TÜRKİYE'DE KATILIM ENDEKSİ İLE DÖVİZ KURU, ALTIN VE PETROL ARASINDAKİ İLİŞKİNİN ANALİZİ[1]

ANALYSIS OF THE RELATIONSHIP BETWEEN THE PARTICIPATION INDEX AND EXCHANGE RATE, GOLD AND OIL IN TURKIYE

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Öz

Bu çalışmanın temel amacı Türkiye'deki katılım endeksi ile döviz kuru, altın ve petrol arasındaki ilişkiyi araştırmaktır. 03.01.2016 – 26.12.2021 dönemine ait haftalık veriler kullanılarak Johansen eşbütünleşme ve Toda-Yamamoto nedensellik testleri kullanılarak araştırma gerçekleştirilmiştir. Serilerin tamamının birinci farkta durağan olduğu tespit edilmiş daha sonrasında Johansen eşbütünleşme ve Toda-Yamamoto testleri uygulanmıştır. Yapılan analizler sonucunda katılım endeksi ile döviz kuru, altın ve petrol serilerinin uzun dönemde eşbütünleşik oldukları tespit edilmiştir. Toda-Yamamoto nedensellik testine göre ise döviz kuru ve petrolden katılım endeksine doğru tek yönlü nedensellik olduğu saptanmıştır. Katılım endeksi yatırımcılarının alternatif olarak döviz kuru ve petrolü portföy sepetlerinde kullanmaları yatırım riskini azaltacaktır.

Anahtar Kelimeler: Katılım Endeksi, Döviz Kuru, Altın, Petrol.

JEL Sınıflaması: E44, G11, G32.

Abstract

The main purpose of this study is to investigate the relationship in Türkiye between the participation index and the exchange rate, gold, and oil. The research has been carried out using Johansen cointegration and Toda-Yamamoto causality tests by using weekly data for the period 03.01.2016 – 26.12.2021. All of the series were found to be stationary at the first difference, and then Johansen cointegration and Toda-Yamamoto tests were applied. As a result of the analysis, it has been determined that the participation index, exchange rate, gold and oil series are cointegrated in the long term. According to the Toda-Yamamoto causality test, it was determined that there is one-way causality from exchange rate and oil to the participation index. The alternative use of exchange rate and oil in portfolio baskets by participation index investors will reduce the investment risk.

Keywords: Participation Index, Exchange Rate Gold, Oil.

JEL Classification: E44, G11, G32.

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1. Introduction

The functioning of the products and services in the conventional financial system is interest-based. Therefore, investors with religious sensitivities stay away from such products and services and withdraw their surplus cash from the market, causing the economy to be adversely affected. In order to eliminate this negativity and to offer investment opportunities to those investors with religious sensitivity, Islamic finance products and services are needed (Emeç, 2021; p.64). Moreover, due to the economic and financial crises that have occurred in recent years, new economic and financial systems are needed. Thus, the necessity of implementing alternative investment systems emerges. Participation indices, one of the Islamic capital market instruments, or Islamic indices, as known in the world literature, constitute one of these systems.

At the global level, examples of legal and institutional infrastructure for Islamic capital markets differ from one country to another. While Malaysia, one of the leading countries in the Islamic capital market, has a distinct law specifically for the Islamic capital market, the United Kingdom has opened the door for Islamic finance and the Islamic capital market by making amendments to the existing legislation. However, unlike Malaysia, Türkiye does not have a distinct independent legislation governing the participation capital markets. Similar to the United Kingdom, supplementary or sub-regulations to existing laws were implemented, and the sphere of action of participation capital markets was formed. With the communiqué No. III. 43 "Principles Regarding Lease Certificates and Asset Leasing Companies" published in 2010, participation capital market products were defined within the scope of the legislation for the first time in Türkiye (Participation Finance Strategy Document, 2022; p. 59).

The participation indices, which were first created with the initiatives of intermediary institutions operating in the capital market in Türkiye, were incorporated into Borsa İstanbul as of November 12, 2021, and started to be calculated in five different types within the principles determined in the "Share Certificate Issuance and Trade" standard developed by the Participation Banks Association of Türkiye (TKBB) Advisory Board. These types are BIST Participation 30 Index, BIST Participation 50 Index, BIST Participation 100 Index, BIST Participation All Index and BIST Sustainability Participation Index (Participation Finance Strategy Document, 2022;p. 59). With these indices, it is aimed to bring the mattress savings of investors, who have religious sensitivities, to the economy and to convert them into an interest-free investment so that a more effective participation finance system would be put forward.

