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Research Article / *Araştırma Makalesi*

AN ANALYSIS OF MACROECONOMIC FACTORS AFFECTING LONG-RUN PRICE PERFORMANCE IN INITIAL PUBLIC OFFERINGS ON BORSA ISTANBUL*

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ABSTRACT

This study aims to investigate the macroeconomic factors affecting the three-year market-adjusted cumulative abnormal returns of 106 stocks that conducted initial public offerings (IPOs) on Borsa Istanbul (BIST) between 2010 and 2018, using balanced panel data analysis. In addition, it provides new insights into the effects of expansionary monetary policies, global crises, and external shocks such as COVID-19 on investor behavior. The analysis covers the years 2010-2021. Random effects are observed in panel data analysis, and the Random Effects model is deemed appropriate. According to the Random Effects model results there is a positive relationship between long-term stock returns and the Consumer Confidence Index (CCI), gold prices, and Gross Domestic Product (GDP). While a positive relationship between the CCI and GDP with long-term stock returns is expected, the positive relationship between gold prices and stock returns contradicts expectations. This finding may be interpreted as evidence that investor behavior is shaped by the exchange rate shock and heightened macroeconomic uncertainty in Turkey in 2018, the global impact of the COVID-19 pandemic, and the expansionary monetary policies and low interest rates implemented during the period. The aim of this study is to contribute to the literature by examining the macroeconomic factors affecting the long-term returns of stocks that have conducted initial public offerings (IPOs) on Borsa Istanbul (BIST) using updated data.

Keywords: *Initial Public Offering, Long-run Performance, Macroeconomic Factors, Panel Data Analysis*

JEL Classification: *G10, G30*

BORSA İSTANBUL'DA İLK HALKA ARZLARDA UZUN DÖNEM FİYAT PERFORMANSINA ETKİ EDEN MAKROEKONOMİK FAKTÖRLERİN ANALİZİ

ÖZET

Bu çalışmada, BİST'de 2010-2018 yılları arasında ilk halka arzını gerçekleştirmiş 106 adet payın 3 yıllık piyasaya göre düzeltilmiş birikimli anormal getirilerini etkileyen makroekonomik faktörler dengeli panel veri analiziyle araştırılması amaçlanmıştır. Ayrıca, çalışma genişleyici para politikalarının, küresel

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krizlerin ve COVID-19 salgını gibi dış şokların yatırımcı davranışını nasıl etkilediğine dair yeni öngörüler sunmaktadır. Analizler 2010-2021 yıllarını kapsamaktadır. Panel veri analizlerinde rassal etkilerin olduğu görülmüş ve Rassal Etkiler Modelinin(REM) kullanılması uygun bulunmuştur. REM sonuçlarına göre; payların uzun dönem getirileri ile Tüketici Güven Endeksi (TGE), altın ve GSYH arasında pozitif bir ilişki olduğu sonucuna ulaşılmıştır. TGE ve GSYH ile uzun dönem pay getirileri arasında pozitif yönlü bir ilişki olması beklenen bir sonuçken, altın fiyatları ile pay getirileri arasındaki pozitif yönlü ilişki beklentiler ile tezat oluşturmaktadır. Bu bulgu, 2018 yılında Türkiye'de yaşanan döviz kuru şoku ve artan makroekonomik belirsizlik, COVID-19 salgınının küresel etkileri, bu dönemde uygulanan genişleyici para politikaları ve düşük faiz oranlarının yatırımcı davranışlarını şekillendirdiği yönünde yorumlanabilir. Çalışmanın BİST'de ilk halka arzı gerçekleşmiş payların uzun dönem getirilerini etkileyen makroekonomik faktörleri güncel veriler ile inceleyerek literatüre katkı yapması amaçlanmaktadır.

Anahtar Kelimeler: *İlk Halka Arz, Uzun Dönem Performans, Makroekonomik Faktörler, Panel Veri Analizi*

JEL Sınıflandırması: *G10, G30*

1. Introduction

Investors who invest in stocks seek to make informed investment decisions and avoid losses or minimize risks by understanding and managing the systematic risks they face. The rise or accuracy in stock prices indicates a risk reduction in risk. Long-term returns in financial markets are affected by macroeconomic factors. Macroeconomic factors are large-scale variables that reflect general economic and market conditions. Identifying and analyzing these factors is of great importance to investors, academics, and policymakers. Therefore, there is extensive literature on which macroeconomic factors affect stock returns and how these factors influence returns. This study aims to identify the macroeconomic factors affecting the returns of stocks that conducted their initial public offerings on the Borsa Istanbul between 2010 and 2018 and to analyze the relationship and direction between stock returns and these variables.

This study investigates the long-term performance and macroeconomic factors affecting the returns of 106 stocks that conducted their initial public offerings between 2010 and 2018 using balanced panel data analysis. The long term is included in the study as three years (578 business days). Therefore, the analyses cover the period from the beginning of 2010 to the end of 2021.

This study contributes meaningfully to the financial literature by examining the macroeconomic determinants of the long-term performance of IPO stocks listed on BIST during the 2010–2018 period. In addition, it offers novel insights into how expansionary monetary policies, global crises, and external shocks—such as the COVID-19 pandemic—affect investor behavior. Notably, the observed positive relationship between gold and stock returns suggests the necessity for further investigation into patterns that diverge from conventional portfolio theory expectations.

