



Exploring the Causal Linkage Between Foreign Equity Investments and BIST 100 Index



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Abstract: This study examines the interrelation between foreign equity investments (FEIs) and the BIST 100 index, a pivotal indicator of the Turkish economy's overall performance. Given Turkey's emergence as a market with considerable potential returns, this analysis is particularly pertinent. The focus is on the volume of shares held by international investors in Borsa Istanbul and its impact on the BIST 100 index. Data spanning 924 weeks, from 2006 to 2023, form the empirical basis of this investigation. Stationarity of variables was assessed using the Augmented Dickey-Fuller (ADF) and Phillips-Peron (PP) unit root tests. The direction of causality between the studied variables was determined via a Granger causality test, employing a Vector Autoregressive (VAR) model. Findings reveal a bidirectional causality between the returns of the BIST 100 index and FEIs, aligning with prevailing hypotheses that posit a connection between foreign equity flows and stock market indices. This relationship underscores the integral role of international investments in shaping market dynamics within emerging economies. The study contributes to the understanding of financial market interdependencies, highlighting the significance of foreign investments in the context of a developing economy's stock market.

Keywords: BIST 100 index return; Foreign equity investment (FEI); Granger causality test; Stock market indices

1. Introduction

Since the 1990s, there has been a significant increase in capital inflows to developing countries due to the impact of financial liberalization. This trend has been fueled by several factors, such as financial sector reforms aimed at the development of capital markets, advancements in technology and information flow, increasing investor confidence leading to a rise in foreign direct investments, and diversification of financial instruments.

Moreover, enhanced growth prospects, government initiatives directed towards advancing financial liberalization, the potential risk-return advantages attainable through international diversification, and the motivation for seeking higher returns due to low interest rates in developed nations together present an alternative target for portfolio investment from advanced economies to emerging markets. (Batten & Vo, 2015; Vo & Ellis, 2018).

FEIs are classified into two primary categories: foreign direct investments and FEIs. In the case of direct investments, investors engage in funding a company with the intention of actively participating in its management. Conversely, FEI entails a foreign investor acquiring shares issued in another country, providing the investor with ownership rights, though lacking control, in the acquired business. FEIs aim to generate high returns in a short period of time following entry into the targeted markets. Positive economic and political conditions tend to attract portfolio investments to these countries. Conversely, negative expectations can lead to a sudden and significant outflow of capital from them (İlter & Gök, 2021). The abrupt and significant withdrawals from the stock market by foreign investors undoubtedly affect the stock market index.

Foreign capital investments are considered a source of economic prosperity, increased liquidity, and efficient capital market allocation (Levine, 2001). The free movement of capital across national borders enhances productivity through efficient resource allocation (Ahmed & Zlate, 2014). Both direct foreign investments and private capital flows in the form of FEIs enhance investor confidence in the host country, attracting more investors and positively impacting the host country's performance (Gozgor & Erzurumlu, 2010). While direct foreign

investments in physical form become irreversible once made, portfolio investments in the form of stock investments consist of liquid assets that can be sold and exchanged more easily and quickly (Sarno & Taylor, 1999).

FEIs are crucial for both investors and host countries. For investors seeking to diversify their risks and achieve higher returns by investing across countries, FEIs become an inevitable choice. From the perspective of the host country, especially for developing nations, portfolio investments are believed to play a significant role in generating cash flow, closing the savings-investment gap, and providing the necessary foreign exchange to finance the current account deficit (Celik, 2023; Garg & Dua, 2014).

Determinants of foreign capital investments exist at the country, industry, and firm levels; they vary depending on factors such as financial development, financial liberalization, inflation rate, financial crises, investor sensitivity, interest rate, host country stock market performance, country credit rating exchange rates and US stock market returns (Singhania & Saini, 2018). It is natural for developing countries to be affected by developments in the leading global players such as the US economy and the New York Stock Exchange (Tetik & Özen, 2016). Another important factor is that the exchange rate is a very important determinant of FEI for developing countries. Given that exchange rate fluctuations can impact companies' profits and subsequently influence stock returns, foreign portfolio investors tend to exhibit sensitivity to exchange rate risks (Vurur, 2021; Vurur & Özen, 2020). Also, the performance of the stock markets of the host country is an important factor in attracting FEIs (Şenol & Koç, 2018). In a study by Yıldız (2012), for example, the performance of the Borsa Istanbul index is determined as a factor influencing FEI behavior in Turkey. Studies measuring the impact of domestic stock market performance on portfolio flows (Agarwal, 1997; Chakrabarti, 2001; Rai & Banumurthy, 2004) also emphasize that foreign investors are driven by returns.

