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Research Article

Macroeconomic influences on ETF prices: Evidence from iShares MSCI Türkiye[1]

BYF fiyatları üzerindeki makroekonomik etkiler: iShares MSCI Türkiye'den kanıtlar

[1] This article is derived from the doctoral dissertation titled "Investigation of the relationship between exchange traded funds and benchmark index values: An application for the fragile five", conducted at Afyon Kocatepe University.

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Abstract

Exchange-traded funds (ETFs) are among the most widely used financial instruments for accessing financial markets today. This study investigates the influence of key macro-financial indicators—namely the BIST100 index, exchange rate, interest rate, foreign direct investment inflows, Türkiye's CDS premiums, and the VIX—on the price dynamics of the iShares MSCI Türkiye. The analysis employs quarterly data spanning 2013–2024 and uses the ARDL methodology. The results indicate a cointegration relationship between the variables. In the long run, the iShares MSCI Türkiye exhibits a statistically significant positive association with the BIST100 index, whereas it demonstrates a statistically significant negative association with the exchange rate. It is determined that shocks to iShares MSCI Türkiye prices are effective in the short term and that at least 95% of them spill over to the next period. Still, these shocks are offset in the following period and lead to convergence. Based on the Granger causality analysis, the exchange rate and foreign direct investment inflows are the Granger causes of the iShares MSCI Türkiye. Therefore, BIST100, exchange rates, and foreign direct investment inflows are important for iShares MSCI Türkiye investors and fund managers in determining their investment strategies.

Keywords: Exchange Traded Funds (ETFs), Exchange Rate, Foreign Direct Investments (FDI), Stock Exchange

Jel Codes: O16, D14, F65, G21, P33

Öz

Borsa yatırım fonları (ETFs), günümüzde finansal piyasalara erişim için en yaygın kullanılan finansal araçlar arasındadır. Bu çalışmada, BIST100 endeksi, döviz kuru, faiz oranı, doğrudan yabancı yatırım girişleri, Türkiye'nin CDS primleri ve VIX gibi temel makro finansal göstergelerin iShares MSCI Türkiye'nin fiyat dinamikleri üzerindeki etkisi araştırılmıştır. Analiz, 2013-2024 dönemini kapsayan çeyreklik veriler kullanılarak ARDL metodolojisinden yararlanılmıştır. Analiz sonuçları, değişkenler arasında bir eşbütünleşme ilişkisi olduğunu göstermektedir. Uzun vadede, iShares MSCI Türkiye, BIST100 endeksi ile istatistiksel olarak anlamlı pozitif ilişki sergilerken, döviz kuru ile istatistiksel olarak anlamlı negatif ilişki göstermektedir. iShares MSCI Türkiye fiyatlarında oluşan şokların kısa vadede etkili olduğu ve en az %95'inin bir sonraki döneme yansıdığı belirlenmiştir. Ancak, bu şoklar bir sonraki dönemde dengelenmekte ve yakınsama göstermektedir. Granger nedensellik analizi sonuçlarına göre, döviz kuru ve doğrudan yabancı yatırım girişleri, iShares MSCI Türkiye hisse senedinin Granger nedenleridir. Bu nedenle, BIST100, döviz kuru ve doğrudan yabancı yatırım girişleri göstergeleri, iShares MSCI Türkiye yatırımcıları ve fon yöneticileri için yatırım stratejilerini belirlemede önemlidir.

Anahtar Kelimeler: Borsa Yatırım Fonları (BYF), Döviz Kuru, Doğrudan Yabancı Yatırımlar (FDI), Hisse Senedi Piyasası

Jel Kodları: O16, D14, F65, G21, P33

Introduction

In recent years, global-scale financial crises (such as the 1997 Asian crisis, the 2008 global financial crisis, and the 2009 European debt crisis) have compelled investors to be more selective and cautious in their investment decisions (Huang & Lin, 2011; Wang, 2024). Investors have increasingly shifted their preferences from investment instruments that merely promise the highest returns to those that offer reasonable returns with a higher likelihood of capital recovery. In addition, novel financial market instruments, which can be considered innovations, have begun to take their place in the markets. The primary purpose of such investment instruments is to attract a group of investors seeking to capture not only risk and innovation but also extraordinary return potential in financial markets. Within this context, exchange-traded funds (ETFs) have emerged as one of the most popular investment instruments in recent years (Huang & Lin, 2011; Bialkowski, Dang & Wei, 2016; Wang, 2024; Joshi & Dashi, 2024). Despite the increase in market volume over recent years, academic studies of ETFs have not increased significantly. Existing research has primarily focused on measuring ETF performance and tracking errors; however, discussions of various economic indicators that could influence ETF prices have not been comprehensively explored. This signals a great deficiency, especially for those ETFs composed of assets traded in emerging and fragile markets. The motivation for this study is to identify the economic indicators that influence the price movements of ETFs, whose importance in financial markets is rapidly increasing, as reflected in the number of investors and the size of assets under management. Financial assets traded in countries with fragile market characteristics, such as Türkiye, are known to be more sensitive to macroeconomic indicators. To the best of our knowledge, no study has examined the effects of these indicators on the iShares MSCI Türkiye ETF from a comprehensive, holistic perspective. In this framework, the primary objective of this study is to empirically determine the macroeconomic factors that influence the prices of iShares MSCI Türkiye ETFs and to systematically examine the relationship between ETF prices and economic indicators. The study also aims to fill an important gap in the literature by examining the role of emerging-market-specific vulnerabilities in ETFs, using the iShares MSCI Türkiye ETF as an example. The findings are expected to contribute to the development of investor portfolio strategies, enhance fund managers' analysis of ETF price sensitivity sources, and aid policymakers in identifying potential vulnerabilities that could affect market stability. Thus, the study aims to offer a holistic perspective on both theoretical literature and practice.

In this context, examining the theoretical foundations of the investment concept and its role in financial markets in more detail would be useful. Investment is defined economically as investing money in income-generating movable or immovable property, or as the additions made by an institution/organisation to increase its service and production capacity (TDK, 2025). Assets acquired by individuals or organisations to generate profit by assuming risk in exchange for their capital are also considered investments (Bischoff & Wühler, 2019). However, it would be inaccurate to consider investment solely as a means of generating income, as we must consider the time value of money, which holds that funds held by businesses or individuals today are more valuable than the same amount in the future (Sayılgan, 2019). Individuals and companies seeking to preserve the time value of money also invest in various financial instruments. Governments, banks, businesses, and individuals use investment instruments traded in financial markets, such as stocks, bonds, commodities, foreign exchange, gold options markets, futures, investment funds, and exchange-traded funds (ETFs), to increase their income (van den Burg, Stuiver, Bolman, Wijnen, Selnes & Dalton, 2017). Investment funds and ETFs are among the most commonly used instruments for accessing financial markets today.