In the first part of the study, cumulative abnormal returns adjusted for the market are calculated, and in the second part, three different models are tested using balanced panel data analysis: the Pooled Ordinary Least Squares Model, the Fixed Effects Model, and the Random Effects Model. The purpose of this is to identify the effective model in our study and to inter-

pret the findings based on the effective model. It is necessary to select the appropriate model to find consistent and unbiased estimators in panel data analyses. Therefore, in addition to the Pooled Ordinary Least Squares Model, the Fixed Effects Model and the Random Effects Model are included in the analysis to test for the presence of fixed and random effects. First, the presence of fixed effects is investigated using the F (Fischer) test. In the second step, the Breusch and Pagan Lagrangian Multiplier Test is applied to test for the presence of random effects. According to the analysis results, both random and fixed effects are observed, and it is determined that the Random Effects Model, based on the Clustered-Robust Hausman test results, is the effective model. Therefore, the findings are interpreted based on the Random Effects Model results.

2. Literature Review

Aggarwal (1981) examines the impact of monthly changes in the effective exchange rate of the US dollar on US stock returns for the period 1974-1978 using simple linear regression analysis. The analysis concludes that there is a positive relationship between exchange rates and stock returns, with the positive relationship being stronger in the short term than in the long term.

Fama & French (1989) analyze the effects of economic activity, inflation, and interest rate variables on stock and bond returns, assessing these variables' ability to explain market returns. The study results indicate that economic activity significantly impacts stock and bond returns. It is concluded that stock and bond returns generally increase during periods of economic activity and decrease during periods of economic downturn. Additionally, they associate high-interest rates with low stock returns.

Telatar (1998) investigates the relationship between real stock returns and inflation in the BIST for the period 1989-1998, concluding that there is a negative relationship between real stock returns and inflation.

Durukan (1999) examines the relationship between monthly returns of stocks traded on the BIST and inflation, interest rates, exchange rates, economic activity, and money supply variables using the Least Squares method for the period 1986-1998. The study finds that money supply and inflation do not explain changes in stock returns, while interest rates have a negative relationship with stock returns.

Akkum & Vuran (2002) analyze the relationship between stock returns and macroeconomic factors for 20 stocks traded on the BIST 30 during 1999-2002 using AFM. They find that exchange rates, money supply, inflation rate, and market interest rate variables have a high explanatory power for changes in returns.

Wongbangpo & Sharma (2002) study the relationship between gross national product, consumer price index, money supply, interest rates, and exchange rates, and stock returns in the stock markets of Indonesia, Malaysia, Singapore, the Philippines, and Thailand. The study concludes that inflation negatively correlates with stock returns in all markets included in the study. Interest rates negatively correlate with stock returns in the Philippines, Singapore, and Thailand markets, while a positive relationship exists in the Indonesian and Malaysian markets. A positive relationship between exchange rates and stock returns is found in the Indonesian,

Malaysian, and Philippine stock markets, while a negative relationship is observed in the Singapore and Thailand markets.

Duman & Karamustafa (2004) examine the relationship between monthly returns of stocks traded on the BIST and inflation and real production for the period January 1990-May 2002. It is found that there is a negative relationship between inflation and real production and a positive relationship between stock returns and real production.

Albeni & Demir (2005) examine the relationship between the financial index and macroeconomic factors for the period 1991-2000 using multiple linear regression analysis. Their results indicate that there is a negative relationship between the financial index and deposit interest rates, portfolio investments, and exchange rates, while a positive relationship is found with Republic gold, contrary to expectations.

Patra & Poshakwale (2006) investigate the relationship between monthly returns of stocks traded on the Greek stock market and the consumer price index, money supply, and exchange rate for the period 1990-1999 using cointegration and Granger causality tests. The study concluded that there is a short- and long-term equilibrium relationship between inflation, money supply and stock prices.

Sayılgan & Süslü (2010) research the macroeconomic factors affecting stock returns traded on emerging markets for the period 1999-2006 using balanced panel data analysis. The results show that stock returns in emerging markets are affected by exchange rates, inflation rates, and the Standard and Poor's 500 index. No statistically significant relationship is observed between interest rates, gross domestic product, money supply, oil prices, and stock returns.

Hosseini et al. (2011) investigate the relationship between monthly returns of stocks traded on the Chinese and Indian stock markets and crude oil prices, M2 money supply, industrial production, and interest rates for the period 1999-2009 using cointegration analysis and VECM model. The study concludes that oil prices positively affect stock returns in China and negatively affect stock returns in India in the long term. An increase in inflation positively affects stock returns in both countries. Industrial production has a negative impact on the Chinese stock market.

Ayaydın & Dağlı (2012) examine the relationship between stock returns and inflation rates, interest rates, exchange rates, industrial production index, and money supply variables for 22 different emerging markets for the period 1994-2009. It has been revealed that interest rates negatively impact stock returns in all markets included in the study, but this impact is not statistically significant. The change in inflation rates positively affects stock returns in the included markets, while the change in exchange rates has a negative effect.

Naik & Padhi (2012) analyze the relationship between monthly stock returns in the Indian stock market and the Indian Stock Exchange Index, industrial production index, money supply, wholesale price index, treasury bond interest rates, and exchange rates for the period April 1994-June 2011 using Johansen cointegration and vector error correction models. The results show that stock returns positively relate to money supply and industrial production index, negatively related to inflation, and no statistically significant relationship exists between exchange rates and interest rates and stock returns.

