

**THE RELATION BETWEEN BOND RETURNS, BIST-100 RETURNS AND BANK PROFITABILITY**Fatih KAYHAN<sup>1</sup>**Abstract**

The purpose of this study is to analyze the impact of bond return index (proxy for bond market) as well as BIST-100 (proxy for economic activity) upon bank profitability. The scope of this paper is Turkey. Data covers quarterly period between 2011 and 2021, data structure is panel data. Panel Dynamic Ordinary Least Squares (DOLS) is used in econometric analysis conducted in this study. ROA ratio of commercial bank, participation banks (non-interest banking industry) and investment & development banks are used as dependent variable; on the other hand, all-bond return index (as a reference for bond market interest rates) and BIST-100 return index are used as explanatory variables. Finding of the analysis indicate that the bond yield index (BOND) and the stock return index (BIST100) have a positive and statistically significant impact on the return on assets (ROA) of banks.

**Keywords:** BOND MARKET, BIST-100, BANK PROFITABILITY**JEL Codes:** E43, E44, G10, G21.

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## BONO GETİRİLERİ, BIST-100 İLE BANKA KARLILIĞI ARASINDAKİ İLİŞKİ

### Öz

Bono getiri oranı (bono piyasası göstergesi) ve BIST-100 (iktisadi faaliyet düzeyi) getiri endeksinin banka karlılık oranları üzerindeki etkisinin tespit edilmesi bu makalenin hedefidir. Çalışma Türkiye'yi kapsamaktadır. Analizde kullanılan veri, 2011, 2021 yılları arası çeyrek dönemleri kapsamaktadır ve panel veri yapısı kullanılmıştır. DOLS (Panel Dinamik En Küçük Kareler Yöntemi) yöntemi analizde kullanılmıştır. Türkiye'de faaliyet gösteren ticari bankalar, katılım bankaları yanında kalkınma ve yatırım bankalarının ROA (*Aktif Karlılık*) oranı bağımlı değişken olarak dikkate alınmıştır; diğer yandan, Tüm-Bono Endeks Getirisi (Tahvil ve Bono piyasasını temsil etmek üzere) ve BIST-100 açıklayıcı değişkenler olarak analize dahil edilmiştir. Analiz bulguları göstermektedir ki; bono getiri endeksi (Tüm Bono) ve hisse senedi getiri endeksi (BIST-100), ROA üzerinde anlamlı derecede pozitif etkiye sahiptir.

**Anahtar Kelimeler:** BONO PİYASASI, HİSSE SENEDİ PİYASASI, BANKA KARLILIĞI

**JEL Sınıflandırma:** E43, E44, G10, G21.

## 1. INTRODUCTION

As known 'CAMEL' (capital, asset quality, management, earnings and liquidity) principle is the key approach for an effective bank management, and the letter 'E' refers to *earnings*, which can be related to profitability. By their very nature, banks are established as corporations (firms) and operate for the purpose of generating high profits. Two key ratios of bank profitability are known as '*return on assets*' (ROA).

To compare profitability of different banks, 3 basic ratios are employed; the first one is '*return on assets*', which is calculated by dividing '*net income*' by '*total assets*'; the second one is '*return on equity*' (calculated by dividing net income by shareholder equity); and the third one is NIM (net interest margin), which is computed by the following formula '*net interest income/earning assets*' (Yay, 2012: 349). The scope of this paper covers only ROA for the sake of simplicity. In these formulas '*interest income and expenditure*' and '*non-interest income and expenditure*' are the key concepts.

Erdem (2012: 194) explains these as follows: Main elements of '*interest income and receivables*' are composed of '*interest income from loans*', '*interest income from financial assets*', '*interest income from deposits with other banks*', '*interest income from interbank market*'. On the other hand, '*interest expenditures*' are mainly made up of '*interest paid for deposits*', '*interest paid for financial assets (issued or sold)*', '*interest paid for loans*' that banks receive from other banks and financial institutions and '*interest paid for funds utilized through interbank money market*'.

