BDDK Bankacılık Düzenleme ve Denetleme Kurumu

BDDK Bankacılık ve Finansal Piyasalar
Journal of BRSA Banking and Financial Markets

Cilt / Volume: 19
Sayı / Issue: 1
Yıl / Year: 2025

e-ISSN: 1307-945X
Araştırma Makalesi
Research Article

Determination of Economic and Financial Factors Affecting Investment Instruments: An Application on Borsa İstanbul*

Erol KÖYCÜ**
İlhan EGE***

Abstract

This study aims to identify the economic and financial factors affecting investments in stocks, exchange traded funds, and private-sector debt instruments. For this purpose, three different models are developed based on the dependent and independent variables used in the study and the period range of the study is determined as 2008:01 - 2023:07. The current study follows a time series analysis process that takes structural breaks into account and conducts cointegration, causality, impulse-response and variance decomposition analyses. According to the short-term findings, stock investments are affected by inflation, interest rates, reserves, CDS, investor sentiment, risk appetite, and consumer loans; fund investments are affected by inflation, interest rates, reserves, investor sentiment, risk appetite, and consumer loans; and private sector debt instruments are affected by interest rates, reserves, risk appetite, and consumer loans. In addition, according to the long-term findings, stock investments are affected by all independent variables used in the study; fund investments are affected by inflation, interest rates, reserves, investor sentiment, risk appetite, and consumer loans; and finally, private sector debt instruments are affected by inflation, interest rates, reserves, risk appetite, and consumer loans.

Keywords: Investment Instruments, Stock Exchange Istanbul, Time Series Analysis.
JEL Classification: C22, D53, G11

*This study is derived from the doctoral thesis titled "Determinants of Financial Asset Investments: An Application on Borsa Istanbul" completed by Erol Koycu under the supervision of Prof. Dr. Ilhan Ege at Mersin University on 02.09.2024.

**Corresponding Author, Asst. Prof. Dr., Sirnak University, Faculty of Economics and Administrative Sciences, Department of Business Administration, E-posta: erol.koycu@hotmail.com – ORCID: 0000-0001-8166-2185
*** Prof. Dr., Mersin University, Faculty of Economics and Administrative Sciences, Department of Business Administration, E-posta: ilhanege2005@hotmail.com – ORCID: 0000-0002-5765-1926

Makale Gönderim Tarihi: 10.12.2024 Makale Kabul Tarihi: 11.04.2025

Atıf: Köycü, E. ve Ege, İ. Determination of Economic and Financial Factors Affecting Investment Instruments: An Application on Borsa Istanbul, BDDK Bankacılık ve Finansal Piyasalar Dergisi, 19(1), 22-45.
https://doi.org/10.46520/bddkdergisi.1723976

Yatırım Enstrümanlarını Etkileyen Ekonomik ve Finansal Faktörlerin Tespiti: Borsa İstanbul Üzerine Bir Uygulama*

Erol KÖYCÜ**

İlhan EGE***

Öz

Bu çalışmada pay senedi, borsa yatırım fonu ve özel sektör borçlanma araçları yatırım enstrümanlarına yapılan yatırımları etkileyen ekonomik ve finansal faktörlerin tespit edilmesi amaçlanmaktadır. Bu amaç doğrultusunda çalışmada kullanılan açıklanan ve açıklayıcı değişkenler esas alınarak üç farklı model geliştirilmiş ve çalışmanın dönem aralığı 2008:01 -2023:07 olarak belirlenmiştir. Mevcut çalışmada yapısal kırılmaları dikkate alan zaman serisi analiz süreci izlenmiştir ve eşbütünleşme, nedensellik, etki-tepki ve varyans ayrıştırma analizleri gerçekleştirilmiştir. Elde edilen bulgulardan hareketle kısa dönem analiz sonuçlarına göre pay senedi yatırımlarını enflasyon, faiz, rezerv, CDS, yatırımcı duyarlılığı, risk iştahı ve tüketici kredileri değişkenlerinin etkilediği; fon yatırımlarını enflasyon, faiz, rezerv, yatırımcı duyarlılığı, risk iştahı ve tüketici kredilerinin etkilediği; özel sektör borçlanma araçlarını ise faiz, rezerv, risk iştahı ve tüketici kredilerinin etkilediği tespit edilmiştir. Bununla birlikte uzun dönem analiz sonuçlarına göre pay senedi yatırımlarını çalışmada kullanılan tüm açıklayıcı değişkenlerin etkilediği; fon yatırımlarını enflasyon, faiz, rezerv, yatırımcı duyarlılığı, risk iştahı ve tüketici kredilerinin etkilediği ve son olarak özel sektör borçlanma araçlarını ise enflasyon, faiz, rezerv, risk iştahı ve tüketici kredilerinin etkilediği tespit edilmiştir.

Anahtar Kelimeler: Yatırım Enstrümanları, Borsa İstanbul, Zaman Serisi Analizi.
JEL Sınıflandırması: C22, D53, G11

*This study is derived from the doctoral thesis titled "Determinants of Financial Asset Investments: An Application on Borsa Istanbul" completed by Erol Koycu under the supervision of Prof. Dr. Ilhan Ege at Mersin University on 02.09.2024.
**Corresponding Author, Asst. Prof. Dr., Sirnak University, Faculty of Economics and Administrative Sciences, Department of Business Administration, E-posta: erol.koycu@hotmail.com – ORCID: 0000-0001-8166-2185
*** Prof. Dr., Mersin University, Faculty of Economics and Administrative Sciences, Department of Business Administration, E-posta: ilhanege2005@hotmail.com – ORCID: 0000-0002-5765-1926
Makale Gönderim Tarihi: 10.12.2024 Makale Kabul Tarihi: 11.04.2025

1. Introduction

Many different investment instruments can be invested in financial markets. These instruments are preferred and added to portfolios according to investors' return and risk expectations. Therefore, it is possible to form different portfolio baskets. Considering that each investor has different return expectations and risk perceptions, it is understandable that different portfolios are constructed according to investor types. Accordingly, it is possible to classify investor types as risk-averse investors, risk-indifferent investors, and risk-loving investors (Çakar and Özkan, 2019). It can be stated that risk-loving investors are more likely to hold risky assets such as stocks and foreign exchange, while risk-averse investors are more likely to hold risk-free assets such as government bonds and treasury bills. Therefore, at this point, it can be said that each investor has a utility curve and that different utility functions can be obtained for different types of investors. The utility function, also known as the utility curve, is simply the investor's perception of expected return and risk (Markowitz, 1952). According to Markowitz, the portfolio that offers the lowest risk at the same return level or the highest return at the same risk level among the portfolios on the investor utility curve is the optimal portfolio that provides the highest utility and is located at the tangent point between the efficient frontier and the utility curve.

Many different factors affect the return and risk of investment instruments and hence their investability. Especially in the globalizing world, it is known that investment instruments are affected not only by internal factors but also by external factors. In this context, it can be mentioned that many different internal and external factors affect the investment decision process of investors. For example, it is known that the mortgage financial crisis in the United States of America (USA) housing market in mid-2007 led to a sell-off in global markets, a decline in financial asset prices, and a negative impact on investor risk appetite. Although the mortgage crisis originated in the US, it can be concluded that the crisis spread to different countries in financial markets that are integrated with each other in the globalizing world (Ege and Şahin, 2015). Therefore, in an investment conjuncture where there are so many risk factors both globally and locally, determining the economic and financial factors affecting investment instruments is important for investors, policymakers, and literature.

Therefore, this study aims to determine the economic and financial factors affecting the investments in stocks, ETFs, and private sector debt instruments traded in Borsa Istanbul by using time series analysis methods based on the period 2008:01 - 2023:07. It is observed that the studies in literature focus on stocks as an investment instrument. Therefore, the fact that the current study analyzes exchange-traded funds and private-sector debt instruments, including stocks, reveals the originality of the study. In this context, the current study consists of six chapters including an introduction and conclusion. The first part of the study consists of the 'introduction' section, where the importance of the topic is dependent; the second part of the study consists of the 'theoretical background' section, which describes the theoretical framework; the third part of the study consists of the 'literature review' section, which includes international and national studies in literature on the current research topic; the fourth part of the study consists of the 'methodology' section, where the infrastructure of the time series tests applied is dependent; the fifth part of the study consists of the 'findings' section where the outputs obtained as a result of the econometric tests are presented and interpreted, and finally, the sixth and last part of the study consists of the 'conclusions and recommendations' section where the findings obtained as a result of the analyzes are evaluated in general and accordingly, recommendations are presented to both investors and policymakers.

2. Theoretical Background

In financial markets, parties with surplus funds and parties with deficit funds come together, and the fund transfer process takes place through investment institutions in line with legal regulations (Medetoğlu, 2023). At the end of this process, the party with a funding deficit accesses the financing it needs, while the party with excess funds utilizes its surplus funds to purchase financial assets. A financial asset is a liquid asset traded in financial markets, also known as a security (Dızman, 2015). Financial assets can be categorized into different groups such as stocks, government debt instruments, exchange traded funds, private sector debt instruments, structured products and other investment instruments. However, it is possible to categorize financial assets into different risk categories according to their type. For example, while stocks are classified as very risky assets (Gürsakal, 2007), bonds, which are among government debt instruments, are classified as risk-free assets (Dabbağoğlu, 2010). Therefore, depending on the return expectation and risk perception of the party with excess funds, in other words, the investor, there are different financial assets in the financial markets where the excess funds can be utilized, and these financial assets have different characteristics.

