BMIJ
ISSN: 2148-2586

bmij (2025) 13 (4):2076-2100
doi: https://doi.org/10.15295/bmij.v13i4.2673
Research Article

# Macroeconomic determinants of Türkiye's participation index: A VECM and SVAR analysis

## Türkiye Katılım Endeksi'nin makroekonomik belirleyicileri: VECM ve SVAR analizi

Fazlı Irmak[1]

[1] Asst. Prof. Dr., Bafra Vocational School, Ondokuz Mayıs University, Samsun, Türkiye, fazli.irmak@omu.edu.tr

ORCID: 0000-0003-3584-2462

## Abstract

This study examines the sensitivity of Türkiye's Participation Index (XK100) to key macroeconomic and financial indicators. Using daily data from November 2021 to November 2024, Johansen cointegration, Vector Error Correction Model (VECM), Granger causality, and Structural VAR (SVAR) analyses are employed. The results indicate that the Participation Index is positively associated with the BIST 100 index, gold prices, and the profit-sharing rates of participation banks. In contrast, it is negatively associated with interest rates and the global risk indicator (VIX). No long-run relationship is found between the exchange rate and the CDS premium. SVAR findings show that the index is particularly sensitive to shocks in interest rates and global uncertainty, yet it maintains a strong long-run cointegration with the conventional index. Overall, the results suggest that Islamic financial markets in Türkiye are not entirely decoupled from traditional markets and remain influenced by similar macro-financial risk factors, offering valuable implications for investors and policymakers.

**Keywords:** Participation Index, Cointegration Test, Structural VAR (SVAR) Analysis

**Jel Codes:** G1, G2, G4

## Öz

Bu çalışma, Türkiye Katılım Endeksi'nin (XK100) makroekonomik ve finansal göstergelere karşı duyarlılığını analiz etmektedir. Kasım 2021–Kasım 2024 dönemine ait günlük veriler kullanılarak Johansen eşbütünleşme testi, Vektör Hata Düzeltme Modeli (VECM), Granger nedensellik ve Yapısal VAR (SVAR) analizleri uygulanmıştır. Bulgular, Katılım Endeksi'nin BIST 100 endeksi, altın fiyatı ve katılım bankacılığı kâr payı oranlarıyla pozitif; faiz oranı ve küresel risk göstergeleriyle negatif ilişkili olduğunu göstermektedir. Döviz kuru ve CDS primi ile uzun vadede anlamlı bir ilişki tespit edilmemiştir. SVAR sonuçları, endeksin özellikle faiz oranı ve küresel belirsizlik şoklarına duyarlı olduğunu, ancak geleneksel endeksle güçlü bir eşbütünleşme sergilediğini ortaya koymaktadır. Sonuçlar, İslami finans piyasalarının geleneksel piyasalardan tamamen ayrışmadığını, benzer makroekonomik risk faktörlerinden etkilendiğini göstermekte; yatırımcılar ve politika yapıcılar için risk yönetimi ve piyasa istikrarı açısından önemli çıkarımlar sunmaktadır.

**Anahtar Kelimeler:** Katılım Endeksi, Eşbütünleşme Testi, Yapısal VAR (SVAR) Analizi

**JEL Kodları:** G1, G2, G4

**Submitted:** 1/09/2025

**1st Revised:** 13/10/2025

**2nd Revised:** 30/10/2025

**Accepted:** 15/11/2025

**Online Published:** 25/12/2025

**Citation:** Irmak, F., Macroeconomic determinants of Türkiye's participation index: A VECM and SVAR analysis, bmij (2025) 13 (4):2076-2100, doi: https://doi.org/10.15295/bmij.v13i4.2673

## Introduction

In the last quarter of the 20th century, unexpected fluctuations occurred in the stock markets of many countries, particularly in the United States. Scientists have stated that macroeconomic factors may have caused these fluctuations. Based on this idea, studies have been conducted to determine the effect of macroeconomic variables such as inflation, unemployment rate, interest rate, oil price, money supply, exchange rate, gold, and foreign trade balance on stock prices and stock market indices (Erdem, Arslan and Sema Erdem, 2005; Al-Majali and Al-Assaf, 2014; Barakat, Elgazzar, and Hanafy, 2016; Koyuncu, 2018; Karakoç, 2020: 32; Bhuiyan and Chowdhury, 2020; Fattah and Kocabıyık, 2020). From an investor's perspective, stocks are among the most important investment instruments, and numerous factors influence stock prices. Investors who closely monitor these variables that affect stock prices develop investment strategies in response to changes in these variables, aiming to predict stock price movements in advance and achieve higher returns (Syzdykova, 2018: 332).

The factors affecting the stock market can be predicted, but it is quite difficult to determine which factors have what level of impact. In some cases, even investors' psychological behaviour can affect stock prices. Even if macroeconomic factors and market conditions remain unchanged, stock prices can still fluctuate. At this point, identifying the factors that influence stock prices is a crucial issue for both scientists and investors (Sancar, Uğur, and Akbaş, 2017: 1775). Knowledge of these reciprocal relationships between the stock market and macroeconomic factors is critical not only for investors but also for policymakers (Vejzagic and Zarafat, 2013: 94). According to the efficient market hypothesis, stock prices accurately reflect the underlying fundamentals of price formation, and changes in stock prices serve as leading indicators of macroeconomic variables. Therefore, the relationship and interaction between macroeconomic variables and stock prices can be used as a reference in the formulation of national macroeconomic policy (Maysami, Lee, and Hamzah, 2004: 48). While numerous studies have been conducted in the literature on the relationship between traditional stock markets and various macroeconomic variables, researchers continue to be interested in whether similar results can be obtained in the relationship between macroeconomic variables and indices developed in line with Islamic sensitivities (participation indices), especially after the 2008 financial crisis.

The global financial crisis of 2008 shook confidence in interest-based financial institutions, leading to increased interest in Islamic finance. The most important reason for this increased interest is the expectation that Islamic finance, with its ethics-based approach, could serve as an alternative to the traditional financial system (Sakarya, Yıldırım, and Yavuz, 2018: 440; Konak and Türkoğlu, 2022: 818). During the COVID-19 pandemic, serious problems emerged in financial systems worldwide, affecting both traditional and Islamic stock exchanges similarly. However, studies show that Islamic bonds were quite resilient during this period (Kazak, 2023: 197). According to Raza et al. (2019: 210), Islamic stock indices have the advantage of reducing risk when mixed with alternative assets. In addition, the development of Islamic stock indices provides alternative opportunities to diversify portfolios globally and across asset classes. Similarly, the results of Kenourgios et al.'s (2016: 37) study indicate that Islamic stocks and bonds can act as a buffer against risk and instability, particularly during crisis periods.

Religious rules govern the Islamic financial system, and social, moral, and ethical values are at the forefront of all transactions (Seçme et al., 2016: 108). The most important difference between the Islamic financial system and the traditional financial system is that it is based on Islamic rules, the most important of which is the prohibition of interest. In addition, the ban on gambling (maysir), avoidance of excessive risk and uncertainty (gharar), bribery (rishwah), and risk sharing are also fundamental rules that are taken into account when creating Islamic financial products (Rizvi et al., 2016: 51; Shahzad et al., 2017: 9). Bank Islam Malaysia Bhd, established in 1983, was recorded as the first application related to Islamic capital markets. The DMI 150 (Dow Jones Islamic Index) was established in 1988 by Faisal Finance and Votebel Bank. At the beginning of the 21st century, Islamic financial institutions and instruments continued to be established. Islamic indices were based not only in Islamic countries but also in the stock exchanges of developed countries around the world, such as Dow Jones, S&P, and FTSE (Carı and Nesimioğlu, 2019: 57). As of 2023, the total value of Islamic financial assets in more than 1,600 financial institutions has reached $4.5 trillion (London Stock Exchange Group, LSEG, 2024). In Turkey, the total value of Islamic financial assets exceeded 90 billion dollars as of 2023, and according to data from the "Islamic Financial Services Board," when evaluated in terms of total assets, the value of Turkish Islamic financial assets ranks seventh in the world in the Islamic banking market (Bloomberght, 2024).

Stock market indices are created to serve as underlying assets for financial products, to monitor market price movements, and to serve as benchmarks for collective investment instruments. The Participation Index, on the other hand, is an index created to enable institutional or individual investors who wish to invest in accordance with participation finance principles to select from among companies operating in

accordance with these principles, to increase companies' awareness in this direction, and to enable them to benefit more from funding opportunities in the participation finance sector (Borsa Istanbul, 2024). In Turkey, the Participation Index is traded on the Borsa Istanbul National Market and was established on December 31, 2008. Following the establishment of the Participation 30 Index, the Participation 50 and Participation Model Portfolio indices began operations within Borsa Istanbul on July 9, 2014 (Yıldız, 2015: 44). For a company to be eligible for inclusion in the Participation Index, it must not engage in activities such as the production and trade of alcoholic beverages, the production and trade of narcotic substances for non-medical purposes, gambling and gambling-related activities, the production and trade of pork and pork products, interest-based financial transactions, publishing activities contrary to morality and Islamic values, entertainment, hospitality, and other activities incompatible with Islamic values, activities causing significant harm to the environment and living beings, biological/genetic activities aimed at altering human nature, and the production and trade of tobacco products harmful to health." In the next stage, the ratio of the income obtained from the company's activities in the areas mentioned above to the total income must not exceed 5%, the average market value of interest-bearing assets listed in the financial statements or 33% of the total assets, whichever is greater, and the average market value of interest-bearing liabilities listed in the financial statements or 33% of the total assets, whichever is greater, must not be exceeded" (Borsa Istanbul, 2024).

The relationship between macroeconomic variables and stock returns has been extensively studied in finance research. Macroeconomic indicators affect discounted future cash flows, thereby changing stock values. Previous studies have shown that there are causal relationships between traditional stock market indices and macroeconomic indicators. However, the uncertainty about whether a similar relationship between conventional stock market indices and macroeconomic variables also holds for the participation index persists. In this sense, this study aims to examine the relationship between the participation index and macroeconomic indicators, specifically global risk indicators (gold, fear index) and national risk indicators (gold, fear index), during the periods from November 12, 2021 - November 29, 2024, between the participation index and macroeconomic indicators such as global risk indicators (gold, fear index), national risk indicators (credit default swap premiums), traditional stock indices, and other macro variables. Understanding the behaviour of the participation index will help investors and fund managers be more effective in portfolio diversification and assist regulatory agencies in taking the necessary measures. As the literature shows, many studies have examined the relationship between the participation index and macroeconomic variables, but most use only a few variables. This study examines a broad pool of variables thought to be related to the participation index. Additionally, the CDS variable, which is related to traditional stock market indices but not to the participation index, has been included in the study. Furthermore, the profit shares paid by participation banks, which are thought to be related to the participation index, have also been included among the variables.

In the continuation of the study, under the heading of literature review, literature on the relationship between the stock market and macroeconomic variables, focusing on participation indices, is discussed. After introducing the data set and methodology, the findings are discussed, and the study concludes with the results section.

## Literature review

There are many studies examining the relationship between the participation index and traditional stock market indices and macroeconomic variables (Nishat, Shaheen, and Hijazi, 2004; Hussin et al., 2012; Al-Majali and Al-Assaf, 2014; Varsak, Koyuncu and Kiliç, 2017; Bhuiyan and Chowdhury, 2020; Fattah and Kocabıyık, 2020; Demirdogen and Kaplan, 2020; Avcı and Sarıgül, 2022). The main objective of this study is to determine the relationships between the traditional stock market index, country-specific macroeconomic factors, country- and global-risk indicators, and participation banking profit-sharing rates, as well as the participation index, in the Turkish sample. The study focuses on research conducted in Turkish markets and references international studies.

While participation indices are based on asset returns, traditional indices are interest-rate-focused and credit-based (Rahim and Masih, 2015: 2). Therefore, participation indices are less affected by shocks originating from the financial system than traditional indices (Dewandaru et al., 2014: 562). Indeed, Ho et al. (2014) found that Islamic indices were less affected by the mortgage crisis than traditional indices. Ajmi et al. (2014) identified a causal relationship between Islamic indices and traditional indices, while Al-Khazali et al. (2014) determined that the conventional index leads the Islamic index. Içellioğlu (2018) investigated cointegration between the participation index and the BIST100 using the Johnson cointegration test and found a cointegration relationship between the two. Furthermore, in a study examining the short- and long-term relationship between the Participation 30 index and the traditional stock market index, a one-way causal relationship from the Participation 30 index to the BIST100 index

was identified. Avcı and Sarıgül (2022) found that the participation index and the traditional stock market index are cointegrated and that the latter increases the performance of the former. Additionally, the causality test revealed a two-way causality relationship between the traditional stock market index and the participation index. Similarly, Kazak (2023) identified a two-way causality relationship between the traditional stock market and the participation index in their study.

