heteroscedasticity in the data. The joint test result shows a chi-square statistic of 1509.696 with 1430 degrees of freedom and a probability value of 0.0700, which is not below the typical significance level of 0.05. This suggests that there is no significant heteroscedasticity in the data.

Additionally, when examining the individual components of the test, most of the variables have high probabilities and relatively low chi-square statistics. For example, res4res4, res4res1, res4res2, and res4res3 have probabilities above 0.05, indicating no significant evidence of heteroscedasticity in these variables.

Overall, there is no strong indication of heteroscedasticity in the model which supports the robustness of the VAR model.

5.2.3. The Empirical Results of the VAR Models

As the demonstration of statistical robustness of the referenced VAR model through diagnostic tests is done, the attention can now be turned to estimation of the VAR models. The VAR models have been frequently applied in empirical literature to test for Granger causality between monetary policy and asset prices and to examine the dynamic response of the asset prices to a monetary policy shock using impulse response functions

and variance decompositions. The aim of this study is to gain a mechanical understanding of the impact of monetary policy on capital markets in Türkiye. Additionally, although the VAR method is believed to be the appropriate model to achieve this purpose, this study also uses the ES method to determine the robustness of the VAR model results.

In this study, the VAR method developed by Sims (1980) is used to examine the relationship between monetary policy and capital markets. The VAR method is used to study the dynamic effects of random shocks on macroeconomic variables. The variables are not distinguished by the VAR method as endogenous and exogenous, therefore all variables in a VAR model are endogenous. This feature of the VAR method is useful for this study because the simultaneity bias often occurs in the analysis that examines the transmission mechanism of monetary policy. The VAR method intuitively eliminates the simultaneity bias (Davidson & MacKinnon, 2021).

Using the Choleski identification scheme, Thorbecke (1997) and Berument and Kutan (2007) place equity returns at the end of the chain order to determine the structural parameters from the VAR estimates. Assuming that the stock market is sensitive to shocks to macroeconomic variables, this is consistent with the efficient market hypothesis. The variables in this study are ordered as follows (ΔLNUSD , ΔLNCPI , ΔLNINT , $\Delta \text{LNBIST}/\Delta \text{LN XU30C}$) and similar economic theory that is used in the mentioned studies is proceeded. There are six different BIST indices and one BIST 30 Index Contracts which are traded under the BIST derivatives market (VIOP). Therefore, there are seven different VAR models estimated in this study. BIST indices and BIST 30 Index Contracts are placed at the end for all of the models.

According to this order, the USD/TRY rate affects all other variables contemporaneously, but the other variables have an impact on USD/TRY with a lag. Furthermore, while the remaining variables have a direct impact on the BIST indices, the indices do not have a contemporaneous impact on them. Finally, there is a time lag in the effects of each variable on each variable.

This assumption is supported by an economic theory that states that capital markets consume all available information and that changes in asset prices therefore reflect

economic activity, particularly monetary policy decisions. We therefore place the proxy variable interbank interest rate (ΔLNINT) directly in front of the stock and derivative market indicators. Furthermore, Section (3) clarifies that although the CBRT does not have an exchange rate target, it often intervenes in the market. With this information and the knowledge that the CBRT, as the central bank of a developing country, does not have the power to manage exchange rates (in this case ΔLNUSD) in an economy that practices free movement of capital and controls interest rates, FX rates are considered an exogenous factor in the VAR model. As the CBRT monitors the FX market and implements an inflation targeting regime, we place the inflation rate (ΔLNCPI) right after the USD/TRY exchange rate because we know that monetary policy innovations have a lagging impact on the economy.

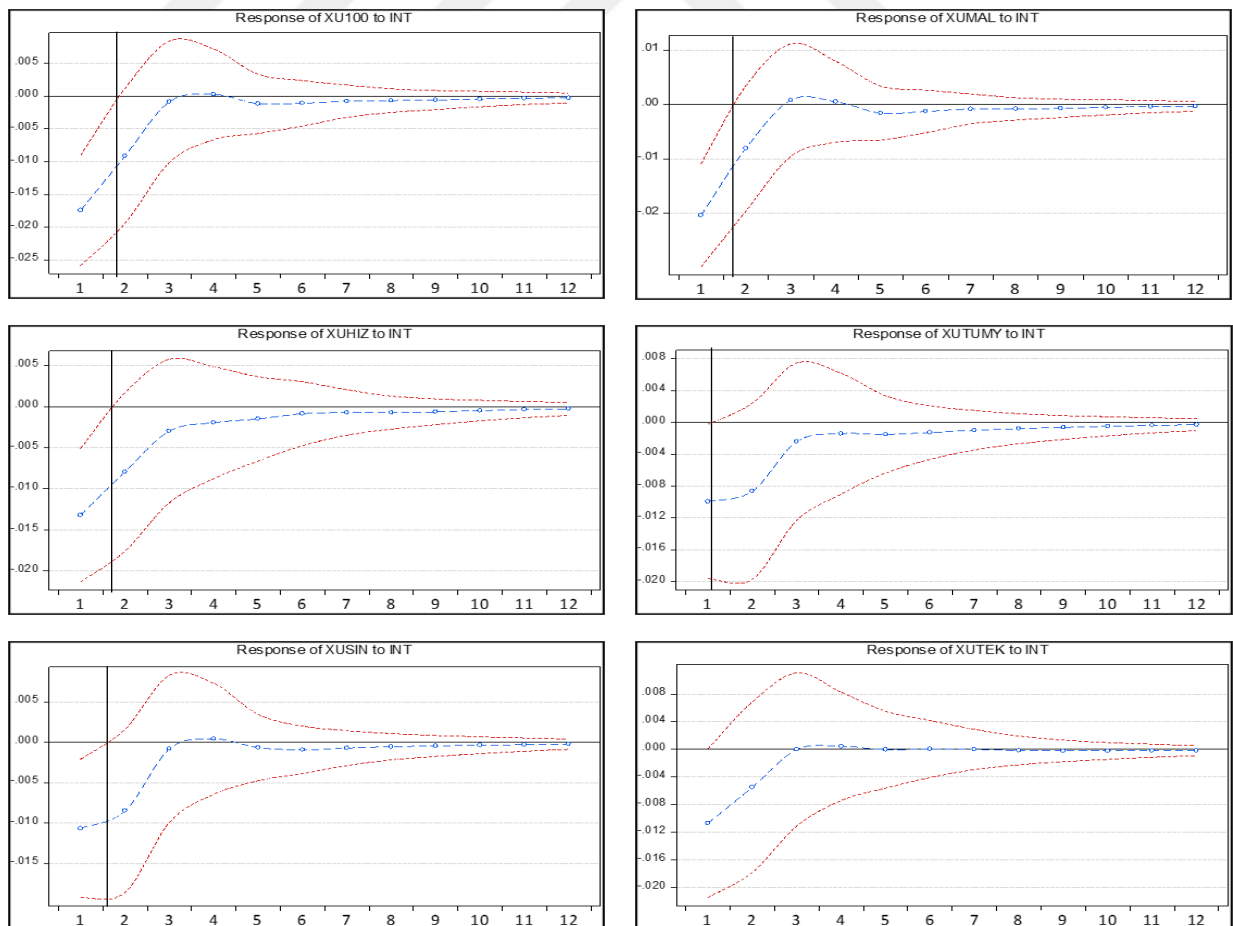
For all equations in the VAR models, 11 monthly dummy variables are exogenously inserted into the regression to control for the seasonal effect. It is very difficult to interpret a VAR model with the estimated coefficients. For this reason, impulse-response function plots and variance decomposition results are generally used when interpreting the results of a VAR model. The following subsections analyze monetary policy shocks and capital market reactions to these shocks, as well as the variations caused by the shocks. Because the interaction of other variables in the VAR models is beyond the scope of this study, the results are not analyzed. However, it is important to note that the results suggest that the CBRT does not respond to inflation shocks but rather to exchange rate shocks. This may seem strange at first glance, since the CBRT applies an inflation targeting regime, but as explored in detail in section (3), the CBRT sees the exchange rate as the main driver of inflation and therefore intervenes heavily in the market. It is worth noting that the results in this regard and the results of the interaction of the remaining variables are similar in all models. Therefore, the results of the model in which the main index XU100 is analyzed could shed light on the other models, in which the sub-indices and XU30C are analyzed (for the results in this regard see app. 2 and app. 3.3).

5.2.3.1. Impulse Responses

In the impulse-response function graphs obtained from the estimation of the VAR models, the direction and percentage magnitude of the response of other variables to a one standard error shock applied to the corresponding variable are shown on the vertical axis, as well as the 12-month axis, which is horizontal axis, shows the post-shock period on a monthly scale. Red lines represent ± 2 standard error confidence intervals for the response of the variable and play an important role in determining the statistical significance of the results. The blue line plots how the BIST indices react to policy shock.

Impulse response functions' graph showing the impact of a one standard error shock to the interbank interest rate growth (ΔLNINT) on the growth of BIST indices (ΔLNBIST) in the system for the analysis period are shown in Figure 5.14.

Figure 5.14. Impulse Responses of BIST indices



As shown in Figure 5.14, the response of all BIST indices to the one standard error shock to the interest rate is negative for all periods. These results are consistent with expectations and previous studies (see Berument & Kutan, 2007; Gunduz, 2020; Bayir & Abdioglu, 2020). Furthermore, except for the XUTEK, the responses of all indices to the first period shock are significant.

The strongest reaction comes from the XUMAL index to a monetary shock (top right) among the stock market indices. This is in line with expectations. The index consists of stocks of banks, insurance companies, factoring companies, real estate investment trusts (REITs), etc. The scope of operation of financial cooperation is directly related to short-term interest rates. Therefore, if the interest rate rises, the cooperate stock prices react negatively. This could be because rising borrowing costs indicate declining profitability of financial cooperations. The second strongest reaction comes from the XU100 index (top left), the main index of the BIST, XU100 is composed of the 100 most liquid and tradable stocks listed on Borsa Istanbul. The index provides a benchmark to track the performance of the Turkish stock market as a whole. Therefore, significant response of XU100 to monetary policy shock means that the CBRT has an impact on the Turkish stock market. However, the impact of a monetary shock on XU100 and XUMAL bottoms down after three months and becomes insignificant even before reaching the second month after the monetary shock. Which implies that the impact is short-lived and not strong.

