

**The Effect of the Monetary Policy Decisions Taken
by the US Federal Reserve on the Stock Prices of
Turkish Energy Companies**

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Submitted to the
Institute of Graduate Studies and Research
in partial fulfillment of the requirements for the degree of

Master of Science
in
Banking and Finance

Eastern Mediterranean University
September 2024
Gazimağusa, North Cyprus

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ABSTRACT

This thesis aims at analysing the effects of the U. S. monetary policies on the stock returns of Turkish energy sector with focus on the U. S. Treasury Bills, the exchange rate between USD and TRY and Türkiye's Consumer Price Index. The research work covers a time span from January 2001 to December 2023 using monthly data of some financial variables with the help of Fourier ARDL model. The data sets of the study consist of stock prices of Turkish energy companies including Zorlu Energy, Ayen Energy, Aygaz Energy, Aksu Energy, Akenerji, Turcas Energy, Ipek Energy and BIST Electricity Index. The analysis results show that there is strong evidence regarding the long-term relationships between US monetary policies and the stock returns of energy companies in Türkiye. The study also establishes that U.S T-Bills and the USD/TRY exchange rate have a positive effect on stock returns; thus, an increase in these variables enhances the returns of Turkish energy stocks. On the other hand, the correlation between Türkiye's CPI and stock return is negative, which indicates the negative influence of domestic inflation on the profitability of the energy firms. The results also confirm that Turkish energy sector is vulnerable to the changes in the global monetary situation especially the one originating from the United States of America given its economic strength.

Keywords: U.S. Monetary Policies, Turkish Energy Sector, Stock Returns, Macroeconomic Variables, Fourier ARDL.

ÖZ

Bu tez, Amerikan Merkez Bankası (FED)'in aldığı para politikası kararlarının Türk enerji şirketlerinin ve Elektrik endeksi hisse senedi fiyatları üzerindeki etkisini araştırmakta, özellikle ABD Hazine Bonoları (T-Bills), USD/TRY döviz kuru ve Türkiye Tüketici Fiyat Endeksi (TÜFE) değişkenlerinin etkisini incelemektedir. Ocak 2001'den Aralık 2023'e kadar olan dönemi kapsayan ve çeşitli finansal değişkenlerin aylık gözlemlerini içeren çalışma, Fourier Oto-Regresif Dağıtılmış Gecikme (Fourier ARDL) modeli kullanılarak gerçekleştirilmiştir. Analiz, Zorlu Enerji, Ayen Enerji, Aygaz Enerji, Aksu Enerji, Akenerji, Turcas Enerji, İpek Enerji gibi çeşitli Türk enerji şirketlerinin ve BIST Elektrik Endeksi hisse senedi fiyatlarını içermektedir. Ampirik sonuçlar, ABD para politikaları ile Türk enerji şirketlerinin hisse senedi getirileri arasında önemli uzun vadeli ilişkiler ortaya koymaktadır. Çalışma, ABD Hazine Bonoları ve USD/TRY döviz kurunun hisse senedi getirilerini olumlu yönde etkilediğini, bu değişkenlerdeki artışların Türk enerji hisse senetleri için daha yüksek getirilerle sonuçlandığını göstermektedir. Buna karşılık, Türkiye TÜFE'si hisse senedi getirileri ile olumsuz bir ilişki sergileyerek, yerel enflasyonun enerji şirketlerinin karlılığı ve değerlemesi üzerindeki olumsuz etkisini yansıtmaktadır. Bulgular, Türk enerji hisse senetlerinin uluslararası para politikalarına, özellikle ABD gibi büyük bir ekonomik aktörün politikalarına duyarlılığını vurgulamaktadır.

Anahtar Kelimeler: ABD Para Politikaları, Türk Enerji Sektörü, Hisse Senedi Getirileri, Makroekonomik Değişkenler, Fourier ARDL.

ACKNOWLEDGMENT

Thank you to my thesis supervisor, Prof. Dr. Salih Katırcıođlu, and to our dear department chair, Asst. Prof. Nigar Tařpınar, who never hesitated to offer me help at every opportunity.

Lastly, I am grateful to my dear family and my girlfriend Yüksel for their moral support throughout this process.

TABLE OF CONTENTS

ABSTRACT.....	iii
ÖZ	iv
ACKNOWLEDGMENT.....	v
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
LIST OF ABBREVIATIONS	ix
1 INTRODUCTION	1
2 LITERATURE REVIEW	7
3 DATA AND METHODOLOGY	14
3.1 Data Description.....	14
3.2 Unit Root Tests	15
3.3 Methodology	17
3.4 Diagnostic Tests.....	19
4 EMPIRICAL RESULTS	20
5 CONCLUSION	30
REFERENCES.....	34

LIST OF TABLES

Table 1: Cases of cointegration	18
Table 2: Descriptive statistics test	20
Table 3: Stationary test.....	22
Table 3: Stationary test (cont.)	24
Table 4: Cointegration test	25
Table 5: Long-Run test.....	27
Table 6: Diagnostic tests	29

LIST OF FIGURES

Figure 1: Rates of T-bills and fed funds	15
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LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fulley
AIC	Akaike Information Criteria
ARDL	Autoregressive Distributed Lag
CPI	Consumer Price Index
ECB	European Central Bank
EMH	Efficient Market Hypothesis
FED	Federal Reserve System
HAC	Heteroscedasticity and Autocorrelation Consistent
OMT	Open Market Transaction
PP	Phillips-Perron

Chapter 1

INTRODUCTION

The Central Bank is one institution that investors need to monitor as their decision on whether to ease off or tighten monetary policies has a significant influence on asset prices. Monetary policy has the primary objective of maintaining price stability, which is why central banks are so crucial. Monetary policy aims to accomplish particular goals through actions on economic indicators, such as inflation, real output, and employment (Ioannidis & Kontonikas, 2008). Among the most influential of these powerful institutions is the U.S. Federal Reserve, which has tremendous power in regard to the global financial landscape through its monetary policy decisions. Therefore, as the economic relations between countries become more closer, a monetary policy solution taken by FED also has an impact seen over there among countries far away, of course, to America.

Today, the USD is the most dominant currency of the global economy, and it plays a significant role in various countries' economies. With the global economy's and financial markets' growing globalization, shocks from industrialized nations like the United States significantly impact other markets (Hamori & Yang, 2014). According to Goldberg and Tille (2008) and Gopinath (2015), the majority of World Trade is carried out predominantly with the US Dollar.

For this reason, FED decisions affecting the US dollar may affect the stock markets of developing countries such as Türkiye. Additionally, the decisions regarding the US central bank's monetary policies have both direct and indirect macroeconomic impacts, such as commencing to stabilize local currencies of other countries, especially emerging markets like Türkiye, Argentina, and Indonesia and these nations must stabilize their currencies against inflation and market volatility (Ivrendi & Guloglu, 2012). Moreover, monetary policymakers in developing countries should be more careful about issues such as capital flight and currency instability compared to developed countries, according to the research conducted by Ivrendi and Guloglu (2012).

