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REAL ESTATE INVESMENT TRUSTS AND DETERMINANTS OF THE INDUSTRY'S INDEX: EVIDENCE FROM TURKISH CAPITAL MARKET

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Abstract

This paper evaluates real estate investment trust (REIT) market and reviews the financial determinants of real estate investment trusts index. To this end, the study finds an answer to the research question of whether REIT index (XGMYO) is significantly affected by inflation, USD/TL parity and interest rates. Data is retrieved from Borsa-Istanbul and Central Bank of Turkey and covers the period from 2011 and 2021 (monthly data). Findings of the quantitative analysis are as follows; XGMYO has two regimes. Deposit (Index Return) with different lags is the most effective variable in both regimes. While CPI-Inflation is statistically significant in Regime 2, it is not significant in Regime 1. Similar to inflation, housing-loans-interest rate (applicable to clients) statistically has impact on XGMYO in Regime 2, but it has no statistically significant impact on Regime 1.

Keywords: Real Estate Investment Trusts, Return Index, Markov Switching Model

JEL Codes: G10, G20, G23

1. INTRODUCTION

Referred as 'REIC' (Real Estate Investment Company) by Capital Market Board of Turkey (CMB-The Board), Real Estate Investment Trusts are categorized under capital market institutions. REIC is referred to REIT (Real Estate Investment Trust) in this paper in line with the literature in the world. REITs are defined by CMB as a type of capital market institution that is set up in order to issue its shares for the purpose of operating and managing a portfolio which is made up of real estates, real estate projects, real estate-based rights, infrastructural investments and services, capital market instruments, Clearing Bank money market ('Takasbank Para Piyasası') and reverse repurchase transactions ('ters repo'), time deposits or participation accounts in Turkish Lira ('vadeli mevduat', 'katılım hesapları'), demand-deposit and time-deposits or special-current and participation-accounts in foreign currency (Yabancı para cinsinden vadesiz, vadeli veya özel cari hesap ve katılım hesabı), subsidiaries and affiliates, and other assets, rights and instruments to be determined by the Board, and which may engage in other activities permitted in the related Communique ('Tebliğ'), within the limits of activities delineated in Article 48 of the Capital Market Law (Law Number 6362).

Capital Market Board of Turkey specifies REITs, in the official web site as follows:

''REICs operating and managing a portfolio consisting of infrastructural investments and services are required to be founded/transformed solely and exclusively for these activities, and the REIC's articles of association should contain a clause in connection therewith. REICs founded for operation and management of a portfolio consisting solely of infrastructural investments and services cannot invest in real estates, real estate-based rights and real estate projects unrelated with the infrastructural investments and services. Other REICs covered by this Communiqué can also not invest in infrastructural investments and services and the associated assets and rights, except for those which are incidental by nature and are performed as a part of real estates or real estate projects within the frame of their main fields of business.''

Table 1. Net Asset Value of Real Estate Investment Trusts – Turkish Market (2021/4Q)

Year	Number	Market Value	
		Thousand TRY	Million $
2011/12	23	11,708,492	6,224
2012/12	25	15,781,822	8,857
2013/12	30	18,632,452	8,730
2014/12	31	21,981,323	9,462
2015/12	31	21,279,729	7,279
2016/12	31	24,961,535	7,080
2017/12	31	26,924,062	7,125
2017/03	33	26,512,729	6,702
2018/06	33	22,729,756	4,975
2018/09	33	20,304,110	3,383
2018/12	33	19,362,622	3,660
2019/03	33	18,680,395	3,313
2019/06	33	17,580,680	3,049
2019/09	33	20,143,472	3,081
2019/12	33	32,711,518	5,497
2020/03	33	23,489,605	3,569
2020/06	33	36,826,077	5,372
2020/09	33	46,498,583	5,987
2020/12	33	55,333,402	7,445
2021/03	33	63,836,562	7,654
2021/06	35	65,874,962	7,575
2021/09	35	79,525,331	8,941
2021/12	36	87,271,873	6,536

Source: Capital Market Board of Turkey, Monthly Bulletin 2022-02.

As can be seen in Table 1, there is a steady increase in Net Asset Value of Real Estate Investment Trusts in Turkish Market with respect to the number of REITs and market value in TRY. Due to the fluctuations in USD/TL parity, USD equivalent of market value is not increasing.