When determining the participation indices, criteria determined by the TKBB are strictly followed. According to the criteria, the participation indices-constituent companies are those the main field of activity is not interest-based financial transactions (below a certain rate); companies that do not engage in gambling, and gamble-like occupations, production and trade of alcoholic drinks and tobacco, and forward gold, silver and currency trading; companies that do not product pig and trade pig products, and lastly media companies, which is not against morals and Islamic principles, and entertainment not contradicting Islamic moral standards (tkbbdanismakurulu.org.tr, 07.10.2022). In addition, it is required that the ratio of the companies' total interest loans to market value be below 33%, the ratio of their assets cash and securities to valuation be below 33%, and the ratio of their income from the aforementioned prohibited activities to their total income be below 5% for them to be included in the index. Participation Model Portfolio Index shares are selected from the shares within the scope of the Participation 50 Index. In addition, on the basis of shares, the ratio of ineligible incomes to total incomes is required to be below 5% (tkbbdanismakurulu.org.tr, 07.10.2022).

Participation indices may not be affected as much by economic and political events as conventional indices. However, it is important in terms of revealing the relationship between economic and political indicators and indices and determining appropriate policies. It is possible to say that the most important macroeconomic indicator affecting conventional indices is the exchange rate. The fluctuation in exchange rates causes changes on operating costs. The increase in exchange rates has serious effects on many factors such as consumption patterns, investment expenditures, and production factors (Erdogan, Gedikli and Cevik, 2019:1-2). It is very important to reveal the factors affecting the participation index for investors of participation indexes, policy practitioners of participation index and other interlocutors of participation indexes.

Among the macroeconomic variables, financial instruments such as the exchange rate, gold and oil are examined, as it is a known fact that these variables affect traditional stock markets. Examining the literature reveals that the number of research exploring the link between the participation index and the exchange rate, gold, and oil is insufficient. Therefore, in this study, the relationship between the participation index -which is put forward as an alternative to the universal indices- exchange rate, gold and oil is attempted to be explored in Türkiye in particular. In addition, in this study, it has been examined whether the participation index investors in Türkiye will reduce the risk by investing in exchange rate, gold and oil while creating their investment portfolios. The study consists of four parts; In the first part, theoretical participation indices are explained. In the second part of the study, the literature examining the studies on the subject in Türkiye and abroad is given. In the third part, the variables and

methodology used in the study are explained and the findings obtained as a result of the analysis are reported. In the last part of the study, the results obtained in the analyzes were evaluated and compared with the studies in the literature.

2. Literature Review

There are some studies that examine the relationship between the participation index and the exchange rate, gold, and oil at home and abroad. Some of the studies in the literature are summarized below. These studies are listed chronologically. It is thought that determining the relationships between participation indices and financial instruments is important for investors of participation indices, policy practitioners and financial markets.

Table 1. Summary of the Literature

Author(s)	Objectives of the Study	Method Used	Findings
Adaramola (2012)	The author looked into the cause-and-effect connection between oil prices and stock prices in Nigeria.	Johansen Cointegration Test and VECM Model	A strong causality finding was obtained from oil prices to the Nigerian stock market.
Chittedi (2012)	The researcher examined the effect of volatility in stock markets in India on oil prices.	ARDL Method	It has been established that oil prices are significantly impacted by the volatility of Indian stock values.
Nagayev and Dinc (2018)	They examined the relationship between gold and MSCI Türkiye stock market index and MSCI participation index.	Wavelet Coherence	They found that gold has a role as a hedging instrument and is a reliable investment tool during periods of high volatility.
Alsu (2019)	The researcher investigated the relationship between the equity markets of Türkiye, the United Arab Emirates, Jordan, Saudi Arabia, Bahrain, Qatar and Kuwait and oil prices.	Hatemi-J Cointegration, Maki Cointegration, Toda-Yamamoto, and Fourier Toda-Yamamoto Causality Tests	The indexes of other countries' stock markets and oil prices have been found to be cointegrated, with the exception of the Saudi Arabian stock market index, according to the results. The study also determined a short-run causality relationship from oil prices to the stock market indices of Kuwait, Qatar, United Arab Emirates and Bahrain.
Konuskan and Kocabiyik (2019)	They looked at the correlations between the BIST 100, the exchange rate, gold, and oil.	Unrestricted VAR and Granger Causality Tests	The long-term correlation between oil, gold, the currency rate, and the BIST 100 has not been discovered. They discovered that there was no connection between oil, gold, and BIST 100 in terms of causation. But they discovered a link between the exchange rate and BIST 100.
Singal et al. (2019)	They discussed about the constantly changing connections between the Mexican stock market, gold, oil, and currency rates.	ARDL model	They found that gold prices positively affected Mexican stock price, while oil prices adversely affected them.