According to recent data provided by Banking Regulation and Supervision Agency of Turkey (*Main Indicators Report*, September 2022) as of September 2022, there are 57 banks operating in Turkish Banking Sector as 35 Deposit banks, 16 Development and Investment banks as well as 6 Participation banks. Number of branches realized as 11.068 while number of personnel realized as 205.247. Total assets of Turkish Banking Sector increased by 42% to TL 13.100 billion in September 2022 when compared to the previous year-end (2021). The ratio of asset size of Turkish Banking Sector to GDP

realized as 1,28 as of end-2021. As of September 2022, net income of Turkish Banking Sector is TL 286 billion (Net Interest Income of TL 498 billion – (Net Non-Interest Expense + Special Provision + Tax Provision)). As of September 2022, Return on Assets (ROA) –for all banking groups, public, private, foreign- increased when compared to 2021–year-end.

In *Financial Stability Report* (November, 2022) by Central Bank of Turkey, it is underlined that as of the last quarter of 2022, Banks' interest rate risk is at a limited level, and their balance sheet structures are capable of managing interest rate shocks. While banks' strong profitability performance supports capital adequacy, excess capital buffers gets stronger.

The subject matter of this paper is significant in that after the last quarter of 2021, in Turkey a new monetary policy was introduced and gradually '*central bank funding rate*' (CBFR) decreased gradually in an effort to deal with high inflation throughout the year 2022 (Policy rate was 9% at the end of 2022 in Turkey). As banks play a key role in the economy (and economic development), the relation between (bond market) interest rates and economic activity (proxied by BIST-100) and banks profitability deserves to be investigated. The very fact that banks' total assets have been recently greater than gross domestic product of Turkey brings about this study's research question: '*Are bank's profitability ratios significantly affected by bond-market returns (related with interest rates) or stock-market-return index (related with economic activity)?*'

As known bond interest rates are conversely related to bond return: As bond interest rates (in bond market) increase, values of bonds (=bond return index) held in the bank portfolio decrease, on the other hand, when interest rates in (secondary) bond market go down, bonds lose value (bond return index decreases).

Bank profits depend on all interest rates for asset and liability items, rather than market interest rate (Hancock, 1985: 189).

As far as data and method is concerned, panel data is used. Units are 3 different banking types: Deposit banks, participation banks and investment & development banks in Turkey. Data for 120 quarters are taken into account from 2011q1 to 2021q4. Dependent variables are ROA and explanatory variables are All-Bond Index (used as benchmark for market interest rate), BIST100 index (proxy for economic activity).

This study contributes to the literature by providing up-to-date data for analyzing the impact of market (bond and stocks) returns upon ROA of the bank operating in Turkey in the new era of finance.

The paper is organized as follows: Section I is the introduction. Section II provides literature review in relation to the subject of this paper. Section III covers quantitative analysis. Section IV is the last part, conclusion part.

## **2. REVIEW OF LITERATURE**

In this part, previous studies pertaining the link between interest rates and banking profitability is provided.

Malik et al. (2014) examine the market interest rate effect on the bank's profitability in public and private sectors of Pakistan. Empirical results of the study indicate that the interest rate has more effects on ROA in private banks when compared to the state-run-banks.

Borio et al. (2015) investigates the impact of monetary policy on bank profitability and suggest that low interest rates and flat term structure that are considered unusual deteriorate profitability of banks. Apart from banking industry, for paper industry listed in stock exchange (Borsa-Istanbul) regarding the determinants of ROA, Islamoglu and Çelik argue that although firm-specific and industry-specific factors have statistically significant effect on ROA, (commercial loan) interest rates have no significant impact on ROA.

Saldanlı and Aydın (2016) study the factor that influence bank profitability and their panel data analysis indicate that ROA is significantly affected by the –bank

specific- ratios of 'Shareholders' Equity/Total Assets', 'Liquid Assets/Current Liabilities', 'Non-Interest Income/Total Assets' and 'Interest Income/Interest Expense'.

Regarding the nexus between interest rate fluctuations and participation banks (non-interest banks) in Turkey, Minny and Görmüş (2017) carry out a panel data analysis for the period between 1q2008 and 3q2016 with a panel data analysis and panel co-integration estimation technique. Based on the empirical analysis they show that the interest rate changes have a significantly positive relationship with the participation banks' profitability.