Foundation of REITs under Turkish legislation can be described as follows: ‘They may directly be set up as a real estate investment company. Or, joint-stock companies may be converted into a REIC (REIT) by amending and adopting their articles of association (in line with provisions of the Capital Market Law and the related Communiqué).’

’In the case of both foundation and transformation of REICs operating a portfolio consisting solely of infrastructural investments and services, it should clearly be stated in their articles of association that minimum 75% of their total assets will be composed of infrastructural investments and services. Provided, however, that only infrastructure companies may be transformed and converted into a REIC operating a portfolio consisting solely of infrastructural investments and services.’

‘Either way, establishment of a real estate investment trust should be accepted by CMB. Then an application for establishment can be made to the Ministry of Industry and Trade. Following the Ministry's permission, the establishment of the investment trust is announced in the Turkish Commercial Registry Journal.’’

Table 2. Historical Consolidated Portfolio Structure of Real Estate Investment Trusts

All Investment Trusts							
Year	Month	Number of Trusts	Market Capitalization (Thousand TRY)	R %	MCMI %	GB %	OTHER %
2018	03	33	72,544,550	79	4.11	2.61	14.76
2018	06	33	74,718,843	78	4.49	2.44	14.69
2018	09	33	77,126,402	77	4.32	2.41	16.45
2018	12	33	79,414,634	79	3.38	2.39	15.12
2019	03	33	80,570,803	78	2.32	3.66	15.59
2019	06	33	80,342,082	78	2.30	3.54	15.91
2019	09	33	81,053,204	78	2.28	4.06	15.97
2019	12	33	86,227,907	77	2.33	4.91	16.25
2020	03	33	86,015,236	77	2.32	5.16	15.74
2020	06	33	87,144,954	76	2.23	5.48	16.10
2020	09	33	91,233,496	74	2.28	7.20	16.53
2020	12	33	94,881,785	77	2.38	5.87	14.96
2021	03	33	98,241,013	75	5.98	5.05	14.29
2021	06	35	112,711,275	72	4.27	9.33	14.02

2021	09	35	114,408,663	73	4.55	9.49	12.83
2021	12	36	149,766,514	75	3.96	9.82	11.27

Source: Capital Market Board of Turkey, Monthly Bulletin 2022-02.

Table 2 indicates that proportion of 'R' (Real Estates, Real Estate Projects and Rights) in the Portfolio have not changed for the last 4 years. MCMI (Proportion of Money and Capital Market Instruments in the Portfolio) decreases in 2020 but goes up to 2018 levels. On the other hand, GB (Proportion of Affiliates in the Portfolio) increases steadily from 2018 to 2021.

Contribution of REITs to the economy is best described in 'Manual for Informing Investors about REITs' by Capital Market Board of Turkey. It is underlined that they provide funding for large-scale real estate projects like business centers or shopping malls. Companies themselves have difficulty in finding funding for these great projects, due to the fact that those companies with lack of capital may experience the burden of interest for loans to be granted for these projects. REITs can provide funding for these projects through contributions in return for shares of REITs.

Here, it is useful to mention the general economic outlook in Turkey and World briefly as of June 2022. Central Bank of Republic of Turkey, Financial Stability Report (May 2022) indicates that with the contribution of domestic and external demand, economic activity also remained strong in the first quarter of 2022 in Turkey. Since 2021 Turkish economic growth has been based on export-oriented movements (foreign-trade being much more important) with the help of competitive local currency level. When we look at global demand and supply conditions, Chinese economy still has significant effect on global economy from supply and demand side. Regarding foreign trade competitiveness and China, Özcelik (2022) argues that foreign trade competitiveness of the Far East Countries partially converges to the that of China during economic recession periods, whilst this convergence is seen full in economic expansion periods.