Ogel and Gökgöz (2020)	They looked at how interest, the exchange rate, the BIST 100, and the participation index related to one another.	Cointegration and Fourier Granger Causality Test	There was no cointegration relationship. However, a causality relationship was found from the dollar to the BIST 100 and the participation index.
Altunöz (2020)	The author conducted research on the connection between the currency rate and the stock market.	ARDL Cointegration and Granger Causality Tests	They discovered that, over the long run, there is a cointegrated link between the stock market and the currency rate. It was also discovered that there is a causal correlation between the stock market and the currency value.
Kassouri and Altintas (2020)	They looked at the connection between Turkey's exchange rate and the stock market.	Engle Granger, TAR and M-TAR Asymmetric Cointegration Test	It has been determined that the stock market and the exchange rate act together in the long run in Türkiye.
Emec (2021)	The aim is to examine the relationship between gold prices, the amount of funds collected by participation banks and the participation index in Türkiye, using the data for the period February 2011 – May 2021.	Fourier Cointegration Test and Generalized Analysis of Variance	The Fourier Cointegration Test findings revealed that the series interacted over a lengthy period of time. The generalised analysis of variance revealed that the long-term quantity of money and the price of gold both had an impact on the participation index.
Zahrok et al. (2021)	They discussed the connection between the Indonesian participation index, currency rates, gold, and oil.	MRA method	They found that gold and oil had a significant impact on the Indonesian participation index.

Analysing the relevant literature reveals that the number of research examining the link between the participation index and the exchange rate, gold, and oil is insufficient. This circumstance demands that the topic under consideration be examined using various techniques and samples. For this reason, the relevant variables were examined in the study.

3. Data Set and Method

The main purpose of this study is to investigate the relationship between the participation index 30 and exchange rate, gold, and oil. In the study, weekly data for the period 03.01.2016 – 26.12.2021 were used, which was taken from investing.com. Analyzes were carried out by taking the logarithm of the values of the variables in TL. The Johansen cointegration test and the Toda-Yamamoto causality test were employed to investigate the relationship between the participation index and the exchange rate, gold, and oil using the EViews 9 package program.

It is possible to mention the existence of many tests that reveal the cointegration relationship between series. However, the most commonly used in the literature are the Engle-Granger and Johansen cointegration tests. The cointegration test reveals the existence of a long-term relationship between series that are integrated at the same level (Polat and Kılıç, 2019:394). Johansen Cointegration Test was used in the study as it offers the opportunity to investigate the long-term relationships of series that are not static at the level but become static at the first difference (Işık, Acar and Işık, 2004:332). It means that at least two time series with non-constant trends are cointegrated if they move together or very close to each other in the long term (Stock and Watson, 2011:663-664). Equation of Johansen Cointegration Test;

$$Y_t = \sum_{i=1}^{p} A_i Y_{t-1} + \beta X_t + u_t$$

By taking the first difference of the non-stationary series at I(0) level, the series that become stationary at the I(1) level are calculated as follows.

$$\Delta Y_t = \pi Y_{t-1} + \sum_{i=1}^{p-1} \tau_i Y_{t-1} + \beta X_t + v_t$$

$\pi = \sum_{i=1}^{p} A_i - I$ ve $\tau = -\sum_{j=i+1}^{p} A_j$ is accepted as. $\pi = \alpha\beta$ is explained as. It represents two matrices with α and β (kxr) dimensions and rank r. α represents the coefficient of the error correction model term, and β represents the long-run co-integration coefficients. If the rank is 1, there is 1 cointegration between the variables, and if it is greater than 1, there is a cointegration relationship as much as its value (Akpolat and Altintas, 2013:123-124).

The existence of the relationship between the series is not known to be internal or external. Granger (1969) and Sims (1972) deal with the relationship of mutual causality between the series. In this case, the test in which the direction of the relationship between the series and the number of delays are determined is called the Granger Causality Test (Elmas and Polat, 2013:41). In order for the Granger causality test to be applied, the level values of the series must be static. However, in the Toda-Yamamoto (1995) test, there is no requirement for the series to be static at the level, which means that it can be analysed regardless of the level of the series. Thus, it is understood that the data loss of the series can be prevented and the results to be obtained will be more reliable.