It is expected that cooperates operating in the technology sector should be less affected by monetary shocks, since the main costs of this type of companies come from research and development expenses and the majority of their income comes from sales of value-added products. The result is in line with expectations as XUTEK does not react to monetary shocks (bottom right). A surprise comes from XUSIN's result (bottom left) as the result shows that the manufacturing sector reacts to the monetary shock for more than a half month. The manufacturing sector is highly dependent on inventory managements and supply chain factors. Monetary policy usually has a direct effect on the financial markets. The transmission mechanism to the real sector takes more time, and when the impact occurs, other factors related to the real economy tend to dominate the monetary policy effect. Therefore, one of the reasons why XUSIN reacts to monetary

policy could be that investors put aside the fundamental analysis about the sector and only follow general behavior when interest rates rise (taking into account the decline in the XU100). Another reason could be that investors consider fundamental analysis and realize that unsupervised stimulus programs such as KGF may not have been used in accordance with the purposes of the programs, so they assume that this will have a worse effect on the company's financial health in the future. Therefore, they start selling their shares in these companies and parking their liquid risk-free instruments like fixed deposits when interest rates rise.

Although it becomes insignificant within a month, it can be seen from Figure 5.2. (middle left) that the XUHIZ response to one standard error interest rate shock bottoms down after six months. While the duration of the significant response is very similar to that of XUMAL the magnitude of the response is also very similar to that of XU100. On the other hand, the duration of the monetary impact is very similar to that of XTUMY as these two indices diverge from the set considered in this context. Since the service sector refers to a very broad group of companies and these companies could be listed below in the XU100, XUMAL and XTUMY indices at the same time, this could be the reason that the index has similar characteristics to these three indices. Furthermore, XUHIZ index is largely determined by the share price movements of companies operating in the tourism and energy sectors. These types of sectors are known to be too sensitive to external shocks, which could explain why the monetary shocks last longer in XUHIZ than in the other indices. As mentioned earlier, XTUMY index includes all shares of the cooperations' stocks that are traded in the BIST except for the companies in BIST100. The index reacts to monetary shocks little further than initial shock impact. Considering that the XU100 contains stocks with high trading volumes and that the index reacts to monetary policy innovations, it can be concluded that easily manipulated/speculated stocks leverage the attributes of efficient market theory in a bad way. Thus, as transaction volume decreases, information asymmetry increases in the market.

Together with the other capital market instrument that displays the prices of BIST 30 index futures contracts (XU30C), the US dollar could be considered as an investment instrument. This is because the public in Türkiye prefers the dollar as a means of securing their savings, which would otherwise be wiped out given Türkiye's high

inflation trend. As can be concluded from the Section (3.), dollarization reached a point where the government and the CBRT took unprecedented measures such as KKM to steer the public towards the Turkish lira.

Figure 5.15. Impulse Responses of FX and Derivatives

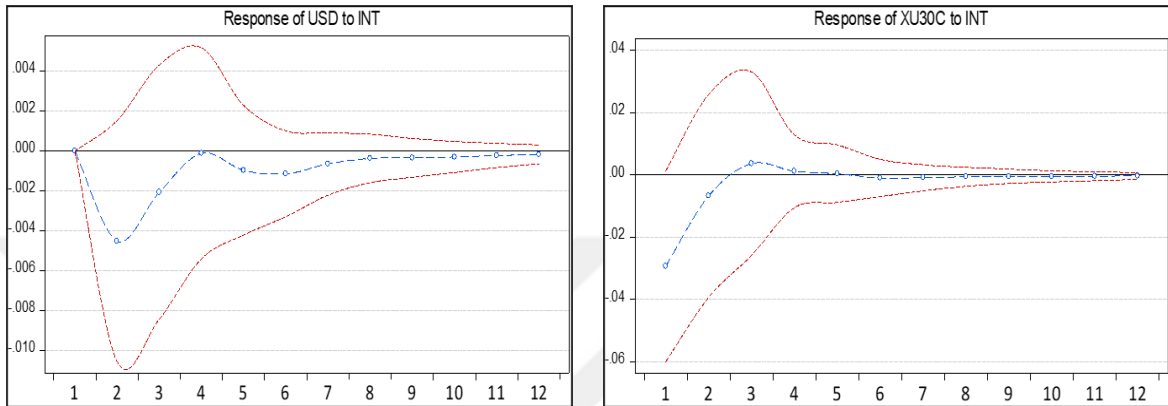


Figure 5.15. demonstrates the plots of impulse response functions showing the impact of a one standard error shock to the growth of interbank interest rates (INT) on the growth of USD/TRY rates (USD), and on the growth of the BIST 30 index contracts (XU30C) in the system for the analysis period.

As shown on the left side of Figure 5.15. the USD/TRY rate reacts negatively to a monetary shock. While the impact of the shock is permeant, the respond is not significant. From the graph on the right, it is understood that the futures of the BIST30 index respond to a monetary shock similar to that of the stock markets. However, here too the impact is insignificant.

The results correspond to the expectations. It follows that the efficiency and functionality of both FX markets and derivatives markets are relatively less susceptible to asymmetric information problem. Cooperates carry out hedging transactions, particularly in derivatives markets, which are characterized by trading in complex financial products. This provides leverage against an unexpected loss incurred by other capital market investments. The nature of both markets can therefore give them relatively more advantage of being able to incorporate the decisions of monetary authorities into their prices before those decisions are even made. Moreover, the respond

of USD/TRY rates to a monetary shock supports the economic theory that is used in this study when specifying the VAR models.

In conclusion, while the majority of BIST indices react to the monetary shock significantly the impact is short-lived and not strong and the CBRT cannot affect the derivative and FX markets. Thus, the transmission mechanism of monetary policy on asset prices only works in stock markets with a limited effect.

5.2.3.2. Variance Decompositions

To understand the economic reasons for the observed market reactions, forecast error variance decomposition (FEVD) is used after the estimation of the VAR models. Table 5.6. reports the 12 step-ahead forecast error variances in XU100 as percentages.

Table 5.7. Variance Decomposition of $\Delta \text{LN XU100}$

Period	S.E.	$\Delta \text{LN USD}$	$\Delta \text{LN CPI}$	$\Delta \text{LN INT}$	$\Delta \text{LN XU100}$
1	0.06	1.50	10.31	8.69	79.50
2	0.06	1.39	8.90	9.53	80.18
3	0.06	3.59	8.69	9.32	78.39
4	0.07	5.63	8.51	9.12	76.75
5	0.07	6.05	8.49	9.10	76.36
6	0.07	6.08	8.53	9.12	76.27
7	0.07	6.10	8.57	9.12	76.21
8	0.07	6.14	8.58	9.12	76.15
9	0.07	6.18	8.58	9.12	76.11
10	0.07	6.20	8.59	9.12	76.09
11	0.07	6.21	8.59	9.13	76.07
12	0.07	6.22	8.59	9.13	76.07

Cholesky Ordering: $\Delta \text{LN USD}$ $\Delta \text{LN CPI}$ $\Delta \text{LN INT}$ $\Delta \text{LN XU100}$

Looking at the results, a large variation of XU100 is self-explanatory for the entire period. The variation in the XU100 can be largely explained by the first month inflation of 10.31%. While monetary innovations explain 8.69% of the variation, exchange rates explain 1.5% in the first month. The ability of the exchange rate to explain changes in the XU100 more than doubled in the third month compared to previous months' values. This is consistent with the findings of the impulse-response functions, as the impact of monetary shocks disappears from the third month onwards.

After the first month, the interest rate comes first to explain the changes in XU100, after being second in the first month. The order of explanatory power between interest rate, inflation and exchange rate does not change for the rest of the period.

As for the FEVD results of the sub-indices XTUMY, XUMAL and XUHIZ the jump in the exchange rate's ability to explain the changes in the main index in the third month was also reflected itself. Furthermore, except for XTUMY, the exchange rate takes the lead in explaining the changes in the indices as of the fourth month and remains so for the rest of the period. The interest rate explains the bigger portion of XTUMY changes compared to exchange rate and inflation but to very small extent. In addition, the inflation rate explains most of the change in the XUTEK and XUSIN sub-indices for the entire period (see app. 3.1).

Table 5.8. below presents results of the USD/TRY exchange rate variance decomposition.

Table 5.8. Variance Decomposition of Δ LNUSD

Period	S.E.	Δ LNUSD	Δ LNCPPI	Δ LNINT	Δ LN XU100
1	0.04	100.00	0.00	0.00	0.00
2	0.04	95.78	3.11	1.10	0.01
3	0.04	94.81	3.11	1.32	0.76
4	0.04	94.01	3.94	1.30	0.76
5	0.04	93.13	4.29	1.33	1.24
6	0.04	92.94	4.29	1.40	1.38
7	0.04	92.93	4.28	1.42	1.37
8	0.04	92.92	4.29	1.42	1.37
9	0.04	92.90	4.29	1.43	1.38
10	0.04	92.89	4.30	1.43	1.38
11	0.04	92.88	4.30	1.43	1.38
12	0.04	92.88	4.30	1.44	1.38

Cholesky Ordering: Δ LNUSD Δ LNCPPI Δ LNINT Δ LN XU100

This can be concluded from Table 5.7. that exchange rate changes are largely self-explanatory. Furthermore, the exchange rate has the greatest self-explanatory power compared to other variables for all the VAR models that are estimated in this study. The result is similar to that of other models in which sub-indices are analyzed (see app. 3.2). Along with impulse response function, FEVD's results also support economic theory that suggests putting USD/TRY first when specifying the VAR models in this study.

Table 5.9. shows FEVD results of XU30C, the indicator of future contracts price changes that are traded on VIOP.

Table 5.9. Variance Decomposition of $\Delta \text{LN XU30C}$

Period	S.E.	$\Delta \text{LN USD}$	$\Delta \text{LN CPI}$	$\Delta \text{LN INT}$	$\Delta \text{LN XU30C}$
1	0.20	0.17	0.59	2.19	97.05
2	0.20	1.22	0.58	2.27	95.93
3	0.20	1.49	0.59	2.29	95.62
4	0.20	1.52	0.81	2.29	95.38
5	0.20	1.59	0.84	2.29	95.28
6	0.20	1.66	0.84	2.29	95.21
7	0.20	1.67	0.84	2.29	95.19
8	0.20	1.67	0.85	2.29	95.19
9	0.20	1.67	0.85	2.29	95.18
10	0.20	1.68	0.85	2.29	95.18
11	0.20	1.68	0.85	2.29	95.18
12	0.20	1.68	0.85	2.29	95.18

Cholesky Ordering: $\Delta \text{LN USD}$ $\Delta \text{LN CPI}$ $\Delta \text{LN INT}$ $\Delta \text{LN XU30C}$

It seems obvious that the changes in the derivatives markets are self-explanatory. It should also be noted that the FEVD result of the exchange rate in this model has similar consequences to the models of the BIST indices.