Forson & Janrattanagul (2013) investigate the long-term relationship between monthly returns of stocks traded on the Thai stock market and money supply, consumer price index, interest rates, and industrial production index for the period 1990-2009 using cointegration and Granger causality analysis. Their study indicates that stock returns have a positive relationship with money supply and a negative relationship with the industrial production index and consumer price index.

Chia & Lim (2015) investigate the macroeconomic factors affecting stock prices traded in the Malaysian market for the period 1980-2011 using the ARDL boundary test. The study concludes that there is a positive relationship between stock prices and money supply and interest rates and a negative relationship with inflation.

Alper & Kara (2017) examine the relationship between returns of the BIST Industrial Index and exchange rates, interest rates, inflation rates, gold prices, money supply, oil prices, foreign trade balance, and industrial production index for the period January 2003-February 2017 using impulse-response analysis and variance decomposition analysis. It has been revealed that gold prices, foreign trade balance, industrial production index, and interest rate variables explain changes in real stock returns, while inflation rate, money supply, and real oil price variables do not significantly explain changes in real stock returns.

Sadeghzadeh & Elmas (2018) examine the relationship between returns of 130 stocks traded on the BIST and 26 macroeconomic variables for the period January 2000-March 2017 using dynamic panel data analysis. The results show that the macroeconomic factors most affecting stock returns are the VIX fear index, consumer confidence index, and BIST trading volume.

Yang et al. (2018) examine the effects of macroeconomic shocks on the stock market in Korea using a structural vector autoregression (SVAR) model. According to the findings, an increase in interest rates leads to a depreciation of the USD/KRW exchange rate and a decline in the long-term real growth rate. In the short term, a sudden increase in interest rates reduces demand, which negatively affects stock prices.

Gürsoy (2019) investigates the effects of macroeconomic variables on the stock returns of 100 banks traded on Borsa Istanbul (BIST) between 2006 and 2017. The study concludes that bank stock returns are positively influenced by changes in the S&P 500 Index. Other significant variables affecting bank stock returns are identified as the exchange rate and U.S. interest rates.

Bhuiyan & Chowdhury (2020) examine the effects of macroeconomic variables on stock prices in different sectors in the U.S. and Canadian stock markets between 2000 and 2018. The study uses industrial production, money supply, and long-term interest rates and finds that all these factors influence stock returns in the U.S. However, for Canada, only money supply and interest rates have a significant relationship with stock returns.

Gögül & Yaman (2020) analyze the causal relationships between the BIST100 Index and exchange rate, deposit interest rate, oil prices, M2 money supply, Consumer Price Index (CPI/inflation rate), and Industrial Production Index for the period 2006-2020/7 using symmetric and asymmetric causality tests. The symmetric analysis results indicated a causal re-

lationship between exchange rate, deposit interest rate, money supply, and oil prices to stock prices. No causality is found between CPI, industrial production index, and stock prices. In the asymmetric analysis, the exchange rate and money supply variables are found to be the causes of stock prices in positive components, while the inflation rate is the cause in negative components. Additionally, interest rate and oil price variables have a causal relationship with stock prices in both positive and negative components, whereas no causality is detected between industrial production index and stock prices.

Güngör & Polat (2020) examine the effects of macroeconomic factors on stock returns in Borsa Istanbul between 2004 and 2017. The study uses exchange rate, gold, and interest rates as independent variables. Using monthly data and the ordinary least squares (OLS) method, the study finds a statistically significant and negative relationship between the U.S. dollar, interest rates, and the BIST100 Index. The relationship between gold and the BIST100 Index is not statistically significant. The same results applied to the BIST service sector and BIST financial sector indices.

Gürsoy (2020) tests the impact of the VIX Index derived from the S&P 500 Index on BRICS stock markets using the Toda-Yamamoto causality test for the period 2011-2020. The study finds bidirectional causality between the VIX Index and Russian and South African stock markets, while a unidirectional causality is detected for India and China.Huy, Dat and Anh (2020) investigate the impact of seven macroeconomic factors on stock prices on a joint stock commercial bank, Sacombank (STB) in Vietnam in the period of 201 4- 2019. The findings indicate that the increase in GDP growth, reduction in CPI and lending rate has a significant effect on increasing STB stock price with the highest impact coefficient, the second is decreasing the risk free rate.

Öndeş & Levent (2020) investigate macroeconomic factors affecting the stock returns of 13 banks traded on BIST between 2008 and 2018. The study examines the effects of financial risk ratio, political risk ratio, inflation rate, interest rate, and exchange rate on bank stock returns. A statistically significant and positive relationship is found between political risk ratio, exchange rate, and stock returns. A statistically significant negative relationship is found between interest rate and stock returns, while no significant relationship is detected between financial risk ratio, inflation rate, and stock returns.

Ünal (2020) analyzes the effects of monetary and fiscal policy changes on the BIST100 Index for the period 2006-2019/9. The study uses M3 money supply/GDP to measure monetary policy and non-interest budget balance/GDP to measure fiscal policy. The findings indicates that negative changes in the budget balance and increases in M3 money supply have a statistically significant positive effect on the BIST100 Index.