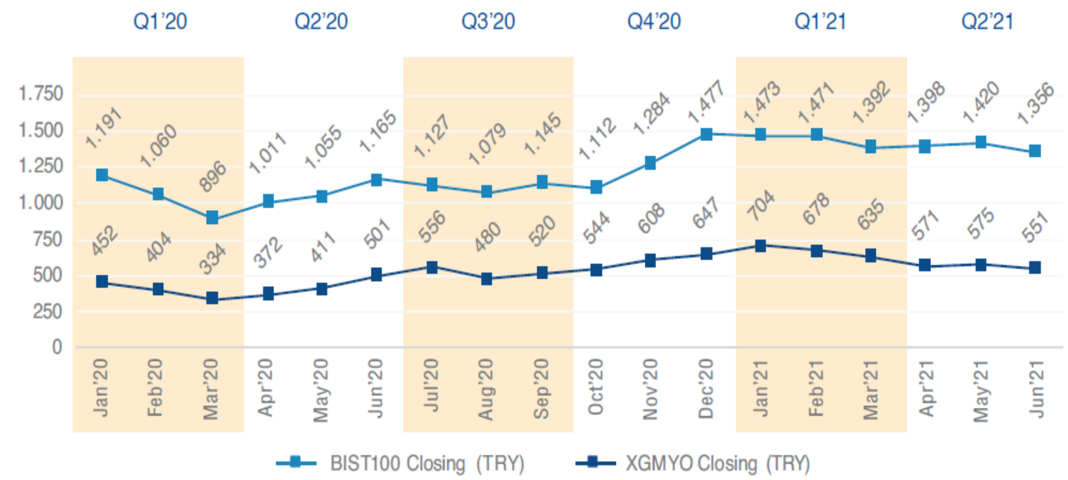

Figure 1. BIST REIT Index Performance (TRY)

Source: GYODER-Turkey Real Estate Sector 2021 and BIST

Figure 1 shows that The REIT Index closed at 550.58 at the end of June 2021. On this figure, index closing prices for the first day of every month are considered (https://www.gyoder.org.tr/files/202111/8a71c99d-f1f1-4ae9-9017-b41fc5f042f5.pdf).

The importance and motivation of this subject of paper comes from the very fact that in Turkey investment in real estate and real property is of great significance in regard to mid-term and long-term returns over inflation. REITs, as capital market institutions provide an alternative means of investment for local investors. Increasing market volume of REITs indicates the future importance of the subject.

The research question of this study is whether leading financial and economic indicators have statistically significant impact on XGMYO, which is the BIST-REIT index in Turkey. To this end, data is retrieved from BIST, Central Bank to analyze the period between 2011 and 2021 monthly. In this way, study covers 132 months. The scope of the study is limited to Turkey. The impact of deposit (return), inflation, FX parity, BIST-100 (Istanbul Stock Exchange leading index as a proxy), Bond-Return Index and housing-loans-interest rates are regarded as explanatory variables in the econometric analysis that is conducted to solve the research question of this paper.

This study contributes to the literature by analyzing REITs comprehensively and by examining XGMYO with its financial determinants together with recent data for Turkey. In this way, the study fills a gap in the literature by employing current figures and data.

The paper is structured as follows: Section I is the introduction part. Section II provides a literature review of real estate investment trusts and the related market in Turkey. Section III covers data, methodology and findings of econometric analysis. Section IV concludes the study.

2. LITERATURE REVIEW

In this part, previous studies related to real estate investment trusts, commonly known as REITS and the determinants of index for these trusts are examined. Major topics that are covered in this part are performance of XGMYO (BIST REIT index) and general remarks, fundamental about REITs.

Corgel et al. (1995) in their seminal paper reviews the financial economics literature with respect to real estate investment trusts. They maintain that the literature is separated into three major topics: Investment decisions, financing decisions, and return and risk issues.

As far as the fundamentals of REITs are concerned, Akkaya et al. (2005) argue that REITs are considered as corporation combining the capital of investors to provide funding for real estate assets. They are formed to provide investors with the opportunity to take part in the benefits of holding larger-scale real estate; in a way they are possibly the best inflation-hedge around.