In conclusion, the key finding is that while the explanatory power of changes in the BIST's main index is proportionally distributed across interest rate, inflation and exchange rate as the values converge within twelve months, the monetary stance of the CBRT still appears to be so seems relatively more effective on the stock markets. However, the CBRT's monetary policy decisions appear to be inefficient in the FX and derivatives markets in Türkiye.

5.3. Even-Study (ES) Methodology

An event study in monetary economics involves analyzing the impact of specific events, such as monetary policy decisions on various economic indicators, primarily asset prices. When the ES method is mentioned in the field of monetary economics, this does not refer to the method used in finance discipline. As mentioned in section (4), studies that examine how asset prices react to changes in the expected and unexpected portion of monetary policy instruments in an event window (in this case the days of monetary policy announcement) are accepted in the literature as an ES method works. Generally,

these studies select surveys, futures on policy rate, and T-bill yields to identify expected and unexpected changes in monetary policy. Although the studies use the ES methods are generally like this, it can be seen that the ES method used in finance has been applied to the field of monetary economics in recent studies (see Gunay & Bayraktaroglu, 2022 and Eren & Demireli, 2023).

The literature highlights that the ES method typically assume that monetary policy shocks dominate other structural shocks in decision-making phases. This entails the assumption that on the announcement days of monetary policy decisions, the variance of the policy shock becomes infinitely large relative to the variance of other shocks in monetary policy dates ($\sigma_\varepsilon/\sigma_\eta \rightarrow \infty$ and $\sigma_\varepsilon/\sigma_z$). That is, it is assumed that within the monetary policy announcement day, when the data have a high frequency and lie in the event window, the ES methodology could avoid the pitfalls of simultaneity bias by practicing a truly exogenous measure of monetary policy shocks (Duran et al., 2010).

Following the event study methodology in Bernanke and Kuttner (2005);

$$R_t = \beta_0 + \beta_1 \Delta i_t^e + \beta_2 \Delta i_t^u + \varepsilon_t \quad (5.10)$$

The OLS estimation results of equation 5.10 are often used to gauge monetary policy impact on the asset prices. In equation 5.10; while R_t represents changes in asset prices i_t^e and i_t^u indicate expected and unexpected changes in the proxy variable respectively. ε_t is the error term that shows the impacts on asset prices caused by factors other than policy changes.

The ES method is based on EMH's assumption that expected policy changes are reflected in market prices before announcement days, but unexpected changes should impact asset prices. Therefore, it assumed that while expected policy changes should not play a significant role in the model, unexpected changes determine asset price changes. In this study, the ES method is used to verify the robustness of the results of the VAR models and to gain better understanding of the impact of the CBRT's policies on capital markets.

5.4. Estimation of The ES Models

Upon presenting the data to be used in the ES models and the process for determining the expected and unexpected component of the CBRT's monetary policy decisions, this subsection ends with the results of the applied ES models.

5.4.1. Data Specifics of the ES Models

The variables used in the VAR models in section (5.2) are also used in the ES models, with the exception of interbank interest rates and CPI index. As a reminder of the data, the stock market indices consist of BIST 100 (XU100), BIST All Shares (XTUMY) excluding the cooperate stocks in XU100, BIST Services (XUHIZ), BIST Financials (XUMAL), BIST Industrials (XUSIN) and BIST Technology (XUTEK). While USD/TRY buying rates are used to understand the reaction of the foreign exchange market, XU30C index is also used again to see the reaction of the VIOP. Selecting the same capital market variables allows the results to be compared with those of the VAR models.

To capture the reaction of the government bonds market and gain a better understanding of the impact of monetary policy on capital markets: two-year (T-Bond2y, benchmark rate), five-year (T-Bond5y) and ten-year (T-Bond10y) yields on government bonds of Türkiye is used.

To examine the relationship between capital markets and monetary policy decisions, this study uses an approach similar to that of Kuttner (2001) and Demiralp and Yilmaz (2010). Therefore, to distinguish between expected and unexpected changes in monetary policy, the CBRT's survey of market participants on expectation of one-week CBRT repo auction interest rate by the end of the current month, is used. As examined in detail in section (3), as of May, 2010, the CBRT generally funds the market with its policy interest rate, which is equal to the one-week repo rate. Therefore, the policy interest rate survey data is used.

As can be deduced from the selection of survey data, the choice of period inevitably differs from the period of the VAR models. The survey data begins by collecting participants' expectations regarding the level of the CBRT's one-week repo rate by the

end of June 2010. Therefore, the analysis period for all models begins on June 17, 2010, the first MPC meeting after the start of the survey, and ends on December 21, 2023, as the date is the last MPC meeting in the analysis period. During the period 2010:06 to 2023:12, 155 MPC sessions took place, so all models, except the model in which XU30C analyzed, have 155 observations. The derivatives market model must start on 07/19/2012 as there is no daily/intraday data available for the XU30C index before this date. Hence, this model has 129 observations.

The MPC meeting announcements publish at two o'clock in the afternoon by the CBRT. Therefore, in order to meet the assumptions of the ES methodology, it would be best to relate the event window to the price change in the capital markets immediately preceding and following this point in time. However, since it would be very difficult to obtain hourly data and it is not possible to obtain such data for every capital market instrument, the difference between the intraday opening and closing values of prices is included in the model. Additionally, for the stock market, the data for the second session up to date 12/22/2015 is included in the models as this session is closer to 2:00 p.m. when the monetary policy decisions are announced, meaning the ES method is more robust to meet its assumptions. Nevertheless, after this date, since the BIST discontinued the afternoon session, the data must be included in the model with the intraday changes between closing and opening prices.

Accordingly, the stock market data is obtained from the BIST website “datastore.borsaistanbul.com” until December 22, 2015. Along with the rest of the stock market data and the remaining of the dataset consisting of USD/TRY exchange rates, the XU30C index and T-Bonds are collected from investing.com. For all instruments, the intraday changes between closing and opening prices are calculated corresponding to the MPC meeting days.

The raw data on monetary policy surprises comes from the CBRT survey of market participants on the expectation of a one-week CBRT repo auction rate by the end of the current month, which is obtained from EDDS. Table 5.10 reports the results of the survey corresponding to the month in which the MPC made monetary policy decisions,

as well as the actual changes in policy interest rates and the price changes of the selected instruments.

Table 5.10. Partial Data Set

Meeting Days	Modified Mean	Policy Rate	ΔPolicy Rate	Expected Changes	Unexpected Changes	ΔXU100	ΔT-Bond2y
10/14/2010	7.00	7.00	0	0	0	-0.01	-8
11/11/2010	7.00	7.00	0	0	0	-0.01	12
12/16/2010	7.00	6.50	-50	0	-50	-0.02	-11
1/20/2011	6.29	6.25	-25	-21	-4	-0.02	-3
2/15/2011	6.22	6.25	0	-3	3	-0.01	-10
3/23/2011	6.25	6.25	0	0	0	-0.01	7
11/20/2012	5.75	5.75	0	0	0	0.00	5
12/18/2012	5.66	5.50	-25	-9	-16	-0.01	5
1/22/2013	5.50	5.50	0	0	0	0.00	-2
3/26/2013	5.50	5.50	0	0	0	0.01	3
4/16/2013	5.35	5.00	-50	-15	-35	0.00	-18
5/16/2013	4.86	4.50	-50	-14	-36	0.00	-24
1/28/2014*		10.00	550	0	550	-0.02	4
6/24/2014	9.17	8.75	-75	-33	-42	-0.01	-27
7/17/2014	8.41	8.25	-50	-34	-16	0.00	1
8/27/2014	8.25	8.25	0	0	0	-0.01	-2
11/24/2015	7.50	7.50	0	0	0	-0.03	24
12/22/2015	7.78	7.50	0	28	-28	0.00	13
1/19/2016	7.69	7.50	0	19	-18.88	-0.01	10
11/24/2016	7.50	8.00	50	0	50	-0.01	-7
12/20/2016	8.00	8.00	0	0	0	0.01	-9
1/24/2017	8.55	8.00	0	55	-55	0.01	6
5/23/2018	8.00	8.00	0	0	0	-0.01	33
5/28/2018*		16.50	300	-7	307	0.02	-30
6/7/2018	17.75	17.75	125	125	0	0.02	35
6/12/2019	24.00	24.00	0	0	0	0.00	-53
7/25/2019	21.43	19.75	-425	-257	-168	-0.02	-40
9/12/2019	17.00	16.50	-325	-275	-50	0.00	-45
2/19/2020	11.02	10.75	-50	-23	-27	-0.01	19
3/17/2020	10.33	9.75	-100	-42	-58	-0.02	-103
4/22/2020	9.33	8.75	-100	-42	-58	0.00	-68
9/23/2021	19.00	18.00	-100	0	-100	-0.01	0
10/21/2021	17.63	16.00	-200	-37	-163	0.02	-19
11/18/2021	15.25	15.00	-100	-75	-25	0.02	37
12/16/2021	14.53	14.00	-100	-47	-53	0.04	-1
9/22/2022	13.00	12.00	-100	0	-100	0.01	-54
10/20/2022	11.22	10.50	-150	-78	-72	0.00	-62
11/24/2022	9.00	9.00	-150	-150	0	0.00	-23
6/22/2023	17.56	15.00	650	906	-256	0.04	-39
7/20/2023	19.17	17.50	250	417	-167	0.01	0
8/24/2023	19.19	25.00	750	169	581	-0.02	184

**Out-of-the-Schedule MPC Meetings*

In months with out-of-the-schedule meetings, data from scheduled meetings is ignored and replaced with data from out-of-the-schedule meetings

The full data are not presented in Table 5.10 for simplicity. The complete data includes 155 observations, i.e. 155 MPC meetings in the period 2010:06-2023:12. The first column of Table 5.10 shows the MPC meeting dates within the analysis period. The data shown in the second column comes directly from the survey as a modified mean of participants' estimates of what they expect the policy rate to be at the end of the survey month. Until the first month of 2013, the CBRT conducted the surveys twice a month. Therefore, the data set consists of the survey data that are considered to best express expectations and are conducted closest to the MPC meetings for that month. Nevertheless, since the surveys were conducted only once a month after that date, this practice could not be applied for the subsequent data.