Dalkılıç et al. (2021) examine the relationship between the Consumer Price Index, exchange rate (USD), oil price (Brent), gold (ounce), industrial production index, and the BIST Banks Index for the period 2003-2020. A statistically significant relationship is found between the BIST Banks Index and deposit interest rate, exchange rate, gold (ounce), and industrial production index. A negative relationship is observed between the BIST Banks Index and exchange rate, as well as gold (ounce), while a positive relationship is found with oil price (Brent).

Samanta & Deo (2021) investigate the impact of macroeconomic factors on stock returns in the Indian stock market between 2005 and 2021. Their study find that industrial production, interest rate, and exchange rate have a long-term negative relationship with stock returns. Specifically, changes in industrial production, interest rates, and exchange rates are found to influence stock returns.

Süslü & Gök (2021) analyze the relationship between the BIST Tourism Index returns and gold prices, money supply, exchange rate, inflation rate, interest rate, and oil prices for the period 2006-2018. The data were analyzed using Impulse Response Analysis, Variance Decomposition Analysis, and Toda-Yamamoto (1995) Causality Analysis. According to the Toda-Yamamoto causality analysis results, gold prices are found to be the Granger cause of BIST Tourism Index stock prices, while the BIST Tourism Index stock prices are the Granger cause of oil prices.

Ünal (2021) examines the impact of bond interest rates and USD/TRY exchange rate changes on stock returns of 348 firms traded on BIST between 2009 and 2020. The findings indicate that changes in the USD/TRY exchange rate have a negative impact on stock returns in the banking, financial leasing, telecommunications, and construction sectors. No significant relationship is found between interest rates and sectoral stock returns.

Düzakın & Özekenci (2023) investigate the relationship between the BIST100 Index and independent variables such as interest rate, inflation, money supply (M1), industrial production index, and exchange rate using regression analysis for the period 2006-2023/5. The study finds a statistically significant positive relationship between the BIST100 Index and inflation, as well as the industrial production index, while a negative relationship is found with interest rates and exchange rates. No statistically significant relationship is detected between money supply and the BİST 100 Index.

3. Data

This study investigates the long-term performance and macroeconomic factors affecting the returns of 106 stocks that conducted their initial public offerings on BIST between 2010 and 2018. In 2010, 22 stocks went public, 26 in 2011, 25 in 2012, 18 in 2013, 11 in 2014, 6 in 2015, 1 in 2016, 3 in 2017, and 9 in 2018. Although 121 companies conducted their initial public offerings between 2010 and 2018, data for 106 companies were consistently available for three years (2019-2020-2021). Therefore, the study continued with 106 stocks. Data were obtained from the websites of the CMB, BIST, KAP, and Finnet financial analysis platform.

The long term is included in the study as three years (578 business days). To include the 36-month daily closing data of the stocks, the latest IPOs analyzed are from 2018. Thus, the data for the period 2010-2021 are included in the analyses. Due to the publication of financial statements of stocks traded on the BIST submarket and watchlist market every six months, the data are included in the study as six-month percentage changes. Macroeconomic factors effecting stock returns are investigated using balanced panel data analysis. The analyses are conducted using the Stata/SE 12 program.

4. Methodology

In the first section of the study, cumulative abnormal returns for three years are calculated to be used as the dependent variable in the analyses. The event study methodology is applied to calculate the short-term performances (30-day returns) of IPOs. The market-adjusted return method, one of the return models used in event study methods, is used to calculate the returns. According to this method, it is necessary to remove the abnormal return from the market's price movements. The abnormal return (AR) of a stock is found by subtracting the market return from the stock's raw return (Kıymaz, 1997: 48).

To analyze underpricing, raw returns, market returns, market-adjusted abnormal returns, and cumulative abnormal returns are calculated (Ritter, 1991; Aggarwal et al., 1993; Kıymaz, 1996).

The raw return for stock *i* in the period *t* is calculated as follows:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (1)$$

where *Pi*, *t* is the closing price of stock *i* at time *t* and Pi,t-1 is the closing price of stock i one day before time t

$$R_{i,1} = \frac{P_{i,1} - P_{i,0}}{P_{i,0}} \quad (2)$$

where Ri,1 is the initial raw return, Pi,1 is the closing price at the end of the first trading day of stock i, and Pi,0 is the offer price

The initial raw return is defined as the price change from the offer price to the closing price at the end of the first trading day.

Market movements influence IPO returns. To reduce the market effect on stock returns, the market-adjusted return of the stock is estimated by subtracting the market return from the raw return of the stock (Chalk & Peavy, 1987; Ritter, 1991; Kıymaz, 1996). In this method, the returns are not adjusted for systematic risk, and it is assumed that the beta (β) values of the first publicly offered stocks are equal to 1. This is because sufficient and accurate information about the companies could not be reached before the first public offering (Karan, 2000: 92). The Istanbul Stock Exchange (ISE) All Shares Index is used as the market index in the study.

The market return:

$$R_{m,t} = \frac{P_{m,t} - P_{m,t-1}}{P_{m,t-1}} \quad (3)$$

where $P_{m,t}$ is the closing price of BIST All Shares Index at time t and $P_{m,t-1}$ is the closing price of BIST All Shares Index at time t-1

Market Adjusted Abnormal Return:

$$AR_{i,t} = R_{i,t} - R_{m,t} \quad (4)$$

where $R_{i,t}$ is the raw return of stock i at time t, $R_{m,t}$ is the market return of BIST All Shares Index at time t

Cumulative Abnormal Return:

$$CAR_T = \sum_{t=0}^{T} \mathrm{AR}_T \quad (5)$$

where CAR_T is the average cumulative abnormal returns *T* days after the event date for n stocks, AR_T is the sum of average abnormal returns over that period.

