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THRESHOLD EFFECT OF INFLATION ON THE RELATIONSHIP BETWEEN STOCK MARKET INDEX AND INTEREST RATE*

Borsa Endeksi ile Faiz Oranı Arasındaki İlişkide Enflasyonun Eşik Etkisi

Kenan İLARSLAN**

Keywords:
Stock Market Index,
Inflation,
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JEL Codes:
G10, E31, E43, C32.

Abstract

This research examines how the deposit interest rate impacts Turkey's stock market index and the inflation rate from January 2003 to June 2024. The empirical findings derived from the analyses conducted under the threshold regression model indicate that the inflation rate has a single threshold impact on the connection among the stock market index and the interest rate. Thus, when inflation rates are at 2.67% or lower, rising bank deposit interest rates negatively impact the stock market index. Nevertheless, when inflation rates exceed 2.67%, the rise in bank deposit interest rates positively influences the stock market index. As a result, empirical evidence indicates that deposit interest rates have a nonlinear effect on the stock market index in Turkey, which is influenced by the level of inflation. These findings suggest policy implications for investors concerning the impact of the inflation rate on the connection among stock market indices and deposit rates.

Anahtar Kelimeler:
Borsa Endeksi,
Enflasyon,
Faiz Oranları,
Eşik Regresyon.

JEL Kodları:
G10, E31, E43, C32.

Öz

Bu çalışma, Türkiye bağlamında Ocak 2003- Haziran 2024 döneminde enflasyon düzeyine bağlı olarak mevduat faiz oranının borsa endeksi üzerindeki etkisine odaklanmıştır. Eşik regresyon modeli çerçevesinde yapılan analizlerden elde edilen ampirik sonuçlar enflasyon oranının, borsa endeksi ile faiz oranı arasındaki ilişkide tek bir eşik etkisine sahip olduğunu göstermektedir. Buna göre %2,67 ve altındaki enflasyon oranları döneminde banka mevduat faiz oranındaki artış borsa endeksini negatif yönde etkilemektedir. Ancak %2,67 üstündeki enflasyon oranı dönemlerinde ise banka mevduat faiz oranındaki artış borsa endeksi üzerinde pozitif yönlü etkiye neden olmaktadır. Bu nedenle, enflasyon düzeyine bağlı olarak mevduat faiz oranlarının Türkiye'deki borsa endeksi üzerinde doğrusal olmayan bir etkiye sahip olduğuna dair ampirik kanıtlara ulaşılmıştır. Elde edilen bu sonuçların yatırımcılar için borsa endeksi ile mevduat faizleri arasındaki ilişkide enflasyon oranının rolüne ilişkin politika çıkarımları sağladığı söylenebilir.

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** Assoc. Prof. Dr., Afyon Kocatepe University, Bolvadin Faculty of Applied Sciences, Department of Accounting and Financial Management, Türkiye, ilarslan@aku.edu.tr

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1. Introduction

Stock exchanges are regarded as a significant measure since they represent the overall state of a nation's economy. The stock market index (*smi*) is a fluctuating environment that provides individual and institutional investors with positive or negative signals regarding stock prices and market returns. Chikwira and Mohammed (2023), Omar et al. (2022), and Ali (2021) contend that fluctuations in stock prices and, consequently, price movements in the stock market are influenced by the robust and sound framework of the nation's economy, with macroeconomic indicators and their uncertainties acting as the main catalysts of stock market volatility. Adjasi (2009) asserts that the critical significance of uncertainty in macroeconomic data lies in the essential role stock markets have in comprehending the consequences of risk management. Additionally, insights into macroeconomic indicators can assist market participants and analysts in managing their portfolios more effectively. It also creates an environment for policymakers to formulate suitable policies that will enhance the stock market more effectively and efficiently by managing the macroeconomic variables influencing the stock market.

Inflation (*inf_rt*) and interest rates (*int_rt*) are crucial macroeconomic factors that significantly influence the economy and, more specifically, the stock market. When an economy faces elevated *inf_rt*, the actual value of money declines, resulting in diminished purchasing power, reduced profitability, and lower actual returns on investments. In other words, rising *inf_rt* prompts an increase in the nominal *int_rt* to maintain a positive real *int_rt*, rendering the stock market less appealing than other investment options. Additionally, this significant rise can lead to numerous challenges in corporate performance, diminish future dividend yields, and eventually lower stock prices (Bui and Nguyen, 2023). When *int_rt* rise, it leads to increased costs and lower profitability, signaling to investors that bonds provide better returns compared to stocks, which causes a drop in stock prices (Verma and Kumar, 2015; Eldomiaty et al., 2020). In theory, there is a negative link among *int_rt* and *smi*. This occurs because an increase in *int_rt* reduces the present value of future dividend earnings, which in turn lowers stock prices. On the other hand, reduced *int_rt* lead to decreased opportunity costs associated with borrowing. Reduced *int_rt* promotes investment and economic activity, increasing prices (Hamrita and Trifi, 2011). *Int_rt* is a crucial instrument for central banks in regulating monetary policy. Monetary policy can influence financial markets, such as bond and stock markets, through changes in the money supply and *int_rt*. Monetary policy can influence fluctuations in stock prices and bond yields. When a central bank reduces *int_rt*, borrowing is less expensive, which motivates businesses and consumers to obtain loans and invest in the economy. This can boost economic growth, enhance employment, and elevate stock prices.