Dizgil (2017) examines the micro factors influencing the profitability of deposit banks in Turkey by using panel data for top 10 banks for the period 2009-2017. She finds a significant association between asset profitability and capital adequacy ratio, operating expenses ratio and the ratio of financial assets/total assets.

Altavilla et al. (2018) reviews the relation between standard and non-standard monetary policy and bank profitability by employing proprietary and commercial data upon euro area bank financials. They suggest that an easing monetary policy that ease is not related with lower bank profits once we control for the endogeneity of the policy measures to expected macroeconomic and financial conditions.

Bikker and Vervliet (2018) study the effect of the unusually low interest rate environment on the soundness of the United States banking sector in regard to profitability and risk-taking. They employ both dynamic and static modelling approaches and various estimation techniques, and they find that the low interest rate environment has negative impact on bank performance and curbs net interest margins. However, banks have been able to maintain their overall level of profits, because of lower provisioning, that in turn may threaten financial stability.

Yaman (2021) reviews the relation between bank specific factors and bank profitability and conducts panel data analysis, it is found out that the capital adequacy, credit investments, ability to change expenses into revenues, market share and personnel expenses have positive effects upon net interest margins.

In a recent study by López-Penabad et al (2022) regarding the impact of a negative interest rate policy on bank profitability and risk taking (for European banks), it is argued that the application of negative interest rate policy influences banks' profitability and risk taking differently, depending on the business model which is applied.

Bal and Sönmezer (2022) review the factors that have significant effect on the profitability of banks. Using the annual data, they examine the banks in Turkey for the period between 2004 and 2017. They find that GDP growth has a positive effect on bank profitability.

### 3. DATA, METHOD AND ANALYSIS

In this part, data structure and the method which is employed to solve the research question of the paper will be covered. Then, econometric analysis and analysis results are provided. In the following table, data and definitions are seen.

**Table 1.** Data and Definitions

Variable Title	Type of Variable	Brief Definition	Source
ROA	Dependent	Return on Assets	BRSA
ALLBOND	Explanatory	All Bonds Index	BORSA-ISTANBUL
BIST100	Explanatory	BIST-100 Index	BORSA-ISTANBUL

For all variables, it should be noted that, quarterly data is taken into account. Data structure is panel data covering 3 different bank type, namely commercial banks (conventional, deposit banks), participation banks (non-interest, profit-share-based financial institutions) and investment and development banks.

#### *Data and Method*

In the study, the statistical relationship among the economic and financial data between the years 2011-2021 for Bank Types (Deposit, Participation and Investment Development Banks) was tested with Panel Regression method. Return on Assets was used as an indicator of Banks' Return on Assets and shown as "ROA" in the analysis.

The bond yield index is involved in the analysis with the “BOND” and the “BIST100 Index” for the Stock Return Index. The data set for the study was obtained from the website of the Banking Regulation and Supervision Agency, [www.bddk.org.tr](http://www.bddk.org.tr) and the website of Borsa-Istanbul [www.borsaistanbul.org.tr](http://www.borsaistanbul.org.tr). Information for research variables is shown below in tabular form.

**Table 2.** Variables of the Model

Variables	Definition	Date Range	Web Sources
Return on Assets(ROA)	Change in ROA (%)	2011-2021	<a href="http://www.bddk.org.tr">www.bddk.org.tr</a>
Bond Yield Index(BOND)	Change in BOND (%)	2011-2021	<a href="http://www.borsaistanbul.org.tr">www.borsaistanbul.org.tr</a>
Stock Return Index (BIST100)	Change in BIST100 (%)	2011-2021	<a href="http://www.borsaistanbul.org.tr">www.borsaistanbul.org.tr</a>

The model estimated in this study is shown in equation (1):

$$ROA_{it} = \alpha + \beta_1 BOND_{it} + \beta_2 BIST100_{it} + u_{it}$$

In the model, "ROA" represents the return on assets of *i* bank at time *t*, "BOND" represents the Bond Yield Index and "BIST100" Stock Return Index for the same period.  $\alpha$  is the constant in the model;  $\beta$  represents the variable coefficient and  $u$  represents the error term. In the research model, ROA shows the return on assets of banks as a dependent variable. Independent variables are shown with the symbol (Bond Yield Index) “BOND” and (Stock Return Index) “BIST100”.