The VAR process created for the Toda-Yamamoto test is as follows.

$$\ln X_t = \sum_{i=1}^{k+d_{Max}} \beta_{1i} \ln X_{ti} + \sum_{i=1}^{k+d_{Max}} \alpha_{1i} \ln Y_{ti} + \varepsilon_{t1} \quad (1)$$

$$\ln X_t = \sum_{i=1}^{k+d_{Max}} \beta_{2i} \ln X_{ti} + \sum_{i=1}^{k+d_{Max}} \alpha_{2i} \ln Y_{ti} + \varepsilon_{t2} \quad (2)$$

The dmax parameter in equations (1) and (2) represents the maximum integration degrees of the variables in the model, the k term represents the optimal lag length calculated with the VAR model, and the εt term represents the error correction model.

Under the condition i≤ k in equation (1), the null hypothesis is tested as β1i. If the alternative hypothesis is accepted, there is no causality relationship from Yt to Xt. Equation (2) indicates that if the null hypothesis is tested as β2i = 0 for the i≤ k condition and the alternative hypothesis is accepted, it finds a causal relationship from Xt to Yt (Ugur and Bingol, 2018: 264-265).

4. Findings and Interpretations
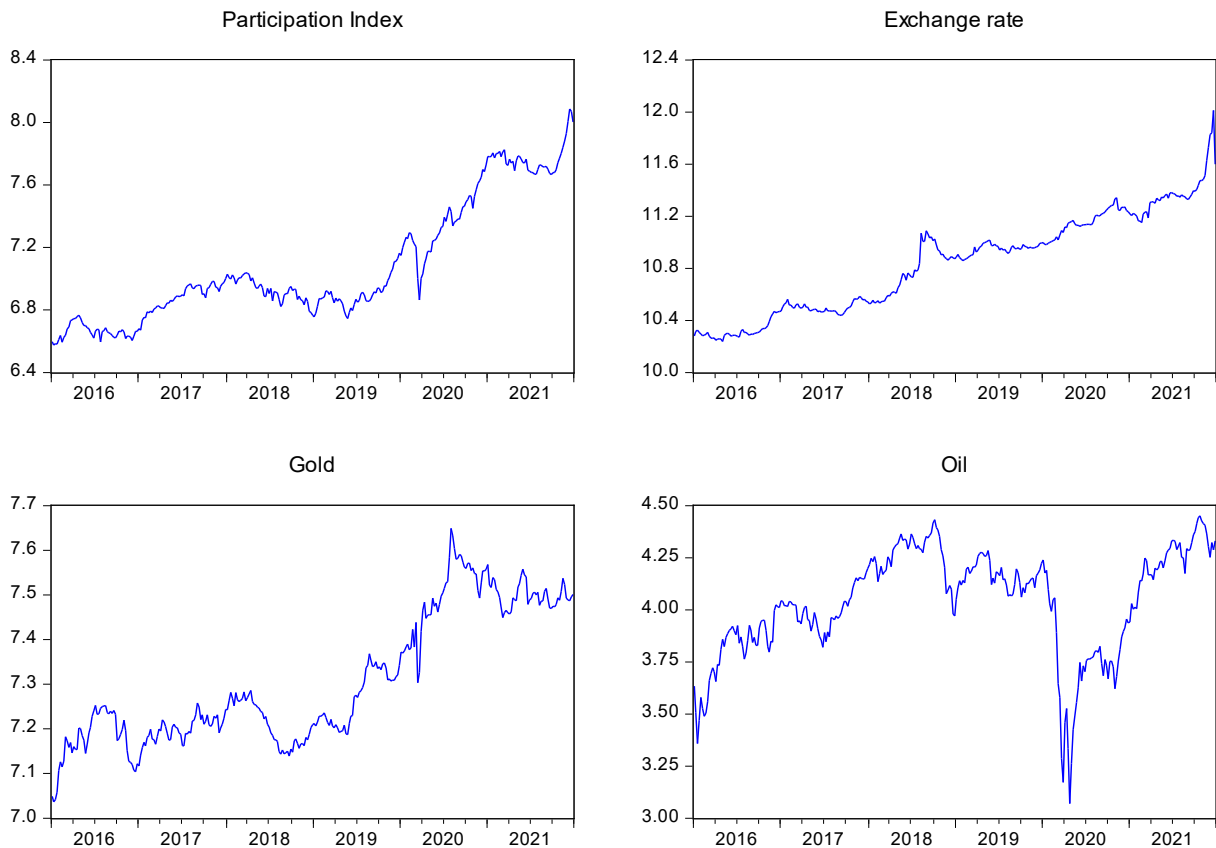
When the variables of the price series graphs are examined, it is possible to say that the participation index and exchange rate are generally on the rise, although there are small decreases in the discussed. It is observed that there are intense fluctuations in gold and oil variables.