Modern portfolio theory emphasises the importance of portfolio diversification to spread risk. In this sense, understanding the interaction between Islamic and traditional stock indices can help investors diversify their portfolios. In their study, Hakim and Rashidian (2002) investigated the interactions between conventional and Islamic stocks. According to the GARCH results of their research, they found that traditional indices influence Islamic indices and that Islamic indices and traditional indices are inseparable. According to Hakim and Rashidian (2002), investors should develop portfolios comprising conventional and Islamic indices for diversification. Ajmi et al. (2014) identified linear and nonlinear causality between Islamic and traditional stock indices in their study and found that causality flows from Islamic to conventional indices. The study, which also examined the causal relationship between financial risk factors, showed that the relationship between Islamic indices and non-Sharia-compliant products, such as interest rates, indicates that Islamic indices are similarly affected by financial markets as traditional indices.

In particular, companies that depend on foreign raw materials and on loans experience higher costs and lower profits when exchange rates rise. This decline in profits affects the company's share prices. In the event of a decrease in the exchange rate, especially for export-oriented companies, sales and company profits increase, and stock prices rise. This situation is not limited to companies listed in the traditional index but also applies to companies operating in the participation index (Purbowisanti, 2018: 44). When examining studies on the relationship between the participation index and the exchange rate in the literature, most studies identify a negative relationship (Sakti and Harun, 2013: 81; Vejzagić and Zarafat, 2013: 106; Habib and Islam, 2017: 43; Sertkaya, 2022: 185). Ögel and Gökgöz (2020) found no cointegration between the participation index and the dollar and euro exchange rates. Still, they identified a one-way causal relationship from the dollar exchange rate to the participation index. Kılıç and Türkan (2023) found that the participation index and the exchange rate are cointegrated in the long run and that there is a one-way causal relationship from the exchange rate to the participation index. The results of Şimşek and Bulut's (2024) study show that the effects of the dollar and the euro on the participation index are positive, with the relationship intensifying as the quantile level increases. On the other hand, studies have also found no relationship between the exchange rate and the participation index (Yiğiter and Tanyıldızı, 2020: 194; Karakuş and Vural, 2022: 72).

In the relationship between interest rates and stock market indices, interest rates reduce stock market returns. This is because during periods of high interest rates, savers tend to turn to low-risk, interest-bearing investment instruments rather than stocks. On the other hand, the negative impact of interest rate increases on cash flows causes a decline in companies' price performance and, consequently, in stock market indices (Nishat et al., 2004: 635). Additionally, in company stock valuation, when calculating present value, future cash flows are discounted to the present using a certain discount rate. An increase in interest rates raises the discount rate and, consequently, reduces the company's present value (Panda, 2008). For this reason, many studies have shown a negative relationship between interest rates and index returns (Shiller and Beltratti, 1992: 42; Koch and Zaporoşenko, 2001: 179). Although there is consensus on the relationship between interest rates and traditional stock market indices, the relationship between participation indices and interest rates remains unclear. Although the companies included in the participation index are interest-free, they may have certain levels of interest-based assets or liabilities (Abdul Rahman et al., 2010: 230). Therefore, it is expected that interest rates are related to the participation index, even if not at the same level as in the traditional stock market. Indeed, Vejzagić and Zarafat (2013) found that the Malaysian Hicret Islamic Index plays an important role in macroeconomic indicators and that the Islamic Index negatively affects interest rates. In the study by Avcı and Sarıgül (2022), a unidirectional causal relationship from the interest rate to the participation index was identified. However, Habib and İslam (2017) and Karakuş and Vural (2022) did not find a significant relationship between interest rates and the Islamic index in their regression analysis. Similarly, Ögel and Gökgöz (2020) and Yiğiter and Tanyıldızı (2020) found no evidence of cointegration or causality between interest rates and the Islamic index.

When examining studies on the relationship between the participation index and gold prices, Emeç (2021) found cointegration between the variables and concluded that gold prices affect the participation index in the long term, based on the Generalised Variance Analysis. Naeem et al. (2021) identified an asymmetric relationship between gold prices and Islamic index returns. Sertkaya (2022), on the other

hand, identified a positive, significant relationship between gold prices and the participation index using the ARDL bounds test approach. In their study, Kılıç and Türkan (2023) found cointegration between the variables but could not establish a causal relationship between gold and the participation index. Şimşek and Bulut (2024) found that the positive effect of gold on the participation index intensifies as the quantile level increases, based on their quantile regression analysis.

The fear index (VIX) represents an indicator of global risk factors. The VIX reflects the market's expectations for future volatility and provides investors with information for speculation and hedging. Investigating the relationship between the VIX, which is an indicator of economic uncertainty and instability, and the participation index will help investors hedge against risk or speculate for higher returns. Hammoudeh et al. (2014), in their study to identify the determinants of traditional and Islamic indices, found that the VIX negatively affects both traditional and Islamic indices, and that Islamic indices are not an alternative to conventional stock indices in terms of uncertainty. Kazak (2023) identified a one-way causal relationship from the VIX index to the participation index. Unlike studies reporting a relationship between the VIX and the participation index, Ajmi et al. (2014) found no linear or nonlinear causal relationship between the Dow Jones Islamic Market Index and the VIX. Arfaoui and Raggad (2023), in their study investigating the causal relationship between the Dow Jones Islamic stock index and the VIX, emphasised that no clear causal relationship existed between the Islamic index and the VIX, and that the Dow Jones Islamic index was Sharia-compliant because it did not contain speculative elements. In a study by Iskenderoğlu and Akdağ (2019) that investigated the causal relationship between the returns of 19 developed and developing country stock markets and the VIX index, no causal relationship was identified from the VIX index to the Tadawul All Share index, which is considered an Islamic index.

Chan-Lau and Kim (2004) stated that CDS and stock markets interact. An increase in CDS rates indicates higher credit risk. An increase in credit risk raises borrowing costs, which in turn shifts resources toward external debt and away from necessary investment, thereby reducing the country's growth figures. As a result, households and firms are exposed to higher taxes to pay off external debts, causing consumption and investment to slow down and leading to a decline in firm profits (Coronado et al., 2012: 38). The decline in firm profits negatively affects stock prices and the stock exchange indices on which the stocks are traded. When examining studies that investigate the relationship between CDS and index returns, Naifar (2016) identified a positive relationship between Islamic index dynamics and CDS, as well as a causal relationship between CDS and the index. In Chan et al.'s (2009) studies, a cointegration relationship was identified between stock prices and CDS for China, South Korea, and Thailand. Furthermore, CDS is a Granger cause of stock prices for Indonesia, Malaysia, and the Philippines. Başarır and Keten (2016) found no long-run relationship between CDS premiums and stock market indices across 12 developing countries. Still, they did find a two-way Granger causality between CDS and stock market indices in the short run. Bayrakdaroğlu and Mirgen (2021) conducted a regression analysis and found a significant negative relationship between CDS and stock markets across BRICS countries.

## Data sets and methods

The purpose of this study is to analyse the daily data of the BIST Participation 100 (XK100) index, which is listed on the Istanbul Stock Exchange, by examining its daily data between November 12, 2021, when the index began trading, and November 29, 2024, to determine the relationship between the participation index and traditional stock market indices, national and global risk indices, participation banking profit-sharing rates, and certain national macroeconomic variables.

The Bist Participation 100 (XK100) index was preferred over the Participation 30 or Participation 50 indices because it includes the 100 most liquid and high-market-value stocks compliant with Islamic finance principles, providing broader market coverage and a more representative reflection of the participation-based financial segment.

The variables used in the study are based on daily data. XK100 index data and other explanatory variables were obtained from Investing (investing.com.tr), the Central Bank of the Republic of Turkey Electronic Data Distribution System (EVDS), and the Turkish Participation Banks Association (TKBB) databases. The Eviews 12 software package was used for data analysis.

The participation banking profit-sharing rate (KATKI) variable was derived from the bulletins published by the Turkish Participation Banks Association (TKBB). TKBB announces the profit-sharing rates for each participating bank separately. In this study, the KATKI variable was calculated as the simple arithmetic average of the rates announced by all participating banks for each period.

The dependent and independent variables used in the study are presented in Table 1.

**Table 1:** Variables Table

| Variables | Variable Code | Variable Description |
|---|---|---|
| Islamic (Participation) Index | XK100 | BIST Participation 100 Index |
| Traditional Index | XU100 | BIST 100 Index |
| Islamic Banking Profit Sharing | KATKI | Participation Banks Profit Share Average |
| Fear Index | VIX | CBOE Volatility Index (Korku Endeksi) |
| Turkey Risk Premium | CDS | Turkey's 5-year Credit Default Swap (CDS) premium |
| Interest Rate | DIBS | 2-year government bond interest rates |
| Exchange Rate | KUR | USD/TRY exchange rate |
| Gold Price | ONS | 1 The value of an ounce of gold in US dollars |

To determine the macroeconomic variables affecting the participation index, daily data series were analysed using econometric time-series methods. The analysis consists of four basic stages. First, the stationarity of the series was tested using the Augmented Dickey–Fuller (ADF; Dickey and Fuller, 1979), Phillips–Perron (PP; Phillips and Perron, 1988), and Dickey–Fuller GLS (DF-GLS; Elliott, Rothenberg and Stock, 1996) tests. In the second stage, the lag length of the model was determined. In the third stage, the Johansen cointegration test was conducted to examine the long-term cointegration relationship between the series, and the Vector Error Correction Model (VECM) was used to analyse deviations from equilibrium among the variables. In the final stage, Granger causality analysis was performed to determine the causality relationship between the series.

In addition to these stages, a Structural VAR (SVAR) analysis was included in the study. The SVAR model provides more detailed results on the direction and magnitude of causality, in addition to those of the traditional VAR model. Using the SVAR model, the effects of structural shocks in variables on other variables were analysed through impact-response analysis. Furthermore, using the forecast-error variance decomposition, the contribution of each variable to the forecast error was assessed. The SVAR analysis yielded more in-depth interpretations than the Granger causality analysis and contributed to a more thorough evaluation of the relationships among variables. Furthermore, the SVAR results, along with other time series analysis results, supported the validation of the findings.

First, unit root tests were used to assess the series' stationarity. In time series analysis, the series must be stationary to perform cointegration and causality tests. If the mean and variance of a series change over time, the series is not stationary. Estimation results obtained from non-stationary series have no statistical significance (Habib and Islam, 2017: 39). The first method used to test for the presence of a unit root in a series is the ADF test. The ADF test examines the null hypothesis that the series has a unit root (Bhattacharjee and Das, 2020: 59). The second unit root test method is the PP unit root test. The PP test is a nonparametric test based on the Newey-West adjusted variance method, a traditional Dickey-Fuller test that accounts for autocorrelation and heteroscedasticity. The PP test tests the null hypothesis that the series has a unit root (Habib and Islam, 2017: 39). Finally, the DF-GLS test developed by Elliott et al. (1996) was used to test for a unit root. The DF-GLS test is based on the assumption of using the generalised least squares (GLS) estimator in the unit root test. If the sample size is sufficiently large to capture autocorrelation effects and ensure the correctness of asymptotic approaches, it is the best-performing unit root test among second-order sample-based tests (Elliott et al., 1996: 830). The applicability of this test depends on the absence of autocorrelation and of variance in the error terms, and it assumes that the error terms are constant-variance and independent (Yalçınkaya, 2019: 35).

The most fundamental problem in time series is selecting the most appropriate model. The optimal lag length determines the most suitable model. In time-series analysis, if there are multiple models, each specified by a fixed parameter vector, and the prior weights are sufficiently large, the best model is the one with the highest probability (Akaike, 1978: 217). The Akaike information criterion (AIC) can also be used as a cross-validation measure of parameter estimates obtained from the original sample on different samples.

In the third stage, Johansen cointegration analysis was performed using the optimum lag selected with the VAR model. Taking the differences of the series and making them stationary can lead to information loss and cause the relationships between the series to be lost. Cointegration theory is a method that allows for testing the stationarity of linear combinations of non-stationary series and, if the relationships are stationary, for examining long-term equilibrium relationships. This analysis assumes that long-term relationships may exist even between non-stationary series and that these relationships may have a stationary structure. In other words, the existence of a long-term relationship indicates that each series within the system is influenced by a common stochastic trend rather than its own permanent and

external shocks. For cointegration to exist, the series must be equally stationary. In such a model, the series will not exhibit spurious regression because they are influenced by the same stochastic trend (Tarı and Yıldırım, 2009: 100).