Regarding the performance of REITs in Turkish Stock Market, İslamoğlu et al. (2015) evaluate the performance of REITs in Borsa Istanbul by employing the Entropy Based TOPSIS method. They argue that Real Estate Investment Trusts are considered to be financial intermediaries that facilitate financing for real estate properties and thus play an important role in the development of (the real estate) market. A confirmed evaluation of financial performance is significant since there exists an increasing competition which leads to a risk to maintaining the market share of companies. Hence, the valuation of companies in regard to liquidity, profitability, turnover and capital structure ensures managers to take the necessary precautions and then make contribution to the soundness of the companies. Aytekin and Kahraman (2015:299) evaluate the financial efficiency of the companies in BIST REIT Index (XGMYO), their study is on Turkish REIT market for the years between 2008-2012 and they employ data envelopment method. In their paper, it has been revealed that the companies traded in the BIST Real Estate Investment Trusts index cannot make optimal use of their assets and resources in terms of reaching financial efficiency, and this situation should be handled by the financial managers of the companies. Yılmaz and İçten (2018) analyze cash flow-focused financial performance of REITs for Borsa Istanbul between 2007 and 2016; they find that cash generating ability of REITs does not indicate a steady trend throughout the years, after it goes up the highest level in 2009, it has weak performance from 2010 to 2014 and starts to incline starting from 2015. Çelik and Manan (2018) examine the linkage between risk and performance of real estate investment trusts that are listed in BIST (Turkey) for a sample period of 2007-2016 with annual data. They show that there is an assosication between risk and performance of REITs. Sırma (2019) studies the impact of real estate investment trusts portfolio structure on the market performance for Turkey and the effect of increase in the assets of REITs traded between 2007 and 2017 on stock returns (BIST-100) is investigated with panel data analysis; he concludes that the incline in assets of REITs is not as effective as the factors affecting the market as a whole. Özcan and Gürol (2020) investigate the performance of real estate investment trusts and focus on REITs in Turkey; they argue that REITS with low debt ratios, shareholders' equity or continued capital and real estate portfolio, are at the top of the performance ranking. Upon their analysis results, they also contend that in the years when they are offered to the public, the less risky transactions under the portfolio constraints introduced by the public offerings positively reflected the REITS' balance sheets. Ayrancı and Gürel (2020) examine financial performance of REITs, they focus on BIST Enterprises (Turkiye); they find that acid-test ratio, equity multiplier, long term debt/assets, equity profitability, return on assets and operating profit margin are able to increase the businesses value; on the other hand the leverage ratio cause their value to decrease.

Studies regarding Turkey about the BIST-REIT Index and different variables (economic, financial) are as follows: Zügül and Şahin (2015) employs 'least square method' and multivariate regression analysis (with data covering the period between January 2002-December 2012) and argue that there exists a negative relation between BIST REIT Index and deposit interest rate, on the other hand there is no relationship between BIST REIT Index and inflation rate. Kandır and Özhan (2018) in their study on Turkey investigate the factors which influence stock returns of the Real Estate Investment Trusts; the sample covers 16 REITs during 2010:2 – 2010:6 period, the results of their study indicate that BIST 100 has a significant effect on REITs Stock Returns; on the other hand Housing Price Index does not have a –statistically-significant effect ın REIT Stock Returns. Afşar and Karpuz (2019) analyze the relationship between macroeconomic variables and Borsa-Istanbul Real Estate Investment Trusts Index by using BIST-REIT Index as dependant variable and BIST-100 index, economic growth, deposit interest rate and inflation rate as independant variables. They use quarterly data sets for the period 2000-2017 and employ Granger Causality Test. The results of the analysis indicate that there exist unidirectional causality from the deposit interest rate to the BIST REIT index. They find that there exists a different or related relationship between the REIT Index and the selected macroeconomic variables which are expected to have this influence.

Karakuş and Öksüz (2021) examine the relationship between BIST-REIT index and house price index, interest rate and inflation with the help of ARDL bounds testing approach for the period between January 2010 and December 2020; after the analysis they find that there is cointegration between BIST REIT Index and the house price index, the rental consumer price index and the house loan interest rates. They also find that in the long run, the increase in the house price index increases BIST REIT Index; but the increase in the rental consumer price index and house loan interest rates cause BIST REIT Index to decrease. Likewise, Gazel and Münyas (2021) in their paper examining the relation between real estate investment trust index and various index for the period between October 2005 and September 2019, argue that -in line with short term results- BIST 100 index is associated with BIST REIT Index.

Ewing and Payne (2005) reviews the response of REIT returns (in United States) to unexpected changes in the real output growth, the inflation, the default risk premium, and the stance of monetary policy employing 'generalized impulse response analysis'; their study results show the degree and the significance of the association between the REIT market and macroeconomic factors. They find that shocks to monetary policy, economic growth and inflation bring about lower than expected returns, while a shock to the default risk premium is related with higher future returns. Fang et al. (2016) study the impact of macroeconomic factors on the real estate investment trust index return by employing Granger non-causality test, they indicate that a unidirectional relationship, where inflation rate shifts bring about changes in REIT index, exists in Japan and Singapore. Furthermore, there is a wealth effect, where stock index movements result in changes in REIT index (in Singapore).