On the other hand, when a central bank increases *int_rt*, the borrowing cost rises, discouraging both borrowing and investment, potentially hindering economic growth, controlling *inf_rt*, and decreasing stock prices Schrank (2024). In these situations, when the *int_rt* banks offer depositors rises, individuals move their capital from the stock market to the bank. This leads to reduced stock demand and a decline in stock prices. The contrary is also correct. To put it differently, theoretically, there exists an inverse correlation between stock price and *int_rt* (Alam and Uddin, 2009). Investors have other choices like the stock market and savings accounts. The attractiveness of investing in bank deposits depends on the connection between the nominal *int_rt* and the *inf_rt*. Nevertheless, putting money into bank deposits could encounter the risk of value loss because of negative real *int_rt* and the suppression of nominal

int_rt caused by high *inf_rt*. In reality, depositors effectively incur an *inf_rt* tax by considering the elevated *inf_rt* and the absence of a relationship between the nominal *int_rt* and the *inf_rt* of their bank deposits. As a result, investors select financial markets based on their risk assessment and potential for profit. Consequently, the rise or at least maintenance of various assets' value over time leads investors to opt for the stock market, bank savings, or other financial markets (Sadeghi et al., 2023).

Various scholars have applied different theoretical frameworks in the studies carried out to link macroeconomic variables broadly and *int_rt* specifically to the *smi*. Among these theories is the semi-strong efficient market hypothesis created by Fama (1970) and the Arbitrage Pricing Model (APM) introduced by Ross (1976). According to Fama, an efficient market is characterized by prices consistently reflecting all available information. Nonetheless, various kinds of information influence market operations. The semi-strong market efficiency hypothesis examines the negative or positive connection among stock market returns and macroeconomic variables, as it posits that macroeconomic factors are entirely incorporated into stock market prices. In other studies, Fama (1981, 1990) posits that there is an inverse connection between *int_rt* and stock prices over the long term, which is directly influenced by the impact of long-term *int_rt* on the discount rate. The negative connection is also founded on the idea that a rise in *int_rt* will result in increased borrowing costs, reduced future profits, and a higher discount rate for stock investors, and consequently, stock prices will decline.

Consequently, *int_rt* rises indirectly impact stock prices (Al-Naif, 2017; Bahloul et al., 2017; Hashmi and Chang, 2023; Belhoula et al., 2024). APM represents an alternative method for determining asset prices, as proposed by Ross, who advocates for a multi-factor approach to describe asset pricing via APM. The theory suggests that an asset is influenced by market risk and a range of unanticipated elements. These elements are systematic risks that cannot be eliminated through diversification. Once arbitrage opportunities in the market environment have been removed, the returns on financial assets are influenced by two main groups of factors. The first group comprises macroeconomic factors that are systematic risk components like *int_rt* and *inf_rt*. The second group consists of factors specific to companies. These elements are defined by coefficients specific to each factor that assess the sensitivity of assets to those factors. APM offers a more realistic account of shifts in stock prices since it accommodates a broader range of factors influencing stock returns. As a result, APM has emerged as a significant theory in elucidating the influence of macroeconomic factors on stock returns (Nordin et al., 2014; Atıcı et al., 2019; Daariy et al., 2023; Ichwanudin et al., 2023).

Generally, the stock market offers long-term funding options, particularly for fixed capital investments. Consequently, assessing the performance and efficiency of the stock market is critical for investors, policymakers, and other market players who provide and request long-term financing in an economy. Globally, the stock market is viewed as a measure of the well-being and prospects of a country's economy and a gauge of the confidence exhibited by both local and international investors (Alam and Uddin, 2009). As a critical element, *inf_rt* influences financial markets by leading to variations in *int_rt*, stock prices, and exchange rates. The connection between *inf_rt* and financial market risks is especially significant during high *inf_rt*, a crucial concern in investment and policy decisions (Choi and Kim, 2023). During the assessed period, elements such as the Covid-19 pandemic, the implementation of the Currency Hedged Deposit system in December 2021, the subsequent Russian invasion of Ukraine in February 2022, the Kahramanmaraş earthquakes in February 2023, as well as national and

global supply chain disruptions, fluctuations in energy prices, and changes in the labor market, have arisen as contributors to inflationary pressure. In this context, Kim (2023) noted in his research that the *inf_rt* caused by the Covid-19 pandemic and the Russia-Ukraine conflict presented a challenge to the global economy, leading to assessments that the U.S. Federal Reserve raised *int_rt* aggressively to combat rising *inf_rt*, which resulted in the strengthening of the U.S. dollar against other currencies, prompting investors to withdraw from stock markets, particularly in developing countries.