The cointegration test was first proposed by Engle and Granger (1987) as a single-equation test. Due to shortcomings in this test, Johansen (1988) developed a multi-equation cointegration test that can identify multiple cointegration relationships among variables in models with more than one explanatory variable (Canbay and Mercan, 2017: 97-98). The most important advantage of Johansen cointegration analysis is that it allows cointegration analysis to be performed without distinguishing between internal and external series. Cointegration analysis is a VAR (Vector Autoregression) model consisting of n variables and n equations. In such an equation, at most n-1 cointegration relationships emerge (Azgün and Taşdemir, 2010: 41). In the third step of the methodology, Johansen cointegration analysis was performed to determine the cointegration relationships. In the Johansen cointegration method, two statistical methods, the eigenvalue and trace statistics, are used. The eigenvalue statistic is as follows (Sahu et al., 2019: 20):

$$LR(r, r+1) = -Tln(1-\lambda_{r+1}) \quad (1)$$

Equation (1) contains the λ_(r+1) eigenvalue estimates, while T denotes the number of observations.

The following formula is used for the trace value statistic (Sahu et al., 2019: 21):

$$LR(r, r+1) = -T \sum_{i=r+1}^{g} \ln(1-\lambda_i) \quad (2)$$

The g in Equation (2) represents the number of variables.

After determining the long-term relationship using the Johansen cointegration test, a VECM was applied in the fourth stage to assess long-term deviations from equilibrium in the model. In the analysis, the deviation from the model's long-term relationship (equilibrium) is determined using a VECM. In this model, a negative coefficient of the error correction term indicates that the variables are balanced in the long term. Furthermore, the magnitude of the error-correction term coefficient indicates the percentage of the deviation that will be corrected in the next period (Canbay and Mercan, 2017: 99; Bayır, 2020: 388). When cointegration exists between variables, the VECM model formula is as follows (Bekmez and Özpolat, 2013: 105):

$$\Delta X_t = \delta + \sum_{j=1}^{k-1} \gamma_j \, \Delta X_{t-1} + \mu ECT_{t-1} + \varepsilon_t \quad (3)$$

Equation (3) represents the Δ difference operator, the delay length k, and the error correction term $ECT_{t-1}$. $\mu$ indicates the speed of reaching equilibrium in the event of a deviation from equilibrium.

In the final stage, the causal relationships between the variables were analysed using the Granger causality test. This test is a statistical hypothesis test used to determine whether one time series of data can be used to predict another. In Granger's (1969) approach, if the X variable increases the accuracy of predicting the Y variable by taking past values of Y into account, then X is a cause of Y. The test can perform two-way predictions, both one-sided and two-sided (Bhattacharjee and Das, 2020: 60). In the Granger causality test, the model is constructed as follows (Granger, 1969: 431):

$$X_t = \sum_{J=1}^{m} a_j X_{t-j} + \sum_{J=1}^{m} b_j Y_{t-j} + \varepsilon_t \quad (4)$$

$$Y_t = \sum_{J=1}^{m} c_j X_{t-j} + \sum_{J=1}^{m} d_j Y_{t-j} + \eta_t \quad (5)$$

In equations (4) and (5), "m" denotes the delay lengths, "$\varepsilon_t$" denotes the error term for formula 4, "$\eta_t$" denotes the error term for formula 5, and "t" denotes the periods. Equation (4) expresses causality from X to Y, and equation (5) expresses causality from Y to X.

In addition to time-series analyses to determine the relationship between the participation index and selected economic and financial indicators, an SVAR analysis was also conducted. The SVAR model, in

addition to traditional VAR models, introduces structural constraints grounded in economic theory, enabling the study of causal relationships among variables and the effects of structural shocks (Sims, 1986).

In VAR models, predictions are computed using the Cholesky decomposition, regardless of the variable order. Therefore, external shocks are fixed in VAR analysis. However, unlike VAR analysis, which calculates coefficients, the SVAR model focuses on errors caused by external shocks (Sims, 1986; Bernanke, 1986).

SVAR is an extension of the VAR model. The SVAR model provides a suitable framework for assessing the relative importance of structural shocks. In SVAR analysis, as in VAR analysis, the optimal number of lags must be determined. This method allows for the direct interpretation of shocks. The SVAR model is represented as follows (Hamilton, 1994: 320):

$$A_0 Z_t = \alpha + \sum_{i=1}^{p} A_i Z_{t-i} + \varepsilon_t \quad (6)$$

In equation (6), $Z_t$ denotes the [N×1] vector of endogenous variables. $A_i$ denotes the [N*N] autoregressive coefficient matrix, and $A_0$ represents the [N*N] contemporary matrix. $\varepsilon_t$ denotes structural shocks.

## Findings and discussion

Before the time series analysis of macroeconomic factors affecting the participation index, descriptive statistics for the variables are presented in Table 2. Table 2 presents basic statistical indicators for the natural logarithm of the variables, based on 762 days of data from November 12, 2021, to November 29, 2024. Although basic statistical indicators are not sufficient to explain the relationship between the series, they do help form an opinion about the series. During the research period, the series experienced high rates of increase, which is thought to be due to pandemic-induced expansionary monetary and cost policies. The global indicators VIX and ONS also accompanied the major changes in national economic indicators, albeit to a lesser extent. The participation index and the BIST100 index moved similarly over the sample period, though minor differences were observed in their average daily returns. Additionally, when comparing investment risk between the traditional index and the participation index, the conventional index's standard deviation is higher; thus, despite the participation index's higher returns, its risk is lower. In their study investigating the returns and volatility of the participation index and the conventional stock market index, Seçme et al. (2016) concluded that the traditional stock market index has higher volatility and that the participation index offers higher returns. The basic statistical tables confirm the results of Seçme et al. (2016). The high difference between the maximum and minimum values of the variables during the research period indicates that the series is unstable. The instability of the series can be interpreted as an indication that the series is not normally distributed. On the other hand, skewness values may indicate that the series is not symmetric. The kurtosis value is expected to be between -1 and +1. However, it was identified that the kurtosis values were positive and above the normal distribution limit of +1. Since the series shows a peaked distribution, a normal distribution cannot be mentioned. The Jarque-Bera statistical results confirm that the series are not normally distributed.

**Table 2:** Descriptive Statistics

| | XK100 | XU100 | VIX | ONS | CDS | DIBS | KUR | KATKI |
|---|---|---|---|---|---|---|---|---|
| Average | 8.481844 | 8.463356 | 2.937089 | 7.572973 | 6.154951 | 3.047340 | 3.063330 | 2.943885 |
| Median | 8.545238 | 8.541216 | 2.931727 | 7.599051 | 6.252019 | 3.072693 | 2.949913 | 2.785857 |
| Maximum | 9.221603 | 9.321233 | 3.652475 | 7.811394 | 6.809038 | 3.804326 | 3.506302 | 3.650918 |
| Minimum | 7.374309 | 7.429877 | 2.473171 | 7.396887 | 5.348630 | 2.157559 | 2.365560 | 2.615350 |
| Std. Dev. | 0.562075 | 0.571374 | 0.91981 | 0.093629 | 0.345352 | 0.482214 | 0.304960 | 0.335496 |
| Skewness | -0.33121 | -0.27013 | 0.222243 | 0.673535 | -0.22266 | -0.10440 | -0.03760 | 0.764052 |
| Kurtosis | 1.695688 | 1.710155 | 1.940163 | 3.047274 | 1.982531 | 1.804596 | 1.714793 | 1.875093 |
| Jarque-Bera | 6.072382 | 5.548971 | 3.747837 | 5.155266 | 3.500217 | 4.178475 | 4.702909 | 1.021648 |
| Probability | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| Observations | 762 | 762 | 762 | 762 | 762 | 762 | 762 | 762 |

The natural logarithm of the series, before applying the unit root test, is shown in Graph 1. It was observed that all series had intercepts, and some series had trend + intercept characteristics. The graph also showed that the series was not stationary.


**Graph 1:** Level Graphs of Series

Normality, autocorrelation, heteroscedasticity, and multicollinearity tests were performed for the model. Based on the diagnostic tests, the skewness and kurtosis of the series indicated a normal distribution (skewness = -0.12, kurtosis = 3.30), and the probability value was greater than 5% (p = 0.11). The Durbin-Watson test statistic was used to examine autocorrelation, and the model was found not to exhibit autocorrelation (Durbin-Watson = 2.13). The Breusch-Pagan-Godfrey test was used to test for heteroskedasticity. Since the test statistic's p-value was greater than 5% (p=0.08), the assumption of constant variance in the series was deemed valid. VIF values were examined for multicollinearity; since the outlier VIFs were below 10, it was determined that there were no multicollinearity issues.

Before selecting an analysis model, the stationarity of the series must be checked. ADF, DF-GLS, and PP tests were used to test for stationarity. It was determined that the series were not stationary in their natural logarithms, and the results of the repeated unit root tests after differencing are presented in Table 3.

**Table 3:** Unit Root Tests

| Variables | ADF | | DF-GLS | | PP | |
|---|---|---|---|---|---|---|
| | Intercept | Trend+Intercept | Intercept | Trend+Intercept | Intercept | Trend+Intercept |
| Levels | | | | | | |
| XK100 | -0.634261 | -2.340877 | 1.678314 | -1.791478 | -0.643381 | -2.473097 |
| XU100 | -0.345009 | -2.622262 | 1.930635 | -1.916805 | -0.338586 | -2.694239 |
| VIX | -2.658149 | -3.282490 | -2.139733 | -2.343420 | -2.604188 | -3.379814 |
| ONS | -0.134899 | -1.921067 | 0.298204 | -1.274834 | -0.066689 | -1.905264 |
| CDS | -1.148428 | -3.253361 | -1.148038 | -1.215300 | -1.104643 | -3.262466 |
| DIBS | -0.280428 | -1.192982 | -0.282925 | -1.050638 | -0.199059 | -1.078962 |
| KUR | -0.337194 | -2.011503 | -1.705104 | -1.815245 | -0.565018 | -1.884927 |
| KATKI | 1.194244 | -0.774497 | -1.124968 | -0.507629 | 1.828481 | -0.467797 |
| First Differences | | | | | | |
| ΔXK100 | -4.4309[9]*** | -4.4053[9]*** | -4.4464[9] *** | -1.6578[9] *** | -24.5141[4]*** | -24.4935[4]*** |
| ΔXU100 | -4.1044[9]*** | -4.0615[9]*** | -4.0737[9] *** | -15.0677[9] *** | -24.8960[2]*** | -28.0765[2]*** |
| ΔVIX | -7.7024[8]*** | -7.6874[8]*** | -1.9522[6] *** | -11.0062[6] *** | -24.4464[1]*** | -24.4379[1]*** |
| ΔONS | -27.1860[0]*** | -27.2397[0]*** | -2.3940[8] *** | -8.1828[4] *** | -27.1693[4]*** | -27.2370[3]*** |
| ΔCDS | -23.0242[0]*** | -23.0497[0]*** | -1.8251[9] *** | -10.7699[3] *** | -22.9278[3]*** | -22.9298[9]*** |
| ΔDIBS | -13.9513[2]*** | -14.0015[2]*** | -13.9146[2] *** | -13.9768[2] *** | -28.6041[7]*** | -28.6216[6]*** |
| ΔKUR | -5.6461[9]*** | -5.6986[9]*** | -10.2124[9] *** | -2.1092[9] *** | -23.7593[4]*** | -23.7402[4]*** |
| ΔKATKI | -3.9597[4]*** | -4.2426[4]*** | -3.6532[4] *** | -4.2034[4] *** | -28.7540[8]*** | -28.5051[8]*** |
| 1% | -3.439752 | -3.971606 | -2.568372 | -3.480000 | -3.439738 | -3.971606 |
| 5% | -2.865580 | -3.416440 | -1.941290 | -2.890000 | -2.865573 | -3.416440 |
| 10% | -2.568978 | -3.130537 | -1.616386 | -2.570000 | -2.568975 | -3.130537 |

In the table, square brackets ([]) indicate lag lengths, and the symbols *,**, and *** represent p-values at the 10%, 5%, and 1% significance levels, respectively.

The series, which were non-stationary at the level, became stationary after first differencing, and the unit root problem was eliminated. As a result of the stationarity test performed using three different methods, the series were determined to be I(1). In the continuation of the study, model selection was made based on I(1) variables. Before deciding the long-term cointegration relationship using the Johansen (1988) and Johansen and Juselius (1990) methods, the lag length of the model must be selected.

The Akaike (AIC) and Schwarz (SC) information criteria are commonly used to determine the lag length in the Vector Autoregressive (VAR) method. Table 4 shows that a lag length of 6 was calculated using the AIC criterion, and a lag length of 1 was calculated using the SC criterion. However, because high or very low lag lengths can lead to over- or under-parameterisation (Nath Sahu et al., 2014: 210), an LM autocorrelation test was performed to determine the optimal lag length.