Market Adjusted Daily or Monthly Average Abnormal Returns:

$$\overline{AR_t} = \frac{\sum_{i=t}^{n} AR_{it}}{n} \quad (6)$$

is calculated as in the equation.

In the second section of the study, the macroeconomic factors affecting long-term returns are investigated using balanced panel data analysis. In panel data, the same cross-sectional units are observed over time. Panel data combines time series and cross-sectional data. To determine the effective panel data model, the Pooled Ordinary Least Squares Model, the Fixed Effects Model, and the Random Effects Model are tested. Findings are interpreted based on the effective model. (Gujarati & Porter, 2018)

The Pooled Ordinary Least Squares Model used in the study is given in Model 1:

Model1:

$$Return_{it} = \alpha_1 + \beta_1 InterestRate_{it} + \beta_2 ExchangeRate_{it} + \beta_3 CCI_{it} + \beta_4 GDP_{it} + \beta_5 Gold_{it} + \beta_6 CPI_{it} + u_{it} \quad (7)$$

According to the Pooled Ordinary Least Squares Model, there are no differences between units. This model assumes that the response of the dependent variable to the independent variables is the same for all units over time. The Pooled Ordinary Least Squares Model ignores the individuality of the units by pooling the units in the same basket for different time periods. According to this model, each unit's individuality is hidden within the error term. The error term includes differences between units and independent variables not included in the model. Therefore, a correlation can occur between the error term and the independent variables, violating the assumption of no correlation between independent variables and the error term in the classical linear regression model. In this case, the Least Squares estimators become biased and inconsistent. (Gujarati & Porter, 2018:594)

The Fixed Effects Model used in the study is given in Model 2:

Model2:

$$\mathrm{Return_{it}} = \alpha_1 + \alpha_2 \mathrm{D_{2i}} + \alpha_3 \mathrm{D_{3i}} + \alpha_4 \mathrm{D_{4i}} + \alpha_5 \mathrm{D_{5i}} + \ldots + 105\ \mathrm{D_{105i}} + \beta_1 \mathrm{InterestRate_{it}} + \beta_2 \mathrm{ExchangeRate_{it}} + \beta_3 \mathrm{CCI_{it}} + \beta_4 \mathrm{GDP_{it}} + \beta_5 \mathrm{Gold_{it}} + \beta_6 \mathrm{CPI_{it}} + \mathrm{u_{it}} \quad (8)$$

where D_{2i} ……. D_{105i} represent the firms included in the analysis. To avoid the dummy variable trap, the dummy variable for the 106th company is not included in the analysis.

The α1 coefficient is the intercept for the 1st firm.

In the Fixed Effects Model, differences between units are represented by intercepts (dummy variables). Although the intercept varies between units, it does not change over time, i.e., time is constant. Additionally, the slope coefficients of the independent variables do not change between units and over time. To represent the differences in intercepts between units, dummy variables are added for each unit. To avoid the dummy variable trap, one less dummy variable than the number of units is added to the model. The model's intercept represents the dummy variable not included in the model. (Gujarati & Porter, 2018:597)

A limited F test (Chow Test) determines whether to use the Least Squares Model or the Fixed Effects Model. The null hypothesis for the Chow test is:

H0:PooledModel(All intercepts are the same)

H1:FixedEffectsModel

One disadvantage of the model is that if the number of units is large, adding many dummy variables to the model can cause a degrees of freedom problem.

The Random Effects Model used in the study is given in Model 3:

Model3:

$$Return_{it} = \alpha_1 + \beta_1 InterestRate_{it} + \beta_2 ExchangeRate_{it} + \beta_3 CCI_{it} + \beta_4 GDP_{it} + \beta_5 Gold_{it} + \beta_6 CPI_{it} + w_{it} \quad (9)$$

In the Random Effects Model, to prevent the loss of degrees of freedom observed in the Fixed Effects Model, differences between units are included in the model within the error term. The composite error term w_{it} consists of two parts: $w_{it} = \varepsilon_i + u_{it}$. These are:

1. ε_i: the error term representing differences between units

2. u_{it}: the error term representing changes across sections and over time (Gujarati & Porter, 2018:603)

In the study, the macroeconomic factors affecting returns are given in Table 1. All dependent and independent variables used in the analyses are included in the analyses by calculating the percentage changes every six months.

Table 1: Macroeconomic Factors Used in the Study

Independent Variables	Average	Std. Deviation
Interest Rate	0.0543	0.2343
Exchange Rate	-0.0186	0.0589
Consumer Confidence Index (CCI)	0.0106	0.0513
Gross Domestic Product (GDP)	0.7903	1.254
Gold	0.6506	1.241
Consumer Price Index (CPI)	0.4504	0.205

Unlike investors in fixed-income securities, stock investors do not expect fixed and guaranteed returns. They expect higher returns than fixed-income securities in exchange for the risks they undertake. As interest rates increase, the return on risk-free securities like bonds rises, causing investors to sell stocks and buy bonds, resulting in a decrease in stock prices. Additionally, increasing interest rates raise companies' borrowing costs, reducing profit margins and negatively affecting stock prices. Therefore, a negative relationship between interest rates and stock returns is expected. In the study, six-month percentage changes in policy interest rates announced by the Central Bank of Turkey are used.