In the finance literature, there are two types of approaches to explain the return on financial assets in the capital market. These can be expressed as the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT) (Vardar, 2021). The CAPM was developed by William Forsyth Sharpe in 1964. According to the theory, there is a linear relationship between the risk of a financial asset and its expected return and this is dependent by an equilibrium model (Sharpe, 1964). According to the model, the expected return of a financial asset is calculated by subtracting the risk-free interest rate from the expected return of the market portfolio, multiplying the result by the beta coefficient and finally adding the risk-free interest rate (Bartholdy and Peare, 2005). Therefore, there is a linear relationship between the risk and return of a financial asset and this is shown by the 'Financial Asset Market Line' (Bayrakdaroğlu, 2021). According to the CAPM approach, it can be stated that as the risk level of a financial asset increases, the expected return level also increases, and high return expectations are formed from financial assets with high risk.

The APT, which emerged as a criticism of the CAPM approach, was introduced by Stephen Alan Ross in 1976. As the name suggests, the theory is based on arbitrage trading. With the arbitrage transaction, the same good bought from the cheap market is quickly sold in the expensive market (Cihangir and Kandemir, 2010). This eliminates price differences in two different markets. This is because the price of the same good bought in the cheap market will rise as a result of an increase in demand, while the price of the same good sold in the expensive market will fall as a result of an increase in supply. This will continue until prices are equalized in both markets, i.e. until the Law of One Price applies. Therefore, it can be concluded that the Arbitrage Pricing Theory is actually based on the understanding of the Law of One Price. According to the theory, the expected return of a financial asset is calculated by multiplying the sensitivity of the financial asset to the risk factor by the risk premiums obtained from the risk factors and adding the risk-free interest rate to the result (Ross, 1976). In the model, macroeconomic factors such as inflation risk, interest rate risk and foreign exchange risk that affect all financial assets are considered as risk factors and expressed as the 'k' factor. Depending on the K factor, i.e. the risk factor, the theory is divided into three categories: single risk factor arbitrage pricing model, two risk factor arbitrage pricing model and multi-risk factor arbitrage pricing model (Roll and Ross, 1980).

In the light of the information given above, financial asset investments in the finance literature have attracted the attention of researchers from past to present. In this respect, the determination of the economic and financial factors affecting financial asset investments, which is also the subject of the current study, is expected to contribute to literature.

3. Literature Review

There are many different studies on investment instruments in literature (Pastor, 2000; Roman and Mitra, 2009; Nisani and Shelef, 2020). However, it is observed that these studies in literature mostly focus on stock investment instruments. However, it can be stated that there is a lack of information on exchange-traded funds and private-sector debt instruments, which are also the subject of the current study. Therefore, it is thought that the current study will contribute to literature studies and provide useful information in the development of literature.

Regarding the international studies on the subject, Gill et al. (2011) concluded that investment expertise, general knowledge about ETFs, and consultation with investment advisors are effective in investments in exchange-traded funds in India. In another study in literature, Dev and Shakeel (2013) investigated the factors affecting the KSE index, the benchmark index of the Pakistan stock market. The study found that foreign portfolio investments and money supply play an important role in the development of the stock market. In another study in literature on ETFs, Chang et al. (2018) investigated the relationship between ETFs, and the VIX fear index for selected US and European indices. The study finds a negative relationship between ETFs and the VIX fear index. Parveen et al. (2020), who examined stock investments in the context of behavioral finance by bringing a different perspective to literature, found that the emotional factors of overconfidence and representational heuristics have a significant impact on the investment decision process and stock market trading volume. In another recent study, Boonman (2023) analyzed the economic factors affecting portfolio investments in a total of 75 developed and developing countries before and after the 2008 global crisis. As a result of the analysis, it is concluded that reserve, CDS and VIX variables affect portfolio investments in the pre-crisis period (1996 - 2007), while interest rate, reserve, and VIX variables affect portfolio investments in the post-crisis period (2011 - 2019). Alalade et al. (2024) examined the relationship between portfolio investments and macroeconomic factors in Nigeria for the period 1993-2023. The study finds that the interest rate has a negative impact on portfolio investments. Firmansyah et al. (2024) examined the relationship between portfolio investments and macroeconomic factors for ASEAN countries. The study finds that the interest rate in the short term and the inflation rate in the long term affect portfolio investments.

Regarding the national studies on the subject, Öztürk (2008) found a positive relationship between the IMKB-100 index with inflation and IMKB trading volume, while there is a negative relationship between the IMKB-100 index with interest rates and current account deficit. In another study, Demir and Göçmen Yağcılar (2009) found a negative relationship between banking sector stocks with interest rates and money supply. In another study on stocks, Kök and Uygur (2014) examined the relationship between the BIST100 index and selected economic indicators for the period 2005:01 - 2012:12. As a result of the study, a negative relationship has been found between the BIST100 index and the dollar exchange rate, while a positive relationship has been found between the BIST100 index and Brent oil prices. Akkuş and Zeren (2019), who investigated stock investments in the Islamic dimension, examined the relationship between the Participation-30 index and the consumer confidence index. As a result of the study, no causality relationship has been found between the participation index and the consumer confidence index. In another recent study, Nur (2022) finds cointegration and Granger causality between investor risk appetite and the stock market. In another recent study, Güryel and Kula (2024) examined the relationship between foreign portfolio investments and macroeconomic factors in Turkey over the period 2006-2023. The study finds that consumer prices and exchange rate affect portfolio investments in the long run. In another study conducted in the same year, Küçükosman and Uzun (2024) examined the relationship between portfolio investments and CDS premiums over the period 2014Q1-2024Q1. The study finds that CDS premiums affect portfolio investments and unidirectional causality is detected. As can be seen from the studies in literature on the subject, it can be concluded that there is an incompleteness, no definitive finding has been obtained, and therefore field studies are ongoing.

4. Methodology

This study aims to determine the economic and financial factors affecting investment instruments. For this purpose, the scope of the study is determined as 2008:01 - 2023:07 and the time series process with structural breaks is followed. In addition, while the dependent variables of the study consist of stocks, exchange-traded funds, and private-sector debt instruments, the independent variables are categorized into two groups: economic and financial factors. Descriptive information on the dependent and independent variables is presented in Table 1 below;

Table 1. Variables Definitions

Dependent Variables		Method	Data	Unit	Symbol	Source
Stock		Logarithm (Size of Investment Instrument)	Monthly	Million TL	STK	MKK
Exchange Traded Funds					ETFs	
Private Sector Debt Instruments					PSDI	
Independent Variables						
Economic Factors	Inflation	Percentage (%)	Monthly	Ratio	INF	TCMB
	Interest			Ratio	INT	
	Gross Reserves	Logarithm (Variable Value)		Billion Dollars USA	RSV	
	Credit Risk Premium			Index	CDS	investing.com
Financial Factors	Investor Sensitivity			Index	INV	TUIK
	Investor Risk Appetite			Index	RISK	MKK
	Consumer Loans			Million TL	LOAN	BDDK
	Fear Index			Index	VIX	investing.com

The dependent variables stock is composed of the sum of publicly traded and unlisted stocks, exchange-traded funds are composed of the funds traded in Borsa Istanbul, and finally, private sector debt instruments are composed of the sum of commercial papers, private sector commercial papers, corporate bonds, convertible bonds, structured debt instruments and subordinated debt instruments (www.mkk.com.tr, 2023). In addition, the inflation rate, which is one of the independent variables of the study and represents economic factors, is the monthly change in consumer prices; interest rate is the interest rate applied to TL deposits with maturities of up to 1 month; gross reserves is the gross reserves of the Central Bank of the Republic of Turkey; and credit risk premium is the five-year CDS risk premium of Turkey. On the other hand, investor sentiment, which is one of the independent variables of the study and represents financial factors, refers to the consumer confidence index; investor risk appetite refers to the risk appetite calculated for investors; consumer loans refers to consumer loans used by individual customers; and the fear index refers to the VIX index. Since inflation and interest rate variables are calculated as rates in the econometric analysis process of the current study, these variables are included in the analysis in their raw form, while all other variables used in the study are included in the analysis after taking the natural logarithm.

Since the study data set does not consist of annual data, the data set is seasonally adjusted before starting the analysis in order to eliminate seasonal effects. Subsequently, a time series process with structural breaks is followed to reveal the relationship between investment instruments and economic and financial factors. In other words, shocks to variables over the study period are not ignored. In this context, the ADF test developed by Dickey and Fuller (1979) and the KPSS test developed by Kwiatkowski et al. (1992), which are the tests without structural breaks, are applied first. The regression representation of the tests is as follows;

$$\Delta y_t = \gamma y_{t-1} + \sum_{i=2}^{p} \beta_i \Delta y_{t-i+1} + e_t \qquad \epsilon_t \sim WN(0, \sigma^2) \tag{1}$$

$$Y_t = \delta t + r_t + e_t \tag{2}$$

Equation 1 above presents the general form of the ADF test, while equation 2 presents the general form of the KPSS test. In the ADF unit root test regression equation, the first difference operator is denoted by Δ, y_t denotes the series used, t denotes the time trend, β denotes the coefficient on the time trend and e denotes the error term. In Equation 2, δt denotes the deterministic trend, r_t denotes the random walk and e_t denotes the zero-mean stationary error. In the study, unit root tests with structural breaks are also applied. These are the Fourier ADF test developed by Enders and Lee (2012) and the Fourier KPSS test developed by Becker-Enders-Lee (2006). The robustness of the unit root analyses in this study is enhanced by the fact that both unit root tests without and with structural breaks are used together. The regression representation of the tests is as follows;

$$\Delta y_t = c_0 + c_1 t + \delta y_{t-1} + \sum_{j=1}^{m} \lambda_j \sin\left(\frac{2\pi jt}{N}\right) + \sum_{j=1}^{m} \gamma_j \cos\left(\frac{2\pi jt}{N}\right) + \sum_{i=1}^{N} \Psi \Delta y_{t-i} + \epsilon_t \tag{3}$$

$$\gamma_t = c_0 + \beta t + \gamma_1 \sin\left(\frac{2\pi kt}{N}\right) + \gamma_2 \cos\left(\frac{2\pi kt}{N}\right) + \epsilon_t \tag{4}$$