**Table 4:** VAR Delay Length Statistics

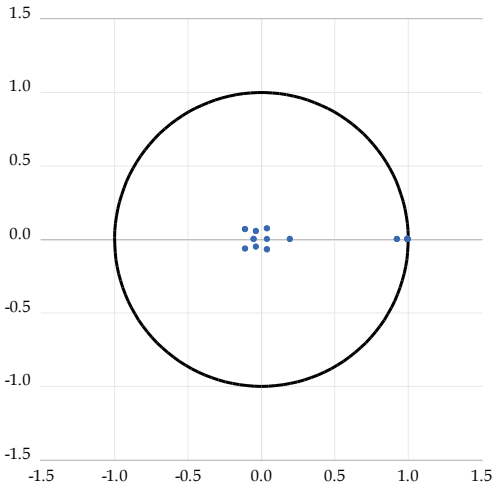
| **Lag** | **LogL** | **LR** | **FPE** | **AIC** | **SC** | **HQ** |
|---|---|---|---|---|---|---|
| 0 | -27.69158 | 22.3158 | 45.2589 | 82.3197 | 82.38003 | 82.34306 |
| 1 | -16.07899 | 22.88008 | 59.70985 | 48.05049 | 48.65385* | 48.28415* |
| 2 | -16.0067 | 14.04934 | 61.20947 | 48.07638 | 49.22276 | 48.52033 |
| 3 | -15.93898 | 12.98131 | 63.70935 | 48.11518 | 49.80523 | 48.77007 |
| 4 | -15.89903 | 75.50438 | 72.00967 | 48.23738 | 50.47024 | 49.10235 |
| 5 | -15.8393 | 11.13031 | 76.80941 | 48.30103 | 51.07646 | 49.37584 |
| 6 | -15.66731 | 31.58649* | 58.70923* | 48.03063* | 51.34908 | 49.31573 |
| 7 | -15.62268 | 80.76139 | 65.50925 | 48.13873 | 52.0002 | 49.63412 |
| 8 | -15.57818 | 79.34993 | 73.20986 | 48.2472 | 52.65168 | 49.95287 |

According to the LM autocorrelation test result in Table 5, autocorrelation was determined at six lags according to the AIC criterion, and no autocorrelation problem was resolved at one lag according to the SC criterion. For this reason, the study was constructed according to the 1-lag model.

**Table 5:** LM Autocorrelation Test

| **Lag** | **LRE* stat** | **Prob.** |
|---|---|---|
| 1 | 130.2806 | 0.0004 |
| 2 | 131.0361 | 0.0004 |
| 3 | 83.65797 | 0.398 |
| 4 | 96.19149 | 0.1195 |
| 5 | 313.6461 | 0.2658 |
| 6 | 86.79373 | 0.3097 |
| 7 | 90.05198 | 0.2302 |

To determine whether the model created for one lag length meets the stability condition, a graph was created in Graph 2 for the inverse roots of the characteristic AR polynomial. The fact that all points are clustered within the circle indicates that the model is stationary. However, because some points in the graph lie within the circle due to their proximity to 1, the module values were calculated in Table 6.




**Graph 2**: Stability of the VAR Model

Based on the modulus values in Table 6, it was determined that a single-delay-length model was appropriate, as none of the moduli exceeded the reference value of 1.

**Table 6:** VAR Stability

| Root | Modulus |
|---|---|
| 0.999957 | 0.999967 |
| 0.999957 | 0.999967 |
| 0.985253 | 0.985253 |
| 0.982811 | 0.982932 |
| 0.982811 | 0.982932 |
| 0.96638 | 0.966643 |
| 0.96638 | 0.966643 |
| 0.929549 | 0.929723 |
| 0.929549 | 0.929723 |
| 0.207419 | 0.207419 |
| -0.119825 | 0.138763 |
| -0.119825 | 0.138763 |
| -0.027556 | 0.082418 |
| -0.027556 | 0.082418 |
| 0.010541 | 0.054054 |
| 0.010541 | 0.054054 |
| 0.032310 | 0,032310 |
| -0.013020 | 0.013020 |

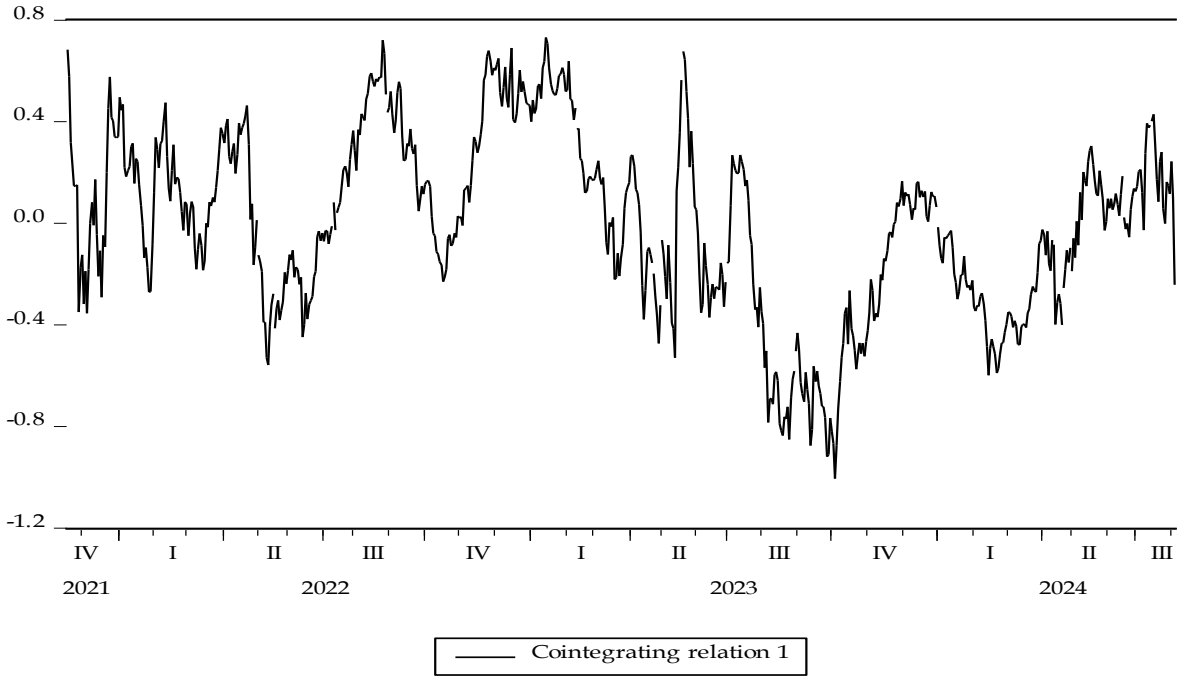
The existence of cointegration for variables with appropriate lag lengths was investigated using the Johansen cointegration test developed by Johansen (1988) and Johansen and Juselius (1990) when the dependent and independent variables were I(1). The purpose of this test is to identify multiple cointegration vectors in multivariate models (Johansen, 1988). The results of the cointegration tests are reported in Table 7.

**Table 7:** Johansen Cointegration Test

| Trace Test | | | | |
|---|---|---|---|---|
| Number of Cointegration Relationships | Intrinsic Value Statistics | Tracking Statistics | 5% Critical Value | Prob. |
| r=0 | 0.092874 | 242.4439 | 197.3709 | 0.0000 |
| r≤1 | 0.088835 | 176.2591 | 159.5297 | 0.0044 |
| Maximum Eigenvalue Test | | | | |
| Number of Cointegration Relationships | Intrinsic Value Statistics | Tracking Statistics | 5% Critical Value | Prob. |
| r=0 | 0.092874 | 661.8476 | 584.3354 | 0.0073 |
| r≤1 | 0.088835 | 631.6791 | 523.6261 | 0.0028 |

According to the Johansen cointegration test results reported in Table 7, the Mackinnon-Haug-Michelis (1999) test statistic exceeds the 5% critical value, and the probability value is less than 5%, indicating the presence of at least two cointegration vectors. The findings confirm the existence of cointegration in the

Jakarta Stock Exchange, as determined by Sakti and Harun (2013), the short- and long-term cointegration relationships identified by Içellioğlu (2018), and the cointegration relationship between the participation index and macroeconomic variables identified by Avcı and Sarıgül (2022). However, the findings differ from those of Ögel and Gökgöz (2020), who found no cointegration between the participation index and macroeconomic variables. After determining the existence of a long-term cointegration relationship between the series, the analysis continued with the VECM model to determine the long-term relationship and short-term deviations from the equilibrium point using the Error Correction Coefficient (ECC). The model's cointegration relationship is shown in Graph 3. The convergence of the cointegration relationship around zero indicates that the variable combinations are linear and supports the Johansen cointegration test.




**Graph 3:** Cointegration Graph

In the presence of long-term cointegration among multiple variables, short-term imbalances may occur. Given that the series are I(1) and cointegration relationships exist, the VECM method has been preferred to explain both short-term and long-term dynamics. According to Engle and Granger (1987), when series are cointegrated, an error-correction mechanism disrupts the equilibrium relationship in the short-term dynamics of the variables. The error correction coefficient corrects part of the short-term imbalance in subsequent periods. Thus, the error correction acts as a reconciliation mechanism, adjusting the short-term and long-term equilibria. The significance of the VECM statistical results, as indicated by the significance of the coefficients or the error correction t-statistic value, indicates the presence of causality. In VECM analysis, short-term and long-term causal relationships are often confused. The probability values of the independent variables indicate short-term causal effects, while the error correction coefficient indicates the long-term causal relationship.

**Table 8:** VECM Test Results

| **Long-Term VECM Results** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ΔXK100 | ΔXU100 | ΔVIX | ΔONS | ΔKUR | ΔKATKI | ΔDIBS | ΔCDS |
| Cointegration Equation | 1 | 1.89870*** | -1.111*** | 2.8005*** | -1.181286 | 2.4693*** | -1.492*** | 0.199757 |
| | | (0.44104) | (0.32598) | (0.83728) | (0.76875) | (0.45099) | (0.25155) | (0.42301) |
| C | -12,73904 | | | | | | | |
| ECC | -0.003242* | 0.003814* | 0.0199*** | -0.00083 | 0.001949 | -0.0068*** | -0.000555 | 0.001639 |
| | (0.00223) | (0.00229) | (0.00747) | (0.00104) | (0.00156) | (0.00099) | (0.00415) | (0.00369) |
| **Short-Term VECM Results** | | | | | | | | |
| | XK100 | XU100 | VIX | ONS | KUR | KATKI | DIBS | CDS |
| ΔXK100 | | 0.097349 | -0.395106 | -0.10743* | 0.04382 | -0.022047 | 0.47342** | 0.7155*** |
| | | (0.14124) | (0.46039) | (0.06388) | (0.09616) | (0.06127) | (0.25546) | (0.22741) |
| ΔXU100 | -0.226434* | | 0.527025* | 0.082709 | -0.02962 | -0.015038 | -0.5644** | -0.7858*** |
| | (0.13414) | | (0.44871) | (0.06226) | (0.09372) | (0.05972) | (0.24898) | (0.22164) |
| ΔVIX | -0.02562** | -0.02829** | | -0.003956 | -0.003366 | -0.003661 | 0.012299 | 0.0995*** |
| | (0.01228) | (0.0126) | | (0.0057) | (0.00858) | (0.00547) | (0.02279) | (0.02029) |
| ΔONS | 0.034313 | 0.052421 | -0.337838 | | 0.002603 | 0.03506 | 0.024475 | -0.128876 |
| | (0.08362) | (0.08582) | (0.27974) | | (0.05843) | (0.03723) | (0.15522) | (0.13818) |
| ΔKUR | 0.14678*** | 0.13121** | 0.202504 | -0.013906 | | 0.008041 | -0.065977 | -0.030456 |
| | (0.05608) | (0.05755) | (0.1876) | (0.02603) | | (0.02497) | (0.10409) | (0.09267) |
| ΔKATKI | 0.049448 | 0.01898 | -0.011785 | -0.050419 | 0.035519 | | 0.156735 | -0.050658 |
| | (0.08541) | (0.08765) | (0.28572) | (0.03965) | (0.05968) | | (0.15854) | (0.14113) |
| ΔDIBS | 0.018813 | 0.028134 | 0.042861 | -0.008815 | 0.015091 | 0.002098 | | 0.021401 |
| | (0.02096) | (0.02151) | (0.07012) | (0.00973) | (0.01465) | (0.00933) | | (0.03464) |
| ΔCDS | 0.001365 | -0.010533 | 0.131664* | -0.017282 | 0.00487 | 0.001908 | 0.026092 | |
| | (0.02342) | (0.02404) | (0.07835) | (0.01087) | (0.01636) | (0.01043) | (0.04347) | |
| C | 0.00215*** | 0.0022*** | 0.000507 | 0.000572 | 0.00129** | 0.0016*** | 0.001216 | -0.000283 |
| | (0.00078) | (0.0008) | (0.0026) | (0.00036) | (0.00054) | (0.00035) | (0.00145) | (0.00129) |

**Note**: The symbols *, **, and *** in the table indicate probability levels of 10%, 5%, and 1%, respectively, calculated from the ttablo value. The symbols in parentheses "()" indicate standard error values.