Sarı and Başakın (2020) estimate REIT Index with tree based regression models by using Classification and Regression Tree (CART) model, Multivariate Adaptive Regression Spline (MARS) and Random Forest (RF) Model. Their analysis reveals that BIST All Index returns and Housing Price Index can predict XGMYO Index (BIST REIT Index).

3. DATA, METHOD, ANALYSIS, FINDINGS

3.1. DATA AND METHODOLOGY

In this part of the study, the theoretical framework of the methods used in the analysis is explained. At the beginning of the analysis, the nonlinearity of the variables is investigated with the test of Tsay (1986) and Brock, Dechert, and Scheinkman (BDS) (1987).

The stationary level of the variables is investigated with the Augmented Dickey-Fuller (ADF) (1979) (1981), Kapetanios, Shin and Snell (KSS) (2003) and Sollis (2009) unit root tests. The estimates are obtained with the Markov regime switching model proposed by Hamilton (1989) (1994).

Table 3. Data Set and Definition of Variables

Name of Variable	Variable Type	Brief Explanation	Source
XGMYO	Dependent	BIST REIT Index	Borsa-Istanbul (ISE)
INT	Explanatory	Housing Loans Interest Rate	EVDS –CBT
EXC	Explanatory	Currency Basket ((USD/TL+ EUR/TL)/2)	EVDS - CBT
XU100	Explanatory	BIST-100 (Return)	Borsa-Istanbul (ISE)
GDS	Explanatory	Government Debt Securities Index (Return)	Borsa-Istanbul (ISE)
DEPOSIT	Explanatory	Net Deposit Index (Return)	Borsa-Istanbul (ISE)
INF	Explanatory	CPI-Annual Inflation	EVDS - CBT

Table 3 below explains data set and details of variables used in econometric analysis. The figures are stated on a monthly basis (CBT: Central Bank of Turkey).

3.2. NONLINEARITY TESTS

Tsay (1986) proposed Eq (1) for xt having p lag autoregressive process (AR(p))

$$x_t = \boldsymbol{X}_{t-1}^{'}\boldsymbol{\phi} + \boldsymbol{M}_{t-1}^{'}\boldsymbol{\alpha} + e_t \tag{1}$$

where $\boldsymbol{X}_{t-1} = \left(1, x_{t-1}, ..., x_{t-p}\right)^{'}$, $\boldsymbol{\phi} = \left(\phi_0, \phi_1, ..., \phi_p\right)^{'}$, $\boldsymbol{M}_{t-1}^{'} = vech\left(\boldsymbol{X}_{t-1}\boldsymbol{X}_{t-1}^{'}\right)$[1] and e_t is the error term. He indicated that x_t is linear when $\boldsymbol{\alpha = 0}$ and otherwise it is not linear. The test statistic has F-distribution with the degree of freedom $g = p\left(p+1\right)/2$ and T-p-g-

[1] vech(.) is the half-stacking vector of a matrix using elements on and below the diagonal.

1. If test statistic is higher than the critical value, the null hypothesis of linearity is rejected.

Another and nonparametric linearity test is Brock, Dechert, and Scheinkman (BDS) (1987). They decided the linearity for xt with the independent or not in sub-dimensions. The test statistic is in Eq (2):

$$D_k\left(\delta,T\right)=\frac{\sqrt{T}\left\{C_k\left(\delta,T\right)-\left[C_1\left(\delta,T\right)^k\right]\right\}}{\sigma_k\left(\delta,T\right)} \sim N\left(0,1\right) \qquad (2)$$

In Eq. (2), δ is the distance of sub-dimensions, T is time, k is the number of dimensions, $C_k\left(\delta,T\right)$is the correlation integral and $\sigma_k\left(.\right)$is the standard deviation of the k-dimension. The test statistic has standard normal distribution. If the test statistic is higher than critical value, linearity is rejected at the level of significance.