Moreover, the implementation of both orthodox and heterodox economic and monetary policies in Turkey indicates that there could be variations in the relationships between money and capital market instruments, thereby offering a chance for contemporary analyses. In this context, a threshold effect might occur in causal relationships, given that the influences of both *int_rt* and *inf_rt* on stock prices are not consistent and could differ depending on the levels of *int_rt* and *inf_rt*. Specifically, a threshold level of *inf_rt* could influence the *smi*. This threshold effect separates two regimes linked to low and high *inf_rt* values. Consequently, the pertinent study employs the threshold regression model to examine the effect of *int_rt* on the *smi* at a specified *inf_rt*. Therefore, the objective of this study is to obtain a pragmatic argument on the impact of the deposit *int_rt* on the *smi* depending on the inflation level from January 2003 to June 2024, specifically in Turkey. The research contributes to the literature as follows: 1) providing findings related to current data on the interplay between *int_rt* and *smi* at a specific *inf_rt* threshold, 2) offering empirical evidence that the connection between *int_rt* and *smi* shows nonlinear behavior relative to a specific inflation level. As a result of the analyses conducted within the framework of threshold regression analysis in the study, the value of the threshold variable *inf_rt* was determined to be 2.67%. In the *inf_rt* periods below and above this threshold value, the monthly deposit *int_rt* has nonlinear effects on the *smi*.

There are four sections to the study. The research topic is presented in the first section, and empirical literature on the topic is summarized in the second. The data and methodology are presented along with the results of the econometric analysis in the third step, which is referred to as the application phase. The findings and suggestions are presented in the fourth and final sections.

2. Literature Review

Many scientific studies have explored the connection between global stock market performance and macroeconomic indicators. While earlier research concentrated on the uniform impact of economic variables, like *int_rt* and *inf_rt*, on the *smi*, recent studies employing advanced econometric techniques have shown that this effect can also be nonlinear. This study focuses on determining the impacts of *int_rt* on the *smi* at a certain *inf_rt* level, based on the assumption that many national and international risk factors may be reflected in the markets from January 2003 to June 2024, specific to Turkey. The findings obtained from empirical studies conducted on the subject at different times, with different methods and samples, are summarized in Table 1.

Table 1. Summary of Empirical Literature on the Topic

Study	Period	Method	Findings
Vo and Nguyen (2024)	2012-2022	VAR, NARDL models	The results of the research indicate that the market risk in the Vietnamese stock market reacts asymmetrically to variations in *int_rt*, exchange rates, trade openness, financial development, and economic growth both in the short and long term.
Belhoula et al. (2024)	1 June 2005- 1 June 2022	TV-AR, AMG estimator, Panel ARDL, Dumitrescu and Hurlin causality test	It has been determined that a significant bidirectional causality exists between stock exchange efficiency and *int_rt*, exchange rates, market volatility, and economic policy uncertainty in the G7 countries.
Nguyen et al. (2024)	2013-2022	EGARCH	According to a study specifically for Vietnam, *int_rt* have asymmetric effects on the *smi*.
Ünal (2024)	2021-2023	t-statistics	Research from the study conducted in Turkey indicates that changes in *int_rt* have a meaningful impact on companies' financial performance and stock returns. Nevertheless, it has been noted that these effects differ based on the market value of firms, sector characteristics, and economic circumstances.
Vaswani and Padmaja (2024)	January 2013-June 2021	NARDL	The research results confirm the asymmetric linkage for *int_rt* in the Indian stock markets. Accordingly, a positive change in *int_rt* worsens stock returns, while a negative change improves them.
Kim (2023)	31 May 2022-30 June 2022	CAPM	As a result of the *int_rt* hikes by the U.S. Federal Reserve, companies with less export orientation and less foreign capital have not only become more volatile but also have more negative returns.
Song and Xu (2023)	1982-2007	VAR, GARCH models	Findings from the study conducted on U.S. stock exchanges show a positive money demand shock that increases *int_rt* and decreases stock prices. It has been determined that the reactions of stock prices are symmetrical in positive and negative money supply shocks.
Wang et al. (2023)	1 January 2008-21 December 2021	Quantile regression analysis	The study's findings indicate that Brazilian, Russian, and South African stock markets react negatively to both short-term and long-term *int_rt* shocks. In comparison, the reaction of the Indian stock market to short-term *int_rt* and the Chinese stock market to long-term *int_rt* is favorable.
Kazak (2023)	2015-2022	ARCH-LM, EGARCH models	The research specifically carried out for Turkey indicates that the BIST 100 index is influenced by changes in the policy rate, with negative shocks having a greater impact on the BIST 100 than positive ones.
Alzoubi (2022)	1991-2020	ARDL	The results obtained from the study on Jordan show that the increase in *int_rt* and *inf_rt* has a decreasing effect on the *smi*.
Baykara (2021)	2015-2020	AR, CAAR, t-test	Findings from the study conducted specifically for Türkiye show a negative price response in banking and insurance companies when monetary policy *int_rt* increase.
Bhuiyan and Chowdhury (2020)	2000-2018	Johansen cointegration analysis, VAR, VECM	The findings indicate a long-term equilibrium connection among the macroeconomic variables that reflect money supply, real economic activity, and long-term *int_rt* for the U.S., the SandP 500, and all sector indices. Furthermore, there is an inverse relationship between long-term *int_rt* and stock market indices.
Eldomiaty et al. (2020)	1999-2016	Johansen cointegration test, cointegration regression analysis, VECM model	The findings indicate that the change in stock prices due to *inf_rt* is negative and significant. Conversely, the coefficient indicating the change in stock prices due to *int_rt* is positive and significant.