According to the VECM statistical results given in Table 8, all variables except KUR and CDS are significant at the 1% and 5% levels in the long-term cointegration equation. Therefore, the existence of long-term cointegration between the variables is accepted, and this result supports the Johansen cointegration test.

According to the long-term VECM results, there is a positive, statistically significant relationship of 1% between the traditional stock market index and the participation index. A 1% increase in the conventional index indicator XU100 causes a 1.89% increase in the participation index variable XK100. The findings are consistent with those of Avcı and Sarıgül (2022), who determine a cointegration relationship between the participation index and the traditional index and find that the conventional

index positively affects the participation index. This finding, based on their long-term cointegration, indicates that both indices share similar market dynamics and respond in a comparable manner to macroeconomic factors. Similarly, the XK100 variable is positively associated with ONS and KATKI at a 1% significance level. A 1% increase in the gold price increases the participation index by 2.80%, and a 1% increase in the profit-sharing rates of participation banks increases it by 2.46%. Kayed and Hassan (2011) stated that Islamic finance is asset-based. Similarly, the participation index focuses on the real sector, comprising firms primarily engaged in production, trade, and commodity-related activities. Therefore, an increase in gold prices may positively influence the profitability expectations and market values of firms included in the participation index. Although profit-sharing rates do not directly represent firms, they reflect the overall investment climate within the interest-free financial system. Moreover, an increase in profit-sharing rates can boost capital inflows, thereby expanding investment and growth opportunities for these firms. The findings are consistent with the results of Sertkaya (2022) and Şimşek and Bulut (2024), which identify a positive relationship between gold and the participation index. Coronado et al. (2012) state that an increase in credit risk will increase borrowing costs and slow down consumption and investment, thereby reducing firm profits. This situation indicates a negative relationship between CDS and the stock market. However, the findings suggest a positive relationship between the participation index and CDS, although it is statistically insignificant. Dewandaru et al. (2014) state that the Islamic index is less affected by the financial system than traditional indices because it does not rely on interest and credit. The obtained result may stem from the participation index being less exposed to the interest system than the traditional index. These unexpected findings may be related to the capital costs, borrowing potential, and contraction in investment demand of the firms included in the participation index. Although firms listed in the participation index are expected to avoid interest-bearing borrowing instruments, their financing structures may still include some interest-bearing liabilities. Therefore, an increase in interest rates reduces the firms' expected future cash flows and negatively affects their market valuations. On the other hand, the negative relationship identified between the VIX index and the participation index is not an anticipated result. The adverse effect of heightened global risk perception on international capital inflows into the Turkish market may explain this inverse relationship. As global uncertainty rises, investors tend to move toward safe-haven assets, leading to capital outflows from emerging markets. Consequently, such capital withdrawals lead to a decline in stock market values in these economies. This finding is consistent with the results of Baur and Lucey (2010), who emphasised that an increase in the VIX weakens investor confidence in emerging markets and contributes to declines in equity indices.

A negative relationship was detected between VIX, DIBS variables and XK100 at a 1% significance level. Fluctuations in the exchange rate may have adverse effects, particularly on firms engaged in import-dependent production. Increases in the prices of imported intermediate goods can raise production costs, thereby reducing firm profitability and performance. Therefore, the statistically insignificant relationship between the exchange rate and the participation index may be attributed to the fact that the firms in the index are generally oriented toward the domestic market or have relatively low import dependence. A 1% increase in VIX causes a 1.11% decrease in the XK100 variable. A one-unit increase in the interest rate causes a 1.49-unit decline in the participation index. This result supports the findings of Nishat et al. (2004), who stated that an increase in interest rates would negatively affect stock prices through the adverse effect it would have on cash flow, and Panda (2008), who stated that an increase in interest rates would increase the discount rate and lead to a decrease in firm value in firm value calculations. This result is similar to the studies by Abdul Rahman et al. (2010), who state that companies included in the participation index are affected by interest rates to a certain extent due to their interest-based assets or liabilities, even though they avoid interest, and Vejzagić and Zarafat (2013), who found that the Islamic index is negatively affected by interest rates. The negative relationship between the participation index and the interest rate contradicts the notion that the participation index is less sensitive to interest rates than the traditional index. Therefore, this result indicates that the participation index is sensitive to interest rates, as are traditional indices.

According to Table 8, a negative relationship between the dollar exchange rate and the participation index was observed, but it was not statistically significant. The findings are consistent with those of Yiğiter and Tanyıldızı (2020) and Karakuş and Vural (2022), who found no relationship between the participation index and the exchange rate.

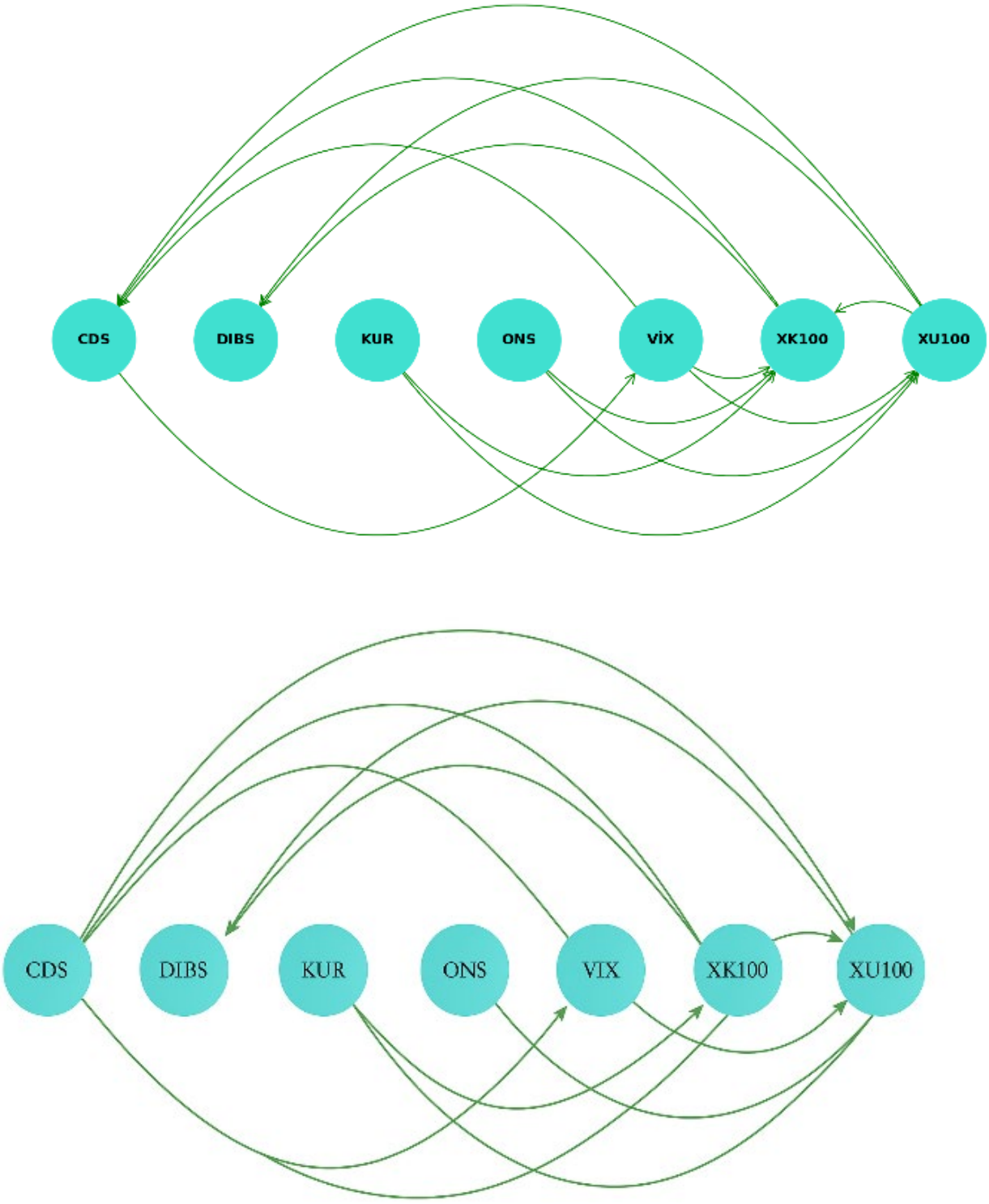
The ECC in Table 8 shows the extent to which the balance will be restored when the cointegration between variables is disrupted. Therefore, the ECC shows how long it will take to reach the equilibrium point again, accounting for the short-term equilibrium adjustment speed in the long-term equilibrium. The coefficients for the ECC should be between 0 and 1 and should be negative. A negative ECC indicates that the error correction term is eliminating deviations and approaching the equilibrium point.

A meaningful ECC suggests the presence of deviation and the rate at which the coefficient approaches equilibrium. When examining the ECC, the adjustment coefficient for the XK100 variable is significant at the 10% level and equals -0.003. The participation index shows that 0.3% of the imbalance in the long-term relationship is corrected each day. The XK100 variable, which has a significant negative coefficient, is external and helps close the gap between it and the other variables. The 1/ECC method is used to calculate the number of days required to reach equilibrium based on the ECC coefficient (Aytekin and Kaya, 2022; Ergün and Ener, 2024). According to the ECC results, the XK100 variable corrects the deviations and reaches equilibrium in 333 days. The XU100 variable, which is significant at the 10% level, and the VIX variable, which is significant at the 1% level, are positive. According to the results obtained, the two variables are moving away from the equilibrium point. The KATKI variable, which is significant at the 1% level, returns to the equilibrium point in 167 days. ECC is not substantial for the ONS, KUR, DIBS, and CDS variables.

Finally, when examining the short-term VECM results in Table 8, it was identified that the XU100 variable was statistically significant at the 10% level, the VIX variable was significant at the 5% level, and the KUR variable was significant at the 1% level. In the short term, changes in the participation index are significantly affected by the traditional stock market index (XU100), with a coefficient of –22.6% ($\beta = -0.2264$, $p < 0.1$), and by the exchange rate (KUR), with a coefficient of +14.7% ($\beta = 0.1468$, $p < 0.01$). The short-term significant relationship between the participation index and the traditional stock market index indicates that these two markets move in a coordinated manner. This result may be associated with the similarity in sectoral composition and the overlap in investor bases between the traditional and participation indices. The explanatory power of the conventional index relative to the participation index may reflect information transmission between the two markets and the similarity in investor expectations. The positive relationship with the exchange rate (KUR) may be related to the fact that the firms included in the participation index are more export-oriented rather than import-dependent. Accordingly, the effects of exchange rate increases are likely to be limited for firms with low dependence on imported intermediate goods. In contrast, for firms that generate foreign currency revenues, a rise in the exchange rate may lead to higher income.

After error-correction analysis, Granger causality was assessed on the difference series to examine causal relationships between the variables. The results of the causality analysis are presented in the graph. Granger causality analysis supports the short-term VECM results.

According to the Granger causality analysis shown in Graph 4, the traditional stock market index was identified as the cause of the participation index. This finding differs from the results of Içellioğlu (2018), who found a one-way, short-term relationship from the participation index to the traditional index in Turkey, and from those of Avcı and Sarıgül (2022), who found a two-way relationship between the traditional index and the participation index. This finding suggests that the conventional index has a strong long-term impact on the participation index. The study identifies that the ONS variable is a Granger cause of the XK100 variable. The relationship between gold prices and the participation index may stem from increased investor interest in participation banking, as the interest-free financing system tends to highlight commodities like gold. Furthermore, the perception of gold as a haven in traditional financial markets may trigger demand for participation banking during periods when gold's influence in financial markets increases (Emeç, 2021). In the study, it was identified that the ONS variable is the Granger cause of the XK100 variable. Our findings support Emeç's (2021) results. One of the variables that is a Granger cause of the participation index is the exchange rate. While our findings on the exchange rate, which we identified as a one-way causal relationship, differ from those of Ögel and Gökgöz (2020), they are similar to those of Yiğiter and Tanyıldızı (2020). A one-way causal relationship was identified from the VIX to the participation index. The increase in global risks and uncertainties is one of the long-term determinants of the index, as it is in traditional financial markets, in Islamic financial markets as well. The finding differs from the results of Ajmi et al. (2014), who investigated the causal relationship between the Dow Jones Islamic Market Index and the VIX. The one-way causal relationship identified between the participation index and the interest rate differs from the results of Avcı and Sarıgül (2022), who found a one-way causal relationship from the interest rate to the participation index in the Turkish market. Finally, a one-way Granger causality was identified from the participation index to CDS. The findings regarding DIBS and CDS suggest that the participation index influences international risk measures and interest rates.