In an economy where exchange rates continuously increase, investors' demand for foreign currency increases. This causes investors to sell their investment vehicles and demand foreign currency, which they think will provide higher returns. The rise in exchange rates reduces the demand for stocks, causing stock prices to fall. In the study, six-month percentage changes in the US dollar exchange rate are used.

Inflation is defined as a persistent increase in the general price level of goods and services in an economy, resulting in a decline in purchasing power. According to Fisher (1930), asset prices move with inflation, and stock prices rise when inflation increases. Fama (1981) concluded that there is a negative relationship between inflation and stock returns. Investors aware of the deterioration caused by high inflation in economic indicators sell their stocks, leading to a decrease in stock prices. Additionally, increasing input costs reduce companies' profitability, negatively affecting stock prices. In the study, six-month percentage changes in CPI announced by the Central Bank of Turkey are used.

Investors view gold as a risk-free investment or a safe haven, so when gold prices rise, they sell risky assets in their portfolios and turn to gold, causing a decrease in stock prices. Conversely, when gold prices decline, stock prices rise. In the study, six-month percentage changes in gold prices are used.

Gross Domestic Product (GDP) measures the total market value of all final goods and services produced within a country's borders during a specific period. It also measures the total spending to purchase all final goods and services produced. GDP represents the purchasing power per capita. When this value is high, households with high purchasing power are expected to invest, increasing the demand for stocks. A positive relationship between GDP and stock returns is expected.

The Consumer Confidence Index (CCI) is an economic indicator that reflects consumers' current conditions and future expectations, as well as their spending and saving tendencies. The CCI is calculated by evaluating the responses of consumers to different questions in the Consumer Tendency Survey. It ranges from 0 to 200, with values between 0 and 100 indicating pessimism and values above 100 indicating optimism. Consumer confidence is affected by economic indicators such as interest rates, inflation, and unemployment rates. However, consumers' optimistic or pessimistic outlooks can lead to different economic outcomes. Optimistic expectations lead consumers to spend and borrow more, while pessimistic expectations lead investors to save. In the study, the CCI data from the Central Bank of Turkey are used. The CCI is frequently used to measure investor sentiment and interpret overall consumption and other macroeconomic indicators. . (Christ & Bremmer, 2003)

5. Empirical results

To obtain accurate results in panel data analysis, it is necessary to test whether panel data analysis assumptions are met. In Model 1, the presence of multicollinearity, the stationarity of the series, cross-sectional dependency, and homoscedasticity of the error terms are tested.

To investigate whether there is a multicollinearity problem among the independent variables in Model 1, a correlation matrix and VIF test are conducted. The results are shown in Table 2 and Table 3.

Table 2: Correlation Matrix

Variables	Interest Rate	Exchange Rate	CCI	GDP	Gold	CPI	Return
Interest Rate	1.0000						
Exchange Rate	-0.2822	1.0000					
CCI	-0.1745	0.1393	1.0000				
GDP	-0.0095	-0.2173	-0.1595	1.0000			
Gold	0.1430	-0.4609	-0.3841	0.0105	1.0000		
CPI	0.4783	-0.1219	-0.3297	-0.0998	0.3503	1.0000	
Return	0.0831	-0.0912	-0.0238	0.0493	0.2415	0.1405	1.0000

Table 3: VIF Values

Independent Variables	VIF	1/VIF
Gold	1.63	0.6117
CPI	1.57	0.6367
Exchange Rate	1.50	0.6683
Interest Rate	1.43	0.6976
CCI	1.30	0.7688
GDP	1.13	0.8885
Average VIF	1.43	

The correlation and VIF test results indicate that there is no multicollinearity among the independent variables. There is a positive correlation of 0.47 between interest rates and inflation, contrary to expectations. There is also a negative correlation of -0.46 between exchange rates and gold prices, consistent with expectations. Since the correlation coefficients among the independent variables are low and VIF values do not indicate multicollinearity, no independent variable is removed from the model.

To determine which unit root test to use in Model 1, the cross-sectional dependency (Pesaran CD) test is applied. According to the Pesaran CD test results, the null hypothesis of no cross-sectional dependency is accepted (test statistic: 0.206, p: 0.8364). Based on the Pesaran CD test results, Levin-Lin-Chu and Im-Pesaran-Shin unit root tests are applied to the dependent and independent variables. The unit root test results indicate that all series, except for GDP, are stationary. The test results are shown in Table 4.

Table 4: Unit Root Tests

Variables	Levin-Lin-Chu p-value	Im-Pesaran-Shin p-value
Interest Rate	0.0000	0.0000
Exchange Rate	0.0000	0.0000
CCI	0.0000	0.0000
GDP	1.0000	0.8958
Gold	0.0000	0.0000
CPI	0.0000	0.0000
Return	0.0000	0.0000

After taking the first difference of the non-stationary GDP variable and making it stationary, unit root tests are reapplied.

To investigate the presence of heteroscedasticity in Model 1, the Breusch-Pagan / Cook-Weisberg test is conducted, resulting in a chi2 value of 0.40 and a p-value of 0.52. Therefore, no heteroscedasticity is observed in the model.

To detect the presence of autocorrelation, or serial correlation, which refers to the correlation between different time points of the error terms, the Wooldridge Autocorrelation Test is applied (F-statistic: 8.7659; p-value: 0.0000). The null hypothesis of no autocorrelation is rejected, indicating the presence of autocorrelation in the model.