Table 1. Continued

Poyraz et al. (2020)	2010-2020	AR, CAR, Wilcoxon signed-rank test	The research carried out in Turkey found that the central bank's *int_rt* cut decisions had a considerable yet restricted negative impact on the BIST100 index. Interest rate hikes were seen to exert a slight negative influence, although the impact was not significant.
Maji et al. (2020)	September 2005-November 2016	ARDL-UECM model	The study carried out in India found that the link between the BSE-BM index and *int_rt* has a negative elasticity that is statistically meaningful. This outcome aligns with the established theoretical premise that there is a negative relationship between *int_rt* and stock price movements.
Gürsoy (2019)	January 2006-December 2017	Regression analysis, Marginal effects analysis	The study stated that U.S. *int_rt* negatively and significantly affect bank stocks traded in BIST.
Fahlevi (2019)	2013-2017	OLS regression analysis	Results from the research carried out in Indonesia indicate that *inf_rt* has a positive impact, while *int_rt* have a negative and meaningful effect on the *smi*.
Ahiadorme et al. (2019)	January 1995-December 2015	OLS regression analysis, Johansen cointegration test, VAR, VECM model	The study results show a positive and significant long-term connection among *int_rt* and stock market returns for the Ghanaian stock market.
Bahloul et al. (2017)	2002-2014	Linear regression model, Markov regime regression, MS-VAR model, Granger causality analysis	*Int_rt* adversely affect the Islamic *smi* in both developed and developing nations. The results further indicate that the returns on traditional stock indexes and the money supply in both low and high-volatility environments influence Islamic *smi* in both developed and developing countries.
Otieno et al. (2017)	January 1993-December 2015	ARFIMA method, Granger causality analysis	The findings from the study conducted in Kenya indicate a negative Granger causality relationship between *int_rt* and stock market returns over the long term.
Al-Mukit (2013)	1991-2012	Johansen cointegration analysis, VECM model, Granger causality analysis	The research carried out in Bangladesh shows a consistent and important long-term connection among the variables. It has been noted that a rise in *int_rt* leads to a decline in the *smi* over the long term. Moreover, a unidirectional causality exists between the *int_rt* and the market index.
Tripathi and Seth (2014)	July 1997-June 2011	ARCH model, Granger causality, and Johansen cointegration test	The research demonstrates a negative connection among *int_rt* and the Sensex stock market.
Nordin et al. (2014)	December 1997-September 2012	ARDL	The study shows an inverse correlation between the Malaysian stock market and *int_rt* over both the short and long term.
Alam and Uddin (2009)	January 1988-March 2003	Panel data method, OLS regression analysis	The results obtained from the analysis of data from 15 developed and developing countries show that *int_rt* have a meaningful negative link with stock prices for all countries.
Panda (2008)	April 1996-June 2006	Johansen cointegration analysis, VECM model	The study's results show a long-term link among *int_rt* and stock prices and that *int_rt* affect stocks negatively and positively in the short term.

3. Methodology

The econometric approach taken in the research is as follows. Initially, fundamental statistical tests and correlation analysis concerning the data were reviewed under the Descriptive Statistical Tests. In the subsequent stage, the overall framework of the model was established by conducting analyses for linearity, structural breaks, and stationary of the data. In the subsequent phase, threshold value regression analysis was applied to the application.