**Graph 4:** Granger Causality Analysis

After determining the lag length for series whose stationarity was assessed using unit root tests, long-term relationships were identified using the Johansen cointegration test. After revealing the structure of the long-term relationship using VECM, the short-term relationship was determined. Finally, Granger causality analysis was performed to determine the direction of causality. After the time-series analyses performed to this point, an SVAR analysis was conducted to examine the structural interactions between the variables in greater depth.

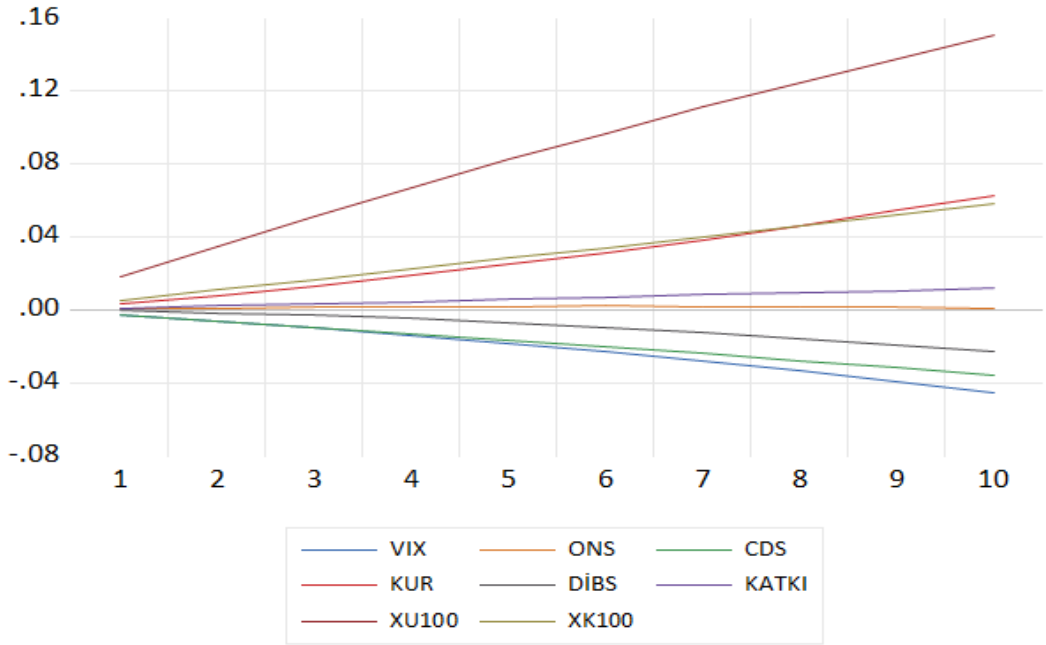
After the basic VAR model estimation was performed in the SVAR analysis, the SVAR model was adopted. Constraints must be determined within the economic theory framework of the SVAR model. Short-term constraints derived from econometric theory were imposed on the A0 matrix to define the model. The impact chain of the study is as follows:

VIX → ONS → CDS → KUR → DIBS → KATKI → XU100 → XK100

The above chain of effects follows a global → national → company → index ranking logic. The VIX, one of the leading indicators of global investor sentiment, can affect markets. On the other hand, gold, another indicator of uncertainty, ranks second in the chain of effects as a worldwide risk indicator. It is expected that global risk indicators will also affect national risk indicators. Therefore, CDS is influenced by both VIX and Gold prices. The next step in the chain is the exchange rate variable. VIX and CDS influence the exchange rate. On the other hand, it also affects internal dynamics such as interest rates and stock indices. Therefore, the exchange rate variable is in the fourth position in the chain. In the fifth position, alongside the exchange rate variable, is the interest rate variable, which is affected by national and global risks and was found to influence stock indices. Following the interest rate variable is the profit share, which represents returns in the Islamic banking sector. At the end of all these processes, the traditional stock market index and participation index are ultimately included in the chain of effects (Bernanke and Mihov, 1998; Baur and Lucey, 2010; Longstaff et al., 2011; Ehrmann et al., 2011).

After estimating the short-term SVAR model, Impulse Response Functions (IRFs) and Variance Decompositions (VDCs) were computed. IRF analyses the impact of a structural shock on other variables over time. VDC, on the other hand, reveals in percentage terms which shocks are responsible for the variance in a particular variable.

To examine the dynamic relationships among the study's variables in detail, impulse-response analysis was conducted within the SVAR framework. Determining the direction and duration of causal relationships has important contributions to theoretical and practical implications. The impulse-response functions in Graph 5 show the time-spread effects of a shock to a model variable on the participation index.



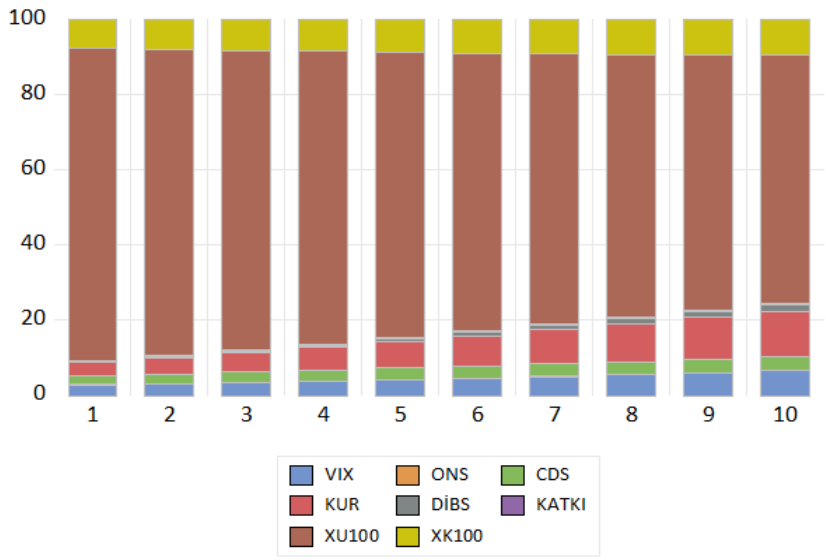

**Graph 5:** Impulse-Response Functions

The model includes the 10-day cumulative effects of VIX, ONS, CDS, KUR, DIBS and KATKI variables on the participation index. XU100, the traditional stock market index, has the greatest and most sustained positive effect on the participation index. At the 10-day time horizon, the effect continues to increase. This shows that the participation index moves in synchronisation with the traditional stock market index and adapts to the general market trend. The shock in the exchange rate has a positive effect on the participation index. Exchange rate shocks are expected to affect stock market indices negatively. A contrary finding was found for the participation index. It is thought that the positive effect may be due to export-oriented firms. The positive effect of ONS is found to be limited. On the other hand, uncertainty indicators and returns from traditional and Islamic finance systems negatively affect the participation index. It is determined that the negative effect of the VIX index deepens over time. Volatility shocks are expected to reduce risk appetite and shift investors towards lower-risk assets. This situation triggers capital outflows from Turkey, an emerging market. Therefore, in this case, the

participation index is also negatively affected. CDS also negatively affected the participation index. However, we cannot talk about a negative effect as deep as the VIX index, the global risk indicator. Although it does not exert as much pressure as VIX, CDS exerts downward pressure on the participation index. Finally, shocks to contribution and interest rates, which are financial rates of return, have a negative, time-increasing effect on the participation index for the contribution variable and a negative effect on the interest rate variable. Both variables have a cumulative negative effect on the participation index over 10 days. This indicates that investors prefer fixed-income investments and interest rates to riskier equity investments. On the other hand, the increase in contributions and interest rates also indicates negative expectations about the country's macroeconomic structure. This expectation drives investors away from the stock market. Therefore, shocks to the contribution margin and interest rate variables negatively affect the participation index. The lower effect of government securities compared to the contribution index may be due to government intervention.

According to the impulse-response analysis, the participation index is sensitive to both national and global shocks, but the magnitudes and persistence of the effects differ. The highest impact is seen to be positive on the traditional stock market index and negative on the VIX index. When evaluated as a whole, the participation index was found to be sensitive to national and global market indicators, and investors should consider that it is exposed to systematic risks in their risk management strategies.

In addition to the impulse-response analysis, a variance decomposition analysis was conducted to examine the dynamic relationships among variables more comprehensively. This analysis shows to what extent the change in the participation index is caused by its own internal dynamics and to what extent by other variables in the model. Graph 6 shows the variance decomposition.




**Graph 6:** Variance Decomposition

The variance decomposition results presented in Graph 6 illustrate the sources of shocks affecting the participation index and how these effects evolve. According to the analysis, in the initial periods, the variable that explains the forecast error variance of the participation index most significantly is the conventional stock market index (XU100). In contrast, the explanatory power of the participation index's own internal shocks remains below that of the traditional index. As time progresses, the influence of the conventional index gradually declines, while the explanatory power of the exchange rate (KUR) increases. Similarly, the initially limited effects of global risk indicators such as VIX and CDS become more prominent over time. The explanatory contributions of DIBS (interest rates), ONS (gold prices), and KATKI (profit-sharing rates) remain relatively low throughout the period, suggesting that these three indicators have a limited impact on the participation index.

Overall, the findings of the variance decomposition analysis indicate that the participation index is sensitive to both domestic and global market indicators; however, this sensitivity varies over time and across different variables. Notably, the impact of exchange rate shocks becomes significantly more pronounced after the fifth period. In contrast, the contributions of interest rates (DIBS), gold prices (ONS), and profit-sharing rates (KATKI) to the explained variance remain limited. These results suggest

that while a range of market indicators influences the participation index, the degree of responsiveness varies across variables and time horizons.

According to the SVAR results, the participation index is sensitive to both the conventional stock market index and various macroeconomic and financial indicators, with this sensitivity varying over time. The influence of the traditional index on the participation index is initially prominent; however, this impact diminishes over time, while the effects of the exchange rate (KUR), credit default swaps (CDS), and the volatility index (VIX) become increasingly significant. In contrast, the contribution of the participation index's own internal dynamics remains relatively stable over time. Additionally, the effects of gold prices (ONS), interest rates (DIBS), and profit-sharing rates (KATKI) on the participation index are found to be limited. These findings indicate that the participation index is shaped not only by its internal dynamics but also by external factors, including the conventional stock market index, macroeconomic indicators, and risk and uncertainty measures.

## Conclusion

This study aims to determine the cointegration and causality relationships among the XK100 index, the participation index in Turkey, the traditional stock market index, national and global risk indicators, the participation banking dividend rate, and some macroeconomic variables. For this purpose, daily index returns were analysed from 12.11.2021, when the XK100 index started trading, until 29.11.2024.

In different stationarity tests, it is determined that the series do not meet the stationarity condition in natural logarithms and that all series are I(1). For the series at the I(1) level, the Johansen cointegration test was performed at a lag length of 1, determined by VAR analysis and the existence of at least two long-run vector cointegrating was determined. In the cointegration graph, it is determined that the cointegration relationship is centred around zero and the variable compositions are linear. VECM analysis was performed to detect short-term imbalances in the model with long-term cointegration.

The fact that the participation index is affected by traditional market variables is a natural consequence of the criteria used to create the participation index, rather than the overall structure of the Islamic financial system. The index includes companies that do not fully comply with Islamic finance principles but meet certain eligibility thresholds. Therefore, it is expected that variables such as interest rates, exchange rates, and global risk indicators will affect the participation index. The VECM analysis indicates that the participation index is positively correlated with the conventional stock market index, the gold price, and the contribution share. In contrast, the global fear index and the interest rate are negatively correlated, whereas the risk premium and the exchange rate are not significantly related. The findings are consistent with those of Abdul Rahman et al. (2010), who stated that the participation index has interest-based assets and liabilities despite adherence to Islamic rules. The VIX and DIBS variables are negatively related to the participation index. Similarly, the negative relationship between the interest rate and the participation index is consistent with Abdul Rahman et al. (2010), who state that although the participation index adheres to Islamic rules, it has interest-based assets and liabilities. It differs from the results of Dewandaru et al. (2014), who state that the Islamic index is less affected by financial shocks than conventional indices. Consistent with the findings of Ajmi et al. (2014), who state that the participation index, which includes non-Sharia-compliant products such as interest, is affected by financial risk factors in a similar way to traditional indices. When the findings are evaluated together, it is determined that the participation index is positively affected by the conventional index, and gold and contributions share increase the participation index. Short-term deviations from the long-run cointegration were assessed using a VECM, which identified a long-run cointegration relationship. It is determined that there is no short-term causality relationship between the contribution share, interest rate, CDS premium and gold price and the participation index. Based on the long-run VECM statistics, it is determined that the participation index corrects 0.3% of the long-run imbalance each day. This shows that the participation index is an exogenous variable and tends to close the difference between other variables in the long run.