5.1. Pooled Ordinary Least Squares Model

According to the Pooled Ordinary Least Squares Model, regression analysis is conducted by assuming no differences between firms (cross-sectional firm data). The robust command is used to solve the autocorrelation problem in the model. The results of the Pooled Ordinary Least Squares Model are given in Table 5. Table 5 shows that the exchange rate, CCI, GDP, and gold variables are statistically significant.

Table 5: Pooled Ordinary Least Squares Model

Independent Variables	β Value	T Value	P Value
Interest Rate	0.1056	0.92	0.358
Exchange Rate	0.8203	2.12	0.037
CCI	1.8225	3.43	0.001
GDP	0.3105	3.36	0.001
Gold	1.7297	5.51	0.000
CPI	3.4460	1.96	0.053
Intercept	-0.1973	-1.85	0.067
F-statistic	6.13		0.0000
R2 Value	0.0913		

According to the analysis results, a 1% increase in the exchange rate results in a 0.82% increase in returns; a 1% increase in CCI results in a 1.82% increase in returns; a 1% increase in GDP results in a 0.31% increase in returns; and a 1% increase in gold prices results in a 1.72% increase in returns. Since differences between units and the presence of random effects have not yet been tested in our panel data set, only the econometric results are reported in this model, and these results are not interpreted from the perspective of financial theory.

5.2. Fixed Effects Model

In Model 2, to investigate whether there is a heteroscedasticity problem, the Modified Wald test is conducted, resulting in a chi2 value of 16425.60 and a p-value of 0.0000. Therefore, a heteroscedasticity problem is observed in the model. The clustered robust command in STATA solves the autocorrelation and heteroscedasticity problems in the panel data set. The results of the Fixed Effects Regression Model are given in Table 6.

Table 6: Fixed Effects Model

Independent Variables	β Value	T Value	P Value
Interest Rate	0.1928	2.04	0.044
Exchange Rate	0.3283	0.97	0.333
CCI	1.0586	2.83	0.006
GDP	0.1033	1.61	0.109
Gold	0.7219	3.19	0.002
CPI	-0.6568	-0.52	0.606
Intercept	0.0346	0.64	0.527
F-statistic	2.54		0.0247

According to the analysis results, the independent variables CCI and gold are statistically significant at the 1% level, while the interest rate is significant at the 5% level. The positive effect of the interest rate, CCI, and gold on returns is observed. A 1% increase in the interest rate results in a 0.19% increase in returns; a 1% increase in the CCI results in a 1.05% increase in returns; and a 1% increase in gold prices results in a 0.72% increase in returns. The R^2 value, which explains the independent variables' ability to explain the dependent variable's changes, is 6%.

In the study, a negative relationship between stock returns and market interest rates is expected. When interest rates increase, the return on risk-free investment vehicles such as bonds rises, and investors tend to prefer risk-free investment vehicles over risky ones. This situation causes stock prices to fall. Additionally, increasing interest rates raise companies' financing costs, reducing net profits. A decrease in companies' profitability is perceived negatively by investors, leading to a decrease in stock prices. In the study, it is observed that a 1% increase in interest rates results in a 0.19% increase in returns. This result contradicts expectations and the literature.

According to the results of the F (Fischer) Test, the F-statistic is 10.98, and the p-value is 0.000. Based on this result, the null hypothesis that there are no individual effects in the model is rejected, and it is concluded that the Pooled Panel Data Analysis cannot be used, indicating that there are differences between firms and that the Fixed Effects Model is more appropriate than the Pooled Panel Data Analysis. Since the presence of random effects in our panel data set has not yet been tested, only the econometric results are reported in this model, and these results are not interpreted from the perspective of financial theory.

5.3. Random Effects Model

The results of the Random Effects Regression Model are given in Table 7.

Table 7: Random Effects Model

Independent Variables	β Value	Z Value	P Value
Interest Rate	0.1739128	1.84	0.066
Exchange Rate	0.3953133	1.21	0.227
CCI	1.203715	3.19	0.001
GDP	0.1350232	2.09	0.037
Gold	0.872474	3.91	0.000
CPI	0.1276831	0.10	0.918
Intercept	-0.0076551	-0.09	0.925
Wald chi2	21.46		0.0015
R2	0.07		

The independent variables CCI, gold, and GDP positively impact returns. A 1% increase in the CCI results in a 1.2% increase in returns; a 1% increase in gold prices results in a 0.87% increase in returns; and a 1% increase in GDP results in a 0.13% increase in returns. The R2 value, which explains the independent variables' ability to explain the dependent variable's changes, is 7%. This value is quite low. "In panel data analyses, having a cross-sectional dimension much higher than the time dimension affects the R2 values." (Gujarati, Porter, 2018: 594-607)

To test for the presence of random effects and to choose between the Pooled Ordinary Least Squares Model and the Random Effects Model, the Breusch and Pagan Lagrangian Multiplier Test is applied. According to the test results, the null hypothesis of no random effects is rejected (chibar2: 423.33; p-value: 0.0000).