3.1. Data

The study utilizes monthly data that spans from January 2003 to June 2024. The dependent variable, the *smi* variable, signifies data for the BIST100 index. The *inf_rt* variable is also a threshold variable and consists of monthly consumer inflation data. The other independent variable, *int_rt*, is the monthly average foreign currency bank deposit *int_rt*. As of the period under review, the average monthly deposit *int_rt* for TL is 1.28%; the average monthly deposit *int_rt* for Euro is 1.60%; and the average monthly deposit *int_rt* for Dollar is 2.18%. Therefore, since it offers higher earning opportunities to investors, the average of Euro and Dollar deposit *int_rt* was taken and defined as the monthly deposit *int_rt* of the foreign currency in the study. All variables used in the analysis based on their nominal values were obtained from the official website of the Central Bank of the Republic of Türkiye. Stata 18 and Eviews were utilized in the analysis stage using nominal values.

3.2. Method

Threshold regression analysis, introduced by Hansen (2000), is an econometric method used to study the nonlinear connection between two or more variables. Using threshold regression provides the benefit of dividing a sample into groups and customizing the threshold variable to assess if countries are below or above the threshold parameter. Therefore, this model can be applied to real-world conditions and produce further realistic results (Raouf, 2022). This method allows us to obtain differences in slope coefficients. Such models are convenient for investigating different effects (e.g., differences in sign, magnitude, and statistical significance) on the connection between dependent and independent variables. The threshold model shows the connection between variables in different data regimes of a defined threshold variable (Siddiki and Bala-Keffi, 2024). The threshold regression model aims to incorporate a particular threshold variable as an unknown variable within the regression model, create a piecewise function, and experimentally evaluate and estimate the relevant threshold value and its impact (Wang and Wang, 2021).

A threshold regression model may have one or more threshold values. The sample is divided into one more regime than the equal number of values. For example, the sample is divided into two regimes if there is a threshold value. In the threshold model, it is evident that observations are categorized into two regimes, which are differentiated by their distinct regression slopes based on whether each observation is above or below the threshold value (Lin and Fu, 2024). As Thanh (2019) stated in his study, the threshold regression model has two categories of explanatory variables. The threshold variable is one, serving as the primary variable to measure the threshold effect on the dependent variable. Once the threshold variable surpasses the threshold value (γ), the sample set can be split into two groups, represented by

distinct slope coefficients β_1 and β_2. The explanatory variable is a variable that indicates its impact on the dependent variable. In the threshold regression model, the effects of the explanatory variables are variable and depend on the threshold value of the threshold variable. After these explanations, the mathematical representation of the single threshold regression model can be made as follows (Huang et al., 2019).

$$y_t = \begin{cases} \alpha_1 + \beta_1' x_t + \epsilon_1, \; q_t \leq \gamma \\ \alpha_2 + \beta_2' x_t + \epsilon_2, \; q_t > \gamma \end{cases} \quad (1)$$

Here, *y* represents the explained variable, *x* represents the explanatory variable, *q* represents the threshold variable, γ represents the threshold value, *α* represents the constant term, and *ε* represents the error term. Considering the variables used in the study, the single threshold regression model can be shown as follows.

$$smi = \begin{cases} \alpha_1 + \beta_1 int\_rt + \epsilon_t, \inf\_rt \leq \gamma \\ \alpha_2 + \beta_2 int\_rt + \epsilon_t, \inf\_rt > \gamma \end{cases} \quad (2)$$

inf, the threshold variable in the study, is included as an exogenous variable.

3.3. Empirical Analysis and Findings

The results of the tests and analyses conducted to examine the general structure and summary of the data and the connection among the variables in terms of the study design are presented in Table 2. If the mean and median values are equal or very close to each other, then the distribution is symmetric (normal). However, the mean and median values of the variables were not close. In addition, none of the variables provide the assumption of normality according to the Jarque-Bera statistics and probability values at the 1% significance level. The skewness and kurtosis values are far from the values of 0 and 3 supports this finding (Lins et al., 2023; Alomari et al., 2024). According to the correlation analysis findings, there is a positive connection among the *smi* and the *inf_rt* and a negative connection with the *int_rt* variable.

Table 2. Descriptive Statistical Tests

	Basic Statistical Tests								Correlation Analysis		
	Mean	**Median**	**Max.**	**Min.**	**St.Dev.**	**Skew.**	**Kurt.**	**J.B.**			
smi	1264.48	741.73	10647.91	95.34	1897.69	3.24	13.22	1577.22***	1		
int_rt	0.01	0.01	0.04	0.00	0.00	0.52	3.02	11.961***	-0.219	1	
inf_rt	0.01	0.00	0.13	-0.01	0.01	3.25	18.02	2872.73***	0.521	-0.237	1

Note: Significance level; ***%1

As Yılancı and Tıraşoğlu (2016) stated in their research, before conducting empirical studies, it is essential to examine the structures of the financial and economic time series variables and to conduct analyses using processes and tests appropriate to these structures. In this respect, analyzing the linear or nonlinear structures of the series is a critical issue to consider for the analyses' validity and reliability. Thus, the model's functional form must be established initially in the analysis process. The aim of conducting a linearity test is to determine if the variables intended for statistical analysis exhibit a linear relationship (Nafisah et al., 2023). This study conducted analyses using the Wald test and L.R. test to evaluate the functional structure of the model and to determine if the variables demonstrate a linear or

nonlinear relationship during the examined period, with the results presented in Table 3. According to the results of both tests, the null hypothesis that the model is linear is rejected at the 1% and 10% significance levels. These results show a nonlinear connection among the *smi*, *int_rt* and *inf_rt*.