In the study Panel unit root tests, panel cointegration tests are performed and subsequently Panel Dynamic Ordinary Least Squares Method(DOLS) were adapted to estimate the data set according to the panel regression equation.

Before adapting Panel DOLS method in analysis, it is necessary to test whether the series are stationary at the same level with panel unit root tests. As the stationarity of the series are verified at the same level, panel cointegration tests that examine the long-run association between the series can be performed. In the next step, more than 50% of the hypotheses regarding the Panel cointegration test statistics should be accepted within the 95% confidence level.

In the study, firstly, whether the series are stationary at level are tested by performing panel unit root tests; Augmented Dickey Fuller-Fisher (Maddala & Wu, 1999), Philip Perron-Fisher (Choi, 2001), Levin, Lin & Chu (2002), Im, Pesaran, & Shin (2003). In panel unit root tests, the appropriate lag length, which expresses the relationship between the successive values of the error terms and eliminates the autocorrelation problem, is chosen according to the Schwarz information criterion.

After testing stationarity of all the series at the same level for either  $I(0)$  or  $I(1)$ , panel cointegration test can be performed. Then, the existence of cointegration can be tested with the Pedroni and Kao Co-integration tests. The Pedroni (1999) cointegration equation can be expressed as:

$$y_{i,t} = \alpha_{it} + \delta_{it} + \beta_{1i}X_{1i,t} + \beta_{2i}X_{2i,t} + \dots + \beta_{Mi}X_{Mi,t} + u_{it} \quad (2)$$

$$t=1, \dots, T=1, \dots, N, m=1, \dots, M$$

$T$  in the equation represents number of observations,  $N$ ; the number of horizontal sections in the panel,  $M$ ; the number of regression variables. If there are  $N$  cross-sections in the panel,  $N$  different equations will be generated for each  $M$  estimator.  $\beta_{1i} + \beta_{2i} \dots$  are the coefficients of the horizontal sections in the panel.  $\alpha_{it}$  is the fixed effects parameter that allows the difference between cross sections. If there is a deterministic trend between the horizontal sections in the panel, the  $\delta_{it}$  parameter is also included in the equation.

Kao (1999) cointegration test also allows heterogeneity between cointegration vectors, but neglects the assumption of endogeneity of independent variables. As a result, if the results of both Pedroni and Kao cointegration tests confirm that the series are cointegrated, a long-term relationship between the series will be approved.

After verifying the cointegration relationship between the series, the Dynamic least squares (DOLS) method developed by Stock and Watson (1993) is used to determine the long-term coefficients of the independent variables.

*Empirical Analysis*

In this study, whether the bond yield index and BIST100 index have a statistically significant effect on the return on assets of banks in the quarters between 2011-2021 was examined by adapting the panel dynamic least squares method.

In order to test whether the series are stationary, panel unit root tests (Levin and Lin & Chu t-stat) and individual unit root tests (Im, Pesaran and Shin , ADF-Fisher, PP-Fisher) were applied.

**Table 3. Panel Unit Root Test Results**

Summary of Panel Unit Root Tests	Individual Intercept	Individual Intercept and Trend
<b>Variable:ROA</b>		
<b>Method</b>		
Method	Statistic	Statistic
Null: Unit root (assumes common unit root process)		
Levin, Lin & Chu t*	-5.47049*	-5.47527*
Breitung t-stat	-5.47049*	-1.75917**
Null: Unit root (assumes individual unit root process)		
Im, Pesaran and Shin W-stat	-5.76683*	-4.9583*
ADF - Fisher Chi-square	43.3338*	34.6175*
PP - Fisher Chi-square	43.3613*	35.2044*
<b>Variable:BOND</b>		
<b>Method</b>		
Method	Statistic	Statistic
Null: Unit root (assumes common unit root process)		
Levin, Lin & Chu t*	-10.0509*	-9.42202*
Breitung t-stat		-4.69303*
Null: Unit root (assumes individual unit root process)		
Im, Pesaran and Shin W-stat	-9.66408*	-8.90324*
ADF - Fisher Chi-square	77.7504*	64.2605*
PP - Fisher Chi-square	77.7575*	64.2710*
<b>Variable: BIST100</b>		
<b>Method</b>		
Method	Statistic	Statistic
Null: Unit root (assumes common unit root process)		
Levin, Lin & Chu t*	-13.2643*	-13.5557*
Breitung t-stat		-3.58627*
Null: Unit root (assumes individual unit root process)		
Im, Pesaran and Shin W-stat	-12.1813*	-12.0915*
ADF - Fisher Chi-square	99.3550*	95.5517*
PP - Fisher Chi-square	102.1470*	106.502*