In equation 3, where the regression representation of the Fourier ADF test is presented, c is a fixed number, π is pi, N is the number of observations, t is the time trend value and ϵ_t is the error term. Equation 4 shows the equality of the Fourier KPSS test. Where c is a fixed number, k is the frequency, N is the number of observations and ϵ_t is the error term. However, while the ADF test is a straight hypothesis test, the KPSS test is a reverse hypothesis test. In other words, while the null hypothesis of the ADF test tests that the series contain unit roots (Dickey and Fuller, 1979), the null hypothesis of the KPSS test tests that the series are stationary (Sjösten, 2022). Since all the variables used in the study are non-stationary at the level, the Johansen cointegration test (1991) and structural break cointegration tests of CiS and Sanso (2006), Arai and Kuruzomi (2007) and Tsong et al. (2016) have been applied in the next stage of the study. The general form of cointegration tests is as follows;

$$\gamma = c_0 + \beta_{it} X_{1t} + \epsilon_t \tag{5}$$

In the above equation, c_0 is the constant number, γ is the dependent variable, X is the independent variable and ϵ_t is the error term. In addition, while Johansen cointegration test is straight hypothesized, other cointegration tests used in this study are reverse hypothesized. In other words, while the Johansen cointegration test (1991) tests the null hypothesis that there is no cointegration between the series, the cointegration tests of Cis and Sansó (2006), Arai and Kuruzomi (2007) and Tsong et al. (2016) test the null hypothesis that there is cointegration between the series. Based on the determination of the long term cointegration relationship between the variables used in the study, short and long term coefficient estimation has been started in the next stage of the study. Before coefficient estimation, the break dates of the variables used in the study were determined by the Zivot and Andres (1992) test and used as dummy variables in the coefficient estimation. The short term coefficient estimate is tested with the Ordinary Least Square (OLS) method while the long term coefficients are estimated by the FMOLS estimator. The regression representation of the tests is as follows;

$$\gamma = \beta X_1 + \epsilon \tag{6}$$

$$\hat{O} = \begin{bmatrix} \beta \\ \gamma \end{bmatrix} = (\sum_{t=1}^{T} X_t X_t{}')^{-1} (\sum_{t=1}^{T} X_t \gamma_t^{+\prime} - T \begin{bmatrix} \lambda_{12}^{+\prime} \\ 0 \end{bmatrix}) \tag{7}$$

Equation 6 above shows the regression representation of the OLS test. In the equation, γ is the dependent variable, X is the independent variable and ϵ is the error term. Equation 7 shows the FMOLS estimator. The t-statistic corresponding to this estimator converges to a normal distribution on an asymptotic basis and the FMOLS estimator can be used to estimate long-run covariance matrices. In the next stage of the study, causality analysis has been conducted. In the last stage of the econometric analysis process of the study, impulse-response and variance decomposition analyses have been conducted. In light of this information, three different models, namely Models 1, 2, and 3, have been developed. The regression equation of these developed models is as follows;

Model 1

$$LNSTK_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 INT_t + \alpha_3 LNRSV_t + \alpha_4 LNCDS_t + \alpha_5 LNINV_t + \alpha_6 LNRISK_t + \alpha_7 LNLOAN_t + \alpha_8 LNVIX_t + \epsilon_t \tag{8}$$

Model 2

$$LNETFs_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 INT_t + \alpha_3 LNRSV_t + \alpha_4 LNCDS_t + \alpha_5 LNINV_t + \alpha_6 LNRISK_t + \alpha_7 LNLOAN_t + \alpha_8 LNVIX_t + \epsilon_t \tag{9}$$

Model 3

$$LNPSDI_t = \alpha_0 + \alpha_1 INF_t + \alpha_2 INT_t + \alpha_3 LNRSV_t + \alpha_4 LNCDS_t + \alpha_5 LNINV_t + \alpha_6 LNRISK_t + \alpha_7 LNLOAN_t + \alpha_8 LNVIX_t + \epsilon_t \tag{10}$$

In the equations above, t is the time dimension of the study, α_0 is the constant coefficient, $\alpha_{1,2,\ldots,8}$ is the slope coefficients and ϵ is the error term. The findings obtained in line with the econometric process described above, taking into account the models developed in the study, are presented in the next section.

5. Findings

This section, which presents the results of the econometric analysis of the study, first presents descriptive statistics information on the independent variables;

Table 2. Descriptive Statistics

	INF	INT	RSV	CDS	INV	RISK	LOAN	VIX
Mean	1.2654	11.5351	11.5244	5.6192	4.4545	3.8401	5.0083	2.9519
Maximum	13.5800	27.2860	11.8098	6.7312	4.5846	4.2333	6.7886	4.0925
Minimum	-1.4400	5.2640	11.1219	4.7846	4.1488	3.0023	3.4225	2.2523
Jarque-Bera	2391.147	27.5187	10.7783	9.3261	21.9061	19.8865	3.3655	13.8301
Probability	0.0000	0.0000	0.0045	0.0094	0.0000	0.0000	0.1858	0.0009
Observation	186	186	186	186	186	186	186	186

According to Table 2 above, which includes the descriptive statistics results of the independent variables used in the study, it is seen that the variable with the highest mean value is INT with a value of 11.5351. In addition, among the independent variables used in the study, the variable with the highest value is INT with a value of 27.2860 and the variable with the lowest value is INF with a value of -1.44. When Jarque-Bera probability values are analyzed as an indicator of normal distribution, it is seen that the probability values of all variables except the LOAN variable are less than the critical value of 0.05. Based on this, it is concluded that the LOAN variable used in the study shows normal distribution characteristics, but the other independent variables do not exhibit normal distribution characteristics. In the next stage of the study, correlation analysis has been performed to detect the multicollinearity problem.

Table 3. Correlation Analysis

t-statistic	**INF**	**INT**	**RSV**	**CDS**	**INV**	**RISK**	**LOAN**	**VIX**
Probability								
INF	1.000							

INT	0.296	1.000						
	4.209	-----						
	0.000	-----						
RSV	0.061	-0.175	1.000					
	0.833	-2.412	-----					
	0.405	0.016	-----					
CDS	0.396	0.696	-0.205	1.000				
	5.852	13.170	-2.846	-----				
	0.000	0.000	0.004	-----				
INV	-0.413	-0.674	0.267	-0.752	1.000			
	-6.168	-12.407	3.763	-15.495	-----			
	0.000	0.000	0.000	0.000	-----			
RISK	0.128	-0.184	0.102	-0.278	-0.022	1.000		
	1.760	-2.545	1.402	-3.931	-0.301	-----		
	0.080	0.011	0.162	0.000	0.763	-----		
LOAN	0.462	0.496	0.359	0.589	-0.431	0.223	1.000	
	7.074	7.756	5.233	9.903	-6.484	3.111	-----	
	0.000	0.000	0.000	0.000	0.000	0.002	-----	
VIX	0.046	0.066	-0.564	0.372	-0.387	-0.078	-0.176	1.000
	0.631	0.908	-9.274	5.451	-5.708	-1.063	-2.427	-----
	0.528	0.364	0.000	0.000	0.000	0.289	0.016	-----

Correlation analysis is a statistical method that measures the strength and direction of the relationship between two quantitative variables. Although the correlation value takes values between -1 and +1, +1 is defined as a perfect linear positive correlation and -1 as a perfect linear negative correlation (Ratner, 2009). However, it can be stated that the high correlation relationship between the independent variables ($r > 0.90$) causes the problem of multicollinearity in the studies (Tabachnick and Fidell, 1996). In this framework, the correlation analysis results in Table 3 above show that there is no high correlation relationship between the independent variables. Therefore, it can be concluded that the independent variables used in the study do not cause the problem of multicollinearity. In the next step, unit root tests have been tested.

Table 4. Results of ADF Unit Root Test

Variables	Level		1st Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
	t-stat.	t-stat.	t-stat.	t-stat.
STK	2.3028	0.3251	-11.8726***	-12.1147***
ETF	5.3101	2.5426	-8.2886***	-9.8587***
PSDI	-2.4950	-0.8610	-3.0443**	-21.1998***
INF	-1.6166	-2.9084	-10.0090***	-10.0037***
INT	-2.0332	-3.0096	-7.5854***	-7.6957***
RSV	-1.8678	-1.8443	-12.9775***	-12.9521***
CDS	-2.1910	-2.9770	-13.5705***	-13.5435***
INV	-2.4361	-2.8247	-13.1854***	-13.1512***
RISK	-2.0814	-2.3681	-10.9907***	-10.9597***
LOAN	0.6947	-1.1305	-5.0260***	-5.0935***
VIX	-2.3735	-2.4579	-17.2890***	-17.2415***
Critical Values	Constant Model; 1%(-3.46) 5%(-2.87) 10%(-2.57) Constant and Trend Model; 1%(-4.00) 5%(-3.43) 10%(-3.14)			

Notes: ***, and ** indicate respectively statistical significance at the 1, and 5 percent levels.
The maximum lag length is set as 12.

According to ADF unit root test results, the level probability values of all dependent and independent variables used in the study are greater than 0.05. Therefore, the H0 hypothesis of the test could not be rejected and the variables are non-stationary at the level and have unit root. On the other hand, it is seen that the probability values of the variables after the first difference process are less than the critical value of 0.05, thus the series is stationary. According to the ADF unit root test results, it can be concluded that all variables used in the study are not stationary at the level and become stationary after the first difference process. After the ADF unit root test without structural breaks, we proceeded to the Fourier ADF unit root test that takes structural breaks into account.