The policy rate column simply displays the one-week repo rate on the corresponding MPC meeting date. Changes in the policy interest rate (Δ Policy Rate) are displayed in the fourth column. The changes are calculated by taking into account the differences in policy rates in consecutive months. For example, at the MPC meeting on December 16, 2010, the policy rate was reduced by 50 basis points to 6.5% from November's 7%. Therefore, the change in the policy rate is negative 50 basis point.

The expected component of the policy interest rate is shown in the fifth column. The calculation process of the expected changes in the policy interest rates is as follows: As can be seen from Table 5.10, the policy interest rate on June 24, 2014 was 8.75 percent. Next month, the market expects the CBRT to cut the policy rate by 34 basis points as the modified mean rate was 8.41 percent in July ($8.41 - 8.75 = -0.34$). But the CBRT actually cut the policy rate by 50 basis points in July when the MPC decided to set the policy rate at 8.25 percent. Therefore, the market misestimation of the changes in the policy interest rate is 16 basis points ($-50 - (-34) = -16$). Hence, the unexpected part of the interest rate changes. The unexpected interest rate changes are shown in column six of Table 5.10.

When calculating the changes in the corresponding prices of capital market instruments, the same logic is applied, but the results for all the instruments are not shown in Table 5.10 for simplicity, except for XU100 and benchmark interest rate. While changes in instruments presented as index prices are calculated in the same manner as with XU100, changes in instruments presented as par value prices are calculated in the same manner

as with t-bond2y. Columns $\Delta XU100$ and $\Delta Bond2y$ show the intraday changes of BIST100 index and Türkiye's two-year government bond yields, respectively. The changes in XU100 are calculated based on the log difference in the opening and closing prices of XU100. This captures intraday price changes before and after the MPC meetings. $\Delta Bond2y$ is calculated using the same logic and is reported as basis point changes in Table 5.10.

5.4.2. The Empirical Results of the ES Models

In order to expand the view of the effects of monetary policy on capital markets obtained from the results of the VAR models and to compare it with the results of the ES models, eleven OLS regressions are carried out in this section.

It is expected that under the Efficient Market Hypothesis (EMH), the unexpected changes in interest rates will have an impact on the market because the market takes into account all the information available before the change in the policy rate and thus the expected changes in interest rates will have no impact on the market. The estimated equation using OLS regression method is shown below:

$$\Delta Y_t = \alpha + \beta_1 (Ex)_t + \beta_2 (Un)_t + \varepsilon_t \quad (5.11)$$

In equation 5.11, t is the market session represents before and after the MPC meeting, Δ is the intraday change operator, Y_t is the logarithmic/basis points difference value of the capital market instruments, $(Ex)_t$ is the expected changes in the policy interest rate and finally $(Un)_t$ is the unexpected changes. The regression results for stock market are shown in Table 5.11 below.

Table 5.11. Stock Market OLS Results

Dependent Variable	XU100	XTUMY	XUHIZ	XUMAL	XUSIN	XUTEK
Constant	-0.00076 (-0.71025)	-0.00100 (-1.27909)	-0.00089 (-0.95259)	-0.00108 (-0.87031)	-0.00007 (-0.07242)	0.00056 (0.46899)
(Ex)	0.00004*** (4.28549)	0.00003*** (3.90894)	0.00004*** (5.16732)	0.00004*** (3.47585)	0.00003*** (3.81343)	0.00004*** (4.10704)
(Un)	-0.00002 (-1.78419)	-0.00002*** (-2.71228)	-0.00002 (-1.78419)	0.00000 (0.25543)	-0.00004*** (-3.31607)	-0.00001 (-0.71199)
Observation	155	155	155	155	155	155
R ²	0.12	0.12	0.18	0.08	0.13	0.10

*** Indicates that the estimated coefficient is statistically significant at the 1%, 5% and 10% levels, respectively. Values in parentheses are the t-statistics of the coefficient

Table 5.11 reports the regression results of equation 5.11 on the days when the MPC meeting took place for the period 2010:06-2023:12. In the first row, the stock market indices used also in the VAR models, are shown. The first column lists the policy rate expectations inserted as independent variables, along with the observation number and R² results showing how well the independent variables explain the variability of the dependent variable.

The results regarding the coefficient signs of the stock market indices and R² results, correspond to those of Demiralp and Yilmaz (2010) and Aktas et. al. (2009). The reaction to an expected rise in interest rates is positive, the reaction to an unexpected rise in interest rates is negative. This may be due to the credibility of the CBRT. It is known that stock prices react more to bad news rather than the good news (Soylu, 2014). Therefore, if the market believes that the CBRT is not implementing its monetary policy in accordance with economic rationale in lowering interest rates, they would think that the CBRT further increases the overall risk of financial markets, which is bad news. Accordingly, the funds would flee the market and look for less risky alternatives. When the CBRT increases interest rates, the credibility of the CBRT increases as it implements its policies along economic rationale which is good news. Thanks to the credibility that CBRT provides across the economy, the funds would return to the market or the new funds would come to market. Because they believe that even if a country with high inflation, in this case Türkiye, provides risk-free time deposits, inflation will wipe out

the profit, they therefore channel their funds to the financial markets, which are obviously riskier but offer higher returns.

The results obtained suggest that the stock market does not respond to monetary policy changes in line with the EMH, as all indices respond to the expected interest rate decisions. If the expected interest rate increases by 100 basis points, stock market prices increase by 0.4%. The XTUMY and XUSIN indices are slightly less responsive than other indices. Furthermore, it is important to note that only these two indices respond to unexpected policy rate hike decisions by decreasing their prices by 0.2% and 0.4%, respectively. Comparing these results with the studies of Demiralp and Yilmaz (2010) and Aktas et. al. (2009), which were conducted when the CBRT did not publicly pursue the financial stability goal, it can be concluded that even after the CBRT added financial stability goal in its objective function in 2010, the EMH is still not functioning on the stock market in Türkiye.

If each index is analyzed specifically, it can be said that XUHIZ's answers support the results of its VAR model. As shown in section (5.2), monetary shocks have the longest impact on XHUIZ. The ES result of XUHIZ also suggests that XUHIZ has the strongest statistically significant value among the results of other indices, and R^2 of this model also has the highest value.

The VAR results of XTUMY suggests that the index reacts to monetary shocks little further than initial shock impact. As shown in Table 5.11, the index shares the smallest response value with XUSIN and is also the only index that responds to unexpected changes along with XUSIN. Recall that, contrary to the nature of the companies included in this index, XUSIN reacts to monetary shocks in its VAR model. Again, the ES results are a surprise as it reacts to monetary policy changes in a similar way to XTUMY.

XUTEK's ES result is in complete contradiction to the results of its VAR model as it did not respond to the monetary shocks contained therein. XUTEK's ES results suggest that it reacts to expected monetary policy decisions. This could be due to the differences in time span between models, as the ES model inevitably misses five observations compared to the VAR model.

In the VAR model of XU100, the results suggest that the index responds to monetary shocks significantly up to almost two months, which is the strongest response with respect to this condition. Therefore, the ES model coefficient is expected to be larger than the coefficients of the other indices. However, contrary to expectations, the coefficient size is similar to the coefficients of other indices. Again, note that the t-statistic of the coefficient has the second highest rate in the set implying high statistically significance level among other indices. Given that they respond similarly to monetary shocks, as shown in their VAR models, XU100's assessment can also be considered valid for XUMAL's response to monetary policy changes, as they again response similarly in their ES models. Moreover, although it is statistically insignificant, XUMAL does not respond at all to unexpected monetary policy decisions, as shown in Table 5.11.

It can be said that the results of the VAR model and the ES model generally agree that the CBRT influences the stock market, but the effect is quite limited.

Table 5.12 demonstrates the impact of monetary policy changes on instruments traded in derivative, FX and T-Bonds markets.

Table 5.12. VIOP, FX and T-Bonds Markets OLS Results

Dependent Variable	XU30C	USD	T-Bond2y	T-Bond5y	T-Bond10y
Constant	-0.00009 (-0.05984)	-0.00021 (-0.01908)	-4.416488 (-1.604141)	0.732463 (0.441689)	-3.272555 (-1.208877)
(Ex)	0.00003 *** (2.68800)	0.00050 *** (5.32271)	-0.025093 (-1.069883)	0.001418 (0.10037)	-0.017162 (-0.744184)
(Un)	-0.00001 (-0.77896)	-0.00121 *** (-9.81143)	0.096273 *** (3.109355)	0.00691 (0.370507)	-0.050026 (-1.643183)
Observation	129	155	155	155	155
R ²	0.06	0.44	0.06	0.001	0.02

*** Indicates that the estimated coefficient is statistically significant at the 1%, 5% and 10% levels, respectively. Values in parentheses are the t-statistics of the coefficient

Table 5.12 shows that XU30C only responds to expected changes. The magnitude of the results is very similar to that of stock market indices. While the VAR model for the index suggests that derivatives are unresponsive to monetary policy shocks, the ES results contradict this finding. It should be noted that the model is very weak as the R²

result indicates that 6% of the dependent variable changes can be explained by the independent variables. Furthermore, compared to other ES models, the model necessarily has 26 missing observations, compared to its VAR model the number is 31 missing values.

A big shocking surprise comes from the USD/TRY exchange rate result. The result contradicts not only the VAR results, but also the findings in the literature (see Aktas et. al., 2009; Duran et. al., 2010). The contradiction with the literature can be explained by the different analysis period and the different selection of proxy variables. As for the contradiction in the VAR results: It could be due to the frequency of the variable. While the ES model uses the intraday changes in exchange rates, the VAR model uses average monthly changes in exchange rates. Another reason could be that the FX market has a very high level of instantaneous information consumption and therefore reacts to monetary policy changes in a very short time window. In fact, the same explanation can be cited as the reason why the VAR result for derivatives markets contradicts its ES result. It is known that the level of asymmetric information problem is relatively lower for these markets. Thus, the instruments could quickly adjust to the new information.

Furthermore, the ES result suggests that exchange rates will increase by 0.05 Turkish lira if the policy interest rate rises by 100 basis points as expected. Exchange rates also react significantly to unexpected changes of larger magnitude, as an unexpected increase of 100 basis points lowers the exchange rate by 0.1 Turkish lira. Thus, exchange rates respond to both changes. The reason for a positive response rate could be inflation expectations. The public accepts that the CBRT raised the policy interest rate because it expects inflation to rise in the future so people start to convert their savings into foreign currencies to hedge against inflation. The negative changes in response to unexpected policy decisions can be explained within the framework of general economic theory, which argues that when interest rates rise, people prefer more domestic currencies.