\*,\*\* stands for significance at the 1 and 5 percent level, respectively. Appropriate lag length has been selected according to Schwarz information criterion. In the LLC test, the Barlett Kernel method was used and the Bandwidth width was determined

by the Newey-West method.

In Table 3, Panel Unit Root Test Results show that all series involved in the analysis are stationary at level for both Individual Intercept and Trend Equations.

#### **Table 4. Pedroni Residual Cointegration Test Results**

Series: ROA BIST100 BOND

Sample: 2011Q2 2021Q4

Included observations: 129

Cross-sections included: 3

Automatic lag length selection based on AIC with a max lag of 3

Newey-West automatic bandwidth selection and Bartlett kernel

#### **Trend assumption: No deterministic trend(1)**

Alternative hypothesis: common AR coefs. (within-dimension)		
	Statistic	Weighted Statistic
Panel v-Statistic	-0.447857	-0.341950
Panel rho-Statistic	-3.492196*	-3.566316*
Panel PP-Statistic	-4.049615*	-4.161641*
Panel ADF-Statistic	-2.363401*	-2.197320**

  

Alternative hypothesis: individual AR coefs. (between-dimension)	
	Statistic
Group rho-Statistic	-3.091768*
Group PP-Statistic	-4.669067*
Group ADF-Statistic	-1.825517**

#### **Trend assumption: Deterministic intercept and trend(2)**

Alternative hypothesis: common AR coefs. (within-dimension)		
	Statistic	Weighted Statistic
Panel v-Statistic	-1.527711	-1.399821
Panel rho-Statistic	-2.838447*	-3.060552*
Panel PP-Statistic	-4.180015*	-4.452151*
Panel ADF-Statistic	-1.942664**	-1.848042**

  

Alternative hypothesis: individual AR coefs. (between-dimension)	
	Statistic
Group rho-Statistic	-2.633248*
Group PP-Statistic	-4.755724*
Group ADF-Statistic	-1.241946

\*,\*\* stands for significance at the 1 and 5 percent level, respectively.

In Table 4 regarding the Pedroni cointegration test results, the H0 hypothesis stating "there is no cointegration relationship between the series" was rejected

according to 9 test statistics. Therefore, in model (1), the  $H_0$  Hypothesis, which states that there is no cointegration relationship in only two out of the 11 test statistics, was accepted. According to the Pedroni cointegration test results in model (2), the  $H_0$  Hypothesis, which states that there is no cointegration relationship in 3 out of the 11 test statistics, was accepted. In other words, the  $H_0$  hypothesis indicating "there is no cointegration relationship between the series", was rejected according to 8 test statistics. Considering the results of the tests, it was seen that at least half of the test results gave statistically significant results in both models in which 11 test statistics were involved according to the Pedroni cointegration test. Therefore, the Pedroni cointegration test results show that there is cointegration relationship between the series.

### **Kao Residual Cointegration Test**

Series: ROA BIST100 BOND

Sample: 2011Q2 2021Q4

Included observations: 129

Automatic lag length selection based on AIC with a max lag of 3

User-specified bandwidth: 1 and Bartlett kernel

### **Trend assumption: No deterministic trend**

	t-Statistic
ADF	-1.644244**
Residual variance	1.61E-06
HAC variance	1.12E-06

\*,\*\* stands for significance at the 1 and 5 percent level

According to the Kao cointegration test, the  $H_0$  hypothesis of "there is no cointegration between the series" was rejected at the 5% significance level, and the alternative hypothesis that there is cointegration between the series, was accepted. Considering both cointegration test results, it is concluded that there is cointegration between the variables of return on assets (ROA), return on bonds index (BOND) and Stock Return Index (BIST100) of banks in the long run.