Table 5. Results of Fourier ADF Unit Root Test

Variables	Level		1st Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
	ADF Statistic Values			
STK	1.210	-3.470	-4.786***	-5.123***
ETF	5.313	-0.707	-3.199*	-10.476***
PSDI	-2.641	-2.411	-5.591***	-5.756***
INF	-1.256	-2.925	-5.185***	-5.252***
INT	0.156	-2.259	-5.534***	-5.751***
RSV	-2.305	-2.050	-5.853***	-5.937***
CDS	-2.023	-3.353	-5.426***	-5.261***
INV	-0.910	-2.298	-9.795***	-9.718***
RISK	-3.677**	-3.926*	-5.723***	-5.720***
LOAN	1.181	-3.206	-5.243***	-5.407***
VIX	-2.518	-2.139	-4.611***	-4.663***
Critical Values	Constant Model; 1%(-3.930) 5%(-3.260) 10%(-2.920) Constant and Trend Model; 1%(-4.620) 5%(-4.010) 10%(-3.690)			

Notes: ***, **, and * indicate respectively statistical significance at the 1, 5, and 10 percent levels.
The maximum lag length is set as 12.

The table above shows the results of the Fourier ADF test. As can be seen from the analysis results in the table, while ADF test statistic values at the level are greater than the calculated critical values, the ADF test statistic values calculated after first difference are smaller than the 1%, 5% and 10% critical values. According to the Fourier ADF test results, it can be concluded that all the variables used in the study are non-stationary at the level, in other words, they have unit roots and become stationary after the first difference process. After the Fourier ADF unit root test, the KPSS stationarity test with the reverse hypothesis has been applied.

Table 6. Results of the KPSS Stationarity Test

Variables	Level		1st Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
	LM Statistic Values			
STK	1.5827	0.2549	0.4397**	0.1422**
ETF	1.4504	0.4064	0V5086*	0.1663*
PSDI	1.2954	0.3239	0.3910**	0.1150***
INF	0.8620	0.2301	0.0917***	0.0268***
INT	1.1963	0.3111	0.2263***	0.0376***
RSV	1.0871	0.6327	0.0719***	0.0469***
CDS	1.0064	0.2759	0.0458***	0.0368***
INV	1.1808	0.2831	0.0521***	0.0430***
RISK	0.8018	0.3055	0.0305***	0.0305***
LOAN	1.7258	0.5130	0.1889***	0.1469**
VIX	0.8670	0.6726	0.0893***	0.0899***
Critical Values	Constant Model; 1%(0.347) 5%(0.463) 10%(0.739) Constant and Trend Model; 1%(0.119) 5%(0.146) 10%(0.216)			

Notes: ***, **, and * indicate respectively statistical significance at the 1, 5, and 10 percent levels.
The maximum lag length is set as 12.

As can be seen from the table above showing the KPSS stationarity test results, while the LM statistic values calculated at the level are greater than the calculated 1%, 5%, and 10% critical values, the LM statistic values calculated after the first difference are smaller calculated critical values. Considering that the KPSS test has a reverse hypothesis, in other words, considering that the null hypothesis of the test states that the series is stationary, it can be stated that the null hypothesis is rejected at the level, but not at the first difference. According to the KPSS stationarity test results, it can be concluded that all variables used in the study have unit roots at the level and become stationary after the first difference process. In the next step of the study, the Fourier KPSS stationarity test, which is the last stationarity test tested in the current study, has been applied.

Table 7. Results of the Fourier KPSS Stationarity Test

Variables	Level		1st Difference	
	Constant	Constant and Trend	Constant	Constant and Trend
	KPSS Statistics Values			
STK	1.045	0.079	0.245*	0.025***
ETF	1.045	0.133	0.422	0.035***
PSDI	1.107	0.123	0.202*	0.021***
INF	1.292	0.081	0.116***	0.029***
INT	0.316	0.281	0.160**	0.029***
RSV	0.728	0.082	0.048***	0.024***
CDS	0.318	0.234	0.033***	0.025***
INV	0.480	0.272	0.049***	0.031***
RISK	1.104	0.163	0.021***	0.020***
LOAN	1.094	0.075	0.126***	0.029***
VIX	0.486	0.118	0.047***	0.021***
Critical Values	Constant Model; 1%(0.132) 5%(0.172) 10%(0.270) Constant and Trend Model; 1%(0.047) 5%(0.055) 10%(0.072)			

Notes: ***, **, and * indicate respectively statistical significance at the 1, 5, and 10 percent levels.
The maximum lag length is set as 12.

As can be seen from Table 7 above, where the Fourier KPSS test results are shown, the KPSS-ist. values of all the variables at the level used in the study are greater than the calculated 1%, 5%, and 10% critical values, while the KPSS-ist. values calculated after the first difference are smaller calculated critical values. Considering that the null hypothesis of the test states that the series is stationary, it can be said that the variables are not stationary at the level and become stationary after the first difference process.

When the unit root and stationarity test results tested above are evaluated in general terms, it can be concluded that all variables contain unit roots at the level but become stationary after the first difference process. Since all of the variables are integrated in the first order, it can be said that the co-integration test is applicable. Based on the findings, cointegration analysis has been conducted in the next phase of the study. First, the Johansen cointegration test, which does not consider structural breaks, is tested.

Table 8. Results of Johansen Cointegration Test

Number of Cointegration	Model 1	Model 2 Trace Stat.	Model 3	5% Critical Value
None*	1035.4920	1107.5180	949.1477	228.2979
At most 1*	707.6103	835.8491	717.2130	187.4701
At most 2*	498.0407	617.3980	545.8716	150.5585
At most 3*	342.4500	426.3745	406.0654	117.7082
At most 4*	243.0243	275.2138	284.9172	88.8038
At most 5*	150.6814	168.0446	192.1318	63.8761
At most 6*	88.4530	99.0334	114.7528	42.9152
At most 7*	44.4395	55.1786	54.9333	25.8721
At most 8*	19.9127	14.9836	17.5815	12.5179

Note: The maximum lag length is set as 12.

As can be seen from the table above, where the Johansen cointegration test results are shown, it is determined that the trace-ist. values calculated in all models developed in the study are greater than all of the critical values determined at the 5% level. Therefore, the null hypothesis of the test, H_0=No cointegration, is rejected and it is concluded that there are at most 8 cointegration relationships between the variables. After the Johansen cointegration test that does not take structural breaks into account, the cointegration tests that take structural breaks into account have been tested.

Table 9. Results of Structural Break Cointegration Test

	CIS & Sansó (2006); AK (2007)			**Tsong et al. (2016)**	
	Break in Constant and Trend			**Trend Break**	
Model 1	**Test**	**Break date**	**Stat.**	**Test**	**Stat.**
	SCols	December 2021	0.055	Fourier ClOls	0.030
	SC (dols)	December 2021	0.061	Fourier CIdols	0.025
Model 2	SCols	September 2021	0.051	Fourier ClOls	0.053
	SC (dols)	July 2021	0.011	Fourier CIdols	0.043
Model 3	SCols	December 2010	0.067	Fourier ClOls	0.030
	SC (dols)	December 2010	0.050	Fourier CIdols	0.023
Critical Values	1%(0.083) 5%(0.103) 10%(0.154)			1%(0.042) 5%(0.048) 10%(0.063)	

Within the scope of structural break cointegration analyses of the current study, cointegration analyses for the constant break and trend model have been tested with CiS and Sansó (2006) and Arai and Kurozumi (2007) tests, while cointegration analyses for the trend break model have been tested with Tsong et al. (2016) test. These tests are reverse hypothesized and stated as H0: There is cointegration. Considering the test results of CiS and Sansó (2006) and Arai and Kurozumi (2007), which show single and sudden breaks in the fixed model, it is seen that the calculated SCols and SC (dols) statistical values of the test in all models developed in the study are smaller than the calculated 1%, 5%, and 10% critical values, so the null hypothesis of the test cannot be rejected. Therefore, it can be concluded that there is a long term cointegration relationship between the variables used in the models developed in this study. However, if we look at the break dates in the test results, it can be concluded that December 2021 for Model 1, July 2021 and September 2021 for Model 2, and December 2010 for Model 3 have been determined as the break dates. On the other hand, the test results of Tsong et al. (2016), which indicate a break in the trend, show that the calculated Fourier CIOls and Fourier CIdols test statistic values of the test in all models developed in the study are smaller than 10% calculated critical values, and therefore the null hypothesis of the test cannot be rejected. Based on this finding, it can be concluded that there is a long term cointegration relationship between the variables used in the models developed in this study. When the results determined within the scope of cointegration analysis with structural breaks are evaluated in general terms, it can be said that the cointegration tests of CiS and Sansó (2006) and Arai and Kurozumi (2007), which are tested for the fixed break and trend model, and the cointegration test of Tsong et al. (2016), which is tested for the trend break model, give similar results and detect the long term cointegration relationship between the variables used in the models developed in the study.

After determining the cointegration relationship, short and long term coefficient estimation has been started. Before estimation, the break dates of the variables used in the developed models have been determined and included in the analysis as dummy variables in the coefficient estimation. The identified dummy variables are December 2019, May 2021 and November 2021 for Model 1; February 2009, December 2019 and December 2021 for Model 2; and February 2009, December 2019 and November 2021 for Model 3. In light of this information, the short term coefficient estimation results tested with the Ordinary Least Square (OLS) method are presented in Table 10 below;

Table 10. Results of Short Term Coefficient Estimation

Variables	Model 1		Model 2		Model 3	
	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
INF	-0.0142***	-2.6239	-0.0199**	-2.1701	0.0289	1.2484
INT	0.0168***	6.0413	0.0285***	5.2814	-0.0639***	-4.6960
RSV	-0.2841***	-3.2591	-0.5886***	-3.7106	1.2627***	3.1573
CDS	-0.2033***	-3.7016	0.0452	0.4810	-0.0886	-0.3734
INV	0.7369***	4.2350	0.4921*	1.6776	-0.2412	-0.3261
RISK	0.2917***	5.8404	0.2516***	2.9993	-0.4726**	-2.2341
LOAN	0.7633***	24.6930	0.5227***	7.8198	3.0278***	17.9650
VIX	-0.0345	-1.0062	-0.0334	-0.5789	0.0210	0.1446
C	1.6123	0.9309	4.3738	1.4479	-21.9952	-2.8878
Adj. R^2	0.9866		0.9714		0.9572	
F-stat.	1240.742***		573.614***		377.781***	
Heteroscedasticity	1.4421**		2.2851***		1.1565***	
Autocorrelation	0.288***		0.261***		0.319***	
Jargue-Bera	5.1783***		0.9556***		1.2379***	

Note: ***, **, and * indicate respectively statistical significance at the 1, 5, and 10 percent levels.