Table 3. Linearity Test Results

	Test Statistics	p-value
Wald test	49.88	[0.000]***
L.R. test	3.41	[0.064]*

Note: Significance level; ***%1, *%10

Once it is established that the model has a nonlinear structure, it becomes essential to identify the regime number resulting from the structural break in the second stage. Breaks may be either single or multiple. The Bai-Perron multiple structural break test was employed to assess this and the findings are presented in Table 4. The results of the Bai-Perron test conducted with the maximum five break options indicated that the ideal number of breaks was found to be one. The F and Scaled F statistics computed for a break number exceed the critical value. Furthermore, the break date was set as May 2021.

Table 4. Bai-Perron Multiple Structural Break Test Results

Break	F-Statistics	Scaled F-Statistic	Critical Value *	Estimated Break Dates
0-1**	265.351	796.054	13.98	2021-05
1-2	3.406	10.220	15.72	2010-03 2021-05
2-3	1.513	4.541	16.83	2009-07 2017-04 2021-05
3-4	0.239	0.718	17.61	2008-01 2011-03 2017-04 2021-05
4-5	0.000	0.000	18.14	2008-01 2011-03 2015-01 2018-03 2021-05

Note: Significance level; **5%, *Bai-Perron critical values

Once it is confirmed that there exists a nonlinear link among the variables and a structural break during the examined period, the data will undergo a stationarity test. Wahab et al. (2023) state that stationarity is a characteristic in which the statistical properties of a time series do not change over time. Having stationary data is crucial for precise modeling and credible analysis. Traditional unit root tests such as ADF, P-P, KPSS, DF-GLS, and Ng-Perron tests can yield varying results in the presence of structural breaks (Yıldırım et al., 2015; Diler, 2018). Applying unit root testing in a structural break offers two possible advantages. Firstly, it prevents biasing test outcomes towards non-rejection. This method will also offer valuable insights to ascertain if a structural break in a specific variable is connected to government policy, financial crises, regime shifts, or other factors, as it can identify when a structural break is expected to happen (Ike et al., 2024). Thus, to assess the stationarity of the data, unit root tests that consider the structural break were conducted; the Zivot-Andrews test, which is a test for a single internal break, along with ADF tests with Structural Breaks were utilized, and the findings are presented in Table 5. The null hypothesis for the Zivot-Andrews test is that the variables examined have a unit root, whereas the alternative does not have a unit root. Accordingly, the null hypothesis is rejected for the *smi* and *inf_rt* variables in different models but cannot be rejected for the *int_rt* variable. On the other hand, the null hypothesis of a unit root in the ADF test with structural

break was rejected for all variables in the fixed and trended models, and the series were stationary at their levels.

Table 5. Unit Root Test Results with Structural Breaks

Test	**Zivot-Andrews Test**			**ADF Test with Structural Break**	
Model	**Constant**	**Trend**	**Costant+Trend**	**Constant**	**Constant+Trend**
smi	5.209** [2021-03]	-2.418 [2021-03]	-3.738 [2021-03]	-0.770 [2023-01]	-4.637* [2024-04]
inf_rt	-6.729*** [2021-03]	-6.190*** [2019-07]	-6.507*** [2021-03]	-10.789*** [2021-06]	-11.126*** [2021-11]
int_rt	-3.554 [2008-12]	-2.847 [2021-03]	-4.802 [2008-12]	-4.548** [2008-11]	-5.097* [2008-11]

Note: Significance level; ***%1, **%5, *%10, Breaking dates are given in parentheses