3.3. UNIT ROOT TESTS

Dickey-Fuller (1979) is the pioneering unit root test for the stationary of the time series. Dickey and Fuller (1979) suggested three test equation whether variable has constant and/or trend. These are

$$\begin{aligned} x_t &= \rho x_{t-1}+\varepsilon_t && (noconstant) \\ x_t &= \alpha_0+\rho x_{t-1}+\varepsilon_t && (constant) \\ x_t &= \alpha_0+\alpha_1 t+\rho x_{t-1}+\varepsilon_t && (constant\ and\ trend) \end{aligned} \qquad (3)$$

where εt is the i.i.d.(0, σ2) error term and t is the time trend. The null hypothesis of the unit root is ϱ=1. Dickey and Fuller suggest Fuller (1976) table critical values for the distribution of the test statistic. Therefore, they adapted the test equations as follows to fit the Fuller's (1976) distribution:

$$\begin{aligned} \Delta x_t &= \rho^* x_{t-1}+\varepsilon_t && (noconstant) \\ \Delta x_t &= \alpha_0+\rho^* x_{t-1}+\varepsilon_t && (constant) \\ \Delta x_t &= \alpha_0+\alpha_1 t+\rho^* x_{t-1}+\varepsilon_t && (constant\ and\ trend) \end{aligned} \qquad (4)$$

where Δ is the difference operator. Thereby, the null hypothesis of unit root is ϱ*=0. The test statistic τ is

$$\tau = \frac{\hat{\rho}^*}{s.d.\left(\hat{\rho}^*\right)} \tag{5}$$

where s.d(.) is the standard deviation of the coefficient estimate. If the τ is more negative than the Fuller (1976) critical values, the null hypothesis is rejected. For the Augmented Dickey-Fuller (ADF) test, the test equations become in Eq. (6) for removing autocorrelation on the εt.

$$\begin{aligned}
\Delta x_t &= \rho^* x_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta x_{t-i} + \varepsilon_t \qquad (noconstant) \\
\Delta x_t &= \alpha_0 + \rho^* x_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta x_{t-i} + \varepsilon_t \qquad (constant) \\
\Delta x_t &= \alpha_0 + \alpha_1 t + \rho^* x_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta x_{t-i} + \varepsilon_t \qquad (constant\ and\ trend)
\end{aligned} \tag{6}$$

Kapetanios et al. (2003) suggested new unit root test considering nonlinearity of the variable. For the exponential smooth-transition AR model, the test equation is

$$\Delta x_t = \rho x_{t-1} + \gamma x_{t-1}\left[1 - \exp\left(-\theta x_{t-d}^2\right)\right] + \varepsilon_t \tag{7}$$

Because of the Eq. (7) directly non-feasible for estimation, they revised the test equation with the first-order Taylor series approximation. Thus, the test equation of the unit root is

$$\Delta x_t = \delta x_{t-1}^3 + \sum_{i=1}^{p} \alpha_i \Delta x_{t-i} + e_t \tag{8}$$

and the test statistic is

$$t_{NL} = \frac{\hat{\delta}}{s.e.\left(\hat{\delta}\right)} \tag{9}$$

where s.e.(.) is the standard error of the coefficient estimate. If the tNL is more negative than the critical values of Kapetanios et al. (2003:364), the null hypothesis of unit root is rejected.

Sollis (2009) extended the KSS unit root test with the asymmetric adjusted model. He added the asymmetric adjustment coefficient into the Eq. (8). The test equation is

$$\Delta x_t = \delta_1 x_{t-1}^3 + \delta_2 x_{t-1}^4 + \sum_{i=1}^{p} \alpha_i \Delta x_{t-i} + e_t \tag{10}$$

and the null hypothesis is . The test statistic of the Sollis test is

$$F = \left(R\hat{\beta} - r\right)' \left[\hat{\sigma}^2 R \left\{ \sum_t x_t x_t' \right\}^{-1} R' \right]^{-1} \left(R\hat{\beta} - r\right) \Big/ m \tag{11}$$

where $x_t = \left[x_{t-1}^3, x_{t-1}^4\right]'$, m=2, R is a 2×2 identity matrix, $\hat{\beta} = \left[\hat{\delta}_1, \hat{\delta}_2\right]'$, $r = [0,0]'$ and $\hat{\sigma}^2$ is the least-square estimate of σ^2. If F-stat is higher than the critical values of the Sollis (2009:121), the null hypothesis is rejected. Both KSS and Sollis tests, there are three test equation whether including constant and trend like ADF unit root test.