The results obtained for the T-Bonds market suggest that the benchmark interest rate responds to policy changes in line with the EMH. In fact, this is the only instrument that meets the conditions of the EMH, as it only responds to unexpected policy rate hikes. An increase in the policy interest rate by 100 basis points increases the benchmark interest

rate by 10 basis points. While the result of the benchmark interest rate is consistent with the results of Demiralp and Yilmaz (2010) when they use the Reuters' survey, it is contradictory to the results of Aktas et. al. (2009). The reason probably lies in the choice of proxy variables, as this thesis uses the same proxy variable as the study by Demiralp and Yilmaz (2010), Aktas et. al. (2009) uses one-month t-bond yields, which the authors calculate using the interpolation method.

Looking at the results of T-Bond5y and T-Bond10y, it can be seen that they do not react to changes in policy interest rates. Although the results contradict those of Duran et. al. (2010) they found that as the maturity of t-bonds increase, the influence of the CBRT decreases, which can intuitively be accepted for the results of this study. Additionally, it is important to note that the R^2 results suggest that the models for the t-bonds are very weak. The R^2 results are also relatively lower than those of the studies mentioned. This is in line with expectations as all studies mentioned examine the period before 2010. Over the years, the t-bonds market is of course expected to deepen, which will naturally reduce the power of monetary policy to influence interest rates in the market. Nevertheless, it is safe to say that the interest rate channel works in Türkiye as the CBRT can influence the benchmark interest rate.

In summary, according to ES results it can be argued that the unexpected rise in interest rates, particularly in recent periods, has been seen as an indicator of tightening by capital markets. However, the recent implementation of unorthodox monetary policy has led to unexpected changes in interest rates, which may have reversed the channel through risk factor. The market is still changing with interest rates perceived to be tight, but the changes are also seen as catalysts for measuring risk. Unexpected interest rate hikes are viewed as a return to normal policy, while unexpected interest rate decreases are viewed as a source of additional risk in the market, leading to a change in the direction and magnitude of the relationship in general.

6. CONCLUSION

The asset price channel is one of the most important monetary policy transmission channels to the real economy. The channel stands out from the other channels because the transmission to the economy through asset prices is connected to other transmission mechanisms. Consequently, changes in asset prices can lead to spillover effects on credit availability and interest rates, thereby amplifying the impact of monetary policy on the economy.

The main aim of this study was to examine the influence of the Central Bank of the Republic of Türkiye (CBRT) on the capital markets and to estimate the extent of this power in the context of the asset price channel. In this respect, it is important to first determine the general monetary stance of the CBRT. In 2010, in addition to price stability, which according to the law is its main task, the CBRT also included the financial stability goal in its objective function. Examining the monetary policy implementations of the CBRT over the analysis period, it is clear that the CBRT has primarily sought to influence foreign exchange markets, as it sees exchange rates as the main driver of inflation. In the case of market funding, one-week repo rate was set as the policy interest rate from May 2010, but there were interventions in the market through the use of complex funding systems. This complexity has sometimes reached such dimensions that it is difficult to understand whether the CBRT is taking steps towards tightening or easing. This is obviously a red flag for a central bank adopting an inflation targeting regime as it compromises the bank's transparency, accountability and credibility.

The interbank interest rate helps to understand the overall monetary policy stance of the CBRT as it reflects how the Bank funds the market. Therefore, the interbank interest rates determined at BIST are used as a proxy variable and seven different VAR models are formed in this study to gauge the monetary policy impact of the CBRT on the stock, FX and derivatives markets.

The empirical results of the VAR models suggest that the stock market response to a one standard error shock to the interbank interest rate is negative. The impact is short-lived and not strong. Additionally, the explanatory power of monetary policy innovations for changes in the stock market is higher in the short-run, but in the long-run the USD/TRY exchange rate will be more prominent. The findings correspond to the results of studies conducted before the CBRT included the financial stability goal in its objective function (e.g., Berument & Kutan, 2007). Regarding the FX market, the results of the VAR model suggest that CBRT cannot influence the market. Therefore, it is not surprising that the variations in the USD/TRY exchange rate are largely self-explanatory. The VAR model for the derivatives market found that CBRT has no impact on the market. The results in this regard are very similar to those of the VAR model for the FX market.

In addition to the VAR method, the event study method (ES) is used to test the robustness of the VAR results and broaden the view of the impact of monetary policy on capital markets. In this context, in addition to the stock market, the FX market and the derivative market instruments used in the VAR models, treasury bonds market is also examined using the ES method. The ES method is commonly used to analyze the impact of expected and unexpected monetary policy decisions on financial markets. To obtain expected and unexpected components of the CBRT decisions, the surveys conducted by the CBRT are used, which are composed of market participants' expectations regarding the level of the one-week repo rate at the end of the month. The results in the stock market are consistent with the findings of the VAR model, as stock prices change slightly when expected decisions are made. If the interest rate rises by 100 basis points as expected, the main BIST price index will rise by 0.4%. The direction of the relationship is consistent with the findings in the literature, and the explanation of the direction could be the credibility level of the CBRT. Contrary to expectation, the results of the ES model, which studied the FX market, suggest that the USD/TRY exchange rate changes when monetary policy decisions are either made in line with expectations or not. The contradiction with the VAR model could be explained by the frequency of the variables, since the ES model uses intraday changes while the VAR model uses monthly changes. The results of the ES model of derivatives markets are similar to the results of the ES model of stock markets. This implies that relevant findings also contradict the

result of the VAR model. The reason for this could be that the ES model is estimated using a smaller number of observations and a shorter time span. The results obtained for the T-Bonds market suggest that the market is the only market that satisfies the conditions of the efficient market hypothesis (EMH), as the benchmark rate changes according to unexpected monetary policy decisions. An increase in the policy interest rate by 100 basis points increases the benchmark interest rate by 10 basis points. As expected, the CBRT decisions lose their impact on the market as the maturity increases. With the exception of the FX market result, the general results of the ES models do not differ from those of studies that analyzed the period before 2010. Consequently, although the EMH in Türkiye still does not work for the stock, FX and derivatives markets, it still works for the T-Bonds market.

In conclusion, it is safe to say that the asset price channel works in the stock market and the CBRT has the power to influence the reference interest rate that the market takes into account when trading in the capital markets. As far as the FX and derivatives markets are concerned, this study has limitations regarding the implementation of high-frequency data in the models for both the VAR and the ES. It is believed that the impact of monetary policy could become clearer if high-frequency data is used. Therefore, if the limitation could be overcome in future researches, the results would be more robust.

The CBRT is a central bank that pursues the goal of financial stability in a developing country with shallow capital markets. Under these circumstances, the impact of the CBRT monetary policy implementations on the capital market is expected to be stronger and more noticeable. However, even after incorporating the financial stability goal into its objective function, the CBRT still does not have any significant influence on the capital markets. This may be due to political or structural decisions regarding the economy rather than economic reality. This could be the subject of future studies. Here again, it is worth noting that there is a contradiction between financial liberalization and the depth of capital markets in Türkiye, as the degree of financial liberalization is very high and the market depth is relatively low. This contradiction is known to increase the impact of hot capital movements on capital markets. Therefore, this study suggests that while CBRT has the potential to restore capital markets to their essential role, this does

not appear to be achievable without eliminating the effects of capital movements resulting from uncontrolled financial liberalization.



REFERENCES

- Abuoliem, N., Nor, S. M., Matar, A., & Hallahan, T. (2019). *Crude oil prices, macroeconomic indicators and the financial sector in Jordan: dynamic causes and responses*. Journal of International Studies, 12(3), 131-146.
<https://doi.org/10.14254/2071-8330.2019/12-3/11>
- Aktaş, Z., Alp, H., Gürkaynak, R., Kesriyeli, M., & Orak, M. (2009). *Türkiye’de para politikasının aktarımı: para politikasının mali piyasalara etkisi*. İktisat İşletme ve Finans, 24(278). <https://doi.org/10.3848/iif.2009.278.6047>
- Altunbaş, Y. and Thornton, J. (2022). *Does inflation targeting increase income inequality?*. Journal of Post Keynesian Economics, 45(4), 558-580.
<https://doi.org/10.1080/01603477.2022.2101>
- Asiri, B., & Alzeera, H. (2013). *Is the Saudi stock market efficient? A case of weak-form efficiency*. Research Journal of Finance and Accounting, 4(6).
- Bayır, M., Abdioğlu, N. (2020). *The effect of interest rate corridor on Turkish financial markets*. İnsan ve Toplum Bilimleri Araştırmaları Dergisi, 9 (5), 3244-3263. Retrieved from <http://www.itobiad.com/tr/pub/issue/57287/747107>
- Bernanke, B. S., & Blinder, A. S. (1992). *The federal funds rate and the channels of Monetary transmission*. The American Economic Review, 82(4), 901–921.
<http://www.jstor.org/stable/2117350>
- Bernanke, B. and Gertler, M. (1995). *Inside the black box: the credit channel of monetary policy transmission*. Journal of Economic Perspectives, 9(4), 27-48.
<https://doi.org/10.1257/jep.9.4.27>
- Bernanke, B. and Kuttner, K. (2005). *What explains the stock market's reaction to federal reserve policy?* The Journal of Finance, 60(3), 1221-1257.
<https://doi.org/10.1111/j.1540-6261.2005.00760.x>
- Bernanke, B., Laubach, T., Mishkin, F.S. And Posen, A.S. (1999). *Inflation Targeting Lessons from the International Experience*. Princeton University Press
- Berument, H. (2007). *Measuring monetary policy for a small open economy: Turkey*. Journal of Macroeconomics, 29(2), 411-430.