Policymakers would do well to familiarize themselves with the variables that cause price fluctuations, as energy costs are among the primary determinants of inflation dynamics due to the correlation between monetary policy choices and substantial changes in asset prices; this is likely to pique the interest of traders as well (Rosa, 2014). Ioannidis and Kontonikas (2008) further emphasize that broader financial markets, including stocks, bonds, mortgages, and foreign exchange, swiftly absorb new information as it helps promptly identify the effects of changes in monetary policy instruments. Monetary policy changes affect macroeconomic variables, which indirectly affect the stock market (Yang & Hamori, 2014). An intricate and interconnected web manages modern economies; actions of leading central banks resonate through international financial markets.

Decisions concerning domestic monetary policy, namely the changes to interest rates, affect domestic stock values immediately and in the long term. An unanticipated 25-

basis-point cut in the federal funds rate is associated with approximately a 1% increase in broad stock indexes (Bernanke & Kuttner, 2005). Changes in interest rates can impact stock prices in two ways: by affecting the speed at which firm values anticipate future cash flows and expectations for those amounts (Ammer et al., 2010). Central banks can issue either government treasury bills or their own bills and most of the developed country using T-bills rates for their own monetary policy (Yi, 2014).

Furthermore, if interest rates affect capitalization rates and future cash flow predictions, both impacts will likely shift in the same direction. Kim and Nguyen (2009) noticed that 12 stock markets in the Asia-Pacific showed a negative response to an unanticipated jump or decline in FED and ECB target interest rate news, causing return volatility to become higher. Share prices are susceptible to economic factors, and therefore, investors generally follow the announcements of central banks (Chen, 2007). Additionally, Chen (2007) notes that the decisions made in monetary policy significantly impact both bullish and bearish market periods. Furthermore, a 1% increase in the interest rate results in a 2.58% decline in returns during bullish markets and a 6.12% drop during bearish markets.

Stock prices have been found to be affected by monetary policy choices; increasing interest rates leads to a lowering of stock markets while reducing interest rates improves them (Lobo, 2002). Moreover, the interventions taken by central banks like the FED affect the foreign currencies of developing countries with high economic instability, such as Türkiye, leading to changes in these countries' local currencies and affecting the stock market. This effect is felt most in foreign-dependent,

developing countries. One of the most important recent changes in stock prices of Turkish energy companies is fluctuations in inflation. Examining the effects of monetary policies on financial markets, which we mentioned in this thesis, is based on some economic theories. This thesis is based on principles of economic theory such as Monetary Theory, International Transmission Theory and Efficient Market Hypothesis (EMH).

According to monetary theory, any change in the amount of money assumes high direct impact on the other economic factors including inflation, rate of interest, and any aspects of economic growth. Monetary authorities like the central banks introduce what is called price makers in an economy so that they can control the monetary base through policies to maintain a stable economy (Mishkin, 2021). In the context of intensified global interdependence through international trade and globalization, the International Transmission Mechanism offers insights into how the actions undertaken by the relevant country's monetary authorities can affect other economies across the world (Feenstra & Taylor, 2017). In order to have a way understand the impact of the actions of the Federal Reserve affecting emerging markets such as Türkiye, then this is the most crucial mechanism. They are worse compounded by the fact that the U. S. dollar is currently the world's reserve currency in the global financial system and playing a pivotal role in international commerce, this is in the opinions of Goldberg and Tille (2008) and Gopinath (2015). Therefore, in line with the Semi-Strong Efficient Market Hypothesis, the asset prices quickly adjust to all the information that is publicly available and can be gathered by investors. This theory holds that efficient operation of financial markets, for example stock markets is evidenced by quick adjustment of stock prices to new information.

When looking at how the financial markets incorporating monetary policy announcement effects on the basis of observable stock prices, this concept is vital. It is possible to use the semi-strong form of EMH when testing the stock markets' reactions to monetary policy shifts because it mainly focuses on how markets consider the availability and processing of new economic information (Mishkin, 2021).

Many studies conducted in the past also show that decisions taken in monetary policy impact stock prices. Some of these studies include Rosa (2014), Ammer et al. (2010), Basistha & Kurov (2008), Bernanke & Kuttner (2005), Eterovic & Eterovic (2013), Ivrendi & Güloğlu (2012) and Irani et al. (2022). However, since no study examines how the monetary policy announcements of one country's central bank affect the stock prices of energy companies in another country, it will make an essential contribution to the literature. On the other hand, Irani et al. (2022) conducted a similar study for the tourism industry according to the best available information, but our subject is energy companies in Türkiye. Therefore, examining this new debate in the energy sector is expected to provide meaningful results and implications. In oil-importing countries such as Türkiye, increases in oil prices have serious effects on inflation (Aka, 2020). These theoretical paradigms are utilized in this thesis to study the intricate relationship between policy choices in monetary management and its impacts on stock price movements, particularly in the emerging economies with an understanding of the role played by the US Federal Reserve Bank as a global central bank. Concretely, this research proposes to contribute to the understanding of the effects of International Monetary Policies on stock market fluctuations in economies vulnerable to fluctuations of the global markets, by analysing more particularly the

case of the Turkish energy sector. The integration of these theoretical studies in this study enriches the theoretical discourse on the effects of monetary policy as well as laid down a robust yardstick to measure the outcomes of this research. The Fourier ARDL model has certain advantages over the conventional models when it comes to the analysis of financial time series data. It enables the distinction between short-term and long-term impacts and also smooth changes with adding Fourier Function to classical ARDL method. This model is especially helpful in capturing such interactions that may emerge from the global economy such as the relationship between U. S. monetary policy and Turkish stock markets. The versatility of the method is that Fourier transformations allow it to identify cyclic patterns that are frequently found in economic data but are not accounted for by traditional models. This makes it an ideal choice for your study, thus increasing the reliability of the results and their ability to represent real economic conditions.

This research contributes to the literature in a way that it examines the role of U. S. monetary policy on the Turkish energy sector which has not been explored in detail in prior studies. Even though there is a large body of literature on the impact of the U. S. monetary policy on the international financial markets, this paper zooms into one sector in an emerging market and offers a micro analysis of how international monetary policies affect industries. The study also adds to the literature in terms of methodological contribution by employing the Fourier ARDL model in the analysis of the financial relationship between the two countries. Besides contributing to the existing literature, this study offers valuable information for policymakers and investors in Türkiye and other emerging economies.