To decide between the Fixed Effects Model and the Random Effects Model, the Cluster-Robust Hausman test is applied. The null hypothesis of the Cluster-Robust Hausman test is that there is no difference between the coefficients of the Random and Fixed Effects Models and that the Random Effects Model is valid. In this case, the difference between the Generalized Least Squares (GLS) and the Ordinary Least Squares (OLS) estimators approaches zero, and the GLS and OLS estimators are unbiased. The alternative hypothesis is that the coefficients of the Fixed and Random Effects Models are different and that the Random Effects

Model is invalid. In this case, the GLS estimators give biased results, while the OLS estimators are unbiased. The Fixed Effects Model should be accepted.

According to the test results, the chi2 value is 7.17, and the p-value is 0.30. Based on the Cluster-Robust Hausman test results, the Random Effects Model is accepted. In our study, it is concluded that the effective model is the Random Effects Model, and the findings are interpreted based on the Random Effects Model results.

Gold is one of the alternative investment instruments to the stock market. Gold is distinguished from other precious metals due to its limited supply, lack of a similar metal, and its use as a reserve asset. The increase in gold prices might have caused investors to turn to gold, which they see as a safe haven, thus increasing the demand for gold and causing them to exit the stock market, which they consider risky. If such a process occurs, a decrease in stock prices is expected. However, this study finds that an increase in gold prices positively affects stock returns, which contradicts theoretical expectations. A 1% increase in gold prices is observed to be accompanied by a 0.87% increase in stock returns. When examining the correlation matrix, a positive correlation of 0.24 between gold and returns is observed. The strongest correlation value between returns and independent variables is observed between gold and returns.

These results, which contradict the literature, can be interpreted as stock prices being more influenced by investor sentiment or international developments rather than domestic investor demand. The CCI reflects investors' current market comments and future expectations, indicating their optimistic or pessimistic outlook on the market. In this study, it is observed that investors' optimistic outlook on the country's economic conditions and the stock market is reflected in stock returns to the same extent. A 1% increase in the CCI is observed to be accompanied by a 1.20% increase in stock returns, indicating that investors' demand for the stock market is directly proportional to their expectations about the country's economy and future outlook.

GDP measures the purchasing power per capita. When this value is high, households with high purchasing power are expected to invest, increasing the demand for stocks. According to the Random Effects Model, a 1% increase in the GDP variable results in a 0.13% increase in stock returns. This result can be interpreted as households with increased purchasing power turning to risky investment instruments and increasing demand for stocks.

6. Conclusion

According to the research findings, a positive relationship has been identified between the three-year long-term returns of 106 shares that underwent an initial public offering (IPO) on Borsa Istanbul (BIST) between 2010 and 2018 and the Consumer Confidence Index (CCI), Gross Domestic Product (GDP), and gold prices. While the positive relationship between CCI, GDP, and share returns aligns with the literature by indicating the direct impact of economic growth and investor confidence on capital markets, the positive relationship between gold prices and share returns contradicts conventional expectations. This discrepancy can be interpreted more comprehensively when considered in the context of global and local economic conditions, changes in investor behavior, and external shocks such as COVID-19.

The existence of a positive relationship between CCI, GDP, and share returns suggests that economic growth and consumer confidence increase optimism in financial markets, thereby raising investor demand for equities. During periods of economic expansion, rising corporate profitability and improved consumer sentiment exert a positive influence on stock returns.

On the other hand, the positive relationship between gold prices and BIST share returns, which contradicts traditional expectations, can be explained by various macroeconomic and behavioral factors. According to widely accepted views in the literature, equities are considered risky assets, while gold functions as a safe haven during periods of economic uncertainty, leading to an expected inverse relationship between the two asset classes. However, the positive correlation observed in this study can be attributed to the following dynamics:

The expansionary monetary policies implemented following the 2008 global financial crisis and during the pre- and post-COVID-19 periods increased demand for both equities and gold due to the high liquidity provided to markets. Low-interest rates and monetary expansion have encouraged investors to diversify across multiple asset classes simultaneously.

Supply chain disruptions and rising global inflation during the COVID-19 pandemic led investors to perceive gold as a hedge against inflation while simultaneously seeking to increase their nominal returns through stock investments.

Low-interest rates have rendered traditional fixed-income investments less attractive, prompting investors to seek alternative returns. This environment has led to simultaneous increases in demand for both risky assets (stocks) and safe-haven assets (gold).

The currency shock and macroeconomic uncertainties experienced in Turkey in 2018 led to increases in TL-denominated gold prices and created volatility in the stock market. During this period, investors sought gold as a hedge against market uncertainties while also capitalizing on opportunities in BIST.

It is well-established that investors exhibit herding behavior during periods of crisis. The desire to construct diversified portfolios may have led investors to invest in both equities and gold simultaneously, creating a positive correlation between these asset classes in contradiction to traditional financial theories.

These findings indicate that the long-term performance of IPO shares on BIST cannot be explained solely by conventional economic indicators. Instead, it is necessary to account for multidimensional factors such as global liquidity conditions, investor behavior, and macroeconomic uncertainties.

In conclusion, this study makes a significant contribution to the financial literature by analyzing the macroeconomic factors that influence the long-term performance of IPO shares on BIST between 2010 and 2018. Furthermore, it provides new insights into the effects of expansionary monetary policies, global crises, and external shocks such as COVID-19 on investor behavior. The positive relationship between gold and stock returns, in particular, highlights the need for further research to understand the dynamics that deviate from traditional portfolio theories.

Author Contribution

The contribution of the first author is 70%, and the contribution of the second author is 30%.

Conflict of Interest

The authors reported no conflict of interest.

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