Mutual funds and asset management companies provide investment management and accounting services to investors who are, or want to become, investors but lack the time or expertise to manage their investments. These companies earn commissions on transactions they process (Anderson, Born & Schnusenberg, 2010). The primary purpose of mutual funds is to pool the financial investment resources of individual and/or organisational investors and organisations, allowing the fund manager(s) to invest in various types of securities based on their risk and return profiles Farid & Wahba, 2022). The first known investment fund, "Eendragt Makkt Magt" (Unity Makes Strength), was established in the Netherlands in 1774 by Abraham Van Ketwich as a closed-end investment fund (Elton & Gruber, 2013). This fund aims to mitigate the risk associated with stocks that are significantly affected by financial crises (Wang, 2024). However, some consider the Massachusetts Hospital Life Insurance Company, founded in 1823, to have pioneered closed-end mutual funds, while others think the New York Stock Trust, founded in 1889, and the Boston Personal Property Trust, founded in 1893, to be pioneers (Anderson & Ahmed, 2005). Closed-end mutual funds are publicly traded funds that invest in securities. As with stocks, the pricing of closed-end funds is determined by the balance of supply and demand (Elton & Gruber, 2013). Unit investment trusts, a variant of closed-end mutual funds, enable small investors to invest in small amounts by dividing their holdings into very small units, similar to mutual

funds(Harman, 1987). Unit trusts, which allow for small investments, are generally viewed as a safe investment instrument by investors with low risk and low return expectations. While the number of people investing in unit trusts is increasing, investment amounts remain low compared to other investment instruments (Annamalah, Raman, Marthandan & Logeswaran, 2019).

In the context of investment funds, the type most frequently associated with the term is the open-ended investment fund. Given the number of funds, open-ended investment funds account for the largest share(Elton & Gruber, 2013). In open-ended investment funds, fund managers can sell securities held in the fund and purchase new securities (Kong & Wang, 2015). One key feature distinguishing open-ended investment funds from closed-end investment funds is that the fund itself is involved in its own buying and selling. If an investor holding a share in the fund doesn't have a purchase request from another investor, they can sell their shares to the fund itself for its net asset value (Cui & Liu, 2000; Elton & Gruber, 2013). Globally, the number of open-ended investment funds has increased consistently for over 10 years, while the total asset value managed by these funds rose until the COVID-19 pandemic, fluctuating thereafter. Still, the upward trend reinitiated at the end of 2023 (Statista (e), 2024; Statista (g), 2024). ETFs are open-end investment funds that hold diversified portfolios of securities and are traded on stock exchanges, and can be bought and sold without a brokerage (da Costa Neto, Klotzle, & Figueiredo Pinto, 2019). ETFs are established to track an index (Gallagher & Segara, 2006), and at least 80% of their assets are included in the index they aim to track (Capital Market Board-SPK, 2024). ETFs typically consist of between 25,000 and 250,000 shares (Investment Company Institute, 2024). Factors differentiating ETFs from mutual funds include transparency, lower fund management costs, and tax advantages (Lettau & Madhavan, 2018). Therefore, ETFs, which have lower costs compared to mutual funds, are more frequently preferred by investors (Narend & Thenmozhi, 2019). The number of ETFs and open-end investment funds traded in the United States between 2003 and 2023 shows a more than 10 per cent decrease in open-end investment funds, while ETFs increased more than 26-fold (Statista (c), 2024; Statista (d), 2024). The first ETF was launched on the AMEX in 1993 under the name "Standard and Poor's Depository Receipts (SPDRs)," which track the S&P 500 index (Deville, 2008; Elton & Gruber, 2013; Lettau & Madhavan, 2018; Narend & Thenmozhi, 2019) and then ETFs have become a significant investment instrument (Hegde & McDermott, 2004). In recent years, their diversification, importance, and market position have continued to grow (Madhavan & Sobczyk, 2016). In 2003, 276 ETFs held $204 billion in assets. By 2023, their number had increased to 10,319 (almost 37 times) and their assets to $11,507 billion (nearly 57 times) (Statista (a), 2024; Statista (b), 2024). The success of ETFs stems from their low cost, high liquidity, and unprecedented diversification opportunities (Ben-David, Franzoni, & Moussawi, 2018). Their tax and operational efficiency have also made them an attractive investment instrument for investors in recent years (Anderson et al., 2010). However, most individual investors (69%) still focus on stocks. Thus, individual investors still haven't considered ETFs as investment vehicles. However, the share of ETFs continues to grow over the years, both in terms of the number of investors and the amount invested (Sabu & Bhat, 2022).

ETFs are generally priced by the net asset values of their underlying assets (Anderson et al., 2010). Because the indices they invest in are transparent, there is not much difference between the index returns they track and the fund returns. Therefore, if the ETF's market value is below its total net asset value, it could be sold, and if it is above, it could be bought (Jares & Lavin, 2004). The price changes in the underlying securities of ETFs are reflected in the ETFs within 15-60 seconds. Therefore, high-frequency investors who believe this price reflection period is excessive consider it an arbitrage opportunity. Furthermore, price pressures arising from stock purchases during the ETF's formation and subsequent divestitures by the fund can cause short-term deviations in the net asset values of other ETFs holding the relevant stocks and those of other ETFs (Da & Shive, 2018). Morgan Stanley Capital International (MSCI) has served global equity markets as an index provider for over 55 years (MSCI, 2025a). iShares is an asset management company that creates ETFs, with approximately 470 ETFs. It also operates the iShares MSCI Türkiye ETF, which invests in Turkish market assets and aims to track the performance of the relevant stock market. It is traded on the NASDAQ Stock Exchange (iShares, 2025).

While ETFs are considered important indicators of stock market performance today (Gazel, 2020), economic indicators such as interest rates, inflation, and exchange rates also influence stock and commodity pricing in a country (Keswani & Wadhwa, 2019). Rising interest rates increase companies' borrowing costs and negatively impact stock prices by discounting future cash flows(Salisu & Sikiru, 2023). The analysis incorporates the stock market index, exchange rate, interest rate, foreign direct investment inflows, credit default swap (CDS) premiums, and the volatility index (VIX) as explanatory variables to account for their potential influence on the price fluctuations of iShares MSCI Türkiye.

Literature review

The literature review on ETFs is categorised into three groups: studies on ETF performance, studies on ETFs' relationships with financial markets and macroeconomic indicators, and studies on the iShares MSCI Türkiye ETF. To this end, this section will review the literature under three headings to identify fundamental relationships among variables.

The Literature on ETF performance

The literature on exchange-traded funds (ETFs) generally focuses on the performance of ETFs and/or their underlying assets, tracking errors in the assets as they aim to track (Da & Shive, 2018; Engle & Sarkar, 2006; Gallagher & Segara, 2006; Gözbaşı & Erdem, 2010; Harper, Madura, & Schnusenberg, 2006; Jares & Lavin, 2004; Nargunam & Anuradha, 2017; Rompotis, 2005; Shin & Soydemir, 2010; Tsalikis & Papadopoulos, 2019), and the impact of ETFs on economic indicators (Agapova, Kaprielyan, & Volkov, 2025; Ben-David et al., 2018; Biktimirov, 2004; Chu, Hsieh, & Tse, 1999; Hasbrouck, 2003; Hegde & McDermott, 2004; Huang & Lin, 2011; Karahan & Kayalı, 2015; Narend & Thenmozhi, 2019; Richie & Madura, 2007; Switzer, Varson, & Zghidi, 2000). While the performance of actively managed mutual funds generally fails to exceed the performance of the market or index (Blake, Elton, & Gruber, 1993; Carhart, 1997; Frino & Gallagher, 2001; Grinblatt & Titman, 1989; Jensen, 1978; Malkiel, 1995; Roll, 1978; Sharpe, 1966), ETFs reflect the performance of the index as they track better than similar mutual funds that track the same indices (Gallagher & Segara, 2006; Gözbaşı & Erdem, 2010; Harper et al., 2006). However, studies treating ETFs as dependent variables and examining the factors influencing them are limited (Bayat, Köktaş, Kayhan, & Konat, 2024; Chang, Hsieh, & McAleer, 2018; Chu et al., 1999; Gazel, 2020; Madhavan, 2012).