Chapter 2

LITERATURE REVIEW

There are some studies available about the effect of U.S. monetary policies on international stock prices in literature. Altogether these studies contribute to the existing knowledge about the impact of American monetary policies on the international financial markets. The interconnections pointed out throughout these works emphasize the need for versatile economic policies in the context of the growing internationalization of the financial systems. Ammer et al. (2010) examine the effect of U. S. Federal Open Market Committee announcements on world stock markets with high frequency data. They find out that foreign stocks are as sensitive to U. S. monetary policy shocks as domestic stocks, with substantial differences in the extent of sensitivity across industries and economies with fixed exchange rates. This goes a long way to explain the extent of the impact of U. S. monetary policies on global markets especially on cyclical industries and countries with a higher degree of monetary integration with the U. S. (Ammer et al., 2010). Tran and Pham (2020), with contribution from the Federal Reserve of San Francisco, explain that US unconventional monetary policies affect domestic and international markets concerning capital movements and value of assets in countries such as Türkiye. Maurer & Nitschka (2023) employ global monthly vector autoregressive (VAR) models as the empirical analysis of the international effect of US monetary policy surprises on world stock markets. In the study, they provide evidence that US

monetary policy surprises have long-run impacts on foreign stock markets mainly through the cash flow news although the impacts are moderated by the stock market liquidity and perceived country risk (Maurer & Nitschka, 2023). Maurer & Nitschka (2023) focus on reaction of the world stock markets to US monetary policy surprises as the empirical analysis of global monthly vector autoregression (VAR) models. Therefore, in the case of the study, they ensure that US monetary policy surprises have long-run effects on foreign stock markets mainly through the cash flow news effect; however, stock market liquidity and perceived country risk moderate this effect (Maurer & Nitschka, 2023). The effects of monetary policies of United States are taken to the next level analysing the implications in emerging economies. Yang and Hamori (2014) using the Markov-switching models examine how changes in U.S. monetary policy response affect the Southeast Asian countries like Indonesia, Singapore and Thailand stock markets. Thus, their evidence shows that U.S. interest rates have significant depressing influence on these markets in expansion and decrease in contraction. This study shows that the impact of monetary policy spillovers is not constant whereby policies originating from the U.S. have greater impact when the economic environment is stable as asserted by Yang & Hamori (2014). Ekşi & Taş (2017) suggested a critical view regarding impact of unconventional monetary policy on stock markets especially in the post 2007 financial crisis period. According to their study, they experience an augment close to the seven-fold market responses with respect to the US Monetary Policy actions particularly when the federal funds rate is near the zero lower bound for their finding and it points to the fact that large-scale asset purchases have a deep imprint on investor behaviour and stock prices especially for the emerging markets like Türkiye (Ekşi & Taş, 2017). Tran and Pham (2020), alongside commentary from the Federal

Reserve of San Francisco, confirm that U.S. unconventional monetary policies significantly influence global market dynamics, impacting capital flows and asset prices in countries like Türkiye. These effects vary in stable versus volatile economic conditions, emphasizing the need for continuous monitoring of global policy shifts, especially for stakeholders in sensitive sectors. (Tran & Pham, 2020). Eterovic et al., (2022) further examine the asymmetric effects of US short-term interest rate changes on emerging market monetary policies. They establish that there are more significant effects of this cross-border influence during the relaxation of US monetary policies as compared to the cases of their tightening. Out of their research, policymakers and financial analysts will note invaluable information (Eterovic et al. 2022). In this paper, Irani et al. (2023) carry out an analysis of the impacts of consumer sentiment and monetary policy fluctuations on Mexican tourism firms' stock returns while taking into account both the domestic and the US contexts. This is an important finding of the study; Mexican consumer sentiment has a positive effect on the tourism firm stock returns whereas the same is not true for the U. S. sentiment changes. Furthermore, the findings reveal that U. S. monetary policy shock, particularly the interest rate, has a positive relation with Mexican tourism stocks contrary to the domestic rate shock. This subtlety of the interaction emphasizes how much cross-border economic policies and tourists' confidence affect the financial processes in tourist-reliant economies (Irani et al. 2023). Further, from literature Vyshnevskiy, Jombo, and Sohn (2024) delve into the impact of the clarity of monetary policy statements on financial market volatility in developing economies. Their analysis highlights that clearer communication, quantified through linguistic complexity and readability indices, is associated with reduced volatility in foreign

exchange rates, offering a strategic tool to aid economic stability by reducing complexity in monetary policy statements (Vyshnevskiy et al., 2024).

Research shows that U.S. monetary policy changes significantly impact emerging markets, with U.S. interest rate hikes reducing output in these economies. The evidence indicates that the US monetary policy shocks are large and affect emerging markets, with the latter's output being affected negatively by US interest rate increases. Lastauskas and Nguyen (2024) demonstrate that these effects are more pronounced when accompanied by increased policy uncertainty, leading to deeper and more prolonged economic declines.

Additionally, the dynamic interplay between monetary policy and stock market liquidity holds critical implications for financial stability and market functioning. According to Lyu and Hu (2024) state and realize that monetary policies with special emphasis on those implemented by the central bank are instrumental in controlling stock market liquidity in all the phased temporal framework across different phases and market situations. Their findings elucidate that expansive monetary policies often aimed at stabilizing liquidity expectations do not uniformly translate to enhanced market liquidity without the establishment of stable liquidity expectations, reflecting the complexity of policy impacts across different economic conditions and market states (Lyu & Hu, 2024).

Basistha and Kurov (2008) investigate the periodicity in the stock market's reaction to the changes in monetary policy of the United States. Thus, they discover that stock returns exhibit a more pronounced response to the federal funds target rate surprises

during recessions and in the context of a tight credit environment. More specially, their empirical work with firm level data indicates that firms vulnerable to monetary shocks in conditions of credit crunch are those that are financially constrained, as compared with relatively less constrained firms. This enhances the credit channel of monetary policy transmission and contributes to the knowledge of how macroeconomic conditions affect the stock market's response to monetary policy (Basistha & Kurov, 2008). Shirota (2023) investigates the state-dependent effects of the Bank of Japan's unconventional monetary policy interventions in stock markets, specifically focusing on stock purchasing programs. The findings indicate that the Bank of Japan's interventions significantly boost stock prices during market downturns but not during upturns, suggesting that the timing of interventions can enhance their effectiveness (Shirota, 2023).

Also, we have checked some literature about theory background of our study. The last decade of developments in literature has contributed a great deal to the understanding of the nature of markets and the depth of the effects of integration of the global financial system on stability. In the light of the Efficient Market Hypothesis (EMH), Filis and Chatziantoniou (2013) have paid a special attention in understanding how the financial markets in oil importing and oil exporting countries react to oil price shocks. They identified significant anomalies in market responses especially in how these shocks are transmitted and manifested in asset prices and thus questioned the efficiency of these markets in these contexts. Forbes and Warnock (2012) in the field of International Transmission Theory put forward a solid theoretical structure for the global transmission of financial shocks via capital flow cycles including waves of surges, stops, and retrenchment. In their assessment they

showed how these capital movements can transmit financial instability across borders, the integration of the modern financial systems and the problems it presents to policymakers. Furthermore, Gertler and Karadi (2015) offered a number of insights to Monetary Theory by analyzing the impact of unexpected changes in monetary policy on credit markets. Their work also focused on the fact that financial intermediaries play a significant role in the transmission of monetary policy shocks, and demonstrated that credit costs and accessibility are significant ways through which monetary policy affects economic activity.