According to Granger and SVAR analysis results, the traditional stock market index positively explains the participation index, with the highest rate at the highest level and a decreasing rate over time. The XU100 index explains a significant portion of the participation index. The exchange rate variable, which is determined to be a Granger cause of the participation index, positively affects the participation index. It has been determined that the variance explanation of the exchange rate variable also increases over time. This result is thought to be due to export-oriented companies. Granger causality has been determined between the VIX, KUR, and ONS variables and the participation index. According to SVAR results, the explanatory power of the CDS variable in the participation index is low but increases over time. It can be said that credit risk has a lagged effect on the participation index. It has been determined

that the explanatory power of the DİBS and KATKI variables for the participation index is lower than that of other variables.

The results of the study provide important conclusions that can be useful for investors, regulatory and supervisory institutions and organisations, portfolio managers and policy makers. The first of these is that there is a cointegration relationship between the participation index and selected variables, which was not found in some studies. Secondly, according to the long-run VECM results, there is a positive relationship between the participation index and the traditional stock market index, the gold price, and the contribution share, and a negative relationship between the global fear index, the exchange rate, and the interest rate. The negative relationship between the participation index and the VIX index indicates that global risk factors hurt the participation index, as they do conventional stock market indices. However, this situation should not be interpreted as contradicting the notion that Islamic indices can serve as an alternative to traditional markets; rather, it reflects the structural characteristics and market sensitivity of the participation index components. Likewise, the negative relationship between the interest rate and the participation index indicates that changes in interest rates affect the participation index in the same direction as conventional indices. This finding suggests that interest rate movements may indirectly influence firms included in the participation index through their operational and financial structures. Still, it does not imply a direct inconsistency with Islamic finance principles. The third important finding of the study is that there is no long-run relationship between the participation index and CDS, as indicated by the VECM. Many studies have revealed a negative relationship between traditional stock market indices and CDS. Therefore, the results of this study suggest that participation indices may be an alternative investment instrument to conventional stock market indices in periods of high credit risk. The fourth important output of the study is that, according to the short-run VECM results, approximately half of the change in the participation index is explained by the traditional stock market index, the exchange rate, and the VIX index, respectively. In other words, in the short run, the participation index is mostly affected by the stock market index, the exchange rate, and the fear index. Therefore, it is thought that investors and portfolio managers who take this finding into account when investing will be more likely to make the right decision. The Granger causality results, consistent with the VECM results, show that the traditional stock market index, exchange rate, fear index, and gold are the Granger causes of the participation index.

One of the most important limitations of the study is the short research period. Daily data from the day the index started trading (12.11.2021) to the day of the analysis (29.11.2024) were analysed. It is thought that a study covering a longer period will make significant contributions to the literature. The second limitation is that, although the analysis includes many economic factors, the effects of macro and micro factors, as well as sectoral and firm-specific factors, that may impact firm performance in the participation index remain unaccounted for. It is expected that important contributions will be made to the literature through studies that include the factors considered effective for the index in the ongoing studies. The effect of corporate governance characteristics on performance, especially for participation index firms, is unclear in Turkish markets. On the other hand, the research period also includes national and global risks, such as pandemics, earthquakes, and wars, which adversely affect the market. Covering such a period, which creates different effects on market performance, is an important limitation for the study.

**Peer-review:**

Externally peer-reviewed

**Conflict of interests:**

The author has no conflict of interest to declare.

**Grant Support:**

The author declared that this study has received no financial support.

## References

Abdul Rahman, A., Azlan Yahya, M. & Herry Mohd Nasir, M. (2010). Islamic norms for stock creening: A comparison between the Kuala Lumpur stock exchange islamic index and the dow jones islamic

market index. International Journal of Islamic and Middle Eastern Finance and Management, 3(3), 228-240. https://doi.org/10.1108/17538391011072426

Ajmi, A.N., Hammoudeh, S., Nguyen, D.K. & Sarafrazi, S. (2014). How strong are the causal relationships between islamic stock markets and conventional financial systems? evidence from linear and nonlinear tests. Journal of International Financial Markets, Institutions and Money, 28, 213-227. https://doi.org/10.1016/j.intfin.2013.11.00

Akaike, H. (1978). On the likelihood of a time series model. Journal of the Royal Statistical Society: Series D (The Statistician), 27(3-4), 217-235. https://doi.org/10.2307/2988185

Al-Khazali, O., Lean, H.H. & Samet, A. (2014). Do Islamic stock indexes outperform conventional stock indexes? A stochastic dominance approach. Pacific-Basin Finance Journal, 28, 29-46. doi: 10.1016/j.pacfin.2013.09.003

Al-Majali, A. A., & Al-Assaf, G. I. (2014). Long-run and short-run relationship between stock market index and main macroeconomic variables performance in Jordan. European Scientific Journal, 10(10).

Arfaoui, M. & Raggad, B. (2023). Do dow jones islamic equity indices undergo speculative pressure? new insights from a nonlinear and asymmetric analysis. International Journal of Finance & Economics, 28(2), 1582-1601. https://doi.org/10.1002/ijfe.2495

Avcı, P. & Sarıgül, S. S. (2022). Is the performance of the companies operating in the participation index in the turkish economy affected by the macroeconomic perspective?. Journal of Ekonomi, 4(2), 63-73. https://doi.org/10.58251/ekonomi.1182456

Aytekin, İ., & Kaya, M. V. (2022, February). Investigation of the effects of digital money bitcoin and electronic funds transfers on electric energy consumption, In 24th RSEP International Conference on Economics, Finance & Business (pp. 149-155). DOI: https://doi.org/10.19275/RSEPCONFERENCES164

Azgün, S., & Taşdemir, M. (2010), "Bütçe Açıklarının Sürdürülebilirliği: Türkiye'nin Zamanlararası Borçlanma Kısıtının Testi (1980-2004)", Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi, 20(2), 35-45.

Azgün, S., & Taşdemir, M. (2010). Zaman Serileri Analizi: Eviews Uygulamalı. Ankara: Detay Yayıncılık.

Barakat, M. R., Elgazzar, S. H., & Hanafy, K. M. (2016). Impact of macroeconomic variables on stock markets: Evidence from emerging markets. International journal of economics and finance, 8(1), 195-207. http://dx.doi.org/10.5539/ijef.v8n1p195

Başarır, Ç. & Keten, M. (2016). Gelişmekte olan ülkelerin cds primleri ile hisse senetleri ve döviz kurları arasındaki kointegrasyon ilişkisi. Mehmet Akif Ersoy Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 8(15), 369-380. https://doi.org/10.20875/sb.72076

Baur, D. G., & Lucey, B. M. (2010). Is Gold a hedge or a safe haven? an analysis of stocks, bonds and gold. Financial Review, 45(2), 217-229. https://doi.org/10.1111/j.1540-6288.2010.00244.x

Bayır, M. (2020). Dış borçlanmanın ekonomik büyüme üzerindeki etkisi. Dicle Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 10(20), 382-395.

Bayrakdaroğlu, A. ve Mirgen, Ç. (2021). Kredi temerrüt takası (CDS) ve borsa endeks ilişkisi: BRICS ülkeleri üzerine bir araştırma. Ekonomi Politika ve Finans Araştırmaları Dergisi, 6(IERFM Özel Sayısı), 65-78. https://doi.org/10.30784/epfad.1019759

Bekmez, S. ve Özpolat, A. (2013). Gelir esnekliğinin ve kentsel dönüşüm uygulamalarının konut talebine etkisinin vecm yöntemi ile tahmin edilmesi. Akdeniz İİBF Dergisi, 13(27), 99-113.

Bernanke, B. S. (1986). Alternative explanations of the money-income correlation. Carnegie-Rochester Conference Series on Public Policy, Elsevier, 25(1), 49-99. DOI 10.3386/w1842

Bernanke, B. S., & Mihov, I. (1998). Measuring monetary policy. The Quarterly Journal of Economics, 113(3), 869-902. https://doi.org/10.1162/003355398555775

Bhattacharjee, A. & Das, J. (2020). Do Indian stock prices respond to domestic macroeconomic variables. NMIMS Management Review, 38(3), 55-71.

Bhuiyan, E. M., & Chowdhury, M. (2020). Macroeconomic variables and stock market indices: Asymmetric dynamics in the US and Canada. The Quarterly Review of Economics and Finance, 77, 62-74. https://doi.org/10.1016/j.qref.2019.10.005

Bloomberght. (2024, 20 Ağustos). *Fitch: Türkiye'de İslami finans büyüklüğü 100 milyar dolara ulaşabilir.* https://www.bloomberght.com/fitch-turkiyede-islami-finans-buyuklugu-100-milyar-dolara-ulasabilir-2341117

Borsa İstanbul (BİST) (2024). <https://borsaistanbul.com/tr/endeks/1/3/katilim>, (Erişim Tarihi: 20.11.2024).

Canbay, Ş. & Mercan, D. (2017). Savunma harcamalarının ekonomik büyüme ve cari işlemler dengesine etkisi: Türkiye örneği. JOEEP: Journal of Emerging Economies and Policy, 2(2), 86-104.

Carı, E. S., & Nesimioğlu, Ş. Ö. (2019, 27-28 Nisan). İslami finans açısından katılım endeksi ve hisse senetleri, International Congress of Islamic Economy, Finance and Ethics, İstanbul, Türkiye. https://isefe.org/dosyalar/ISEFE'19-Bahar%20Tam%20Metin%20Bildiriler%20Kitab%C4%B1%20(%C3%96%C4%9Frenci).pdf#page=57

Chan, K. C., Fung, H. G. & Zhang, G. (2009). On the relationship between asian credit default swap and equity markets. Journal of Asia Business Studies, 4(1), 3-12. https://doi.org/10.1108/15587890980000414

Chan-Lau, J. A. & Kim, Y. S. (2004). Equity prices, credit default swaps, and bond spreads in emerging markets. IMF Working Paper, WP/04/27, International Capital Markets.

Coronado, M., Corzo, M. T. ve Lazcano, L. (2012). A case for europe: the relationship between sovereign CDS and stock indexes. Frontiers in Finance and Economics, 9(2), 32-63.

Demirdogen, Y., & Kaplan, F. (2020). The Relationship between Participation Funds and Macroeconomic Variables: SVAR Analysis Approach. Turkish Journal of Islamic Economics, 7(2). DOI: 10.26414/A091

Dewandaru, G., Rizvi, S.A.R., Masih, R., Masih, M. & Alhabshi, S.O. (2014). Stock market co-movements: islamic versus conventional equity indices with multi-timescales analysis. Economic Systems, 38(4), 553-571. https://doi.org/10.1016/j.ecosys.2014.05.003

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74(366), 427–431. https://doi.org/10.2307/2286348

Ehrmann, M., Fratzscher, M., Mehl, A., & Bekaert, G. (2011). Global crises and equity market contagion working paper series 1381, European Central Bank.

Elliott, G., Rothenberg, T. J., & Stock, J. H. (1996). Efficient tests for an autoregressive unit root. Econometrica, 64(4), 813–836. https://doi.org/10.2307/2171846

Emeç, A. S. (2021). Türkiye'de katılım endeksi, altın fiyatları ve katılım fonları arasındaki ilişki. Journal of Pure Social Sciences, 2(2), 63-75.

Engle, R. F., & Granger, C. W. (1987). Cointegration and Error Correction: Representation, Estimation, And Testing. Econometrica: journal of the Econometric Society, 251-276. https://doi.org/10.2307/1913236

Erdem, C., Arslan, C. K., & Sema Erdem, M. (2005). Effects of macroeconomic variables on Istanbul stock exchange indexes. Applied Financial Economics, 15(14), 987-994. https://doi.org/10.1080/09603100500120365

Ergün, Ü. R., & Ener, M. (2024). Demir çelik sektöründe Geri Dönüşüm Ekonometrisi: Türkiye Örneği. Troy Academy, 9(2), 119-142. https://doi.org/10.31454/troyacademy.1349460

Fattah, A., & Kocabıyık, T. (2020). Makroekonomik Değişkenlerin Borsa Endeksleri Üzerine Etkisi: Türkiye ve ABD Karşılaştırması. Finansal Araştırmalar ve Çalışmalar Dergisi, 12(22), 116-151. https://doi.org/10.14784/marufacd.691108

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. Econometrica: Journal of the Econometric Society, 424-438. https://doi.org/10.2307/1912791

Habib, M. & Islam, K. U. (2017). Impact of macroeconomic variables on islamic stock market returns: evidence from NIFTY 50 shariah index. Journal of Commerce and Accounting Research, 6(1), 37-44.