Within the stream of study, Rompotis (2005) discussed the differences in returns between mutual funds and exchange-traded funds that track the same indices. Findings demonstrate that while there is no significant difference in returns between ETFs and mutual funds, there is a substantial, positive relationship between returns and annual expenses for ETFs. Frino & Gallagher (2001) examined the relationship between the returns of index-based mutual funds and ETFs traded and the index returns. The study concludes that ETF returns track index returns more closely than mutual fund returns. Gözbaşı & Erdem (2010) investigated the performance and pricing efficiency of the Dow Jones Islamic Market Türkiye Exchange Traded Fund (DJIMTR), the first ETF established to track the Islamic market index, and its conventional investment fund counterpart, UNICORNTR. The results reveal that DJIMTR better reflected the index it tracked than UNCORNTR, and that DJIMTR also performed better across both average and risk-adjusted returns. Furthermore, temporary deviations were observed between DJIMTR's pricing and net asset value, driven by trading volume, transaction costs, intraday price volatility, and institutional ownership. Madhavan (2012) examined price movements in exchange-traded products, such as stocks and ETFs, during the Dow Jones Industrial Average crash in May 2010. The findings suggest that the imposition of circuit breakers and other regulatory constraints intended to safeguard investors from extreme price fluctuations complicated the pricing of basket instruments such as ETFs, thereby leading to deviations from their net asset values.

The nexus between ETFs and macroeconomic indicators

A study by Chu et al. (1999) examined the relationships among the S&P 500 spot index, the futures index, and the SPDR S&P 500 ETF (SPY). It was revealed that futures markets are a primary driver of pricing for both spot and ETFs, while SPY significantly impacts price discovery in the S&P 500 market, though not as much as futures markets do. Narend & Thenmozhi (2019) delved into the effects of Indian country ETFs (iShares–MSCI India ETF) and ETFs consisting of products traded in Indian markets (iShares– India and 50 ETFs) and Indian exchange traded products (Indian ETPs) on the S&P BSE Sensex and CNX NIFTY indices traded in India. The findings demonstrate that ETFs and ETPs have a statistically significant and positive effect on the S&P BSE Sensex and CNX NIFTY indices traded in India. Alan, Engle, & Karagozoglu (2020) examined the impact of the COVID-19 pandemic on the market volatility of MSCI country ETFs across 88 countries, including the iShares MSCI Türkiye ETF, using the active case curve. The findings indicate that the active case curve increased the volatility of country ETFs during the COVID-19 pandemic, and that increases in worldwide and U.S. case counts also affected the volatility of other countries' ETFs. Similarly, Karahan & Kayalı (2015) detected a long-term relationship between the BIST30 ETF, traded in Türkiye in 2009, and the BIST30 spot and futures index markets. It concluded that the ETF had no effect on the BIST30, but the futures index markets had a leading relationship with both the BIST30 index and the BIST30 ETF.

Gazel (2020) elucidates the relationship between the price of iShares MSCI Türkiye, traded on U.S. stock exchanges, CDS, and exchange rates, using the NARDL model from March 2008 to September 2018. It

found cointegration and a negative relationship between the USD/TL exchange rate, CDS, and ETFs in both the long and short term. This result shows that exchange rate fluctuations and increases in CDS premiums negatively affect ETF prices in the country. Bayat et al. (2024) identified relationships among CDS, the foreign capital share in the BIST 100, exchange rates, and the Turkish country ETF (iShares MSCI Türkiye) using data from 2008 to 2022. Results indicate that foreign capital's share in the BIST 100 significantly and positively affects ETF prices in both the short- and long-term. However, while the exchange rate does not directly affect ETF prices, it does affect the foreign capital share. Therefore, given the effects on the foreign capital share, it is concluded that the exchange rate has an indirect, rather than a direct, effect on ETF prices. Another research finding is that CDS premiums significantly affect the foreign capital share.

Aypek, Cingöz, & Deniz (2025) analysed the relationship between iShares MSCI sovereign ETFs and CDS premiums in the fragile five countries. The findings illustrate an inverse relationship between changes in CDS premiums and sovereign ETFs. Furthermore, investors react more strongly to changes in CDS premiums in Brazil and Türkiye than in other countries. Lai, Chung, & Hisieh (2022) examine the impact of the VIX on the performance of ETFs, including the iShares MSCI Türkiye ETF, and find a statistically significant negative relationship between the VIX and ETFs. Atilgan, Demirtas, Gunaydin, & Oztekin (2022) investigated the price-discovery role of ETFs by examining the return relationships between emerging-market iShares MSCI country ETFs traded in the U.S. and their respective indices. Regarding the return relationship, country ETFs outperform the index during periods of high volatility. ETFs also play a role in price discovery for the index they track.

The literature on ETF of Türkiye

There are studies in which at least two of the independent variables in this research—namely, the stock market, exchange rate, interest rate, foreign direct investment inflows, CDS, and VIX—are jointly analysed. For instance, a study examining the relationship between the BIST100 and exchange rates in Türkiye found mutual causality between the two (Ayvaz, 2006). Another study conducted by Ustaoğlu (2022) in Türkiye examines the relationship among the BIST100, CDS, and the exchange rate. Results show that there is a mutual causality between the BIST100 and the CDS; from the CDS to the BIST100 and the exchange rate in the short and medium term, and from the BIST100 and the exchange rate to the CDS in all periods. Chue & Cook (2008) traced the impact of changes in exchange rates (YEN/USD and EURO/USD) on companies' stock prices in emerging markets between 1999 and 2006. The results confirm that a 1% loss in exchange rates generally hurts stock prices of 0.4%. While some studies conducted in Türkiye have found a one-way causality relationship from CDS premiums to exchange rate (Başarır & Keten, 2016; İltaş & Güzel, 2024; Pekçağlayan, 2025), there is also a study that observed a one-way causality relationship from exchange rate to CDS premiums (Çonkar & Vergili, 2017). Furthermore, a two-way causality relationship appears between CDS premiums and stocks in the short term (Başarır & Keten, 2016). Kasap (2025) outlined the impact of exchange rates, short-term interest rates, money supply, gold prices, and stock market indices on CDS spreads for Türkiye. The findings indicate a significant, positive relationship between short-term interest rates and CDS spreads during crisis periods. In contrast, the relationship between the BIST100 and CDS spreads is significant under stable market conditions. Tekin (2024) analysed the relationship between Türkiye's economic indicators and the CDS using the Johansen cointegration test and the VECM Granger causality analysis. The findings indicate that inflation rates, VIX, and geopolitical risks have an upward effect on the CDS premium, while increases in the stock market (BIST100) have a downward impact. Furthermore, there is a significant bidirectional relationship between inflation, stock market, exchange rate indicators, and the CDS premium in the short term.

This study is original in that it comprehensively examines the macro-financial indicators affecting the price dynamics of the iShares MSCI Türkiye ETF in the Turkish market. There are few studies in the literature that investigate both the short- and long-term relationships between ETF prices and variables such as the BIST100 index, exchange rates, interest rates, and foreign direct investment inflows within a single framework. Using quarterly data for the period 2013–2024 and employing the ARDL methodology, the study reveals both short- and long-term effects in detail. Furthermore, the Granger causality analysis identifies the impact of exchange rates and foreign direct investment inflows on ETF prices, providing direct insights for investors and fund managers in formulating investment strategies.