Finally, we examined articles from the literature that examine the impact of American central bank policy decisions on the stocks of energy companies. Tsai (2013) investigates the asymmetric impacts of monetary shocks on stock returns during high oil price events, focusing on the differential effects across industries based on their oil intensity. This study demonstrates that stock returns in energy-intensive industries are more negatively affected by monetary policy shocks during high oil price periods compared to non-high oil price events. The findings highlight how monetary policy can exacerbate sector-specific vulnerabilities, emphasizing the importance of considering sectoral differences in policy formulation (Tsai, 2013). Rosa (2014) investigates how U.S. monetary policy decisions, both conventional and unconventional, impact global energy prices, using high-frequency intraday data. The study shows that surprises in monetary policy, particularly unexpected rate hikes, significantly reduce West Texas Intermediate crude oil prices about 3% for a 100-basis-point increase. Additionally, the Fed's large-scale asset purchases notably affect energy prices, similar to substantial rate cuts. This research underscores the critical influence of monetary policy surprises on the dynamics of global energy markets,

highlighting their importance in energy-dependent economic sectors. Tiwari et al. (2024) provide a comprehensive analysis of the dynamic interplay between international monetary policies and energy markets. Their study underscores significant time-varying connectedness, highlighting an "Oil to monetary policy" risk spillover dynamic and the critical role of geopolitical and economic risk factors in shaping these relationships (Tiwari et al., 2024). This comprehensive review illustrates the broad and intricate effects of monetary policies across global markets, underlining the importance of clarity, timing, and adaptation in policy formulation and execution.

Chapter 3

DATA AND METHODOLOGY

3.1 Data Description

This chapter delineates the data and methodology employed in analysing the impact of U.S. monetary policies on the stock returns of Turkish energy companies. To test this effect, the following model considers in this study.

$$\ln Y_i = \beta_0 + \beta_1 \ln USBILL_i + \beta_2 \ln USD/TRY_i + \beta_3 \ln CPI_i + u_t \quad (1)$$

The dataset spans from January 2001 to December 2023, comprising monthly observations of various financial variables. The dependent variables (Y) include stock prices of several Turkish energy firms, such as Zorlu Energy (ZOREN), Ayen Energy (AYEN), Aygaz Energy (AYGAZ), Aksu Energy (AKSUE), Akenerji (AKENR), Turcas Energy (TRCAS), Ipek Energy (IPEKE), and the BIST Electricity Index (XELKT). All stock prices are denominated in TRY. The independent variables considered are US T-Bills (3-months, USBILLS), the USD/TRY exchange rate, and the Consumer Price Index (CPI) in Türkiye, sourced from Refinitive Eikon and Yahoo Finance. All dependent and independent variables were examined by applying logarithm transformation. Moreover, Eterovic et al. (2022) used Treasury Bills rates as interest rates. In this thesis we used Treasury Bills rate instead of Fed Fund rates.

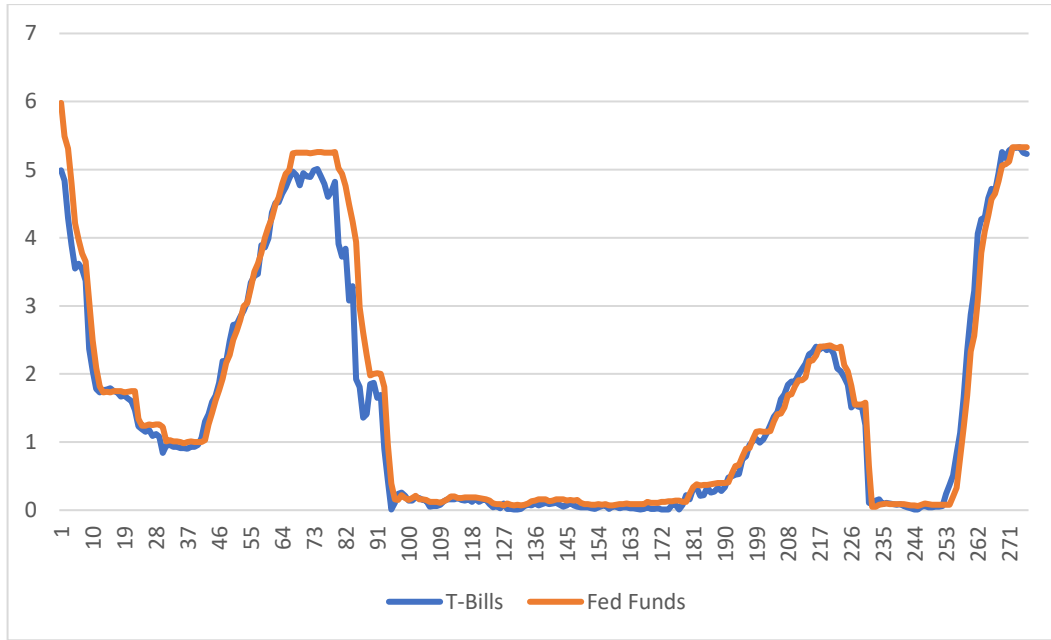


Figure 1: Rates of T-bills and fed funds

According to the chart, the interest rates of treasury bills and FED funds move together. When you look at the chart carefully, it is seen that the fluctuations in Treasury Bills are greater. Yi (2014) states that the reason for this is that Treasury bills are included in open market transactions (OMT).

3.2 Unit Root Tests

To assess the stationarity of the time series data, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test were employed. These tests are standard procedures in econometric analysis for determining whether a series is characterized by a unit root, indicating non-stationarity. The ADF test is an extension of the Dickey-Fuller test, which checks for a unit root in a univariate time series sample (Dickey & Fuller, 1979). The ADF test improves upon the original test by including lagged differences of the series in the test regression to account for higher-order serial correlation. The test regression can be expressed as follows:

$$\Delta y_t = \alpha_0 + \beta t + \lambda y_{t-1} + \sum_{i=2}^k \delta_i \Delta y_{t-i} + u_t \quad (2)$$

Where Δy_t shows first difference of the series, α_0 is constant, βt is a time trend, y_{t-1} is the lagged value of the series δ_i are the coefficients of the lagged difference terms and u_t is the error term in the Eq 1.

The null hypothesis of the ADF test is that the series under consideration contains a unit root meaning the series is non-stationary. On the other hand, the alternative hypothesis hold that the series is stationary. The values of test statistics are then compared with some critical values as a way of determining the presence of a unit root.

The PP test, developed by Phillips and Perron (1988), is another test for detecting unit roots in time series data. Unlike the ADF test, the PP test uses non-parametric statistical methods to account for serial correlation and heteroskedasticity in the error terms without the need to include lagged difference terms. The test statistic is based on the following regression:

$$\Omega^2 = \gamma_0 + 2\sum_{k=1}^q (1 - \frac{k}{a+1})\gamma_k \quad (3)$$

$$\gamma_k = \frac{1}{t} \sum_{t=k+1}^t \varepsilon_t \varepsilon_{t-k} \quad (4)$$

Similar to the ADF test, the null hypothesis of the PP test is that the series contains a unit root. The PP test modifies the test statistics of the Dickey-Fuller test to account for serial correlation by using Newey-West heteroskedasticity and autocorrelation consistent (HAC) standard errors. Both the ADF and PP tests were applied to the time series data in this study to ensure robustness in the results. The tests were conducted using statistical software, and the results were interpreted based on the critical values provided in MacKinnon (1996) for both tests.