Descriptive statistics were presented at first in the study, then correlation analysis was performed, and unit root tests were started. Table 2 provides descriptive statistics for Participation Index, exchange rate, gold, and oil data.

Table 2. Descriptive Statistics

	Participation Index	Exchange rate	Gold	Oil
Average	7.079	10.843	7.308	4.035
Median	6.938	10.914	7.247	4.077
Maximum	8.086	12.013	7.649	4.450
Minimum	6.575	10.238	7.037	3.070
Standard Deviation	0.385	0.381	0.147	0.252
Skew	0.860	0.139	0.533	-0.858
Kurtosis	2.475	2.144	1.909	3.658
Jarque-Bera	42.163	10.577	30.339	44.010
Probability	0.000	0.005	0.000	0.000

Descriptive statistics for the variables are reported in Table 2. It has been noted that the exchange rate has the greatest average value of all the variables. The median, maximum, and minimum values of the exchange rate are observed to have the highest rates at the same time. The participation index is the variable with the most volatility, according to the standard deviation value. When the skewness values of the variables are examined, it can be said that the oil variable shifts to the left due to its negative value and the other variables are inclined to the right. When the kurtosis values are examined, it is seen that the oil variable exhibits a sharp structure, while the other variables exhibit a flattened structure. Since the Jarque-Bera test was less than 5% significance level, it was determined that the variables did not exhibit normal distribution.

Table 3. Results of Correlation Analysis

	Participation Index	Exchange rate	Gold	Oil
Participation Index	1.000			
Exchange rate	0.851	1.000		
Gold	0.885	0.801	1.000	
Oil	0.243	0.299	-0.026	1.000

It was determined that the relationship between the participation index and the exchange rate and gold was strong in a positive way and the relationship between the participation index and oil was weak in a positive direction. It is possible to say that the investment tool with which the participation index has the highest relationship is gold.

Table 4. Unit Root Tests

	Augmented Dickey–Fuller (ADF)		Phillips–Perron (PP)	
	Constant	Intercept and Trend	Constant	Intercept and Trend

Level Values				
Participation Index	0.599	-1.158	0.511	-1.300
Exchange rate	0.311	-3.763*	-0.186	-3.675*
Gold	-1.487	-2.405	-1.409	-2.437
Oil	-2.668	-2.585	-2.322	-2.376
First Difference Values				
Participation Index	-15.939*	-15.978*	-15.939*	-15.981*
Exchange rate	-16.685*	-16.679*	-16.808*	-16.793*
Gold	-17.400*	-17.381*	-17.492*	-17.471*
Oil	-14.259*	-14.257*	-15.159*	-15.139*
Critical Values				
1%	-3.451	-3.988	-3.451	-3.988
5%	-2.871	-3.424	-2.871	-3.424
10%	-2.572	-3.135	-2.572	-3.135

Note: * and ** represent 5% and 10%, respectively.

Unit root analyses of the variables are reported in Table 4. The unit root tests revealed that the variables included unit roots at their level values, indicating that they did not stagnate. However, it was determined that all variables remained constant in the first difference. The Augmented Dickey-Fuller and Phillips-Perron tests have been found to support each other. After determining the stationarity test of the variables, the Johansen Cointegration Test was applied to analyse the long-term relationship between the variables. Johansen Cointegration Test results are reported in Table 5.

Table 5. Johansen Cointegration Test Results

	Eigenvalue	Trace Statistic	5% Critical Value	Probability
None*	0.092	59.277*	55.246	0.021
At most 1	0.052	29.446	35.011	0.174
At most 2	0.024	12.833	18.398	0.252
At most 3 *	0.017	5.181*	3.841	0.023
	Eigenvalue	Max-Eigen Statistic	5% Critical Value	Probability
None	0.092	29.831**	30.815	0.066
At most 1	0.052	16.613	24.252	0.365
At most 2	0.024	7.651	17.148	0.641
At most 3 *	0.017	5.181*	3.841	0.023

Note: * and ** represent 5% and 10%, respectively.