The results of the threshold regression analysis, which is the basic analysis method, are presented in Table 6. The threshold regression analysis results indicate a break, leading to two regimes, with the threshold variable valued at 2.67%. Thus, when monthly consumer *inf_rt* is 2.67% or lower, the rise in monthly bank deposit *int_rt* has a statistically meaningful reducing impact on the *smi*. This situation is consistent with theoretical expectations and can be interpreted as investors preferring favor bank deposit *int_rt* over stock investments during periods of low *inf_rt*. As emphasized by Amata et al. (2016), there is a positive connection among *inf_rt* and stock market volatility in the short and long term. Accordingly, it may not be possible to make big profits in stock markets due to low stock market volatility in low inflation periods. In this respect, the stagnation seen in stock markets may lead investors to want to evaluate their investments in increasing bank deposit *int_rt*. This result, which is consistent with theoretical expectations, is also similar to the findings obtained from the studies of Hashmi and Chang (2023), Kazak (2023), Gu et al. (2022), Baykara (2021), Münyas (2019), Bissoon et al. (2016), Al-Mukit (2013), Alam and Uddin (2009). In the model, May 2021 is the date of the structural break. In periods of *inf_rt* above the threshold value of 2.67%, an increase in monthly bank deposits has a statistically meaningful and increasing effect on the *smi*. The following arguments can be put forward, considering that this situation occurs during periods of high *inf_rt* and needs explanation.

Table 6. Threshold Regression Analysis Results

	Regime 1: Low inflation period inf_rt ≤ %2.67			**Regime 2**: High inflation period inf_rt > %2.67%		
Variables	**Coefficient**	**95% Confidence Interval**		**Coefficient**	**95% Confidence Interval**	
int_rt	-32557.71 [0.001]***	[-51162.45	-13952.96]	187718.3 [0.002]***	[114207.3	261229.4]
c	1439.273 [0.000]***	[1043.085	1835.462]	2560.423 [0.000]***	[1421.05	3699.797]

Note: Significance level; *** %1

In Turkey, annual *inf_rt* in 2020, 2021, 2022, and 2023 was 14.60%, 36.08%, 64.27%, and 64.77%, respectively. 2021, there was a significant increase in *inf_rt*, especially in the last quarter. For example, *inf_rt* in December 2021 was very high at 13.58%. Ünüvar and Aktaş (2022) argued that the main reason for the increase in *inf_rt* during the last period of 2021 was

the exchange rate increase. In addition, the increase in international food prices, agricultural drought, and supply problems have increased *inf_rt*. It has been stated that there is an indirect connection between this increase in *inf_rt* and the COVID-19 outbreak. However, the Central Bank data shows that policy *int_rt* have been below high *inf_rt*. For example, the policy *int_rt* of 17% in December 2020 was 14% in December 2021 and 9% in November 2022. Alongside the policy *int_rt*, the *int_rt* on bank deposits has been observed to be lower than *inf_rt*. According to Graph 1(d) and Graph 1(e) in the Appendix, from January 2003 to May 2021, monthly bank deposit *int_rt* were typically higher than the monthly consumer *inf_rt*, with only minor negative differences observed in certain months.

Conversely, following May 2021, identified as the structural break date, an opposite trend was observed where monthly bank deposit *int_rt* fell below *inf_rt*. As a result, because the Central Bank's low *int_rt* policy was set below *inf_rt*, investors sought refuge in the stock market to safeguard against inflation. Due to high inflation and, conversely, low *int_rt*, negative real *int_rt* does not present an appealing opportunity for investors. As a result, investors have focused on stock markets to safeguard themselves from inflation. These findings indicate that the connection among deposit *int_rt* and the *smi* does not follow a linear pattern during periods of low and high *inf_rt*.

4. Conclusion and Recommendations

This research investigates the impact of deposit interest rates on Turkey's stock market index at a specific inflation rate. The research spans from January 2003 to June 2024. The occurrence of numerous domestic and international political, economic, financial, and epidemic risk factors indicates that the impact of interest rate and inflation rate on stock prices is not consistent and may differ based on the levels of these rates, suggesting a possible threshold effect in the connection among the variables. As a result, Threshold Regression Analysis was utilized as the primary analysis method in the research. Moreover, descriptive statistical tests and several econometric methods, including linearity, structural break, and stationarity analysis, were employed to generate trustworthy results and to uncover the connection between stock market price fluctuations and factors like inflation rate and interest rate.

The study has three important results, which aim to reach empirical evidence on how the deposit interest rates affect the stock market index depending on the inflation level. First, the value of the threshold variable inflation rate was found to be 2.67%. At this and below inflation rates, the increase in interest rates has a decreasing effect on the stock market index, which is in line with theoretical expectations. Second, in monthly inflation rates above the threshold value, the increase in interest rate has an increasing effect on the stock market index. As a potential reason for this, due to the low interest rates policy implemented in the country, interest rates are below inflation rates, and investors may have turned to the stock market to protect themselves from inflation. Third, it was observed that there was a nonlinear connection between the interest rates and the stock market index in the country during the analysis period.

The subsequent recommendations can be proposed for decision-makers, given that the outcomes achieved carry practical significance. First, based on these findings, individual and institutional stock market investors should be attuned to fluctuations in macroeconomic variables like inflation rate and interest rates, as these variables have demonstrated considerable

impacts on the stock market. Second, because of the nonlinear connection between interest rates and the stock market index, portfolio management should follow dynamic strategies. Third, these findings can form a basis for investors' decision-making mechanisms regarding how interest rates affect the stock market at a particular inflation rate level.