Before moving on to the short term coefficient estimation results for the models developed in the current study, firstly, the probability (F-stat.) values in the analysis output results indicate that the value expresses significance at the 99% confidence level in all models. Therefore, it can be said that all the models established in the study are significant as a whole. However, the Adj. R2 values, which show how much of the changes in the dependent variable are realized by the independent variables, are 98.66% for Model 1, 97.14% for Model 2, and 95.72% for Model 3. Based on these results, it can be concluded that independent variables have a high impact on dependent variables. In addition, according to the residual tests, all the models developed in the study do not have heteroscedasticity and autocorrelation problems and are normally distributed. In this case, it can be stated that the short term coefficient estimation results are valid and do not pose a problem.

The short term coefficient estimation results obtained for Model 1 indicate that inflation, interest rates, gross reserves, CDS, investor sentiment, investor risk appetite, and consumer loans variables provide statistically significant results, while the VIX variable is insignificant. Based on these results, a one-unit increase in inflation causes a 0.01-unit decrease in stock investments; a one-unit increase in interest rates causes a 0.01-unit increase in stock investments; a one-unit increase in gross reserves causes a 0.28-unit decrease in stock investments; a one-unit increase in CDS causes a 0.20-unit decrease in stock investments; a one-unit increase in investor sentiment causes a 0.73-unit increase in stock investments; a one-unit increase in investor risk appetite causes a 0.29-unit increase in stock investments; and finally, a one-unit increase in consumer loans causes a 0.76-unit increase in stock investments.

The results of Model 2 developed specifically for this study indicate that inflation, interest rates, gross reserves, investor sentiment, investor risk appetite, and consumer loans variables provide statistically significant results, while CDS and VIX variables provide insignificant results. Accordingly, a one-unit increase in inflation causes a 0.01-unit decrease in ETF; a one-unit increase in interest rates causes a 0.02-unit increase in ETF; a one-unit increase in gross reserves causes a 0.58-unit decrease in ETF; a one-unit increase in investor sentiment caused a 0.49-unit increase in ETF; a one-unit increase in investor risk appetite caused a 0.25-unit increase in ETF; and finally, a one-unit increase in consumer loans caused a 0.52-unit increase in ETF.

Finally, the results obtained for Model 3 indicate that interest rate, gross reserves, investor risk appetite, and consumer loans variables provide statistically significant results, while inflation, CDS, investor sentiment, and VIX variables provide insignificant results. Based on these results, it can be concluded that a one-unit increase in interest rates causes a 0.06-unit decrease in private sector debt securities investments; a one-unit increase in gross reserves causes a 1.26-unit increase in private sector debt securities investments; a one-unit increase in investor risk appetite causes a 0.47-unit decrease in private sector debt securities investments; and finally, a one-unit increase in consumer loans causes a 3.02-unit increase in private sector debt securities investments. After the short term coefficient estimation, we proceeded to the long term coefficient estimation with the FMOLS estimator.

Table 11. Results of Long Term Coefficient Estimation

Variables	Model 1		Model 2		Model 3	
	Coefficient	t-stat.	Coefficient	t-stat.	Coefficient	t-stat.
INF	-0.0142***	-4.4126	-0.0200***	-4.5063	0.0507**	2.3616
INT	0.0178***	10.5236	0.0281***	10.7527	-0.0653***	-5.1746
RSV	-0.3206***	-5.6928	-0.5027***	-6.1348	0.6604*	1.6724
CDS	-0.1922***	-5.8597	0.0323	0.7078	-0.0663	-0.3015
INV	0.6561***	5.5166	0.6983***	4.2789	-1.2886	-1.6388
RISK	0.3103***	10.0868	0.2167***	5.1497	-0.4157**	-2.0500
LOAN	0.8659***	14.4714	0.2943***	3.4857	4.1842***	10.2850
VIX	-0.0367*	-1.7956	-0.0275	-0.9857	0.0124	0.0926
C	1.8904	1.7700	3.4824	2.3152	-15.0740	-2.0797
Adj. R^2	0.9867		0.9715		0.9571	
Autocorrelation	0.471***		0.576***		0.314***	
Jargue-Bera	0.1027***		2.9014***		2.1330***	

Note: ***, **, and * indicate respectively statistical significance at the 1, 5, and 10 percent levels.

The table above presents the long term coefficient estimation results estimated with the FMOLS estimator. The Adj. R2 values in the table are 98.67% for Model 1, 97.15% for Model 2, and 95.71% for Model 3. Therefore, it can be concluded that independent variables have a high impact on dependent variables. In addition, the residual tests in the table show that all models developed in the study do not have autocorrelation problems and the models exhibit normal distribution characteristics. Thus, it can be said that the long term coefficient estimation results are valid.

According to the FMOLS estimator results obtained for Model 1, all independent variables used in the model provide statistically significant results. Based on these results, a one-unit increase in inflation causes a 0.01-unit decrease in stock investments; a one-unit increase in interest rates causes a 0.01-unit increase in stock investments; a one-unit increase in gross reserves causes a 0.32-unit decrease in stock investments; a one-unit increase in CDSs caused a 0.19-unit decrease in stock investments; a one-unit increase in investor sentiment caused a 0.65-unit increase in stock investments; a one-unit increase in investor risk appetite caused a 0.31-unit increase in stock investments; a one-unit increase in consumer loans caused an 0.86-unit increase in stock investments; and finally, a one-unit increase in VIX caused a 0.03-unit decrease in stock investments.

The results of Model 2 in the Table indicate that inflation, interest rates, gross reserves, investor sentiment, investor risk appetite, and consumer loans variables provide statistically significant results, while CDS and VIX variables provide insignificant results. These results are similar to the short term coefficient estimation results. The coefficient results show that a one-unit increase in inflation causes a 0.02-unit decrease in ETF; a one-unit increase in interest rates causes a 0.02-unit increase in ETF; a one-unit increase in gross reserves causes a 0.50-unit decrease in ETF; a one-unit increase in investor sentiment caused a 0.69-uint increase in ETF; a one-unit increase in investor risk appetite caused a 0.21-unit increase in ETF; and finally, a one-unit increase in consumer loans caused a 0.29-unit increase in ETF.

Finally, the results obtained for Model 3 indicate that inflation, interest rates, gross reserves, investor risk appetite, and consumer loans variables provide statistically significant results, while CDS, investor sentiment, and VIX variables provide insignificant results. Accordingly, a one-unit increase in inflation causes a 0.05-unit increase in private sector debt securities investments; a one-unit increase in interest rates causes a 0.06-unit decrease in private sector debt securities investments; a one-unit increase in gross reserves caused a 0.66-unit increase in private sector debt securities investments; a one-unit increase in investor risk appetite caused a 0.41-unit decrease in private sector debt securities investments; and finally, a one-unit increase in consumer loans caused a 4.18-unit increase in private sector debt securities investments. After the short and long term coefficient estimation, causality analysis has been conducted.

Table 12. Results of Toda & Yamamoto Causality Tests

Model 1			Causality	Model 2			Causality	Model 3			Causality
No Break											
INF	→	STK	×	INF	→	ETF	×	INF	→	PSDI	×
INT	→	STK	×	INT	→	ETF	√	INT	→	PSDI	×
RSV	→	STK	√	RSV	→	ETF	×	RSV	→	PSDI	×
CDS	→	STK	×	CDS	→	ETF	√	CDS	→	PSDI	√
INV	→	STK	×	INV	→	ETF	√	INV	→	PSDI	√
RISK	→	STK	√	RISK	→	ETF	×	RISK	→	PSDI	×
LOAN	→	STK	√	LOAN	→	ETF	√	LOAN	→	PSDI	√
VIX	→	STK	×	VIX	→	ETF	×	VIX	→	PSDI	×
Single Fourier											
INF	→	STK	×	INF	→	ETF	√	INF	→	PSDI	×
INT	→	STK	×	INT	→	ETF	√	INT	→	PSDI	×
RSV	→	STK	√	RSV	→	ETF	√	RSV	→	PSDI	×
CDS	→	STK	×	CDS	→	ETF	√	CDS	→	PSDI	√
INV	→	STK	×	INV	→	ETF	√	INV	→	PSDI	√
RISK	→	STK	√	RISK	→	ETF	×	RISK	→	PSDI	×
LOAN	→	STK	√	LOAN	→	ETF	√	LOAN	→	PSDI	√
VIX	→	STK	×	VIX	→	ETF	×	VIX	→	PSDI	×
Cumulative Fourier											
INF	→	STK	×	INF	→	ETF	√	INF	→	PSDI	×
INT	→	STK	×	INT	→	ETF	√	INT	→	PSDI	×
RSV	→	STK	√	RSV	→	ETF	√	RSV	→	PSDI	√
CDS	→	STK	×	CDS	→	ETF	√	CDS	→	PSDI	√
INV	→	STK	×	INV	→	ETF	√	INV	→	PSDI	√
RISK	→	STK	√	RISK	→	ETF	×	RISK	→	PSDI	×
LOAN	→	STK	√	LOAN	→	ETF	×	LOAN	→	PSDI	√
VIX	→	STK	×	VIX	→	ETF	×	VIX	→	PSDI	√