High growth rates offered by developing countries such as Turkey render them attractive to international investors (Koy & Karaca, 2018). The nexus between FEIs and economic performance naturally becomes the subject of academic studies. Covering the period from 2006, the earliest data available from the TCMB EVDS database, to 2023, this study attempts to explore the link between FEIs and the BIST 100 index returns by using Granger causality analysis. A literature review, in fact, reveals the existence of similar studies on the subject. Predominantly monthly data is used in these studies, such as by İbicioğlu (2012), Ustaoglu (2020), Polat & ve Kılıç (2019), Köycü & Ege (2023), and Coşkun et al. (2023). This study differs from others by using weekly data as the frequency interval and by covering a broader analysis period (2006-2023). Indeed, Polat & ve Kılıç (2019) examined the relationship between foreign residents' equity investment and the BIST100 index and concluded that there is a unidirectional causality from equity investment to the BIST100 index. The present study sounds like interesting research as it attempts to, with the extended time period and higher frequency interval, reveal the nature of the relationship between FEI and the BIST 100 index.

In the subsequent section of the study, firstly, research on the impact of FEIs on the stock market and stock indices has been examined. Following this, the dataset is introduced, and findings related to the results of the econometric analyses used in the research are presented. The final section comprises the conclusion, where the findings obtained from the analyses are generally evaluated and discussed.

2. Literature Review

In the literature, there exists a body of research predominantly dedicated to investigating the determinants of FEIs in developing countries. Moreover, more specifically, there are comprehensive studies delving into the intricate relationships between FEIs and various economic and financial indicators within emerging markets. In this section, the focus is directed towards studies that explore the relationship between FEIs and stock indices, stock returns, and market indicators. Yan & Wang (2018) found a positive contemporaneous relationship between stock returns and foreign flows in developing stock markets in their study, which included 21 countries spanning from 1995 to 2014. In 2013, French & Vishwakarma (2013) looked into the connection between net FEI, the volatility of the Philippine stock market, and exchange rates. They found a strong statistical and economic link between positive shocks to net portfolio flows and the volatility of the Philippine stock market. They found that substantial changes in net foreign equity flows led to a significant increase in the two-week performance of the Philippine stock market. A study employing the ARDL method by Okuyan & Erbaykal (2011) indicated the existence of a positive relationship between the monthly foreign trading volume and the stock returns in Borsa Istanbul in the long run. A similar study using the same method was conducted by Akar (2008), where the analysis focused on the monthly closing value of the BIST 100 index and the net foreign transaction volume. In contrast to the findings of Okuyan & Erbaykal (2011), Akar (2008) found a significant positive short-term relationship between the variables.

Coşkun et al. (2023) classified stock investors as individual-institutional/domestic-foreign and analyzed the effects of their portfolios on the BIST 100 Index using the Bayesian Vector Autoregressive Model (BVAR). According to the study, about 67% of the changes in BIST can be explained by the index itself. Institutional-individual domestic investors have the most impact on changes in BIST, followed by institutional-individual foreign investors.

İbicioğlu (2012) focused on FEIs with BIST sector indices. The study found that the stock investments of foreign residents had an impact on the considered indices, with the most notable effects observed in the financial, BIST 100, industrial, service, and technology indices. Ustaoglu (2020) examined the relationships between the buying and selling transaction volumes of foreign investors in BIST and the BIST 100 index using monthly data and the ARDL boundary test for the period 2009-2020. The analysis revealed a long-term cointegration relationship between stock purchases and sales in BIST and the BIST 100 index. A 1% increase in foreign purchases resulted in a 15.58% increase in the BIST 100 index, while a 1% increase in foreign sales led to a 16.43% decrease in the BIST 100 index.