Data set and methodology

This paper investigates the factors affecting the pricing of the iShares MSCI Türkiye ETF, issued by iShares for Türkiye. Given that the iShares MSCI Türkiye ETF trades on the NASDAQ, the study selects the Turkish exchange rate against the U.S. dollar and foreign direct investment inflows as its two

independent variables. Since the iShares MSCI Türkiye ETF consists of assets traded on Türkiye's domestic stock market, the BIST100 index, which represents Türkiye's stock market, is included as an independent variable in the study. Furthermore, the study incorporates the country-specific policy interest rate and CDS premium, which may affect investor behaviour, as well as the Volatility Index (VIX), a widely recognised global risk indicator, as other independent variables in the research model. The data set for the period 2013Q1 to 2024Q4 is used in the research, and the analyses are carried out using EViews 12. Following unit root tests, the series were found to be stationary at the level or first difference. In addition, the dependent variable series is stationary in the first difference. Therefore, the ARDL bounds test approach, which allows analysis with series with different levels of stationarity, is chosen as the research method, provided that no series is stationary at the second difference. The basic hypothesis in the ARDL bounds testing approach is that there is a long-term cointegration relationship between the variables, i.e., that the levels of the explanatory variables are jointly significant. In this context, the H_0 hypothesis states that there is no long-term cointegration, while the H_1 hypothesis states that cointegration is present (Pesaran, Shin, & Smith, 2001). Table 1 presents the variables used in the research, the data sources for these variables, and the expected effects of each.

Table 1: Variables and Expected Signs

Variable	Explanation	Source	Expected Sign
ETF	Price of iShares MSCI Türkiye	ishares.com	Dependent Variable
BIST100	Türkiye stock exchange index value	investing.com	+
EXCHANGE	USD /TRY exchange rate	investing.com	-
INTEREST	Türkiye's One-Week Repo Rate	investing.com	-
FDI	Türkiye's FDI inflow	oecd.org	+
CDS	Türkiye's CDS 5-Year USD	investing.com	-
VIX	CBOE Volatility Index	investing.com	-

Equation 1 is established to determine the factors affecting the price fluctuations of iShares MSCI Türkiye.

$$ETF_t = \beta_0 + \beta_1 BIST100_t + \beta_2 EXCHANGE_t + \beta_3 INTEREST_t + \beta_4 FDI_t + \beta_5 CDS_t + \beta_6 VIX_t + u_t, \quad (1)$$

Increases in the BIST100 and FDI, among the variables in the equation, are expected to positively impact the ETF because they reflect increased confidence in Türkiye's stocks and economy. However, rising exchange rates could signal economic uncertainty, and higher interest rates could lead to decreased stock demand. Similarly, increases in CDS premiums and the VIX index reflect heightened sovereign and global risk, prompting investors to shift towards safer economies (i.e., exit developing countries). Therefore, the Exchange rate, interest rate, CDS premiums, and VIX are expected to negatively impact the ETF. Descriptive statistics for the research variables are presented in Table 2.

The null hypothesis of the Jarque–Bera test assumes that the series is normally distributed (Göksu & Balkı, 2023). According to the Jarque–Bera test results, while the ETF and BIST100 series follow a normal distribution and the null hypothesis cannot be rejected ($p > 0.05$), the EXCHANGE, INTEREST, FDI, CDS, and VIX series do not follow a normal distribution, and therefore the null hypothesis is rejected at the 5% significance level ($p < 0.05$). However, the literature is well-documented that financial series often deviate from normality (Mandelbrot, 1963; Fama, 1965).

Table 2: Descriptive Statistics

	ETF	BIST100	EXCHANGE	INTEREST	FDI	CDS	VIX
Mean	35.46502	251.0078	9.787365	0.157083	3.02704	335.1477	18.04188
Median	36.03563	253.1965	5.564200	0.098750	2.85061	278.7250	16.27500
Maximum	71.78997	477.2070	35.33500	0.500000	6.44538	838.2300	53.54000
Minimum	18.66314	135.5982	1.804500	0.045000	0.66576	143.0100	9.510000
Std. Dev.	12.28053	78.98694	10.05818	0.126585	1.05788	153.5783	7.406436
Skewness	0.652490	0.449179	1.399551	1.725224	0.737977	1.293418	2.572716
Kurtosis	3.085645	2.794454	3.596202	4.973924	4.183045	4.547183	12.22072
Jarque B.	3.420614	1.698595	16.38085	31.60394	7.156068	18.17099	222.9942
Prob.	0.180810	0.427715	0.000277	0.000000	0.027931	0.000113	0.000000
Obs.	48	48	48	48	48	48	48

In empirical time-series studies, the series are assumed to be stationary (Gujarati, 2004). Because spurious regression can occur with non-stationary series, the series must be tested for stationarity, and the research model should be selected based on the unit root test results. The equations for the Phillips-Peron, Augmented Dickey-Fuller and Lee and Strazicich (LS) unit root tests are as follows:

ADF
$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{i=1}^{p} \delta_i \Delta Y_{t-i} + u_t \quad (2)$$

PP
$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + u_t \quad (3)$$

LS
$$\Delta Y_t = \delta' \Delta Z_t + \gamma \tilde{\delta}_{t-1} + \sum_{i=1}^{p} c_i \Delta \tilde{\delta}_{t-i} + u_t \quad (4)$$

The primary purpose of these equations is to test whether the series is stationary (whether it is free from a unit root). If γ=0, the series has a unit root and is non-stationary. If γ<0 and is statistically significant, then the series is stationary and does not have a unit root.

Upon applying PP and ADF unit root tests, it is determined that the series are stationary at the level (I(0)) or at the first difference (I(1)). Since none of the series are stationary in the second difference (I(2)), the ARDL (Autoregressive Distributed Lag) method, which allows working with stationary variables at both (I(0)) and (I(1)) levels, is considered a suitable method. This approach, which reveals the dynamic interaction between current and past variables, provides long-term coefficients via the bounds test approach (ARDL Bound Test). It also estimates short-term coefficients through the error correction model (ECM), and the results determine whether the series are cointegrated (Pesaran et al., 2001). The equation of the ARDL model is presented in equation 5.

$$\begin{aligned} \Delta ETF_t = \varphi_0 &+ \sum_{i=1}^{p=1} \varphi_{1i}\, \Delta ETF_{t-i} + \sum_{j=0}^{r=4} \varphi_{2j}\, \Delta BIST100_{t-j} + \sum_{k=0}^{s=4} \varphi_{3k}\, \Delta EXCHANGE_{t-k} \\ &+ \sum_{l=0}^{t=4} \varphi_{4l}\, \Delta INTEREST_{t-l} + \sum_{m=0}^{v=4} \varphi_{5m}\, \Delta \mathrm{FDI}_{t-m} + \sum_{n=0}^{y=2} \varphi_{6n}\, \Delta \mathrm{CDS}_{t-n} \\ &+ \sum_{o=0}^{z=4} \varphi_{7o}\, \Delta \mathrm{VIX}_{t-o} + \beta_1 ETF_{t-1} + \beta_2 BIST100_{t-1} + \beta_3 EXCHANGE_{t-1} \\ &+ \beta_4 INTEREST_{t-1} + \beta_5 FDI_{t-1} + \beta_6 CDS_{t-1} + \beta_7 VIX_{t-1} + \varepsilon_t \end{aligned} \quad (5)$$

In Equation 5, "Δ" and "ε" represent the difference operator and the error term, respectively. While "p….z" represent the lag lengths, "φ_0" is for the constant term, the short-term coefficients are represented by "φ_1…..φ_7" whereas "φ_i …..φ_n" are used to represent the long-term coefficients.