Hakim, S. & Rashidian, M. (2002). Risk and return of islamic stock market indexes, In 9th Economic Research Forum Annual Conference in Sharjah, United Arab Emirates.

Hamilton, J. D. (1994). Time Series Analysis, Princeton University Press.

Hammoudeh, S., Mensi, W., Reboredo, J. C. & Nguyen, D. K. (2014). Dynamic dependence of the global Islamic equity index with global conventional equity market indices and risk factors. Pacific-Basin Finance Journal, 30, 189-206. https://doi.org/10.1016/j.pacfin.2014.10.001

Ho, C.S.F., Abd Rahman, N.A., Yusuf, N.H.M. & Zamzamin, Z. (2014), Performance of global islamic versus conventional share indices: international evidence. Pacific-Basin Finance Journal, 28, 110-121. https://doi.org/10.1016/j.pacfin.2013.09.002

Hussin, M. Y. M., Muhammad, F., Abu, M. F., & Awang, S. A. (2012). Macroeconomic variables and Malaysian Islamic stock market: a time series analysis. Journal of business studies quarterly, 3(4), 1.

İçellioğlu, C. Ş. (2018). Sermaye piyasalarında islami endeksler ve geleneksel endeksler arasındaki ilişkiler: katılım 30 endeksi ve BİST 100 endeksi. Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi, 19(2), 132-144.

İskenderoğlu, Ö. & Akdağ, S. (2019). Risk iştahı ile petrol fiyatları, döviz kuru, altın fiyatları ve faiz oranları arasında nedensellik analizi: Türkiye örneği. Doğuş Üniversitesi Dergisi, 20(1), 1-14.

Johansen, S. (1988). Statistical analysis of cointegration vectors. Journal of Economic Dynamics and Control, 12(2-3), 231-254. https://doi.org/10.1016/0165-1889(88)90041-3

Johansen, S. & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration—with appucations to the demand for money. Oxford Bulletin of Economics and Statistics, 52(2), doi:169-210. 10.1111/j.1468-0084.1990.mp52002003.x

Karakoç, B. (2020). Foreign capital, real sector financing and excessive leverage in Turkey: What went wrong. EMAJ: Emerging Markets Journal, 10(1), 30-39.

Karakuş, T. F. & Vural, G. (2022). Katılım endeksi ile faiz oranı, döviz kuru ve BİST 100 endeksi arasındaki ilişkinin incelenmesi. International Journal of Commerce, Industry and Entrepreneurship Studies. 2(1), 63-75.

Kayed, R. N., & Hassan, M. K. (2011). The global financial crisis and Islamic finance. Thunderbird International Business Review, 53(5), 551-564.

Kazak, H. (2023). Korku endeksi etkisinde islami ve konvansiyonel pay piyasa endeksleri arasındaki ilişki: Türkiye örneği. JOEEP: Journal of Emerging Economies and Policy, 8(2), 196-208.

Kenourgios, D., Naifar, N., & Dimitriou, D. (2016). Islamic financial markets and global crises: contagion or decoupling?. Economic Modelling, 57, 36-46. https://doi.org/10.1016/j.econmod.2016.04.014

Kılıç, E. & Türkan, Y. (2023). Analysis of the relationship between the participation index and exchange rate, gold and oil in Türkiye. Finans Ekonomi ve Sosyal Araştırmalar Dergisi, 8(2), 335-344. https://doi.org/10.29106/fesa.1198521

Koch, T. W. & Saporoschenko, A. (2001). The effect of market returns, interest rates, and exchange rates on the stock returns of Japanese horizontal keiretsu financial firms. Journal of Multinational Financial Management, 11(2), 165-182. https://doi.org/10.1016/S1042-444X(00)00048-7

Konak, F. & Türkoğlu, D. (2022). Borsa İstanbul bünyesinde katılım endeksi oluşturulmasının hisse senedi fiyatları üzerindeki etkisi. USBAD Uluslararası Sosyal Bilimler Akademi Dergisi, 4(10), 813-831. https://doi.org/10.47994/usbad.1140256

Koyuncu, T. (2018). BİST-100 endeksinin makroekonomik değişkenler ile ilişkisi: Ampirik bir çalışma. Finans Ekonomi ve Sosyal Araştırmalar Dergisi, 3(3), 615-624. https://doi.org/10.29106/fesa.423051

Longstaff, F. A., Pan, J., Pedersen, L. H., & Singleton, K. J. (2011). How sovereign is sovereign credit risk?. American Economic Journal: Macroeconomics, 3(2), 75-103.

LSEG (London Stock Exchange Group). (2024). <https://www.lseg.com/en/data-analytics/products/eikon-trading-software/islamic-finance>, (Erişim Tarihi: 20.12.2024).

MacKinnon, J.G., Haug, A.A. & Michelis, L. (1999). Numerical distribution functions of likelihood ratio tests for cointegration. Journal of Applied Econometrics, 14, 563-577. https://doi.org/10.1002/(SICI)1099-1255(199909/10)14:5<563::AID-JAE530>3.0.CO;2-R

Maysami, R. C., Lee, C. H. & Hamzah, M. A. (2004). Relationship between macroeconomic variables and stock market indices: cointegration evidence from stock exchange of Singapore's All-S Sector indices. Jurnal Pengurusan, 24, 47-77.

Naeem, M. A., Qureshi, F., Arif, M. & Balli, F. (2021). Asymmetric relationship between gold and Islamic stocks in bearish, normal and bullish market conditions. Resources Policy, 72, 102067. https://doi.org/10.1016/j.resourpol.2021.102067

Naifar, N. (2016). Do global risk factors and macroeconomic conditions affect global Islamic index dynamics? a quantile regression approach. The Quarterly Review of Economics and Finance, 61, 29-39. https://doi.org/10.1016/j.qref.2015.10.004

Nath Sahu, T., Bandopadhyay, K. & Mondal, D. (2014). An empirical study on the dynamic relationship between oil prices and Indian stock market. Managerial Finance, 40(2), 200-215. https://doi.org/10.1108/MF-06-2013-0131

Nishat, M., Shaheen, R. & Hijazi, S. T. (2004). Macroeconomic factors and the Pakistani equity market. The Pakistan Development Review, 43(4), 619-637.

Ögel, S. & Gökgöz, H. (2020). BİST 100 ve katılım endeksinin faiz ve döviz kurlarıyla ilişkisinin analizi. Maliye ve Finans Yazıları, (114), 353-374. https://doi.org/10.33203/mfy.662421

Özer, A., Kaya, A. & Özer, N. (2011). Hisse senedi fiyatları ile makroekonomik değişkenlerin etkileşimi. Dokuz Eylül Üniversitesi İktisadi İdari Bilimler Fakültesi Dergisi, 26(1), 163-182.

Panda, C. (2008). Do interest rates matter for stock markets?. Economic and Political Weekly, 43(17), 107-115.

Phillips, P. C. B., & Perron, P. (1988). Testing for a unit root in time series regression. Biometrika, 75(2), 335–346. https://doi.org/10.1093/biomet/75.2.335

Purbowisanti, R. (2018). The relationship between exchange rates and Islamic indices in Indonesia and Malaysia. An-Nisbah: Jurnal Ekonomi Syariah, 4(2), 30-52.

Rahim, Y.A. & Masih, M. (2015). Is Islamic stock index secured against interest rate risk? evidence from wavelet analysis. MPRA Paper, 65259, Munich, Germany.

Raza, N., Ali, S., Shahzad, S. J. H., Rehman, M. U. & Salman, A. (2019). Can alternative hedging assets add value to islamic-conventional portfolio mix: evidence from MGARCH Models. Resources Policy, 61, 210-230. https://doi.org/10.1016/j.resourpol.2019.02.013

Rizvi, S. A. R., Bacha, O. I. ve Mirakhor, A. (2016). Public Finance and Islamic capital markets: theory and application, in: Iqbal, Z., Sultan, J. ve Asutay, M.Springer (Ed.). Capital Markets: Conventional Versus Islamic (s. 45-63), New York: Palgrave Macmillan.

Sahu, P. K., Dey, S., Sinha, K., Singh, H. & Narsimaiaha, L. (2019). Cointegration and price discovery mechanism of major spices in India. American Journal of Applied Mathematics and Statistics, 7(1), 18-24. doi:10.12691/ajams-7-1-3

Sakarya, Ş., Yıldırım, H. & Yavuz, M. (2018). Kurumsal yönetim endeksi ve katılım 30 endeksi ile BİST 50 endeksinin performanslarının değerlendirilmesi. Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 23(2), 439-454.

Sakti, M. R. P. & Harun, M. Y. (2013). Relationship between Islamic stock prices and macroeconomic variables: evidence from Jakarta stock exchange Islamic Index. Global Review of Islamic Economics and Business, 1(1), 71-84. https://doi.org/10.14421/grieb.2013.011-06

Sancar, C., Uğur, A. & Akbaş, Y. E. (2017). Hisse senedi fiyat endeksi ile makroekonomik değişkenler arasındaki ilişkinin analizi: Türkiye örneği. International Journal of Social Sciences and Education Research, 3(5), 1774-1786.

Seçme, O., Aksoy, M. & Uysal, Ö. (2016). Katılım endeksi getiri, performans ve oynaklığının karşılaştırmalı analizi. Muhasebe ve Finansman Dergisi, (72), 107-128. https://doi.org/10.25095/mufad.396724

Sertkaya, B. (2022). Katılım endeksinin döviz kuru ve altın fiyatlarıyla ilişkisi: türkiye için ARDL sınır testi yaklaşımı. Bulletin of Economic Theory and Analysis, 7(1), 173-188. https://doi.org/10.25229/beta.1117113

Shahzad, S. J. H., Ferrer, R., Ballester, L. & Umar, Z. (2017). Risk transmission between Islamic and conventional stock markets: a return and volatility spillover analysis. International Review of Financial Analysis, 52, 9-26. https://doi.org/10.1016/j.irfa.2017.04.005

Sims, C. A. (1986). Are forecasting models usable for policy analysis?, Quarterly Review, 10(Win), 2-16.

Shiller, R. J. & Beltratti, A. E. (1992). Stock prices and bond yields: Can their comovements be explained in terms of present value models?. Journal of Monetary Economics, 30(1), 25-46. https://doi.org/10.1016/0304-3932(92)90042-Z

Şimşek, A. İ. & Bulut, E. (2024). Nonlinear relationships between the participation index and key financial assets: a quantile regression analysis. Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 17(3), 390-401. https://doi.org/10.25287/ohuiibf.1341552

Syzdykova, A. (2018). Makroekonomik değişkenler ve hisse senedi piyasası ilişkisi: KASE örneği. Çankırı Karatekin Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 8(2), 331-354. https://doi.org/10.18074/ckuiibfd.444811

Tarı, R. & Yıldırım, D. Ç. (2009). Döviz kuru belirsizliğinin ihracata etkisi: Türkiye için bir uygulama. Yönetim ve Ekonomi Dergisi, 16(2), 95-105.

Varsak, S., Koyuncu, C., & Kiliç, R. (2017). The impact of participation banks on macroeconomic indicators in Turkey. Journal of Economics Library, 4(4), 543-551. https://doi.org/10.1453/jel.v4i4.1526

Vejzagic, M. & Zarafat, H. (2013). Relationship between macroeconomic variables and stock market index: cointegration evidence from FTSE Bursa Malaysia hijrah shariah index. Asian Journal of Management Sciences & Education, 2(4), 94-108.

Yalçınkaya, Ö. (2019). Türkiye ekonomisinde dış borçların sürdürülebilirliğinin analizi: Doğrusal ve doğrusal olmayan birim kök testlerinden kanıtlar (1970-2018). Maliye Dergisi, 176, 27-51.

Yiğiter, Ş. Y. & Tanyıldızı, H. (2020). Temel ekonomik faktörlerin katılım 30 endeksine etkisi: şubat 2011-mayıs 2018 örneği. IBAD Sosyal Bilimler Dergisi, (7), 183-197. https://doi.org/10.21733/ibad.658564

Yıldız, S.B. (2015). Katılım 30 Endeksi ile BİST 100 endeksinin performanslarının değerlendirilmesi. Finans, Politik ve Ekonomik Yorumlar, 52(606), 41-53.