Polat & ve Kılıç (2019) examined the relationship between equity investments by non-residents and the BIST100 index for the period 2010-2018. In their study, they identified a significant long-term relationship between the variables and concluded that there is a unidirectional causality from equity investments to the BIST100 index. Şit et al. (2020), in their study covering the years 2005-2019 with quarterly data, addressed the relationship between the BIST100 Index and FEIs. Their research showed that the variables were related and that there was bidirectional causality, meaning that FEIs could affect the BIST-100 index and vice versa. In addition to these, Köycü & Ege (2023), in their study conducted using monthly data for the period of 2006-2021, explored the causality between the number of foreign investors participating in Borsa Istanbul and the overall index value of Borsa Istanbul. Their research findings revealed bidirectional causality in this relationship.

In studies utilizing confidence indices, Hamurcu (2021) investigated the relationship between the consumer confidence index, a significant factor in investors' decision-making, and FEIs. The research revealed Granger causality between the consumer confidence index and the portfolio investments of foreign residents, with the direction of causality being from the consumer confidence index to portfolio investments. Furthermore, the study identified that this causality is positive, indicating that an increase in the consumer confidence index could lead to an increase in FEIs or vice versa.

From the studies discussed in the literature up to this point, it appears that FEIs are linked to stock returns and market volatility. Therefore, a causal relationship is expected between the variables in this study.

Accordingly, the alternative hypotheses of the study are set as follows:

H1: There is a causality from the FEI to the return on the BIST 100 index.

H2: There is a causality from the BIST 100 Index return to FEI.

In the context of studies examining the relationship between FEIs and the BIST 100 index, it is crucial to acknowledge that the choice of methodology, the specified time frame, and the format of the data (whether quarterly or monthly) can lead to variations in the analysis outcomes. This study aims to distinguish itself from other research by utilizing a dataset covering a broad period from 2006 to 2023, consisting of weekly data, which differs from datasets used in previous studies.

3. Data Set and Econometric Method

The primary objective of the study is to investigate the relationship between FEIs and the BIST 100 index returns. For this purpose, the study utilizes the weekly closing values of the BIST 100 index and the stock of equities held by non-residents. All data used in the study were obtained from the Central Bank of the Republic of Turkey Electronic Data Distribution System (EVDS). The variables employed in the study consist of 924 weekly observations spanning the period from 2006 to 2023, with details provided in Table 1.

The logarithmic returns of the BIST 100 closing values used in the study are calculated using the formula.

$LOGBIST = LOG(BIST100_t / BIST100_{t-1})$. Information regarding the data involved in the formula is provided below:

- BIST100_t: Closing price of the index on week t
- BIST100_{t-1}: Closing price of the index on week t-1

Similarly, the logarithmic changes of FEIs are calculated using the formul.

$LOGFEI = LOG(FEI_t / FEI_{t-1})$. Information regarding the data involved in the formula is outlined below:

- FEI_t: Foreign equity stock value on week t
- FEI_{t-1}: Foreign equity stock value on week t-1

Table 1. Descriptive statistics of the variables

	LOGBIST	LOGFEI
Number of Observations	924	924
Mean	0.0032	-0.0002
Standard deviation	0.0371	0.0510
Skewness	-0.4524	-0.6605
Kurtosis	4.5301	6.4077
Jarque-Bera	121.6602	514.2589
J.B. Probability	0.0000	0.0000

Note: This table was prepared by the authors

As indicated in Table 1, the standard deviation of FEIs is higher than the standard deviation of the BIST 100 index return, suggesting that the volatility in FEIs is greater compared to the BIST 100 index return. To assess whether the BIST 100 index return series and FEIs series exhibit a normal distribution, the Jarque & Bera (1987) test was conducted. The Jarque-Bera test statistic indicates that neither series follows a normal distribution.