Diagnostic tests are applied to evaluate the reliability and validity of the established econometric model. These tests examine potential issues related to normality, autocorrelation, heteroscedasticity, and functional structure. The Jarque-Bera normality test determines whether the error terms follow a normal distribution. The Breusch-Godfrey Serial Correlation LM test is applied to determine the presence of autocorrelation. The Breusch-Pagan-Godfrey and ARCH heteroscedasticity tests are employed to identify heteroscedasticity. The Ramsey RESET test is used to test the model's functional structure, and the CUSUM and CUSUMQ tests are then applied to assess the model's stability. Literature on the ARDL approach (Pesaran et al., 2001; Göksu & Balkı, 2023) suggests that these diagnostic tests should be applied to ensure the reliability and validity of the model. Finally, the Granger Causality test was used to investigate the direction of causality among the variables.

Empirical findings

Before the econometric analyses, time series graphs for all variables are presented to facilitate a visual assessment of the series' general behaviour. Examining time-series graphs is critical for identifying trends, volatility structures, potential structural breaks, and outliers. Additionally, these graphs provide particularly strong support for interpreting unit root tests. Hence, the time-series graphs of the variables used in the study are presented in Figure 1.

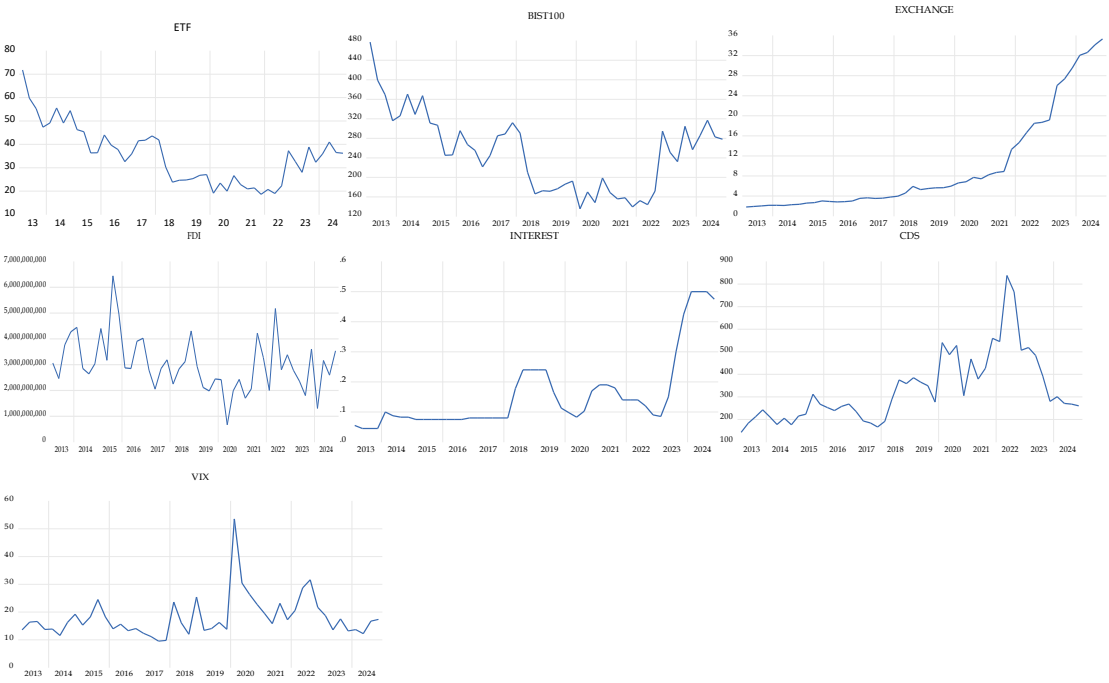

Figure 1: Time Series Graphs

Following the Gezi Parkı protests in 2013, the December 17-25 period, and the Fed's announcements of a tight monetary policy, declines were observed in the iShares MSCI Türkiye and BIST 100 series, while increases were observed in exchange rates, interest rates, CDS, and VIX series. In 2016, the coup attempt was seen as a risk for investors. During this period, declines were observed in the iShares MSCI Türkiye and BIST 100 series, as well as in foreign direct investment (FDI), while increases were observed in exchange rates, CDS, and interest rates. In 2018, the Pastor Brunson crisis caused significant volatility in all series, particularly the exchange rate. These movements were downward for the iShares MSCI Türkiye and BIST 100, while upward for exchange rates, FDI, interest rates, and CDS. The movements in all series, except FDI, were in the expected direction. The upward movement in the FDI series is attributed to the decline in investment costs resulting from the significant increase in the exchange rate and Türkiye's investment policies, which are focused on the energy, infrastructure, and industrial sectors. In 2019, as Türkiye was in the midst of a general election, the renewal of the Istanbul Metropolitan Municipality elections and the increased use of foreign exchange reserves to alleviate exchange rate pressures stemming from the lower interest rates seemed to result in a decline in the iShares MSCI Türkiye, BIST 100, and FDI series, while the exchange rate and CDS series rose. Although upward movements in the iShares MSCI Türkiye and BIST 100 began before the COVID-19 pandemic in 2020, they declined starting in the second half of that year. The pandemic's upward impact on the VIX series, a global fear indicator, is also noticeable. The interest rate series, which began declining in 2019, rose slightly with the onset of the pandemic but continued its downward trend into 2021. During this period, Türkiye implemented the currency-protected deposit system. Low interest rates have driven investors to foreign exchange and exchange rate-protected investment instruments. While the exchange rate-protected deposit system offers investors a haven, it has remained low-yielding due to the ongoing low-interest rate policy. Consequently, investors have turned to the stock market, a trend driven by increases in the iShares MSCI Türkiye and BIST 100 series. In 2023, following the change in the Minister of Treasury and Finance, the low-interest rate policy was abandoned, and interest rates began to rise. This resulted in declines in the iShares MSCI Türkiye, BIST 100, FDI, and CDS series. The decline in the CDS series is expected to lead to increases in other series. However, for the iShares MSCI Türkiye and BIST 100, the outflows in the stock market due to rising interest rates, and for the FDI series, the decline in the investment opportunity provided by low interest rates as interest rates surge, have caused the series to behave differently.

A unit root test should be applied to the series to determine its stationarity and the appropriate model selection (Baykut, 2024), as spurious regression can occur in non-stationary series. Therefore, the Phillips-Peron (PP) and Augmented Dickey-Fuller (ADF) tests, which are classic unit root tests, are applied, and the results are presented in Table 3.