3.3 Methodology

The relationship described in Equation 1 can be examined by the ARDL limits test, which was created by Pesaran et al. (2001). Eq. 1 is reformulated into an error correction representation in the following manner:

$$\begin{aligned} \Delta \ln Y_i = & \alpha_0 + \alpha_1 \ln Y_{i-1} + \alpha_2 \ln USBILL_{i-1} + \alpha_3 \ln USDTRY_{i-1} + \alpha_4 \text{CPI}_{i-1} + \\ & \sum_{t=1}^{p-1} \phi_t \Delta \ln Y_{i-t} + \sum_{t=1}^{p-1} \phi_t \Delta \ln USBILL_{i-t} + \sum_{t=1}^{p-1} \phi_t \Delta \ln USDTRY_{i-t} + \\ & \sum_{t=1}^{p-1} \phi_t \Delta \ln \text{CPI}_{i-t} + u_i \end{aligned} \quad (5)$$

Where Δ , and p represent the first difference operator and lag length. The term u_i denotes the distributed disturbance term, characterized by a zero mean and constrained variance. The Akaike Information Criterion (AIC) determines the ideal lag length. Pesaran et al. (2001) state that in order to determine the presence of a cointegration connection, it is necessary to reject the null hypotheses using following F-test (F_A) and t-test.

$$H_{0a}: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0 \quad (6)$$

$$H_{0b}: \alpha_1 = 0 \quad (7)$$

In addition to the existing null hypothesis of Pesaran et al. (2001), McNown et al. (2017) proposed the following eq 5. of F-test (F_B).

$$H_{0c}: \alpha_2 = \alpha_3 = 0 \quad (8)$$

According to Pesaran et al. (2001), and McNown et al. (2017) we have four different cases of F_A , F_B , and t :

Table 1: Cases of cointegration

	F_A	F_B	t	Result
Case 1	Significant	Significant	Significant	Cointegration exist
Case 2	Insignificant	Insignificant	Insignificant	Cointegration not exist
Case 3	Significant	Significant	Insignificant	Degenerate case #1
Case 4	Significant	Insignificant	Significant	Degenerate case #2

The existence of such examples indicates that there is no cointegration among the variables for the case of spot and futures markets. In the first degenerate case, Equation 5 is reduced to a Dickey Fuller type equation with additional lagged values of the independent variables which are non-significant. To eliminate this possibility, it is necessary to take dependent variable to the first order integration. In the second degenerate scenario, the combined importance of the delayed levels of the variables is only caused by the delay of the dependent variable, which is comparable to a generalized unit root test.

Pesaran et al. (2001) compiled a table of essential critical values for FA and t tests. The critical values are calculated for the lower limit, I (0), and upper bound, I (1). If the test statistic lies inside the range defined by the upper and lower bounds, it is not possible to make a determination on the presence of cointegration. McNown et al. (2017) determine the critical values for all three tests through the utilization of bootstrap simulations. By utilizing the integration properties of the empirical data, any possibility of hesitancy is eliminated as critical values are generated. According to McNown et al. (2017), the bootstrap test is superior to the asymptotic test in terms of ARDL bounds test, power, and size.

The methodological approach of the study is centred around the Fourier Autoregressive Distributed Lag (Fourier ARDL) model, which allows for an advanced examination of linear and non-linear trends in time-series data. This model, developed by McNown et al. 2017 is particularly effective for financial data characterized by seasonal patterns and structural breaks. But in this thesis, we used Fourier ARDL code by Yilanci et al. 2020.

In this method we are adding following Fourier function instead of dummy variables for smooth changes:

$$d(t) = \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) \quad (9)$$

Finally, we are adding Fourier expansion to Eq. 5:

$$\begin{aligned} \Delta \ln Y_i = & \alpha_0 + \gamma_1 \sin\left(\frac{2\pi kt}{T}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{T}\right) + \alpha_1 \ln Y_{i-1} + \alpha_2 \ln USBILL_{i-1} + \alpha_3 \\ & \ln USDTRY_{i-1} + \alpha_4 \text{CPI}_{i-1} + \sum_{t=1}^{p-1} \phi_t \Delta \ln Y_{i-1} + \sum_{t=1}^{p-1} \phi_t \Delta \ln USBILL_{i-1} + \\ & \sum_{t=1}^{p-1} \phi_t \Delta \ln USDTRY_{i-1} + \sum_{t=1}^{p-1} \phi_t \Delta \ln \text{CPI}_{i-1} + u_i \end{aligned} \quad (10)$$

3.4 Diagnostic Tests

Moreover, to ensure the model's reliability, diagnostic tests are performed to check for, Breusch-Godfrey Serial Correlation LM Test (Breusch, 1978) and (Godfrey, 1978) this test is used for checking any autocorrelation in the residuals of the regression, and Ramsey RESET Test (Ramsey, 1969) used to confirm the model's specification, ensuring that the functional form is correctly identified and that there are no omitted variables.

Chapter 4

EMPIRICAL RESULTS

Table 2 shows us the descriptive statistics for eight dependent variables (AKENR, AKSUE, AYEN, AYGZ, IPEKE, TRCAS, XELKT, and ZOREN) reveal important insights into their performance and volatility over the sample period.

Table 2: Descriptive statistics test

	AKENR	AKSUE	AYEN	AYGAZ	IPEKE	TRCAS	XELKT	ZOREN
Mean	0.23	0.61	0.43	1.31	0.83	0.48	3.56	0.15
Median	0.11	0.29	0.17	1.46	0.96	0.61	3.34	0.12
Maximum	1.79	3.98	3.77	5.08	3.88	3.37	6.46	2.06
Minimum	-0.75	-1.13	-1.43	-0.99	-1.70	-2.01	2.41	-1.24
Std. Dev.	0.51	1.26	1.16	1.38	1.38	1.05	0.78	0.51
Skewness	0.79	0.98	0.94	0.41	-0.10	0.00	1.96	0.66
Kurtosis	3.47	3.38	3.63	2.69	2.41	3.54	6.73	5.14
Jarque-Bera	31.72	46.41	45.47	9.19	4.45	3.44	338.15	72.87
Probability	0.00	0.00	0.00	0.01	0.10	0.17	0.00	0.00
Sum	64.34	171.10	120.50	362.19	231.35	132.81	985.22	41.47
Sum Sq. Dev.	73.22	442.39	374.09	531.16	526.96	305.97	170.27	73.42
Observations	276	276	276	276	276	276	276	276

XELKT demonstrates the highest mean value of 3.56, suggesting robust average performance, whereas ZOREN shows the lowest mean value of 0.15, indicating relatively weaker performance. The maximum and minimum values indicate, with XELKT recording the highest maximum value (6.46) and TRCAS the lowest

minimum value (-2.01), signifying substantial volatility in these returns. The Jarque-Bera test statistics (Jarque & Bera, 1980), significant for most companies (p-value < 0.05), indicate deviations from normality in the return distributions. Exceptions include Ipek Energy (IPEKE) and Turcas Energy (TRCAS), which exhibit closer approximations to normality. The probability values associated with the Jarque-Bera statistics, (Jarque & Bera, 1980) confirm these findings, underscoring the non-normal nature of most return distributions in this sample.