In econometric analyses involving time series data, it is essential to test the series stationary through unit root tests to obtain meaningful relationships between variables. This is because working with non-stationary series may lead to a spurious regression problem, creating a situation where there is no real relationship between the series, but it appears otherwise (Gujarati, 2004). The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root test results, conducted to determine whether the series used in the study are stationary or not, are presented in Table 2.

Table 2. Unit root test results

Variables	ADF Test Statistics		Phillips-Peron Test Statistics	
	Constant	Constant and Trend	Constant	Constant and Trend
LOGBIST	-13.5901	-13.8178	-29.5199	-29.6571
	0.0000	0.0000	0.0000	0.0000
	***	***	***	***
LOGFEI	-13.3742	-13.3670	-29.1027	-29.0883
	0.0000	0.0000	0.0000	0.0000
	***	***	***	***
1% level	-3.437213	-3.968023	-3.437213	-3.968023
Mackinnon Critical Values	5% level	-2.864459	-2.864459	-3.414690
	10% level	-2.568377	-2.568377	-3.129501

Note: *** %1 significance level. This table was prepared by the authors

As evident from Table 2, the test statistics for the LOGBIST and LOGFEI series have been calculated for both the constant and constant-trend models. The results of the ADF and PP unit root tests indicate stationarity at the level values, as observed from the t-statistics and p-values. The test statistics for both the LOGBIST and LOGFEI series, which have been included in the analysis after calculating logarithmic returns, are found to be smaller than the critical values of Mackinnon at the 1%, 5%, and 10% significance levels. This suggests the absence of a unit root, indicating that the stationarity condition is satisfied.

After conducting the stationarity test for the series, before starting the analysis with the VAR model, it is essential to determine the optimal lag length. The findings regarding the determination of the optimal lag length are presented in Table 3.

Table 3. Selection of lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	3802.383	NA	8.54e-07	-8.297779	-8.287255*	-8.293762
1	3813.492	22.14571	8.41e-07	-8.313301	-8.281729	-8.301251*
2	3819.608	12.16466	8.37e-07	-8.317921	-8.265301	-8.297837
3	3820.773	2.311950	8.42e-07	-8.311731	-8.238062	-8.283613
4	3835.091	28.35503*	8.23e-07*	-8.334259*	-8.239543	-8.298108
5	3837.798	5.350096	8.26e-07	-8.331438	-8.215673	-8.287252
6	3842.146	8.572648	8.25e-07	-8.332197	-8.195385	-8.279978
7	3844.341	4.317019	8.28e-07	-8.328255	-8.170394	-8.268002
8	3845.71	2.695795	8.33e-07	-8.322520	-8.143611	-8.254234

Note: The asterisk * indicates the appropriate delay number according to the relevant criteria. This table was prepared by the authors

In Table 3, various statistics, including LR (sequential modified LR test statistic), FPE (final prediction error), AIC (Akaike information criterion), SIC (Schwarz information criterion), and HQ (Hannan-Quinn information criterion), were examined to determine the optimal lag length. It is observed that information criteria yield different results in determining the optimal lag length for the series. Generally, AIC and SIC results are preferred in determining the lag length. Therefore, in this study, the optimal lag length was determined as 4 according to the Akaike Information Criterion. LR and FPE tests also support the result of a lag length of 4.

After determining the optimal lag length, a VAR model with a lag length of 4 was constructed. To examine whether the VAR model created for the variables considered in the study has a stationary structure, the inverse roots of the AR characteristic polynomial are analysed. The distribution of the inverse roots of the AR characteristic polynomial within the unit circle is presented in Figure 1. If all roots are within the unit circle, it implies that the estimated model is stationary.