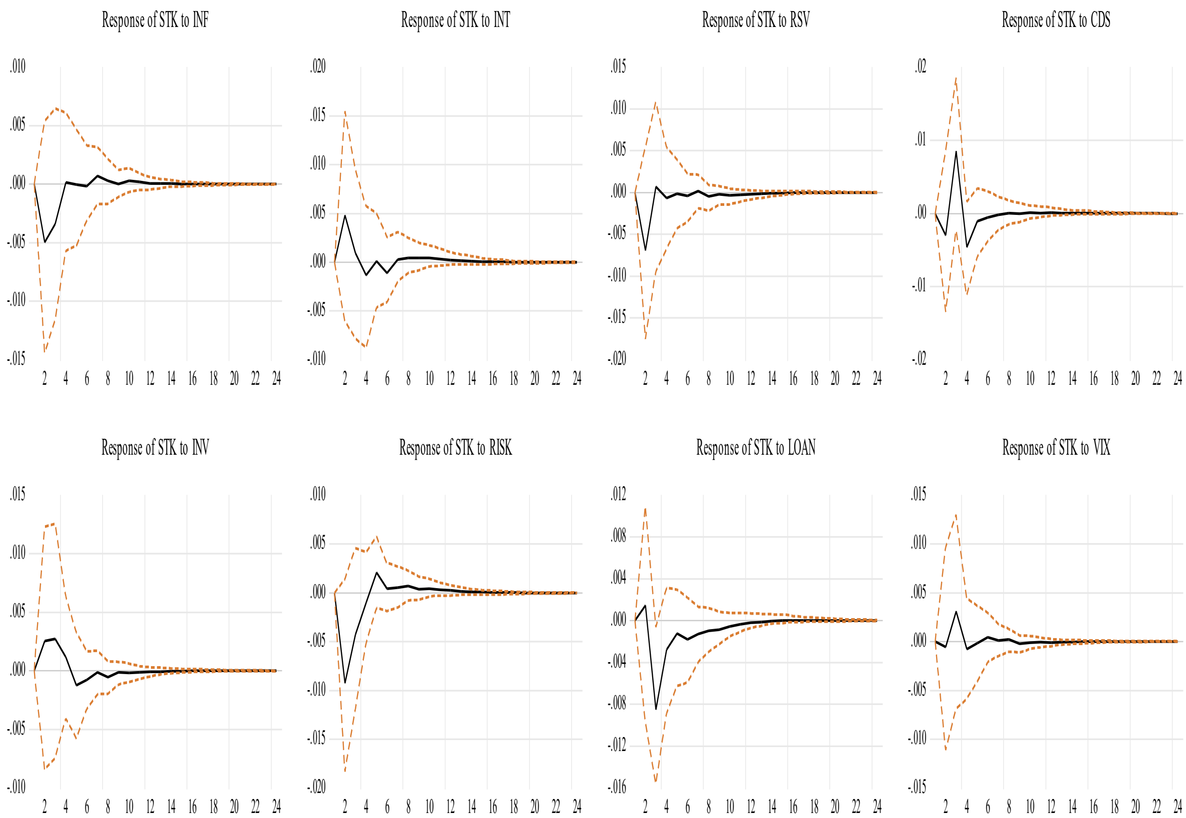
Note: The maximum lag length is set as 12.

The Toda-Yamamoto causality test results include two different probability values: Asymptotic and Bootstrap. In time series analyses, Asymptotic probability values are taken into account when the time dimension is narrow, while Bootstrap probability values are taken into account when the time dimension is high (Topaloglu and Ege, 2020). From this point of view, it can be stated that the time dimension of the current study is high since it consists of 186 observations (15.5 years). Therefore, while reporting the causality test results, interpretation is made by considering the Bootstrap probability values. The results obtained for Model 1 indicate that the independent variables of gross reserves, investor risk appetite, and consumer loans provide statistically significant results in both unstructured and structurally broken Fourier tests. Therefore, according to all Toda-Yamamoto causality test results tested in this study, it can be concluded that there is a Granger causality relationship between RSV, RISK, and LOAN variables to stocks.

According to the results obtained for Model 2, interest rate, CDS and investor sentiment independent variables provide statistically significant results in all Toda-Yamamoto causality tests tested in the study. Therefore, according to all Toda-Yamamoto causality tests tested in this study, it can be stated that there is a Granger causality relationship between INT, CDS, and INV variables to ETF. Finally, the results obtained for Model 3 indicate that CDS, investor sentiment, and consumer loan variables provide statistically significant results according to both unstructured and structurally broken Fourier tests. Therefore, according to all Toda-Yamamoto causality test results tested in this study, it can be said that there is a Granger causality relationship between CDS, INV, and LOAN variables to private sector debt instruments.

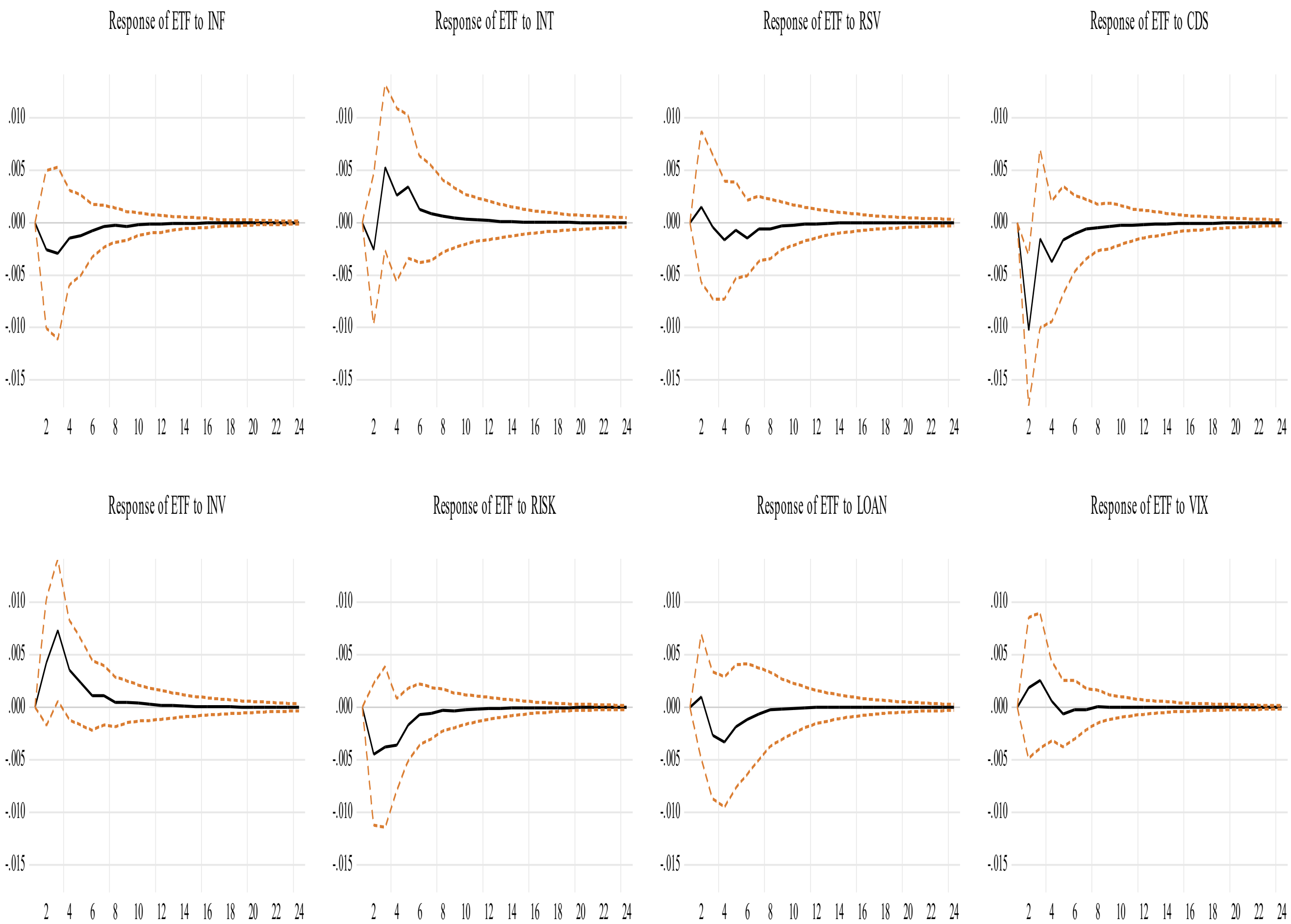
Based on the determination of the long term cointegration relationship in the models developed in the study, the appropriate lag length has been determined by constructing the VEC model in the next stage. As a result of the tests with LR Test Statistic (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ), the optimal lag length for Model 1 has been determined as 9, the optimal lag length for Model 2 as 10 and the optimal lag length for Model 3 as 10 and the VEC model has been reconstructed. Firstly, impulse-response analyses have been performed at a 95% confidence level with the Bootstrap estimator considering 24-month (2-year) periods over the established VEC model. The outputs obtained for Model 1 are presented in Graph 1 below;