Table 3: PP and ADF Unit Root Tests Results

PP	Cons.		Cons. and Trend		No Cons. and Trend	
Level	t-stat.	Prob.	t-stat.	Prob.	t-stat.	Prob.
ETF	-3.2940	**0.0208****	-2.6479	**0.2622**	-1.8902	**0.0567***
BIST100	-3.1734	**0.0280****	-2.5506	**0.3038**	-1.6351	**0.0957***
EXCHANGE	3.9731	**1.0000**	0.6403	**0.9994**	6.1681	**1.0000**
INTEREST	-0.6291	**0.8540**	-1.7283	**0.7228**	0.6773	**0.8587**
FDI	-5.1588	**0.0001*****	-5.5662	**0.0002*****	-0.9048	**0.3191**
CDS	-2.3247	**0.1687**	-2.3027	**0.4243**	-0.6109	**0.4474**
VIX	-4.6702	**0.0004*****	-4.7509	**0.0020*****	-1.1856	**0.2123**
Δ EXCHANGE	-5.7305	**0.0000*****	-7.1687	**0.0000*****	-4.7439	**0.0000*****
Δ INTEREST	-3.4451	**0.0143****	-3.4274	**0.0601***	-3.3866	**0.0011*****
Δ CDS	-8.2928	**0.0000*****	-8.3937	**0.0000*****	-8.3841	**0.0000*****
ADF	**Cons.**		**Cons. and Trend**		**No Cons. and Trend**	
Level	t-stat.	Prob.	t-stat.	Prob.	t-stat.	Prob.
ETF	-3.2531	**0.0230****	-2.6957	**0.2430**	-1.8902	**0.0567***
BIST100	-3.1692	**0.0283****	-2.6001	**0.2822**	-1.5883	**0.1048**
EXCHANGE	3.6174	**1.0000**	0.4513	**0.9988**	5.6412	**1.0000**
INTEREST	-2.3358	**0.1655**	-3.6303	**0.0381****	0.0261	**0.6859**
FDI	-5.1527	**0.0001*****	-5.5756	**0.0002*****	-0.6372	**0.4357**
CDS	-2.3247	**0.1687**	-2.3847	**0.3824**	-0.7581	**0.3826**
VIX	-4.6679	**0.0004*****	-4.7395	**0.0021*****	-0.9583	**0.2969**
Δ EXCHANGE	-5.3698	**0.0000*****	-7.1769	**0.0000*****	-1.3547	**0.1602**
Δ INTEREST	-3.9368	**0.0038*****	-3.9724	**0.0168****	-3.8399	**0.0003*****
Δ CDS	-8.2469	**0.0000*****	-8.2538	**0.0000*****	-8.3363	**0.0000*****

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

As highlighted by the unit root test results in Table 3, the variables ETF, BIST100, FDI, and VIX do not exhibit a unit root and are stationary at the level (I(0)). Even so, EXCHANGE, INTEREST, and CDS exhibit unit roots and become stationary when first differences are taken (I(1)). As the ADF and PP tests do not account for structural breaks, this may lead to misleading and inconsistent inferences. In this context, the Lee and Strazicich (LS) unit root test, which accounts for structural breaks in the series, was also applied (Lee & Strazicich, 2003). The structural break dates and test statistics are presented in Table 4.

Table 4: Lee-Strazicich Unit Root Test

Variables	At Level			First Difference			Decision
	Lag	Break Point	t-stat.	Lag	Break Point	t-stat.	
ETF	3	2015Q4-2022Q2	-5.33	3	2018Q1-2023Q1	**-7.10*****	***I(1)***
BIST100	3	2015Q4-2022Q2	-5.35	0	2015Q3-2016Q2	**-7.07*****	***I(1)***
EXCHANGE	5	2019Q4-2022Q4	**-7.98*****	-	-	-	***I(0)***
INTEREST	7	2018Q1-2023Q1	**-6.93*****	-	-	-	***I(0)***
FDI	6	2015Q3-2021Q4	**-6.05***	6	2019Q4-2021Q4	**-8.47*****	***I(1)***
CDS	8	2016Q4-2021Q4	**-7.29*****	-	-	-	***I(0)***
VIX	7	2019Q4-2023Q1	-7.75***	-	-	-	***I(0)***

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

The Lee-Strazicich (LS) test allows for one or two endogenous structural breaks in the trend or level of a time series (Lee & Strazicich, 2003). Unlike standard ADF or PP tests, LS accounts for shifts in the mean or trend, which can otherwise lead to a false conclusion that a series is non-stationary. This is particularly important for financial variables such as ETFs, FDI, BIST100, VIX, CDS, interest rates, and exchange rates, which may be affected by crises, policy changes, or external shocks. The LS structural break unit root test results generally parallel the ADF and PP tests. The stationarity properties of the variables are examined using the Lee-Strazicich (LS) unit root test, which allows for endogenous structural breaks in the level and trend of the series. Results indicate that ETF, FDI, and BIST100 are non-stationary in levels but become stationary after first differencing (I(1)), even after accounting for structural breaks. In contrast, VIX, CDS, interest rates, and exchange rates are stationary at levels (I(0)), suggesting that incorporating structural breaks captures shifts in these series caused by major shocks or policy changes. The results highlight the importance of accounting for structural breaks when analysing financial and macroeconomic time series, as ignoring them could lead to misclassification of stationarity properties and inappropriate model specification. To this end, it is decided to apply the ARDL model as the best-fitted model for the methodology. As some of the variables in the research model are stationary at the level (I(0)) and others at the first difference (I(1)), with none of them stationary at the second difference (I(2)), the requirement for using ARDL is met.

The maximum lag length for using the ARDL method was set to 4, and the most suitable model, determined by the Akaike Information Criterion (AIC), is (1, 4, 4, 4, 4, 2, 4). FPSS and tBDM tests are applied to examine the cointegration relationship between variables. The ARDL bounds test results are

presented in Table 4. The null hypothesis of the ARDL bounds test approach, developed by Pesaran et al. (2001), is that there is no cointegration relationship. However, if the F-statistic exceeds the upper bound at the 1% significance level, the null hypothesis of no cointegration is rejected. The results indicate cointegration between the variables at the 1% significance level.

Table 5: ARDL Bound Test Result

$f(ETF) = (BIST100, EXCHANGE, INSTEREST, FDI, CDS, VIX)$

ARDL (1, 4, 4, 4, 4, 2, 4)							
k	**6**	**Critical values at 1% significance level**		**Critical values at 2.5% significance level**		**Critical values at 5% significance level**	
		Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
F-statistic	4.906188	2.88	3.99	2.55	3.61	2.27	3.28
t-statistic	-5.099884	-3.43	-4.99	-3.13	-4.66	-2.86	-4.38

The long-run coefficients between the variables are shown in Table 6. The analysis results indicate that only BIST100 and EXCHANGE have a statistically significant impact on the ETF. In the long term, BIST100 has a positive effect on the ETF's price, while EXCHANGE has a negative effect.

Table 6: Long Run Coefficients

Variables	**Coefficient**	**t-statistic**	**Probability**
BIST100	0.155499	54.90993	**0.0000*** **
EXCHANGE	-0.175857	-3.283300	**0.0054*** **
FDI	-2.29E-10	-1.019408	0.3253
INTEREST	-1.925895	-0.480320	0.6384
CDS	-0.002162	-1.150648	0.2692
VIX	0.038449	1.255915	0.2297

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

The results of the error correction model, which yield short-term coefficients, are presented in Table 7. According to the error-correction model test results, the CointEq(-1) value is negative (-0.954996) and statistically significant at the 1% level. This result suggests that a one-unit deviation from equilibrium is expected to return to the long-term equilibrium in approximately 1.05 periods (1 / 0.954996; Balkı, 2023), indicating that about 95% of the disequilibrium is adjusted within a single quarter.

Table 7: Short Run Form Coefficient

Model	**Coefficient**	**t-statistic**	**Probability**
C	-1.421481	-7.438769	0.0000
D(BIST100)	0.131991	59.29841	0.0000
D(BIST100(-1))	-0.018700	-5.066008	0.0002
D(BIST100(-2))	-0.019576	-6.345001	0.0000
D(BIST100(-3))	-0.010789	-3.892665	0.0016
D(EXCHANGE)	-0.296923	-4.897894	0.0002
D(EXCHANGE(-1))	0.376522	4.991361	0.0002
D(EXCHANGE(-2))	0.384015	4.598742	0.0004
D(EXCHANGE(-3))	0.334405	3.913991	0.0016
D(FDI)	-3.96E-10	-5.689221	0.0001
D(FDI(-1))	-3.08E-10	-3.677112	0.0025
D(FDI(-2))	-2.33E-10	-3.215558	0.0062
D(FDI(-3))	-1.83E-10	-2.733400	0.0162
D(INTEREST)	-14.20360	-5.221462	0.0001
D(INTEREST (-1))	-1.859269	-0.760147	0.4598
D(INTEREST (-2))	-12.41868	-4.758586	0.0003
D(INTEREST (-3))	8.978283	5.342808	0.0001
D(CDS)	0.002069	2.127332	0.0516
D(CDS(-1))	0.002633	2.738796	0.0160
D(VIX)	-0.026403	-2.911014	0.0114
D(VIX(-1))	-0.073085	-5.719663	0.0001
D(VIX(-2))	-0.065905	-5.642321	0.0001
D(VIX(-3))	-0.026182	-2.932471	0.0109
CointEq(-1)*	**-0.954996**	**-7.672956**	**0.0000*** **

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

The results of the diagnostic tests for the established model are presented in Table 8. Based on the diagnostic test results, the model is compatible with a normal distribution, free of autocorrelation and heteroscedasticity, and exhibits an appropriate functional form.