To determine the stationarity of the time series data, both the ADF and PP tests were employed. The results of these tests are summarized in Table 3 and Table 4. For the dependent variables, which include the stock returns of several Turkish energy companies (Zorlu Energy [ZOREN], Ayen Energy [AYEN], Aygaz Energy [AYGAZ], Aksu Energy [AKSUE], Akenerji [AKENR], Turcas Energy [TRCAS], Ipek Energy [IPEKE], and the BIST Electricity Index [XELKT]), the Augmented Dickey Fulley and Philipps Perron tests generally indicate that the series are non-stationary at level, or integrated of order zero, I(0).

Table 3: Stationary test

Statistics (Level)	ZOREN	Lag	AYEN	lag	AYGAZ	lag	AKSUE	lag	AKENR	lag	TRCAS	lag	IPEKE	lag	XELKT	lag
τ_T (ADF)	-2.05	(1)	-0.45	(0)	0.84	(1)	-0.42	(0)	-1.45	(1)	-1.03	(0)	-1.10	(0)	0.45	(1)
τ_μ (ADF)	-3.05	(1)	-2.17	(0)	-1.64	(1)	-2.06	(0)	-1.74	(1)	-1.73	(0)	-2.09	(0)	-0.90	(1)
τ (ADF)	-1.11	(0)	0.38	(0)	2.48	(1)	-0.64	(0)	-0.96	(1)	0.41	(0)	0.34	(0)	1.58	(1)
τ_T (PP)	-1.96	(2)	-0.35	(8)	0.70	(3)	-0.42	(0)	-1.40	(3)	-1.16	(6)	-1.15	(1)	0.73	(3)
τ_μ (PP)	-2.76	(1)	-2.22	(5)	-1.08	(0)	-2.22	(2)	-1.67	(3)	-1.95	(6)	-2.18	(1)	-0.60	(3)
τ (PP)	-1.47	(2)	0.49	(7)	2.70	(3)	0.61	(1)	-0.87	(3)	0.20	(6)	0.34	(0)	1.88	(2)
Statistics (First Difference)	Δ ZOREN	Lag	Δ AYEN	lag	Δ AYGAZ	lag	Δ AKSUE	lag	Δ AKENR	lag	Δ TRCAS	lag	Δ IPEKE	lag	Δ XELKT	lag
τ_T (ADF)	-13.87*	(0)	-14.64*	(0)	-13.75*	(0)	-9.32*	(1)	-13.23*	(0)	-15.72*	(0)	-14.51*	(0)	-12.20*	(0)
τ_μ (ADF)	-13.87*	(0)	-14.64*	(0)	-13.84*	(0)	-9.32*	(1)	-13.24*	(0)	-15.70*	(0)	-14.48*	(0)	-12.33*	(0)
τ (ADF)	-13.87*	(0)	-14.52*	(0)	-13.35*	(0)	-9.18*	(1)	-13.22*	(0)	-15.54*	(0)	-14.36*	(0)	-12.08*	(0)
τ_T (PP)	-13.78*	(6)	-14.63*	(10)	-13.72*	(4)	-15.41*	(1)	-13.12*	(8)	-15.74*	(5)	-14.54*	(3)	-12.10*	(6)
τ_μ (PP)	-13.76*	(7)	-14.63*	(10)	-13.80*	(5)	-15.40*	(1)	-13.11*	(9)	-15.72*	(5)	-14.51*	(3)	-12.14*	(7)
τ (PP)	-13.79*	(6)	-14.47*	(8)	-13.35*	(0)	-15.28*	(2)	-13.12*	(8)	-15.60*	(6)	-14.36*	(0)	-12.10*	(4)

Note: All of the series consist of natural logarithms. The symbol τ_T indicates a model that includes both a drift and a trend. The symbol τ_μ represents a model that includes a drift but no trend. The symbol τ represents the most restricted model, which does not include either a drift or a trend. The lag durations enclosed in brackets are utilized in the ADF test to eliminate any existing serial correlation in the residuals. The figures enclosed in brackets when using the PP test represent the Newey-West Bandwidth, which is computed using the Bartlett-Kernel method. Unit root tests were performed using both the ADF and PP tests, starting with the most general model and progressively removing the trend and intercept in subsequent models. This approach was described by Enders (1995: 254-255). The symbols *, **, and *** represent the rejection of the null hypothesis at statistically significant levels of 1 percent, 5 percent, and 10 percent, accordingly. Unit root tests were conducted using EViews 12.

However, upon first differencing, the tests strongly reject the null hypothesis of a unit root for all dependent variables, indicating that they are stationary at the first difference, or integrated of order one, $I(1)$.

According to Table 4 that related with independent variables including US T-Bills (USBILLS), the USD/TRY exchange rate, and the Consumer Price Index (CPI) in Türkiye, the ADF and PP tests show mixed results at the level. USBILLS and USD/TRY exchange rate exhibit non-stationarity at level, or integrated of order zero, $I(0)$, but become stationary at first difference, indicating they are $I(1)$. Specifically, the USD/TRY exchange rate was found to be non-stationary at the level according to the ADF test and PP test, confirming its $I(0)$ status.

Table 3: Stationary tests (cont.)

Statistics (Level)	USBILLS	lag	USD/TRY	lag	CPI	lag
τ_T (ADF)	-2.06	(0)	1.92***	(0)	-6.13*	(2)
τ_{μ} (ADF)	-1.97	(0)	-2.36	(0)	-12.46*	(0)
τ (ADF)	-1.94**	(0)	-0.50	(0)	-5.78*	(2)
τ_T (PP)	-1.96	(1)	-2.69***	(7)	-12.12*	(7)
τ_{μ} (PP)	-1.86	(1)	-2.32	(7)	-12.63*	(5)
τ (PP)	-1.85***	(1)	-0.49	(7)	-11.83*	(7)

Statistics (First Difference)	Δ USBILLS	lag	Δ TRBILLS	lag	Δ CPI	lag
τ_T (ADF)	-13.77*	(1)	-16.61*	(0)	-12.94*	(4)
τ_{μ} (ADF)	-13.80*	(1)	-13.19*	(1)	-12.92*	(4)
τ (ADF)	-13.79*	(1)	-16.65*	(0)	-12.96*	(4)
τ_T (PP)	-17.66*	(2)	-16.61*	(7)	-88.19*	(9)
τ_{μ} (PP)	-17.78*	(3)	-16.85*	(7)	-121.57*	(6)
τ (PP)	-17.70*	(2)	-16.65*	(7)	-87.78*	(3)

Note: All of the series consist of natural logarithms. The symbol τ_T indicates a model that includes both a drift and a trend. The symbol τ_{μ} represents a model that includes a drift but no trend. The symbol τ represents the most restricted model, which does not include either a drift or a trend. The lag durations enclosed in brackets are utilized in the ADF test to eliminate any existing serial correlation in the residuals. The figures enclosed in brackets when using the PP test represent the Newey-West Bandwidth, which is computed using the Bartlett-Kernel method. Unit root tests were performed using both the ADF and PP tests, starting with the most general model and progressively removing the trend and intercept in subsequent models. This approach was described by Enders (1995: 254-255). The symbols *, **, and *** represent the rejection of the null hypothesis at statistically significant levels of 1 percent, 5 percent, and 10 percent, accordingly. Unit root tests were conducted using EViews 12.