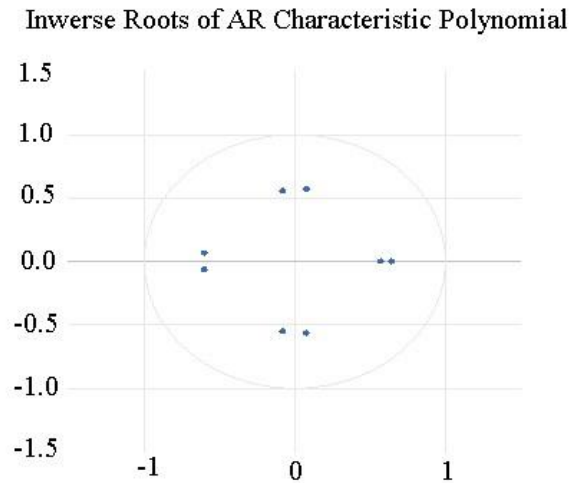


Figure 1. Inverse roots of AR characteristic polynomials of the LOGBIST-LOGFEI model
 Note: This figure was prepared by the authors

After establishing the VAR model, the Granger causality test is applied to determine the direction of causality between variables. The results of the Granger causality test led to a decision based on the null hypothesis. If the null hypothesis is not rejected, it implies no causality relationship between variables. Conversely, rejecting the null hypothesis suggests the existence of a causality relationship between variables (Granger, 1969). The results of the Granger causality test are presented in Table 4.

Table 4. Granger causality test results

H0	Chi-sq	Lag Length	Probability
LOGFEI is not the Granger cause of LOGBIST LOGFEI → LOGBIST	10.13243	4	0.0383
LOGBIST is not the Granger cause of LOGFEI LOGBIST → LOGFEI	15.93106	4	0.0031

Note: This table was prepared by the authors

According to the results of the Granger causality test calculated in Table 4, the probability value of the LOGFEI variable being less than 0.05 indicates a causality relationship at the 5% significance level from FEIs to the BIST 100 index returns, and the null hypothesis (H0) is rejected. In other words, changes in foreign equity holdings are the Granger-cause of changes in the BIST 100 index return. Similarly, the probability value of the LOGBIST variable being less than 0.01 suggests a significant Granger causality relationship at the 1% significance level from the BIST 100 index return to FEIs. The Granger causality test results for both variables indicate a bidirectional causality relationship between FEIs and the BIST 100 index return.

4. Conclusions

International portfolio investments have been increasing significantly since the 1990s. Short and long-term FEIs have a substantial impact on the stock markets of developing countries. FEIs can be influenced by various macro-level determinants. These investments are affected by factors such as growth expectations, interest rates, exchange rates, inflation, and the stock market performance of the host country. Based on this assumption, this study aims to investigate the mutual relationship between FEIs and changes in the stock market index.

In the scope of this study, the relationship between the weekly closing values of the BIST 100 index series, and the foreign residents' equity holdings has been analyzed using 924 weekly data points from the period 2006-2023. The study begins with calculating the descriptive statistics of the variables. Subsequently, unit root tests are conducted to test stationarity of the series, which are followed by a VAR analysis.

Finally, to determine if there is a causal relationship between the variables, a Granger causality test is applied. The causality test results indicate a bidirectional causality relationship between the BIST 100 index return and FEIs. Hence, the null hypotheses of the study are rejected. The findings, therefore, confirm that level of FEI interacts with the local stock market index. The results reflect the impact of capital flows from foreign investors to developing countries on the economic performance of investee markets. The findings of bidirectional causality

are consistent with the empirical results presented in the literature by Köycü & Ege (2023) and Şit et al. (2020). However, the bidirectional causality finding contradicts the results of Hamurcu (2021) and Polat & ve Kılıç (2019), who found a unidirectional causality in similar studies. The divergence of findings might be attributed to variations in the data frequency used in the analysis (weekly, monthly, quarterly) and to differences in the time intervals adopted in the studies.

The findings of the study confirm the importance of the FEI for the development of emerging economies such as Turkey. The policymakers, then, should strive to attract foreign investors. Rule based economic decisions and foreseeable investment climate could pave the way for increased foreign investor participation in the stock market.

The study is based on a robust methodology widely accepted in the literature, together with the data obtained from reliable sources. However, the study has certain limitations as it focuses only on the relationship between FEI and the return on the BIST-100 index. It does not consider other important variables such as interest rates, exchange rates and inflation that might affect FEI level. Future studies could include other variables in their analyses. Moreover, mediating or moderating variables between FEI and stock markets could also be assessed in future studies.

Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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