Table 8: Diagnostic Tests Results

Diagnostic Tests	Test Value	Prob.
Jarque-Bera Normality	2.143421	0.3424
Breusch-Godfrey Serial Correlation	0.971508	0.4064
Breusch-Pagan-Godfrey	0.265696	0.9988
ARCH	4.604371	0.3984
Ramsey RESET	2.545905	0.1107
CUSUM	Stable	
CUSUM²	Stable	

***, ** and * indicate a significance level of 1%, 5% and 10%, respectively.

The CUSUM and CUSUMQ results are presented in Figure 2. According to the results of the CUSUM and CUSUMQ tests, the model has a stable structure.

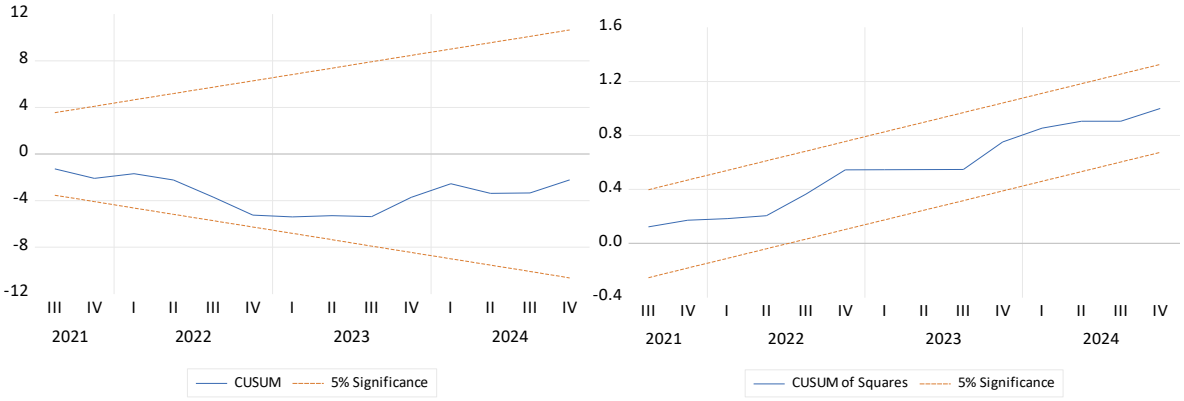

Figure 2: CUSUM and CUSUMQ Graphs

The stability of the estimated regression coefficients is examined using the CUSUM and CUSUM of Squares (CUSUM²) tests. The CUSUM plot shows that the cumulative sum of recursive residuals remains within the 5% significance bounds, indicating that the regression coefficients are stable over the sample period. Similarly, the CUSUM² plot demonstrates that the variance of the residuals is stable, as the cumulative squared residuals stay within the critical bounds. Overall, these results suggest no evidence of structural instability in the model. The Granger Causality test is employed to detect possible causality between two variables—in other words, whether one variable can predict the other. Table 9 shows the results of the Granger Causality tests.

Table 9: Causality Results

Dependent	Causality	Independent	Wald Test	Prob.	Decision
ETF	X	BIST100	4.230153	0.1206	H_0
ETF	✓	**EXCHANGE**	**5.572453**	**0.0617**	**H_a**
ETF	X	INTEREST	0.230747	0.8910	H_0
ETF	✓	**FDI**	**6.566804**	**0.0375**	**H_a**
ETF	X	CDS	3.200105	0.2019	H_0
ETF	X	VIX	0.051102	0.9748	H_0
BIST100	X	ETF	3.538310	0.1705	H_0
BIST100	✓	**EXCHANGE**	**5.936132**	**0.0514**	**H_a**
BIST100	X	INTEREST	0.289238	0.8654	H_0
BIST100	✓	**FDI**	**5.279513**	**0.0714**	**H_a**
BIST100	X	CDS	4.490198	0.1059	H_0
BIST100	X	VIX	0.008122	0.9959	H_0
EXCHANGE	X	ETF	2.035785	0.3614	H_0
EXCHANGE	X	BIST100	2.463755	0.2917	H_0
EXCHANGE	✓	**INTEREST**	**6.182089**	**0.0455**	**H_a**
EXCHANGE	X	FDI	0.917793	0.6320	H_0
EXCHANGE	X	CDS	2.640758	0.2670	H_0
EXCHANGE	X	VIX	0.326355	0.8494	H_0
INTEREST	X	ETF	0.300721	0.8604	H_0
INTEREST	X	BIST100	0.502506	0.7778	H_0
INTEREST	✓	**EXCHANGE**	**16.75111**	**0.0002**	**H_a**
INTEREST	X	FDI	2.282601	0.3194	H_0
INTEREST	X	CDS	0.831185	0.6599	H_0
INTEREST	X	VIX	0.747126	0.6883	H_0
FDI	X	ETF	4.487117	0.1061	H_0
FDI	X	BIST100	3.727616	0.1551	H_0
FDI	X	EXCHANGE	1.279614	0.5274	H_0
FDI	X	INTEREST	0.415357	0.8125	H_0
FDI	X	CDS	1.683081	0.4310	H_0
FDI	X	VIX	1.974487	0.3726	H_0
CDS	X	ETF	3.802435	0.1494	H_0
CDS	X	BIST100	4.349682	0.1136	H_0
CDS	X	EXCHANGE	0.704012	0.7033	H_0
CDS	X	INTEREST	0.948023	0.6225	H_0
CDS	X	FDI	0.971623	0.6152	H_0
CDS	X	VIX	0.253253	0.8811	H_0
VIX	X	ETF	2.898201	0.2348	H_0
VIX	X	BIST100	3.208264	0.2011	H_0
VIX	X	EXCHANGE	0.816337	0.6649	H_0
VIX	X	INTEREST	3.212365	0.2007	H_0
VIX	X	FDI	1.794731	0.4076	H_0
VIX	X	CDS	1.591316	0.4513	H_0

*: H_0: Independent variable does not Granger-cause the dependent variable.

H_a: Independent variable is the Granger Cause of the dependent variable.

Considering the probability values of the results obtained from the Granger causality test analysis, the directions of the causality relationships are as follows:

- from the EXCHANGE to the ETF and BIST100 at a 10% significance level,
- from the FDI variable to the ETF and BIST100 at a 5% significance level,
- from the INTEREST variable to EXCHANGE at a 5% significance level,
- from the EXCHANGE variable to INTEREST at a 1% significance level.

These results collectively suggest a complex, bidirectional interaction among exchange rates, interest rates, FDI, and stock market performance. Policymakers and investors should consider these dynamic linkages when formulating strategies for financial market stability and investment planning.