Figure 1. Results of Impulse-Response Analysis for Model 1



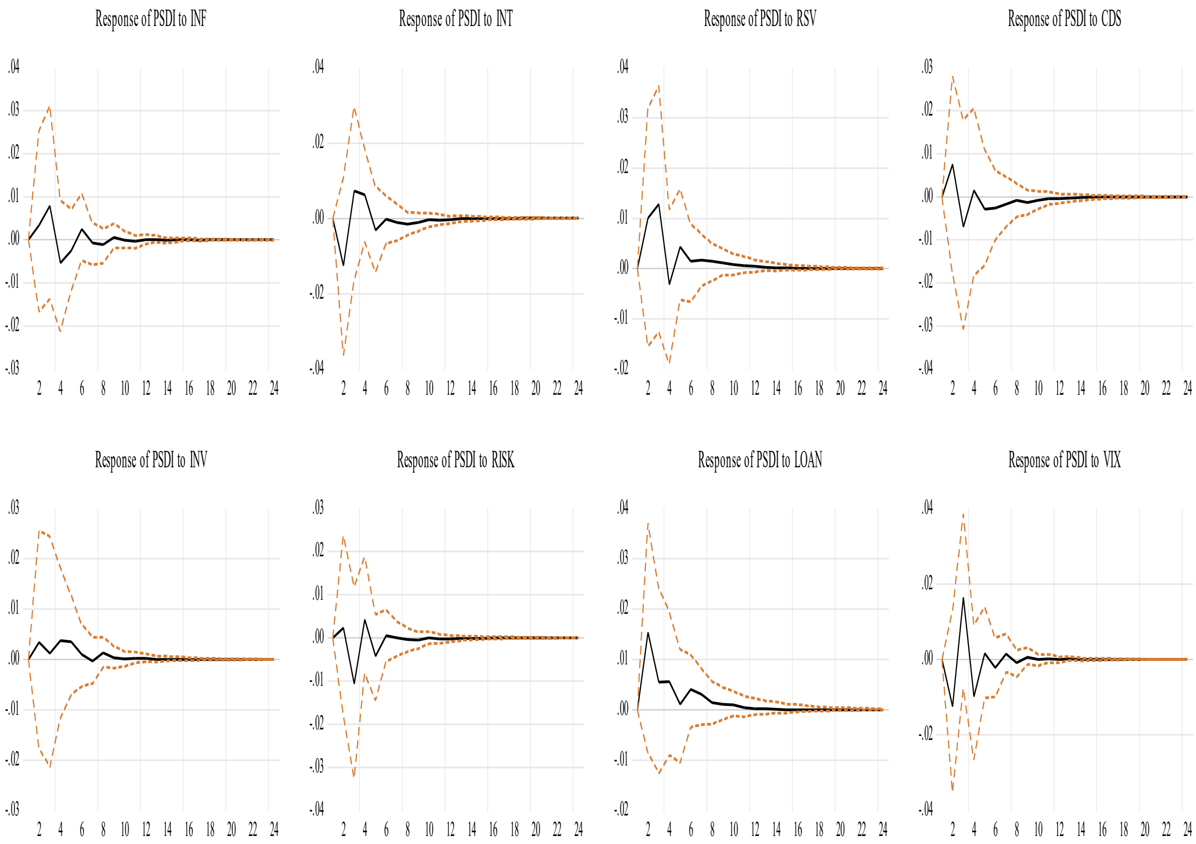
Impulse-response analysis determines to what extent and in which direction variables respond to a shock in the system. After the shock loses its impact, the response of the variables is expected to return to the previous level, in other words, converge to zero (Topaloğlu and Coşkun, 2017). As can be seen from the results obtained, it can be concluded that the stock, which is the dependent variable of Model 1, responds negatively to a shock in INF, RSV, CDS, and RISK variables, while the stock responds positively to a shock in INT, INV, LOAN and VIX variables. However, it is observed that this response of the stock decreases over time and converges to zero, and the response disappears after the sixth period in the general table. However, the responses obtained for RSV, CDS, INV, LOAN and VIX variables are insignificant as the responses are outside the confidence level. In the next step of the study, we proceeded to the impulse-response analysis for Model 2.

Figure 2. Results of Impulse-Response Analysis for Model 2



As can be seen from the results obtained, it is determined that the ETF, which is the dependent variable of the model, responds negatively to a shock in INF, INT, CDS, and RISK variables, while the ETF responds positively to a shock in RSV, INV, LOAN, and VIX variables. When the table is evaluated in general terms, it can be stated that the response of the ETF to all independent variables used in the model decreases over time converges to zero, and disappears after the eighth period. However, the responses obtained for INF, INT, CDS, INV and RISK variables are insignificant as the responses are outside the confidence level. In the next step of the study, we proceeded to the test of impulse-response analyses for Model 3.

Figure 3. Results of Impulse-Response Analysis for Model 3



Based on the results obtained, PSDI, the dependent variable of the model, responds positively to a shock in INF, RSV, CDS, INV, RISK, and LOAN variables, while PSDI responds negatively to a shock in INT and VIX variables. It can be concluded that this response of the PSDI decreases over time, converges to zero, and disappears after the sixth period in the general table. However, the responses obtained for the variables are insignificant as the responses are outside the confidence level.

Finally, variance decomposition analyses have been performed over the established VEC model. For the integrity of the study, the period size has been set as 24 in variance decomposition analyses as in impulse-response analyses. Accordingly, the variance decomposition result table based on periods 1 and 24 is presented below;

Table 13. Results of Variance Decomposition Test

	Period	STK	INF	INT	RSV	CDS	INV	RISK	LOAN	VIX
Model 1	1	100.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	69.382	0.850	9.348	1.594	7.629	0.328	8.984	1.482	0.398
	Period	ETF	INF	INT	RSV	CDS	INV	RISK	LOAN	VIX
Model 2	1	100.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	48.610	0.179	33.532	5.610	4.666	2.023	0.992	2.803	1.581
	Period	PSDI	INF	INT	RSV	CDS	INV	RISK	LOAN	VIX
Model 3	1	100.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	24	78.915	0.338	0.871	3.141	14.110	0.759	0.101	0.815	0.946

With the variance decomposition test, it can be determined on a percentage basis how much of the changes in the error term of the dependent variable are due to its internal dynamics and how much to the error terms of the independent variables used in the study. In light of this information, the variance decomposition test results for Model 1 above indicate that in the first period, all of the changes in the stock error term are due to internal dynamics and that independent variables have no effect. However, in the 24th period, 69.38% of the changes in the stock error term were due to internal dynamics, 0.85% from the error term of INF variable, 9.34% from the error term of INT variable, 1.59% from the error term of RSV variable, 7.62% from the error term of CDS variable, 0.32% from the error term of INV variable, 8.98% from the error term of RISK variable, 1.48% from the error term of LOAN variable and finally 0.39% from the error term of VIX variable. According to the variance decomposition test results for Model 2, in the first period, all of the changes in the error term of the ETF are due to their own internal dynamics and independent variables do not have any effect. However, in the 24th period, 48.61% of the changes in the ETF error term were due to internal dynamics, 0.17% from the error term of INF variable, 33.53% from the error term of INT variable, 5.61% from the error term of RSV variable, 4.66% from the error term of CDS variable, 2.02% from the error term of INV variable, 0.99% from the error term of RISK variable, 2.80% from the error term of LOAN variable and finally 1.58% from the error term of VIX variable. Considering the outputs obtained in Model 3, which is the last model developed within the scope of the current study, it is seen that all of the changes in the error term of the private sector debt instrument in the first period are due to its internal dynamics, while the independent variables do not have any effect. However, in the 24th period, 78.91% of the changes in the error term of the private sector debt instrument were due to internal dynamics, while 0.33% from the error term of INF variable, 0.87% from the error term of INT variable, 3.14% from the error term of RSV variable, 14.11% from the error term of CDS variable, 0.75% from the error term of INV variable, 0.10% from the error term of RISK variable, 0.81% from the error term of LOAN variable and finally 0.94% from the error term of VIX variable.

6. Conclusions and Recommendations

The issue of 'investment instruments' has an important place in the finance literature. It is seen that the traditional and modern basic finance theories that have been introduced to literature are generally focused on return and risk, and investment instruments are needed to calculate the return and risk of portfolio components. Traditional Portfolio Theory argues that risk can be reduced by increasing the number of stocks in the portfolio (lean diversification); Markowitz's Mean Variance Model, which is considered to be the beginning of Modern Portfolio Theory, argues that portfolio risk can be reduced by taking into account the correlation relationship of the assets in the portfolio; Capital Asset Pricing Model (CAPM) argues that portfolio risk can be reduced by including risk-free assets in the portfolio by introducing the concept of risk-free assets in the finance literature. Therefore, the selection of investment instruments to be included in the portfolio components is of great importance in terms of obtaining the expected return calculated for future periods, in other words, avoiding unexpected risks and achieving the ultimate goal of the investments made. In this respect, it is thought that determining the economic and financial factors affecting investment instruments is important for the development of literature, investors, and policy-makers.

Therefore, this study aims to determine the economic and financial factors affecting the investments in stocks, ETFs, and private sector debt instruments traded in Borsa Istanbul by using time series analysis methods with structural breaks based on the period 2008:01-2023:07. In the study, investment instruments constitute the dependent variables, while economic and financial factors constitute the independent variables. Within the scope of the current study, to identify the economic and financial factors affecting investment instruments, ADF and KPSS unit root tests, Fourier ADF and Fourier KPSS unit root tests taking into account structural breaks, Johansen cointegration test (1991), and CiS and Sanso (2006), Arai and Kuruzomi (2007) and Tsong et al. (2016) cointegration tests taking into account structural breaks, short term coefficient estimation with the Ordinary Least Square (OLS) method, long term coefficient estimation with FMOLS estimator, causality tests with Toda-Yamamoto without breaks, single break and cumulative breaks, impulse-response and variance decomposition analyses through VEC model.

In line with the findings obtained, all variables are stationary after the first difference process, and have a long term cointegrated relationship; according to the results of the short term analysis, interest rate, gross reserves, investor risk appetite and consumer loans, and according to the results of the long term analysis, inflation, interest rate, gross reserves, investor risk appetite and consumer loans affect stocks, ETFs and private sector debt instruments; according to the Toda-Yamamoto causality test results both without and with structural breaks, there is a causality relationship from gross reserves, investor risk appetite and consumer loans to stocks, from interest rates, CDS and investor sentiment to ETFs, and from CDS, investor sentiment and consumer loans to private sector debt instruments.