However, it becomes stationary at the first difference, confirming its I(1) status. The CPI, however, showed strong stationarity at the level itself in some cases, suggesting it is I(0), but also confirmed stationarity at the first difference, ensuring robustness.

The cointegration analysis was conducted using the Fourier ARDL method to examine the long-term equilibrium relationships among dependent variables and independent variables. The results are presented in Table 5, with bootstrapped critical values utilized for robustness

Table 4: Cointegration test

Dependent Variables	Frequency	AIC	F _A	Bootstrap Critical Values			t	Bootstrap Critical Values			F _B	Bootstrap Critical Values			Results
				10%	5%	1%		10%	5%	1%		10%	5%	1%	
XELKT	1.90	-1.78	6.50*	3.30	4.03	5.98	-4.85*	-3.03	-3.36	-4.12	8.50*	2.66	3.41	5.83	Cointegration
AKENR	1.90	-1.44	7.17*	3.92	4.51	6.11	-5.05*	-3.33	-3.67	-4.30	4.12**	3.06	3.91	5.46	Cointegration
AKSUE	4.30	-1.11	4.84*	2.86	3.49	4.52	-4.16*	-2.46	-2.91	-3.47	6.42*	2.53	3.16	4.79	Cointegration
AYEN	4.30	-0.82	6.16*	3.26	3.99	5.24	-4.83*	-2.78	-3.17	-3.77	7.97*	2.74	3.63	5.80	Cointegration
AYGAZ	1.60	-1.66	9.36*	2.84	3.59	4.84	-5.79*	-2.61	-3.10	-3.67	12.39*	2.70	3.22	5.02	Cointegration
IPEKE	2.00	-0.62	4.92**	3.90	4.63	6.30	-4.21**	-3.32	-3.84	-4.49	5.60**	3.42	4.26	6.50	Cointegration
TRCAS	1.50	-1.14	7.16*	3.73	4.54	6.10	-5.29*	-3.28	-3.54	-4.29	8.99*	2.79	3.60	6.69	Cointegration
ZOREN	3.70	-1.13	8.38*	3.59	4.45	6.09	-5.66*	-3.13	-3.54	-4.20	8.37*	2.97	3.79	6.23	Cointegration

Note: The symbols *, **, and *** represent the rejection of the null hypothesis at statistically significant levels of 1 percent, 5 percent, and 10 percent, accordingly. Cointegration tests were conducted using EViews 12 with the Fourier ARDL code by Yilanci et al. (2020).

Consequently, the results identified from cointegration tests reveal that all the dependent variables such as all the energy companies and the electricity index are significant according to the F-test (F_A), T-test (t), and F-test (F_B). This indicates that there is a long-term relationship between the dependent variables: energy companies and XELKT and independent variables which are 3-month us treasury bill, dollar TL exchange rate, and Türkiye's consumer price index (CPI) rates.

When we examine the independent variables in detail, the variables XELKT, AKSUE, AYEN, AYGAZ, TRCAS, and ZOREN reject the null hypothesis at a significance level of 1% in all tests (F_A , t , and F_B).

Analysing the independent variables more thoroughly, the variables XELKT, AKSUE, AYEN, AYGAZ, TRCAS, and ZOREN prove the null hypothesis to be rejected at the level of 1% in all the tests, that is F_A , t , and F_B . The AKENR variable rejects the null hypothesis at a significance level of 1% in the F_A and t tests, and at a significance level of 5% in the F_B test. Finally, when we examine the IPEKE company, it rejects the null hypothesis at a significance level of 5% in all tests.

Regarding the dynamics of the dependent and the independent variables, it is easy to understand the long run cointegration after performing the Fourier ARDL test. The findings are presented in Table 6, and dependent variables are the energy firms' stock returns and the electricity index in Türkiye and the independent variables are; US T-Bills (3 months), USD/TRY, and the Consumer Price Index (CPI) in Türkiye. The models were selected based on the Akaike Information Criterion (AIC).

Table 5: Long-Run test

Dependent Variable	Selected Model	CointEq	US T-BILL	USD/TRY	CPI
XELKT	FARDL (10, 5, 1, 0)	-0.13* (0.00)	0.07* (0.03)	1.49* (0.00)	-0.50* (0.00)
AKENR	FARDL (3, 4, 1, 0)	-0.10* (0.00)	0.14* (0.01)	0.42* (0.00)	-0.37* (0.00)
AKSUE	FARDL (3, 1, 1, 0)	-0.12* (0.00)	-0.03 (0.37)	1.62* (0.00)	-0.30** (0.01)
AYEN	FARDL (1, 0, 1, 0)	-0.13* (0.00)	0.01 (0.69)	1.49* (0.00)	-0.32* (0.01)
AYGAZ	FARDL (1, 1, 1, 0)	-0.13* (0.00)	0.11* (0.00)	1.61* (0.00)	-0.50* (0.00)
IPEKE	FARDL (1, 0, 0, 0)	-0.12* (0.00)	0.28* (0.00)	0.67 (0.26)	-0.974* (0.00)
TRCAS	FARDL (1, 0, 1, 1)	-0.13* (0.00)	0.14 (0.17)	1.12 (0.26)	-0.525 (0.28)
ZOREN	FARDL (1, 0, 2, 1)	-0.10* (0.00)	0.04 (0.84)	2.51 (0.15)	-1.139 (0.19)

Note: The symbols *, **, and *** represent the rejection of the null hypothesis at statistically significant levels of 1 percent, 5 percent, and 10 percent, accordingly. Cointegration tests were conducted using E-VIEWS 12 with the Fourier ARDL code by Yilanci et al. (2020).

For the BIST Electricity Index (XELKT), all the independent variables turn out to be significant at the 5% level. The long-run coefficients reveal that U. S. Treasury Bills (T-Bills) and the USD/TRY exchange rate are significantly positively affecting the stock returns, which implies that stock return increases as the US T-Bills and the USD/TRY increases. On the other hand, the consumer price index (CPI) we retrieve exhibits a highly influenced negative relationship; this means that as inflation in Türkiye increases, XELKT returns decrease.

Moreover, the performance of AKENR and AYGAZ is at the similar level of performance comparison to that of XELKT. In the long-run coefficients of the stocks below, they find that U. S. T-Bills and USD/TRY has positive relationship which means that if these variables increase, it results in the increase in the return of

AKENR and AYGAZ. In the case of AKENR and AYGAZ, the coefficients arising from the CPI exhibit a strong negative sign, which suggests that higher inflation in Türkiye lead to lower returns.

In contrast, the results for AKSUE and AYEN reveal no significant relationship between U.S. T-Bills and the stock prices of these companies. However, there is a significant relationship between the stock prices of these companies and both the exchange rate and inflation rate. For IPEKE, the independent variables of U.S. T-Bills and CPI are statistically significant, while the exchange rate is not, indicating that the exchange rate does not affect IPEKE in the long run. Lastly, for TRCAS and ZOREN, none of the independent variables are significant, indicating no relationship between the stock prices of these companies and the independent variables.

When we examined the literature, we observed that companies that are not affected by our independent variables, US T-bills, USD/TRY and CPI rates, may have implemented a series of hedging strategies against these macroeconomic factors. According to Allayannis and Weston, (2001) and Geczy et al., (1997) companies are using currency derivatives against exchange rate risks.