Data regarding the variables used in the study prior to 2003 could not be obtained. This can be expressed as a limitation of the study. In addition, in future studies, the reflections of the interest rate decisions taken by the U.S. Federal Reserve on Borsa Istanbul can be suggested as another research topic.

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Declaration of Research and Publication Ethics
This study which does not require ethics committee approval and/or legal/specific permission complies with the research and publication ethics.

Researcher's Contribution Rate Statement
I am a single author of this paper. My contribution is 100%.

Declaration of Researcher's Conflict of Interest
There are no potential conflicts of interest in this study.

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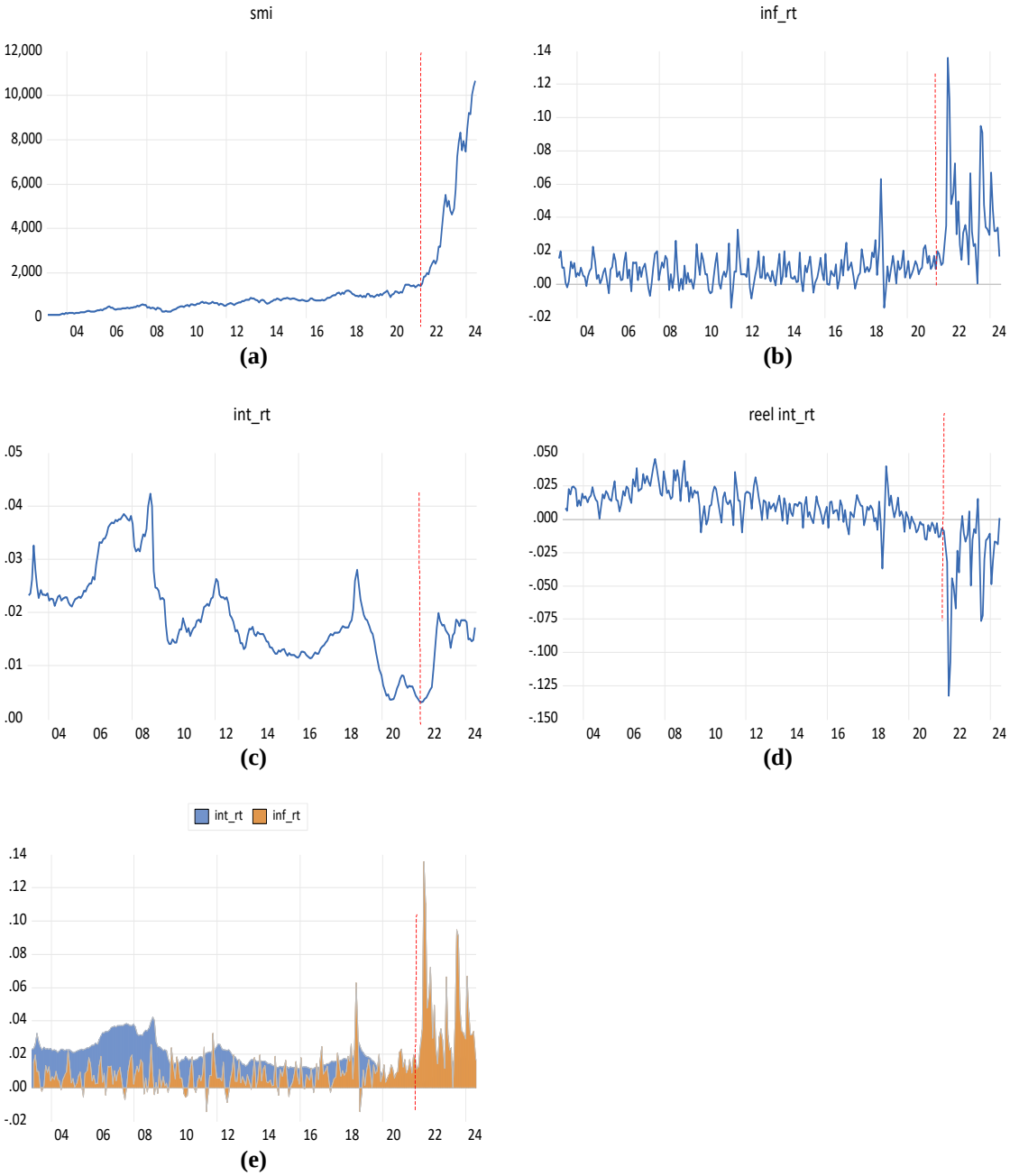
APPENDIX-I



Graph 1. Time Path Graphs of Variables

Note: The red dashed line on the graphs indicates the break date, May 2021.