According to the results of the Johansen Cointegration Test applied to determine the long-term relationship between the variables, the trace statistic was found to be significant according to the 5% importance level. Max-Eigen Statistic are seen to be significant at both 5% and 10% importance levels. This indicates that the participation index and exchange rate, gold and oil are cointegrated in the long run, that is, there is a long-term relationship between the participation index and exchange rate, gold and oil.

The causal association between the participation index and foreign exchange, gold, and oil was examined using the Toda-Yamamoto test. The right delay length must be chosen using the VAR model in order to carry out the Toda-Yamamoto (1995) test (Doan, 2017:24). According to the LR information criterion, the delay length of the variables was found to be 5, according to the FPE and AIC information criteria, it was found to be 3, and according to the SC and HQ information criteria, it was found to be 1.The model predicted the delay length 1 for the SC and HQ information criterion. The LM test was used to determine whether the variables had any autocorrelation. It was discovered that the variables had no issues with autocorrelation. The LM test results are given in Table 6.

Table 6. LM Test Statistics

Lags	LM Statistic	Probability
1	43.799	0.000

It was concluded that there was no issue with the variables' autocorrelation based on the outcomes of the LM test. The Toda-Yamamoto causality test was used to evaluate whether or not there was a causal link between the participation index and the exchange rate, gold, and oil, as well as the direction of that relationship if any. The results obtained are indicated in Table 7.

Table 7. Toda-Yamamoto Causality Test

	F Statistics	Probability
Exchange Rate → Participation Index	4.482*	0.034
Gold → Participation Index	0.139	0.709
Oil →Participation Index	2.910**	0.088
Participation Index →Exchange Rate	0.010	0.920
Participation Index →Gold	2.003	0.157
Participation Index →Oil	2.572	0.109

Note: * and ** represent 5% and 10%, respectively.

According to the results of the Toda-Yamamoto Causality Test, it was determined that there was a positive and one-way causality at the 5% importance level from the exchange rate to the participation index. Likewise, there is a positive and one-way causality relationship at the 10% importance level from oil to the participation index. It was determined that there was no causal relationship between gold and the participation index.

5. Conclusion

In the modern world, it is conceivable to discuss the presence of significant interconnections between financial markets and the financial instruments traded on these markets. The fast advancement of technology is one of the key causes of this. Therefore, the link between the participation index, one of the financial market instruments, and the exchange rate, gold, and oil is crucial for investors to understand. In this study, which investigates the relationship between the participation index and the exchange rate, gold and oil, weekly data for the period 03 January 2016 - 26 December 2021 were used. The variables were initially tested for stability, and it was found that in the first difference, every variable was static. The Johansen cointegration test was used to determine the long-term relationship between the participation index and foreign exchange, gold, and oil. It was found that the variables were cointegrated over the long term, indicating that there was a relationship between the variables and the participation index.

The causation association between the participation index and the exchange rate, gold, and oil was also tested using the Toda-Yamamoto method. It has been noted that there is a positive and one-way causal relationship between the participation index and the exchange rate and price of oil. But no link between the participation index and gold was shown to be causative. This demonstrates how participation index investors' choices are influenced by changes in the exchange rate and oil prices. However, it claims that the participation index investor is unaffected by changes in gold prices.

Investors with religious sensitivities avoid investing their savings in interest or other instruments that are not compatible with their beliefs; thus, they prefer to invest in the participation index. At the same time, participation indices are accepted as an alternative investment tool for investors who diversify their portfolio in order to reduce their risks. Investors investing in the participation index, on the other hand, prefer instruments such as exchange rate, gold, and oil as alternatives for portfolio diversification. The results of this study demonstrate the interaction between the participation index, exchange rate, and oil while demonstrating the independence of gold from the participation index. For this reason, it is thought that it will be beneficial for participation index investors in Türkiye to keep gold and participation index in the same basket when diversifying their portfolios. Thus, pious investors will reduce the risk with portfolio diversification. In future studies, it is thought that it will be useful to analyse the relationship between the returns of participation indices and the returns of investment instruments such as foreign currency, gold, and oil, taking into account the crisis periods. In addition, it is believed that handling the subject with different methods and different samples will be important in terms of its contribution to the literature.

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