Bernanke & Kuttner (2005) noted that the effect of local interest rate increases is usually negative and is evident in the local stock prices. On the other hand, in the current research, we find a positive link between U. S. T-bills and Turkish energy stocks. This can be attributed to the fact that the currencies of developing countries have been devalued due to the decisions that have been made on the part of the United States monetary policies (Lastauskas & Nguyen, 2024). This is due to the fact that energy share prices are quoted in Turkish lira on Borsa Istanbul and hence the

local value of these stocks increases although the U. S. dollar strengthens against the lira in response to higher interest rates in the United States of America. Additionally, Rosa (2014) found that when the FED increases the interest rate, crude oil prices decrease, which means lower input costs for energy companies. When input costs decrease, companies can achieve higher profits. The diagnostic test results provided in the Table 7 show that the models have passed through the Breusch-Godfrey Serial Correlation LM Test and the Ramsey RESET Test which are used to check for the presence of serial correlation and model misspecification, respectively.

Table 6: Diagnostic tests

Dependent Variable	Test	F-stat	Prob
XELKT	Breusch-Godfrey Serial Correlation LM Test:	0.15	0.86
	Ramsey RESET Test	0.79	0.38
AKENR	Breusch-Godfrey Serial Correlation LM Test:	0.75	0.47
	Ramsey RESET Test	1.47	0.23
AKSUE	Breusch-Godfrey Serial Correlation LM Test:	0.19	0.82
	Ramsey RESET Test	1.09	0.30
AYEN	Breusch-Godfrey Serial Correlation LM Test:	0.89	0.41
	Ramsey RESET Test	0.11	0.74
AYGAZ	Breusch-Godfrey Serial Correlation LM Test:	0.76	0.47
	Ramsey RESET Test	1.53	0.22
IPEKE	Breusch-Godfrey Serial Correlation LM Test:	0.29	0.75
	Ramsey RESET Test	0.47	0.49
TRCAS	Breusch-Godfrey Serial Correlation LM Test:	1.07	0.34
	Ramsey RESET Test	1.33	0.25
ZOREN	Breusch-Godfrey Serial Correlation LM Test:	0.98	0.38
	Ramsey RESET Test	1.06	0.30

Note: All prob levels are significant.

For the Breusch-Godfrey Serial Correlation LM Test, all the dependent variables (XELKT, AKENR, AKSUE, AYEN, AYGGAZ, IPEKE, TRCAS, ZOREN) have high p-values all more than 0.05 hence no serial correlation in the residuals. Likewise, the Ramsey RESET Test pointed to high p-values of all the dependent variables, thus implying no signs of model mis specified. Therefore, all these diagnostic tests together imply that the models do not have the problem of serial correlation or misspecification and hence, the specified models are valid.

Chapter 5

CONCLUSION

This study contributes to the literature by investigating whether U.S. Treasury Bills (T-Bills), USD/TRY exchange rate, and Türkiye's Consumer Price Index (CPI) influence stock returns of different Turkish energy companies as well as BIST Electricity Index (XELKT). Applying the Fourier ARDL model enabled to uncover significant long-term relationships, thus shedding light on financial interplays in Türkiye's energy sector. This research fills a gap by examining the impact of U.S. monetary policy on the Turkish energy sector, offering a focused analysis within an emerging market. It also introduces a methodological innovation through the use of the Fourier ARDL model. These findings provide key insights for policymakers and investors in Türkiye and other emerging economies. The theoretical results suggest that the long-term cointegration between the dependent variables such as stock returns of the energy companies and the electricity index and the independent variables is valid absolutely. This shows a strong and long-run cointegration between the stock returns and the variables considered within the macroeconomic system in line with the theories derived from the Efficient Market Hypothesis, International Transmission Theory, Monetary Theory, and broader economics literature. One of the primary findings is the consistent positive impact of U.S. T-Bills and the USD/TRY exchange rate on the stock returns of most energy companies. This relationship underscores the sensitivity of Turkish energy stocks to international monetary conditions, particularly those emanating from the U.S., a major economic player. The

positive correlation suggests that as U.S. T-Bill rates and the USD/TRY exchange rate increase, so do the returns on Turkish energy stocks. This insight is crucial for understanding how global financial shifts can influence domestic markets, particularly in sectors that are heavily integrated into the global economy.

Conversely, the Consumer Price Index (CPI) exhibited a negative relationship with stock returns, reflecting the adverse impact of domestic inflation on the profitability and valuation of energy companies. This finding is particularly relevant for policymakers, indicating that controlling inflation could bolster stock market performance in the energy sector. High inflation rates can erode the purchasing power and profitability of companies, leading to lower stock valuations. Therefore, maintaining a stable inflation rate is essential for sustaining healthy stock market returns in the energy sector.

Furthermore, we found notable heterogeneity in the response of different energy companies to the macroeconomic variables. For instance, while AKENR and AYGAZ showed significant sensitivity to all independent variables, AKSUE and AYEN were less affected by U.S. T-Bills but highly responsive to exchange rates and inflation. This suggests that individual company characteristics and strategies, such as hedging against exchange rate risks, play a crucial role in determining their vulnerability to macroeconomic fluctuations. Companies with robust financial strategies and risk management practices are better positioned to withstand adverse economic conditions, highlighting the importance of strategic planning in mitigating financial risks. The robustness of the models was confirmed through various diagnostic tests, including the Breusch-Godfrey Serial Correlation LM Test and the

Ramsey RESET Test. These tests indicated no presence of serial correlation or model misspecification, affirming the reliability of the findings. The diagnostic tests are crucial in validating the empirical results, ensuring that the conclusions drawn from the data are statistically sound and reliable. This methodological rigor enhances the credibility of the study, providing a solid foundation for the insights generated.

The outcomes of this analysis have several valuable implications. Türkiye's policymakers may infer that they should pay attention to the US economic signals and policy changes given the considerable impact of the US's monetary policy on Turkish energy stocks. Proactive measures that might help minimize negative impacts include inflation reduction and exchange rate stabilization that might improve the robustness of the energy sector. There is need for policymakers to employ preventive measures, such as implementing stringent financial regulations, diversifying the energy portfolio, and enhancing foreign exchange reserves, to guard the domestic economy against negative shocks originating from the international financial markets with a view towards achieving economic stability and growth.

Additionally, for investors, these insights provide crucial guidance to help them distinguish the effects of macroeconomic factors on different energy firms, enabling them to make more informed investment decisions. Thus, diversifying investments within the sector to include firms with stronger hedging mechanisms could help lower risks. Thus, the specific application of the theory can help investors choose companies that are relatively unaffected by changes in macroeconomic factors, which will improve the efficiency of investments and minimize financial risks. In conclusion, this analysis provides new insights to the existing literature by depicting

the interdependencies between several macroeconomic variables and the returns on the Turkish energy sector stocks. The results reveal that both the global and domestic factors significantly influence the performance of the energy sector, and thus the study is beneficial for policymakers, investors, and researchers. Thus, the study calls for vigilantly observing changes in the global financial system and making relevant adjustments in a timely manner to maintain the long-term development of the energy sector in a globalized world.

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