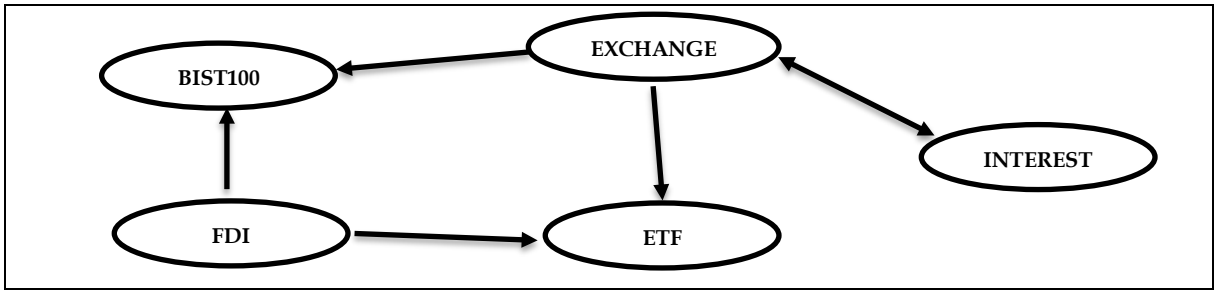

Figure 3: Directions of Causality

The direction and explanations of the Granger causality analyses presented in Figure 3 are also shown in Table 10 below.

Table 10: Results and Directions of Granger Causality

Causal Relationship	Significance Level	Explanation
Exchange Rate → ETF	10%	Exchange rate fluctuations affect ETF performance.
Exchange Rate → BIST100	10%	Exchange rate fluctuations affect BIST100 returns.
FDI → ETF	5%	FDI inflows significantly impact ETF performance.
FDI → BIST100	5%	FDI inflows significantly affect BIST100 returns.
Interest Rate → Exchange Rate	5%	Changes in interest rates affect exchange rate movements.
Exchange Rate → Interest Rate	1%	Exchange rate fluctuations strongly influence interest rate adjustments.

Conclusion, discussion and suggestions

Mutual funds are among the most common ways to access financial markets. Exchange-traded funds (ETFs), structurally similar to mutual funds, have recently expanded their diversity and market presence. This growth has also attracted academic interest. Based on this, a literature review of ETFs reveals that research generally focuses on performance, price movements, and the impact of ETFs on underlying assets. However, to the best of our knowledge, there is limited research on the factors affecting ETF prices. This research aims to fill this gap by examining the impact of the BIST100 index, exchange rate (USD/TRY), interest rates, foreign direct investment flows, CDS premiums, and VIX variables on the pricing of the iShares MSCI Türkiye ETF.

The ARDL test indicates that increases in the BIST100 have a positive long-term effect on iShares MSCI Türkiye ETF prices, whereas increases in the exchange rate have a negative impact. The results from the error correction model indicate that shocks to the iShares MSCI Türkiye ETF are effective, with at least 95% dissipating within the short term. Furthermore, the CUSUM and CUSUMQ graphs demonstrate the reliability of the established model and coefficients. In the Granger causality analysis findings, a one-way Granger causality was observed from the exchange rate and foreign direct investment flows to the ETF. According to other findings from the Granger causality analysis, there is a one-way causal relationship from the exchange rate to the BIST 100 and from foreign direct investment flows to the BIST 100. Also, mutual Granger causality was found between the exchange and interest rates.

One key finding is the positive long-term impact of the BIST100 Index on the iShares MSCI Türkiye ETF. The iShares MSCI Türkiye ETF aims to track the MSCI Türkiye IMI 25/50 Index, which largely consists of assets listed on the BIST 100. Therefore, upward movements in the BIST100 index have a positive impact on the iShares MSCI Türkiye ETF's price, while downward movements have a negative impact. Similarly, Chu et al. (1999) examined the effect of the S&P 500 spot index and the futures market on the price of the SPY ETF, which aims to track the performance of the S&P 500, and concluded that the S&P 500 futures market plays a leading role in the pricing of SPY. Karahan & Kayalı (2015) examined the effect of the BIST30 spot and BIST30 futures markets on the price of the BIST30 ETF, concluding that the BIST30 futures market plays a leading role in determining the price of the BIST30 ETF. However, Narend & Thenmozhi (2019) examined the effect of Indian stock market indices on the iShares MSCI India ETF and concluded that these indices negatively affect its price. Therefore, the significant and positive impact of the stock markets obtained in this study on the price of the iShares MSCI Türkiye ETF is partially supported by Chu et al. (1999) and Karahan & Kayalı (2015) findings, but contrasts with the negative effect of stocks on the country ETF obtained in the study conducted by Narend & Thenmozhi (2019).

A country's high exchange rate can lead to lower returns on the assets originating from that country. Accordingly, the iShares MSCI Türkiye ETF, which is composed of the assets of companies traded in the BIST100, may also be affected by the depreciation of the Turkish Lira. This is consistent with the

research's finding that the exchange rate has a negative relationship with the iShares MSCI Türkiye ETF. The negative impact of exchange rate increases on ETF was also found in a study by Gazel (2020). Firms are expected to be negatively affected by exchange rate increases due to increased borrowing costs and higher raw material prices in Turkish Lira. Therefore, investors are cautious about exchange rate risk when investing in iShares MSCI Türkiye ETF.

Another prominent finding in the causality analysis results is that FDI flows are the cause of the iShares MSCI Türkiye ETF and the BIST100. FDI inflows, viewed as an indicator of economic confidence in a country, increase capital inflows to companies traded there, while FDI outflows have the opposite effect. Therefore, FDI inflows also affect a country's ETF prices.

In this research, Türkiye's interest rates and CDS premiums were expected to negatively affect the price of the iShares MSCI Türkiye ETF, as in the study results of Gazel (2020) and Aypek et al. (2025). However, the results were not statistically significant for this study. An increase in the VIX, one of the independent variables in this study, generally prompts investors to withdraw from developing countries or fragile economies and turn to safer markets. This is also supported by Lai et al. (2022), who found that VIX negatively affects iShares MSCI country ETFs. Therefore, this study shared similar expectations; however, no statistically significant relationship was found between iShares MSCI Türkiye and the VIX. Findings regarding the CDS and VIX are generally inconsistent with the literature. This suggests that assets traded in Türkiye, or their associated ETFs, could be considered alternatives during periods of risk.

ETF investors should consider the economic and financial dynamics of the relevant countries rather than rely on general assumptions when making investment decisions. Implementing hedging strategies, particularly against exchange rate risk, can help investors protect their portfolios against potential volatility. Additionally, investors should monitor political uncertainties, economic shocks, and global crises that emerge during structural breaks, and protect their portfolios against these risks with hedging strategies. Fund managers may consider country-specific dynamics when developing portfolio diversification and risk management strategies. Just as investors do, fund managers should consider a hedging strategy to mitigate exchange rate risk and improve portfolio performance. Policymakers can minimise the potential negative effects of CDS premiums and VIX increases by taking measures such as maintaining exchange rate stability, thereby increasing investor confidence. This study utilised quarterly data for the variables, which may not fully capture short-term dynamics. Future studies could employ higher-frequency data. The country-based and global risk indicators could be explored in future research focusing on ETFs from different countries. Forthcoming studies could also conduct sector-based analyses of price movements in country ETFs, using the underlying sectors that comprise each country's stock market indices as a basis. By considering the symmetric and asymmetric effects of the variables in the research model on ETFs, the study could achieve more generalisable findings by including other developing countries alongside Türkiye. Comparative studies on other emerging markets, along with the inclusion of political indicators, could enrich the findings.

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