- Berument, H., & Kutan, A. M. (2007). *The stock market channel of monetary policy in Emerging markets: evidence from the Istanbul stock exchange*. Scientific Journal of Administrative Development, 5, 117-144.
- Birkan, A. Ö. (2012). *Inflation targeting in an import dependent indebted economy*. International Review of Applied Economics, 26(4), 549-564.
- Bjørnland, H. C. and Jacobsen, D. H. (2013). *House prices and stock prices: different roles in the US monetary transmission mechanism**. The Scandinavian Journal of Economics, 115(4), 1084-1106. <https://doi.org/10.1111/sjoe.12031>
- Central Bank of the Republic of Türkiye. (2011). *2010 Annual Report*. <https://www.tcmb.gov.tr/wps/wcm/connect/b98a8fcc-aca8-4c4a-a1bb-f651e72ed2cd/10ing.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-b98a8fcc-aca8-4c4a-a1bb-f651e72ed2cd-m3fw86X>
- Central Bank of the Republic of Türkiye. (2012). *2011 Annual Report*. <https://www.tcmb.gov.tr/wps/wcm/connect/e109fc46-b901-4ece-ac5a-47470f9cc865/11eng.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-e109fc46-b901-4ece-ac5a-47470f9cc865-m3fw86Y>
- Central Bank of the Republic of Türkiye. (2013). *2012 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2012/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2014). *2013 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2013/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2015). *2014 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2014/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2016). *2015 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2015/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2017). *2016 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2016/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2018). *2017 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2017/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2019). *2018 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2018/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2020). *2019 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2019/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2021). *2020 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2020/files/en-full.pdf>

- Central Bank of the Republic of Türkiye. (2022). *2021 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2021/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2023a). *2022 Annual Report*. <https://www3.tcmb.gov.tr/yillikrapor/2022/files/en-full.pdf>
- Central Bank of the Republic of Türkiye. (2023b). *2023-I Inflation Report*. <https://www.tcmb.gov.tr/wps/wcm/connect/03a3322c-70d4-43cb-88e3-58a6169a894e/Inflation+Report+2023i.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-03a3322c-70d4-43cb-88e3-58a6169a894e-oruSa7h>
- Central Bank of the Republic of Türkiye. (2023c). *2023-II Inflation Report*. <https://www.tcmb.gov.tr/wps/wcm/connect/374f3d71-72a3-4c58-b962-d3d329c38d10/Inflation+Report+2023ii.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-374f3d71-72a3-4c58-b962-d3d329c38d10-oz33-EO>
- Central Bank of the Republic of Türkiye. (2023d). *2023-III Inflation Report*. <https://www.tcmb.gov.tr/wps/wcm/connect/aadb0b28-8a99-4a36-8a6e-9f759a0135b5/Inflation+Report+2023iii.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-aadb0b28-8a99-4a36-8a6e-9f759a0135b5-oGIU-X>
- Central Bank of the Republic of Türkiye. (2023e). *2023-IV Inflation Report*. <https://www.tcmb.gov.tr/wps/wcm/connect/bc7b5b97-2760-4824-82c8-afda35ec5f81/Inflation+Report+2023iv.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-bc7b5b97-2760-4824-82c8-afda35ec5f81-oOwZWeD>
- Central Bank of the Republic of Türkiye. (2024). *2024-I Inflation Report*. https://www.tcmb.gov.tr/wps/wcm/connect/6dbfd9a1-717d-4b5a-9162-d883edd0b8a3/1c24_i.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-6dbfd9a1-717d-4b5a-9162-d883edd0b8a3-oS8CnrS
- Chan, K. C., Hendershott, P. H., & Sanders, A. B. (1990). *Risk and return on real estate: evidence from equity REIT'S*. *Real Estate Economics*, 18(4), 431-452. <https://doi.org/10.1111/1540-6229.00531>
- Chau, F., Deesomsak, R., & Koutmos, D. (2016). *Does investor sentiment really matter?*. *International Review of Financial Analysis*, 48, 221-232. <https://doi.org/10.1016/j.irfa.2016.10.003>
- Christiano, L., Eichenbaum, M., & Evans, C. (1994). *The effects of monetary policy shocks: some evidence from the flow of funds*. <https://doi.org/10.3386/w4699>
- Cloyne, J., Ferreira, C., & Surico, P. (2018). *Monetary policy when households have debt: new evidence on the transmission mechanism*. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3188024>

- Cook, T. and Hahn, T. (1989). *The effect of changes in the federal funds rate target on market interest rates in the 1970s*. Journal of Monetary Economics, 24(3), 331-351. [https://doi.org/10.1016/0304-3932\(89\)90025-1](https://doi.org/10.1016/0304-3932(89)90025-1)
- Davidson, Russell & MacKinnon, James G. (2021). *Estimation and Inference in Econometrics*. Russell Davidson and James G. MacKinnon
- Demir, C. (2019). *Macroeconomic determinants of stock market fluctuations: The case of BIST-100*. Economies, 7(1), 8.
- Demir, F. (2009). *Financial liberalization, private investment and portfolio choice: financialization of real sectors in emerging markets*. Journal of Development Economics, 88(2), 314-324. <https://doi.org/10.1016/j.jdeveco.2008.04.002>
- Demiralp, A., & Belliler, İ. S. (2023). *Bist100 Endeksi ile Politika Faizi Arasındaki Fourier Eşbütünleşme İlişkisi*. EKEV Akademi Dergisi (95), 15-27. <https://doi.org/10.17753/sosekev.1284291>
- Demiralp, S. and Yilmaz, K. (2010). *Para Politikası Beklentilerinin Sermaye Piyasaları Üzerindeki Etkisi*. İktisat İşletme ve Finans, 25(296). <https://doi.org/10.3848/iif.2010.296.2798>
- Duran, M., Özcan, G., Özlü, P., & Ünalımsı, D. (2012). *Measuring the impact of monetary policy on asset prices in Turkey*. Economics Letters, 114(1), 29-31. <https://doi.org/10.1016/j.econlet.2011.08.024>
- Durmuş, M. (2016). *“Merkez Bankası Bağımsızlığı”, para ve faiz: Kapitalizmde finansın ekonomi politiği*. Artvin Çoruh Üniversitesi Uluslararası Sosyal Bilimler Dergisi, 2(1), 22-61
- Enders, W. (2015). *Applied Econometric Time Series, 4th Edition*. In: Wiley Series in Probability and Statistics, John Wiley & Sons, Inc., Hoboken.
- Eren, B. S., & Demireli, E. (2023). *Gelişmekte olan ülkelerde merkez bankası faiz kararlarının mevduat bankaları hisseleri üzerine etkileri: TCMB ve BIST AŞ örneği*. Pamukkale Üniversitesi Sosyal Bilimler Enstitüsü Dergisi (55), 347-364. <https://doi.org/10.30794/pausbed.1182892>
- Fisher, G., Steiner, E., Titman, S., & Viswanathan, A. (2021). *Location density, systematic risk, and cap rates: evidence from REIT'S*. Real Estate Economics, 50(2), 366-400. <https://doi.org/10.1111/1540-6229.12367>
- Gibson, M. S. (1997). *The bank lending channel of monetary policy transmission: evidence from a model of bank behavior that incorporates long-term customer relationships*. International Finance Discussion Papers 584, Board of Governors of the Federal Reserve System (U.S.).

- Gökalp, B. T. (2016). *Para politikası kararlarının hisse senetlerinin fiyatları üzerindeki etkileri*. Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 21(4), 1379-1396
- Günay, F. and Bayraktaroğlu, E. (2022). *Analysis of the effects of the central bank's Interest announcements on tourism index returns*. Sosyoekonomi, 30(51), 91-118. <https://doi.org/10.17233/sosyoekonomi.2022.01.05>
- Gündüz, İ. (2020). *Stock market transmission channel of monetary policy: empirical evidence from Turkey*. International Journal of Finance & Economics, 26(4), 6421-6443. <https://doi.org/10.1002/ijfe.2129>
- Han, Y., & Kim, M. H. (2023). *Monetary shocks on the Korean stock index: structural VAR analysis*. Eurasian Economic Review, 13(1), 85-102.
- Haykır, Ö., & Öztürk-Çetenak, Ö. (2022). *Monetary policy application and stock market reaction during Covid-19 Pandemic: Evidence from Turkey*. Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 15(1), 149-164. <http://doi.org/10.25287/ohuiibf.983443>.
- İnal, D. G., Gürkaynak, R. (2006). *Türkiye’de Para Politikası Faiz Kararlarının Uzun Dönemli Faizler Üzerindeki Etkisi*. Uzmanlık Yeterlilik Tezi, Türkiye Cumhuriyet Merkez Bankası Dış İlişkiler Genel Müdürlüğü, Ankara.
- Irum, S. and Ali, A. (2008). *Whether fiscal stance or monetary policy is effective for economic growth in case of south Asian countries?*. The Pakistan Development Review, 47(4II), 791-799. <https://doi.org/10.30541/v47i4iipp.791-799>
- Jitmaneeroj, B. (2017). *Does investor sentiment affect price-earnings ratios?*. Studies in Economics and Finance, 34(2), 183-193. <https://doi.org/10.1108/sef-09-2015-0229>
- Karabiyik, C. (2021). *Para politikasının hisse senedi getirisi üzerindeki asimetric etkisi: BIST100 boğa ve ayı piyasaları örneği*. Mehmet Akif Ersoy Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 8(1), 288-311. <https://doi.org/10.30798/makuiibf.804461>
- Kashyap, A. K., & Stein, J. C. (2000). *What do a million observations on banks say about the transmission of monetary policy?*. American Economic Review, 90(3), 407-428. <https://doi.org/10.1257/aer.90.3.407>
- Kazak, H. (2023). *Merkez bankası politika faizi kararlarının hisse senetleri ve döviz kuru üzerindeki etkisinin ampirik bir analizi: Türkiye'den kanıtlar*. Uluslararası İktisadi ve İdari İncelemeler Dergisi, 41, 50-63. <https://doi.org/10.18092/ulikidince.1231285>

- Khan, M. I. and Teng, J. (2019). *Asymmetric impact of oil prices on stock returns in Shanghai stock exchange: evidence from asymmetric ARDL model*. Plos One, 14(6), e0218289. <https://doi.org/10.1371/journal.pone.0218289>
- Küçükkocaoğlu, G., Ünalmış, D., & Ünalmış, I. (2013). *How do banks' stock returns Respond to monetary policy committee announcements in Turkey? evidence from traditional versus new monetary policy episodes*. Economic Modelling, 35, 536-545. <https://doi.org/10.1016/j.econmod.2013.07.019>
- Kuttner, K. N. (2001). *Monetary policy surprises and interest rates: evidence from the FED funds futures market*. Journal of Monetary Economics, 47(3), 523-544. [https://doi.org/10.1016/s0304-3932\(01\)00055-1](https://doi.org/10.1016/s0304-3932(01)00055-1)
- Lashgari, Z. and Mousa, A. (2014). *The impact of dividend policy on stock price volatility in the Tehran stock exchange*. Kuwait Chapter of Arabian Journal of Business and Management Review, 3(10), 273-283. <https://doi.org/10.12816/0018408>
- Liu, X. and Sinclair, P. (2008). *Does the linkage between stock market performance and economic growth vary across Greater China?*. Applied Economics Letters, 15(7), 505-508. <https://doi.org/10.1080/13504850500426277>
- Love, I. (2001). *Financial development and financing constraints: international evidence from the structural investment model*. Policy Research Working Papers. <https://doi.org/10.1596/1813-9450-2694>
- Mishkin, F. S. (1978). *The household balance sheet and the great depression*. The Journal of Economic History, 38(4), 918-937. <https://doi.org/10.1017/s0022050700087167>
- Mishkin, F. S. (2019). *Economics of money, banking and financial markets (5th ed.)*. Pearson.
- Mushtaq, M., Yet, C., Tahir, M., & Nasir, A. (2020). *Capital structure of family firms: the effect of debt and equity market timing*. Journal of Family Business Management, 11(1), 1-18. <https://doi.org/10.1108/jfbm-09-2019-0059>
- Normandin, M. and Phaneuf, L. (2004). *Monetary policy shocks: testing identification conditions under time-varying conditional volatility*. Journal of monetary Economics, 51(6), 1217-1243. [https://doi.org/10.1016/s0304-3932\(04\)00069-8](https://doi.org/10.1016/s0304-3932(04)00069-8)
- Özdemir, A. K., & Otluoğlu, E. (2015). *The impact of monetary policy decisions on the stock prices during the period of inflation targeting: an empirical study in BIST*. Journal of Economics Finance and Accounting, 2(1).