Since the Pedroni and Kao Test Results confirm that the series are cointegrated, the long-term effect of the independent variables on the dependent variable can be

analyzed using the DOLS method. The results of the analysis of the statistical relationship between the variables according to the DOLS method are shown in the table below.

**Table 5. Panel Dynamic Least Squares (DOLS)**

***Dependent Variable: ROA***

Sample (adjusted): 2011Q4 2021Q3

Periods included: 40

Cross-sections included: 3

Total panel (balanced) observations: 120

Panel method: Grouped estimation

Fixed leads and lags specification (lead=1, lag=1)

Long-run variances (Bartlett kernel, Newey-West fixed bandwidth) used for individual coefficient covariances

Variable	Coefficient	Std. Error	t-Statistic
BIST100	0.020659	0.010186	2.028142**
BOND	0.058753	0.016031	3.664996*
R-squared	-3.044846	Mean dependent var	
Adjusted R-squared	-3.813366	S.D. dependent var	
S.E. of regression	0.003331	Sum squared resid	
Long-run variance	2.40E-05		

*\*, \*\* stands for significance at the 1 and 5 percent level*

The results obtained according to the DOLS method in Table 5 show that the bond yield index (BOND) and the stock return index (BIST100) have a positive and statistically significant impact on the return on assets (ROA) of banks. When we examine the long-term coefficients, we can conclude that the positive impact of the bond yield index (BOND) on the return on assets (ROA) of banks is relatively stronger than the Stock Return Index.

#### 4. CONCLUSION

This study examines the influence of bond return index (proxy for bond market interest rate) and stock-exchange return index (BIST-100, considered as proxy for economic activity) upon bank profitability. As banks play an important role in the

economic growth, the association between bond market interest rates and economic activity (proxied by BIST-100) and banks profitability is to be examined. The fact that banks' total assets have been larger than gross domestic product of Turkey leads us to this study's research question: *'Are bank's profitability ratios significantly affected by bond-market returns (related with interest rates) or stock-market-return index (related with economic activity)?'*

Panel data is used. Units are three different banking types: Commercial (Deposit) banks, participation banks and investment & development banks in Turkey. Data for 120 quarters are taken into account from 2011q1 to 2021q4. Dependent variables are ROA and explanatory variables are All-Bond Index (used as benchmark for market interest rate), BIST100 index (proxy for economic activity). Analysis is limited to banks in Turkey. Panel Dynamic Ordinary Least Squares (DOLS) is employed in econometric analysis carried out in this paper. ROA of commercial bank, participation banks (non-interest banking industry) and investment & development banks are utilized as dependent variable. All-bond return index (as a reference for bond market interest rate) and BIST-100 return index are used as independent variables. The findings of the analysis is as follows: The bond yield index (BOND) and the stock return index (BIST100) have a positive and statistically significant impact on the return on assets (ROA) of banks.

In regard to the conformity of this study's finding with previous studies (literature) it is apparent that findings of this paper are in line with the literature. One of the arguments of this study is the significant positive effect of BIST-100 upon the banks' profitability; Bal and Sönmezer (2022) study the factors which have significant impact on the profitability of banks, they find that GDP growth has a positive effect on bank profitability. In this study, BIST-100 is taken into account as a proxy of GDP growth.

When the long-term coefficients are taken into consideration, this paper concludes that the positive impact of the bond yield index (BOND) on the return on assets (ROA) of banks is relatively stronger than the Stock Return Index.

This paper recommends that during preparation of new regulations and also amends to primary and secondary legislative documents (law and regulations, decisions, principles) by regulatory bodies, the significant impact of economic growth (proxied by BIST-100) and bond market returns upon banking industry's profitability ratios should be considered in line with the findings specified in this study. This recommendation is attributable to the very fact that banks as financial intermediaries are at the same time considered as companies that work for high profit, which is one of the main motivations of the banks. Those banks with high ROA are able to provide more funding to individuals and corporations that need financing for individual needs and investments that are the key items for growing economies.

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