Based on these results, it is recommended that investors who will invest in stocks, ETFs, and private sector debt instruments in the short term should take into account interest rates, gross reserves, investor risk appetite, and consumer loans, while investors who will invest in the long term should consider inflation, interest rates, gross reserves, investor risk appetite and consumer loans variables in their return-risk calculations. Moreover, since interest rates, gross reserves, investor risk appetite, and consumer loans affect investment instruments both in the short term and in the long term, policymakers are advised to take these variables into account when making decisions regarding financial markets and to take the coefficients into account. In addition, consumer loans, which are used as independent variables in the study, have a positive effect on stocks, ETFs, and private-sector debt instruments both in the short term and in the long term. This suggests that investors may be investing with consumer loans. In this regard, it is recommended that the Ministry of Treasury and Finance and the supervisory and regulatory institutions (BRSA, CMB) work together to take more stringent inclusive measures and proactive measures to ensure more effective monitoring of consumer loans through the banking system; and that the Ministry of Treasury and Finance and the Ministry of National Education work together to add financial literacy courses to the curriculum to raise awareness of today’s students, the potential investors of the future, at an early age.

References

1. Akkuş, H. T. ve Zeren, F. (2019). Tüketici güven endeksi ve Katılım-30 İslami Hisse Senedi Endeksi arasındaki saklı ilişkinin araştırılması: Türkiye örneği. Üçüncü Sektör Sosyal Ekonomi Dergisi, 51(1), 53-70.

2. Alalade, Y. S. A., Oliyide, R. O., Okwu, A. T., Adebola, P. S., Ademola, O. C., & Ogunwale, O. (2024). Macroeconomic variables and foreign portfolio investments in Nigeria. Seybold Report Journal, 19(09), 123-152.

3. Arai, Y., and Kurozumi, E. (2007). Testing for the null hypothesis of cointegration with a structural break. Econometric Review, 2, 705-739.

4. Bartholdy, J., and Peare, P. (2005). Estimation of expected return: CAPM vs. Fama and French. International Review of Financial Analysis, 14, 407-427.

5. Bayrakdaroğlu, A. (2021). Finansal varlıkları fiyatlama modeli. A. Gündogdu (Ed.), in Finansın temel teorileri (pp. 133-165). Gazi Kitapevi.

6. Becker, R., Enders, W., and ve Lee, J. (2006). A stationarity test in the presence of an unknown number of smooth breaks. Journal of Time Series Analysis, 27(3), 381-409.

7. Boonman, T. M. (2023). Portfolio capital flows before and after the Global Financial Crisis. Economic Modelling, 127, 1-17.

8. Carrion-i-Silvestre, J., and Sansó, L. A. (2006). Testing the null of cointegration with structural breaks. Oxford Bulletin of Economics and Statistics, 68(5), 623-646.

9. Central Custody and Data Storage Organization (2023), www.mkk.com.tr.

10. Chang, C. L., Hsieh, T. L., and McAleer, M. (2018). Connecting VIX and stock index ETF with VAR and diagonal BEKK. Journal of Risk and Financial Management, 11(58), 1-25.

11. Cihangir, M., and Kandemir, T. (2010). Finansal kriz dönemlerinde hisse senetleri getirilerini etkileyen makroekonomik faktörlerin Arbitraj Fiyatlandırma Modeli aracılığıyla saptanmasına yönelik bir çalışma. Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 15(1), 257-296.

12. Çakar, R. ve Özkan, O. (2019). Riski seven ve riskten kaçan yatırımcıların optimum portföy seçimi yapabilecekleri piyasalar. Anadolu Üniversitesi Sosyal Bilimler Dergisi, 20(1), 23-38.

13. Dabbağoğlu, K. (2010). Tahvil – Bono ve hisse senedi yatırımlarının raporlanması. Anadolu Bil Meslek Yüksekokulu Dergisi, 19, 53-68.

14. Demir, Y. ve Göçmen Yağcılar, G. (2009). İMKB’de işlem gören banka hisse senetlerinin getirilerini etkileyen faktörlerin arbitraj fiyatlama modeli ile belirlenmesi. Alanya İşletme Fakültesi Dergisi, 1(2), 36-51.

15. Dev, K., and Shakeel, S. F. (2013). Determinants for the growth of stock market. JISR Management and Social Sciences & Economics, 11(2), 71-82.

16. Dızman, S. (2015). Finansal yatırımların Türkiye Muhasebe Standartları (TMS) ve Türkiye Finansal Raporlama Standartları (TFRS) kapsamında muhasebeleştirilmesi. Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, 16(1), 279-298.

17. Dickey, D. A., and Fuller, W. A (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74, 427–431.

18. Ege, İ. ve Şahin, S. (2015). Nedenleri ve Sonuçlarıyla Finansal Krizler. Delice, G. & Ege, İ. (Ed), in Uluslararası Finans, Teori, Politika ve Uygulama (pp. 369-402). Gazi Kitabevi.

19. Enders, W., and Lee, J. (2012). The flexible fourier form and the Dickey-Fuller type unit root tests. Economics Letters, 117(1), 196-199.

20. Firmansyah, M., Mu'ammal, I., and Tsalasa, A. R. A. (2024). The Influence of Macroeconomic on Investment Performance. Economics Development Analysis Journal, 13(3), 289-300.

21. Gill, A., Biger, N., Mand, H. S., and Gill, S. S. (2011). Factors that affect mutual fund investment decision of Indian investors. International Journal Behavioural Accounting and Finance, 2, 329-345.

22. Gürsakal, S. (2007). Hisse senedi ve döviz piyasası risklerinin riske maruz değer yöntemi ile karşılaştırılması. Uludağ Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 26(2), 61-76.

23. Güryel, A., and Kula, V. (2024). Yabancı Portföy Yatırımlarının Belirleyicileri: Türkiye Örneği. Üçüncü Sektör Sosyal Ekonomi Dergisi, 59(3), 1753-1768.

24. Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in gaussian vector autoregressive models. Econometrica, 59(6), 1551-1580.

25. Kök, D. ve Uygur, M. E. (2014). Finansal piyasalarda fiyat etkileşimi: BİST 100 ve seçilmiş finansal göstergeler için VAR analizi. Pamukkale İşletme ve Bilişim Yönetimi Dergisi, 1(1), 1-23.

26. Küçükosman, A., and Uzun, S. (2024). The Causality Relationship between Credit Default Swaps (CDS) and Portfolio Investments: The Case of Türkiye. Journal of Research in Economics Politics and Finance, 9(3), 462-483.

27. Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., and Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root: How sure are we that economic time series have a unit root?. Journal of Econometrics, 54(1-3), 159-178.

28. Markowitz, H. (1952). Portfolio selection. The Journal of Finance, 7(1), 77-91.

29. Medetoğlu, B. (2023). Finansal varlıklar: Tanım, işleyiş ve özellikler. B. Öçal (Ed.), in Sosyal bilimlerde toplumsal sorunlara bakış: Teorik çalışmalar (pp. 7-25). Efe Akademi Yayınları.

30. Nisani, D., and Shelef, A. (2020). A statistical analysis of investor preferences for portfolio selection. Empirical Economics, 61, 1883–1915.

31. Nur, T. (2022). Yatırımcı risk iştahının pay piyasasına etkisi: BİST Mali Endeksi üzerine bir araştırma. Fiscaoeconomia, 6(3), 1103-1125.

32. Özturk, B. (2008). Makroekonomik faktörlerin İstanbul Menkul Kıymetler Borsası Ulusal-100 endeksi ve volatilitesi üzerindeki etkilerinin incelenmesi (1997-2006). [Yayımlanmamış yüksek lisans tezi]. İstanbul Teknik Üniversitesi.

33. Parveen, S., Satti, Z. W., Subhan, Q. A., and Jamil, S. (2020). Exploring market overreaction, investors' sentiments and investment decisions in an emerging stock market. Borsa İstanbul Review, 20(3), 224-235.

34. Pastor, L. (2000). Portfolio selection and asset pricing models. The Journal of Finance, 55(1), 179-223.

35. Ratner, B. (2009). The correlation coefficient: Its values range between +1/−1, or do they?. Journal of Targeting, Measurement and Analysis for Marketing, 17, 139-142.

36. Roll, R., and Ross, S. A. (1980). An Empirical investigation of the arbitrage pricing theory. The Journal of Finance, 35(5), 1073-1103.

37. Roman, D., and Mitra, G. (2009). Portfolio selection models: A Review and new directions. Business, Economics, Mathematics, 1(2), 69-85.

38. Ross, S. (1976). The Arbitrage theory of capital asset pricing. Journal of Economic Theory, 13, 341-360.

39. Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. The Journal of Finance, 19(3), 425-442.

40. Sjösten, L. (2022). A comparative study of the KPSS and ADF tests in terms of size and power. [Yayımlanmamış yüksek lisans tezi]. Uppsala University.

41. Tabachnick, B. G., and Fidell, L. S. (1996). Using multivariate statistics. Harper Collins College Publishers.

42. Topaloğlu, E. E. ve Coşkun, N. (2017). Firma karlılığını etkileyen faktörlerin sahiplik yoğunlaşması doğrultusunda tespiti: Ampirik bir yaklaşım. Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 22(1), 95-112.

43. Topaloğlu, E. E. ve Ege, I. (2020). Kredi temerrüt swapları (CDS) ile Borsa İstanbul 100 Endeksi arasındaki ilişki: Kısa ve uzun dönemli zaman serisi analizleri. İşletme Araştırmaları Dergisi, 12(2), 1373-1393.

44. Tsong, C. C., Lee, C. F., Tsai, L. J., and Hu, T. C. (2016). The Fourier approximation and testing for the null of cointegration. Empirical Economics, 51, 1085–1113.

45. Vardar, G. (2021). Arbitraj fiyatlama teorisi: Ross ve çok faktörlü modeller. A. Gündogdu (Ed.), in Finansın temel teorileri (pp. 167-199). Gazi Kitapevi.

46. Zivot, E., and Andrews, D. W. K. (1992). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. Journal of Business & Economic Statistics, 10(3), 251-270.