- Rigobón, R. and Sack, B. (2002). *The impact of monetary policy on asset prices*. Finance and Economics Discussion Series, 2002(04), 1-34.
<https://doi.org/10.17016/feds.2002.04>
- Rochon, L. and Rossi, S. (2006). *Inflation targeting, economic performance, and income distribution: a monetary macroeconomics analysis*. Journal of Post Keynesian Economics, 28(4), 615-638.
- Rochon, L. and Rossi, S. (2006). *Inflation targeting, economic performance, and income distribution: a monetary macroeconomics analysis*. Journal of Post Keynesian Economics, 28(4), 615-638.
- Şahin, B. C. (2011). *Para politikası kararlarının hisse senedi piyasası üzerine etkisi: Türkiye uygulaması*. TCMB Uzmanlık Yeterlilik Tezi. Ankara
- Şanlı, S., Konak, T., & Özmen, M. (2021). *Faiz, döviz kuru, altın fiyatları ve bist100 Endeksi ilişkisinin ekonometrik analizi: Türkiye üzerine bir uygulama*. İzmir İktisat Dergisi, 36(4), 928-948. <https://doi.org/10.24988/ije.880784>
- Sargent, T. J. and Wallace, N. (1976). *Rational expectations and the theory of economic policy*. Journal of Monetary Economics, 2(2), 169-183.
[https://doi.org/10.1016/0304-3932\(76\)90032-5](https://doi.org/10.1016/0304-3932(76)90032-5)
- Şentürk, M., & Dücan, E. (2014). *Türkiye'de döviz kuru-faiz oranı ve borsa getirisi ilişkisi: ampirik bir analiz* Business and Economics Research Journal, 5(3), 67.
- Sims, C. A. (1980). *Macroeconomics and reality*. Econometrica, 48(1), 1.
<https://doi.org/10.2307/1912017>
- Sims, C. A. (1992). *Interpreting the macroeconomic time series facts*. European Economic Review, 36(5), 975-1000. [https://doi.org/10.1016/0014-2921\(92\)90041t](https://doi.org/10.1016/0014-2921(92)90041t)
- Soylu, N., Korkmaz, T., & İsmail Çevik, E. (2014). *Merkez bankası faiz duyurularının finansal piyasalara etkisi*. Business & Economics Research Journal, 5(4).
- Sullivan, A. and Sheffrin, S.M. (2007). *Economics: principles in action (The Wall Street Journal Classroom Edition)*. Pearson Prentice Hall.
- Tang, Y., Luo, Y., Xiong, J., Zhao, F., & Zhang, Y. (2013). *Impact of monetary policy changes on the Chinese monetary and stock markets*. Physica a Statistical Mechanics and Its Applications, 392(19), 4435-4449.
<https://doi.org/10.1016/j.physa.2013.05.023>
- Taştan, H., & Güngör, A. (2019). *Türkiye hisse senedi piyasa volatilitesinin makroekonomik temelleri*. Business and Economics Research Journal, 10(4), 823-832.

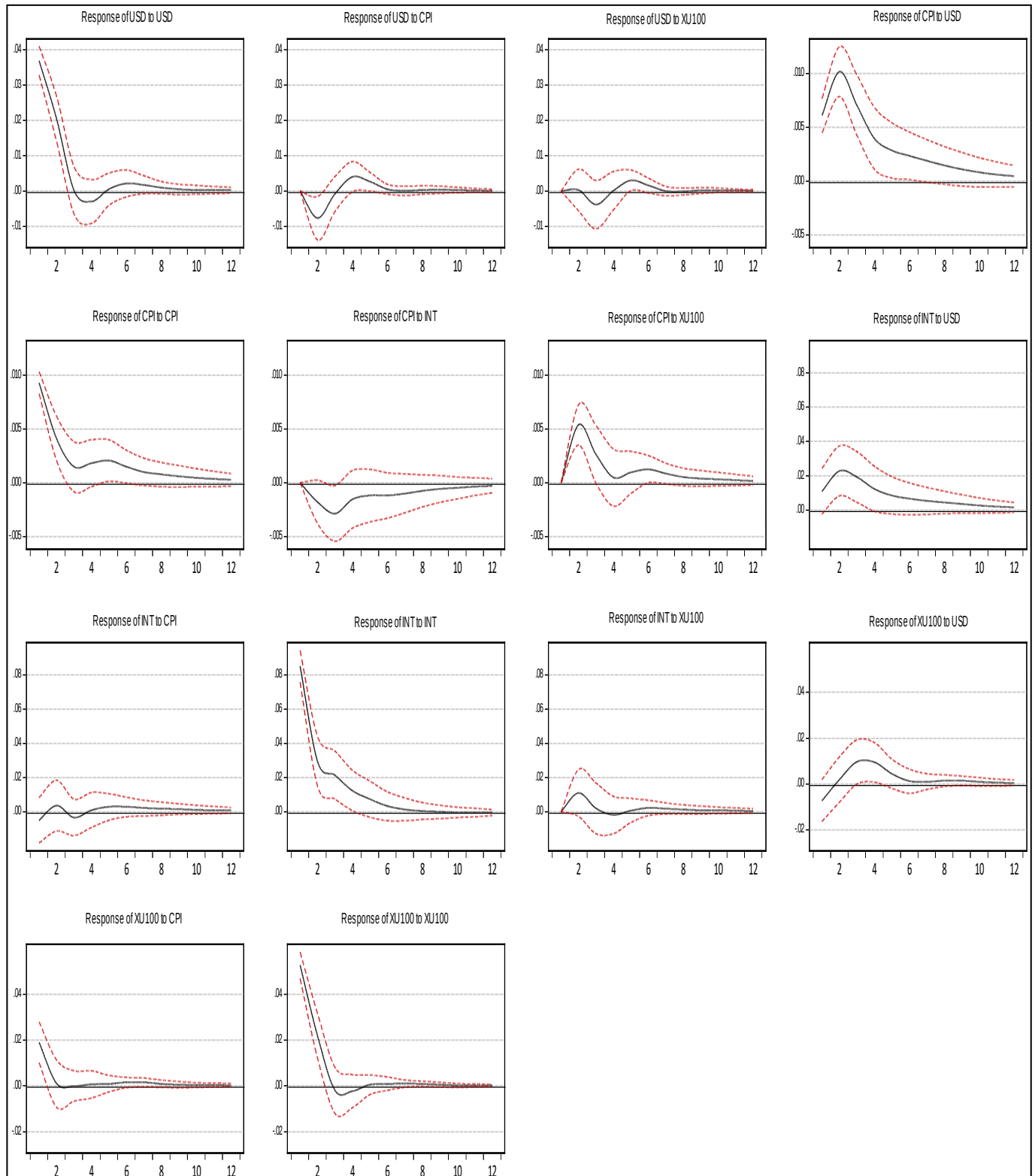
- Thorbecke, W. (1997). *On stock market returns and monetary policy*. The Journal of Finance, 52(2), 635. <https://doi.org/10.2307/2329493>
- Titman, S. and Warga, A. (1986). *Risk and the performance of real estate investment trusts: a multiple index approach*. Real Estate Economics, 14(3), 414-431. <https://doi.org/10.1111/1540-6229.00395>
- Van Horne, J. C. (2002). *Financial management and policy* (No. Ed. 12). Prentice-Hall, Inc.
- Velankar, N., Chandani, A., & Ahuja, A. K. (2017). *Impact of EPS and DPS on stock price: a study of selected public sector banks of India*. Prestige International Journal of Management & IT-Sanchayan, 6(1), 111-121.
- Widarni, E. L. and Bawono, S. (2021). *The comparison of foreign financial investment and human investment effect on economic in Indonesia base on macroeconomic point of view*. Studies of Applied Economics, 39(12). <https://doi.org/10.25115/eea.v39i12.6006>
- Yay, G. G. (2015). *Para ve finans: teori – politika* (2nd. Ed). İstanbul Bilgi University Press.
- Yıldırım, D. Ç., & Mirasedoglu, M. U. (2015). *Aktarım mekanizmasının hisse senedi Fiyatları kanalının etkinliğine ilişkin bir analiz*. Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi, 16(2), 105-126.
- Youssef, M. and Mokni, K. (2019). *Do crude oil prices drive the relationship between stock markets of oil-importing and oil-exporting countries?*. Economies, 7(3), 70. <https://doi.org/10.3390/economies7030070>
- Zengin, B. (2020). *Faiz oranları, ABD doları, euro ve BIST100'ün BIST bankacılık endeksi ile ilişkisi: Türkiye üzerine bir uygulama*. İşletme Akademisi Dergisi, 1(1), 77-87. <https://doi.org/10.26677/TR1010.2020.352>

APPENDICES

APP. 1. ADF Unit Root Test Results Without Exogenous Variables

Variables	LEVEL VALUES				LOG DIFFERENCE VALUES			
	ADF Value	MacKinn One-Sided p-values			ADF Value	MacKinn One-Sided p-values		
		1% level	5% level	10% level		1% level	5% level	10% level
USD	-7.647802	-2.57897	-1.94276	-1.61543	4.825825	-2.57905	-1.94277	-1.61542
CPI	-2.681558	-2.57914	-1.94278	-1.61542	2.945314	-2.57914	-1.94278	-1.61542
INT	-7.810638	-2.57897	-1.94276	-1.61543	0.277569	-2.57905	-1.94277	-1.61542
XU100	-8.746192	-2.57897	-1.94276	-1.61543	2.417775	-2.57897	-1.94276	-1.61543
XUTUMY	-8.095786	-2.57897	-1.94276	-1.61543	3.04384	-2.57897	-1.94276	-1.61543
XUHIZ	-8.179484	-2.57897	-1.94276	-1.61543	2.666434	-2.57897	-1.94276	-1.61543
XUMAL	-9.162023	-2.57897	-1.94276	-1.61543	1.931821	-2.57897	-1.94276	-1.61543
XUSIN	-8.290035	-2.57897	-1.94276	-1.61543	2.990533	-2.57897	-1.94276	-1.61543
XUTEK	-8.681065	-2.57897	-1.94276	-1.61543	3.096513	-2.57897	-1.94276	-1.61543
XU30C	-13.22443	-2.57905	-1.94277	-1.61542	1.631281	-2.57897	-1.94276	-1.61543

APP. 2. IIR Graphs



APP. 3. FEVD Results

APP. 3.1. Stock Market

Period	S.E.	ΔLNUSD	ΔLNCPI	ΔLNINT	ΔLNXTUMY
1	0.06	0.52	2.10	2.46	94.92
2	0.07	0.49	2.09	3.67	93.75
3	0.07	1.55	2.21	3.74	92.50
4	0.07	2.55	2.24	3.74	91.47
5	0.07	2.84	2.27	3.77	91.12
6	0.07	2.88	2.32	3.80	91.00
7	0.07	2.90	2.36	3.82	90.92
8	0.07	2.93	2.38	3.83	90.86
9	0.07	2.95	2.39	3.83	90.83
10	0.07	2.96	2.40	3.84	90.81
11	0.07	2.96	2.40	3.84	90.80
12	0.07	2.96	2.40	3.84	90.79

Period	S.E.	ΔLNUSD	ΔLNCPI	ΔLNINT	ΔLNXTUMAL
1	0.07	4.03	9.22	9.22	77.53
2	0.07	3.64	8.33	9.50	78.52
3	0.07	6.32	8.11	9.23	76.34
4	0.07	9.34	7.86	8.92	73.88
5	0.07	9.94	7.81	8.90	73.34
6	0.07	9.96	7.86	8.92	73.25
7	0.07	9.97	7.93	8.92	73.17
8	0.07	10.03	7.95	8.92	73.10
9	0.07	10.08	7.96	8.93	73.04
10	0.07	10.10	7.96	8.93	73.01
11	0.07	10.11	7.96	8.93	73.00
12	0.07	10.12	7.96	8.93	72.99

Period	S.E.	ΔLNUSD	ΔLNCPI	ΔLNINT	ΔLNXTUHIZ
1	0.06	1.71	6.61	5.71	85.98
2	0.06	1.66	5.64	6.63	86.06
3	0.06	4.67	5.42	6.60	83.30
4	0.06	6.78	5.30	6.54	81.37
5	0.06	7.14	5.28	6.57	81.00
6	0.06	7.17	5.33	6.58	80.91
7	0.06	7.19	5.39	6.59	80.83
8	0.06	7.23	5.40	6.60	80.77
9	0.06	7.26	5.41	6.60	80.73
10	0.06	7.28	5.41	6.61	80.71
11	0.06	7.28	5.41	6.61	80.69
12	0.06	7.29	5.41	6.61	80.69

Period	S.E.	ΔLNUSD	ΔLNCPI	ΔLNINT	ΔLNXTTEK
1	0.07	0.01	8.04	2.17	89.78
2	0.08	0.22	7.44	2.44	89.90
3	0.08	0.83	7.39	2.41	89.37
4	0.08	1.39	7.34	2.40	88.87
5	0.08	1.55	7.33	2.40	88.73
6	0.08	1.58	7.33	2.39	88.69
7	0.08	1.60	7.35	2.39	88.66
8	0.08	1.62	7.35	2.39	88.64
9	0.08	1.63	7.35	2.39	88.62
10	0.08	1.64	7.36	2.39	88.62
11	0.08	1.64	7.36	2.39	88.61
12	0.08	1.64	7.36	2.39	88.61

Period	S.E.	ΔLNUSD	ΔLNCPI	ΔLNINT	ΔLNXTUSIN
1	0.06	0.00	7.30	3.41	89.29
2	0.06	0.62	6.34	4.71	88.33
3	0.06	1.68	6.26	4.67	87.38
4	0.06	2.39	6.23	4.63	86.75
5	0.06	2.61	6.26	4.63	86.51
6	0.06	2.66	6.29	4.64	86.40
7	0.06	2.69	6.32	4.65	86.34
8	0.06	2.72	6.33	4.65	86.30
9	0.06	2.74	6.34	4.66	86.27
10	0.06	2.75	6.34	4.66	86.25
11	0.06	2.76	6.34	4.66	86.24
12	0.06	2.76	6.34	4.66	86.24

APP. 3.2. FX Market

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXUSIN
1	0.04	100.00	0.00	0.00	0.00
2	0.04	95.33	3.55	1.13	0.00
3	0.04	94.62	3.57	1.37	0.45
4	0.04	93.78	4.35	1.36	0.51
5	0.04	92.90	4.75	1.38	0.97
6	0.04	92.78	4.76	1.43	1.04
7	0.04	92.76	4.75	1.45	1.04
8	0.04	92.75	4.76	1.45	1.04
9	0.04	92.73	4.77	1.46	1.04
10	0.04	92.72	4.78	1.46	1.05
11	0.04	92.71	4.78	1.47	1.05
12	0.04	92.71	4.78	1.47	1.05

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXU30C
1	0.04	100.00	0.00	0.00	0.00
2	0.04	94.24	4.34	1.25	0.16
3	0.04	93.92	4.39	1.51	0.19
4	0.04	93.00	5.31	1.50	0.18
5	0.04	92.49	5.81	1.51	0.19
6	0.04	92.42	5.83	1.55	0.21
7	0.04	92.38	5.82	1.59	0.21
8	0.04	92.35	5.83	1.61	0.21
9	0.04	92.32	5.85	1.62	0.22
10	0.04	92.30	5.86	1.63	0.22
11	0.04	92.29	5.86	1.63	0.22
12	0.04	92.29	5.86	1.63	0.22

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXUTUMY
1	0.04	100.00	0.00	0.00	0.00
2	0.04	95.03	3.77	1.19	0.00
3	0.04	94.48	3.82	1.49	0.21
4	0.04	93.50	4.62	1.49	0.39
5	0.04	92.62	5.07	1.51	0.80
6	0.04	92.52	5.10	1.55	0.83
7	0.04	92.49	5.09	1.58	0.84
8	0.04	92.47	5.10	1.59	0.84
9	0.04	92.45	5.11	1.60	0.84
10	0.04	92.43	5.12	1.61	0.84
11	0.04	92.42	5.13	1.61	0.84
12	0.04	92.42	5.13	1.61	0.84

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXUMAL
1	0.04	100.00	0.00	0.00	0.00
2	0.04	95.81	3.09	1.10	0.00
3	0.04	94.79	3.09	1.32	0.80
4	0.04	93.96	3.95	1.30	0.79
5	0.04	93.06	4.31	1.34	1.29
6	0.04	92.88	4.31	1.40	1.41
7	0.04	92.88	4.31	1.41	1.41
8	0.04	92.87	4.31	1.42	1.41
9	0.04	92.85	4.32	1.43	1.41
10	0.04	92.83	4.32	1.43	1.41
11	0.04	92.83	4.33	1.43	1.41
12	0.04	92.82	4.33	1.43	1.41

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXUHIZ
1	0.04	100.00	0.00	0.00	0.00
2	0.04	95.97	2.92	1.00	0.11
3	0.04	95.01	2.90	1.20	0.89
4	0.04	93.91	3.96	1.18	0.95
5	0.04	93.24	4.42	1.20	1.15
6	0.04	93.03	4.42	1.26	1.29
7	0.04	92.98	4.42	1.30	1.30
8	0.04	92.96	4.42	1.32	1.30
9	0.04	92.94	4.43	1.33	1.30
10	0.04	92.92	4.43	1.34	1.31
11	0.04	92.92	4.44	1.34	1.31
12	0.04	92.91	4.44	1.34	1.31

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXTEK
1	0.04	100.00	0.00	0.00	0.00
2	0.04	95.32	3.51	1.03	0.15
3	0.04	94.83	3.54	1.29	0.34
4	0.04	93.77	4.59	1.28	0.36
5	0.04	93.10	5.08	1.28	0.54
6	0.04	93.04	5.09	1.31	0.56
7	0.04	93.02	5.09	1.34	0.56
8	0.04	92.99	5.10	1.35	0.56
9	0.04	92.97	5.11	1.36	0.56
10	0.04	92.95	5.12	1.37	0.56
11	0.04	92.95	5.12	1.37	0.56
12	0.04	92.94	5.12	1.37	0.56

APP. 3.3. Interbank and Inflation

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXUHIZ
1	0.09	1.64	0.34	98.01	0.00
2	0.09	7.20	0.43	91.02	1.35
3	0.10	10.40	0.50	87.82	1.28
4	0.10	11.61	0.50	86.63	1.27
5	0.10	12.17	0.57	86.00	1.26
6	0.10	12.52	0.64	85.54	1.30
7	0.10	12.75	0.69	85.23	1.33
8	0.10	12.90	0.72	85.04	1.34
9	0.10	13.00	0.74	84.91	1.35
10	0.10	13.06	0.75	84.84	1.36
11	0.10	13.09	0.76	84.80	1.36
12	0.10	13.10	0.77	84.77	1.36

Period	S.E.	ALNUSD	ALNCPI	ALNINT	ALNXTEK
1	0.01	30.04	69.96	0.00	0.00
2	0.02	50.94	37.44	1.14	10.48
3	0.02	55.46	30.79	3.29	10.46
4	0.02	56.48	29.88	3.74	9.90
5	0.02	56.43	29.84	3.97	9.77
6	0.02	56.29	29.59	4.22	9.90
7	0.02	56.28	29.38	4.40	9.93
8	0.02	56.32	29.27	4.50	9.91
9	0.02	56.33	29.21	4.56	9.90
10	0.02	56.32	29.18	4.60	9.90
11	0.02	56.32	29.16	4.62	9.90
12	0.04	92.94	5.12	1.37	0.56