3.4. MARKOV REGIME SWITCHING MODEL

Hamilton (1989) proposed the estimation method based on Markov chains when the regime switchings are caused by unobserved factors. In this method, regime switching is occured based on state of the the self-process, not by a variable in the model. While st is the unobserved process of yt which belogs to AR(1) process, two-regime Markov switching model is

$$x_t = \begin{cases} \alpha_{0,1} + \alpha_{1,1} x_{t-1} + \varepsilon_t, & if \quad s_t = 1 \\ \alpha_{0,2} + \alpha_{1,2} x_{t-1} + \varepsilon_t, & if \quad s_t = 2 \end{cases} \tag{12}$$

And if st=1 and st=2 are, these are indicated the changing in Regime 1 and Regime 2, respectively. The st is the first order Markov process and it is connected to the st-1. In this case, the conditional probabilities of the st and st-1 are

$$\begin{aligned} P\left(s_t = 1 \middle| s_{t-1} = 1\right) &= p_{11} \\ P\left(s_t = 2 \middle| s_{t-1} = 1\right) &= p_{12} \\ P\left(s_t = 1 \middle| s_{t-1} = 2\right) &= p_{21} \\ P\left(s_t = 2 \middle| s_{t-1} = 2\right) &= p_{22} \end{aligned} \tag{13}$$

where p11 and p22 are the probabilities of the duration in Regime 1 and Regime 2, respectively. p12 and p21 are the probabilities of the switching from Regime 1 to Regime 2 and Regime 2 to Regime 1 respectively. In Table 4, it is shown that the sum of the probabilities equals to 1 along the lines.

	Regime 1	Regime 2	$\sum pij$
Regime 1	p_{11}	p_{12}	$p_{11}+p_{12}=1$
Regime 2	p_{21}	p_{22}	$p_{21}+p_{22}=1$

Hamilton (1989:374) pointed out that using the formula of (i=1,2) for achieving the duration times in the regimes. As a result of this, he stated that the number of periods staying in regimes can be obtained as for that sample frequencies. Hamilton showed that the unconditional probabilities for two regimes with ergodic Markov chains. Hamilton (1989:361-374,1994:681-683) showed that getting the unconditional probabilities for two regime with ergodic Markov chains in Eq. (14).

$$P(s_t = 1) = \frac{1 - p_{22}}{2 - p_{11} - p_{22}}$$
$$P(s_t = 2) = \frac{1 - p_{11}}{2 - p_{11} - p_{22}} \qquad (14)$$

The condition for applying the Markov switching model is that the unconditional probabilities have to be higher than 0.5.

3.5. FINDINGS

The descriptive statistics of the variables are reported on the Table 5. The minimum and maximum values of the XGMYO are 250.670 and 721.090, respectively. While DEPOSIT has higher standard deviation, INF has the lowest. The skewness coefficients indicate that all the variables have right-skewed and the kurtosis coefficients show that all the variables are platykurtic distribution. These statistics indicate that all the variable have positive shocks and these shocks are higher than the negative shocks. The mean, minimum and maximum values of the variables are different from each other for all the variables. Thus, for the stationary condition on variance and getting the rid of the difference of unit, the natural logarithm is taken for the variables.

Table 5. Descriptive Statistics

Statistic	XGMYO	XU100	GDS	DEPOSIT	INF	INT	EXC
Mean	407.164	911.144	1462.698	2720.912	0.104	13.705	4.293
Standard Er.	8.428	22.752	36.595	73.115	0.004	0.345	0.218
Median	395.015	855.245	1391.302	2482.456	0.090	12.719	3.143
Standard Dev.	96.825	261.403	420.445	840.030	0.043	3.963	2.502
Kurtosis	1.919	1.437	-0.679	-0.721	3.308	3.891	1.304
Skewness	1.361	1.139	0.702	0.707	1.547	1.815	1.269
Maximum	250.670	512.666	899.910	1686.921	0.039	8.298	1.823
Minimum	721.090	1857.650	2301.141	4650.805	0.308	28.948	14.435
T	132	132	132	132	132	132	132

In the first step of the analysis, it is controlled the nonlinearity with the Tsay F-test and BDS test. These results are reported in the Table 6. For the 12 lags, Tsay F-test indicates that all the variables are nonlinear. Also, XGMYO reaches the maximum F-stat in the lag of 10. In addition, all other variables are nonlinear with different lags based on Tsay F-test. The similar results are achieved with the BDS test for one standard deviation in all the sub-dimensions. Because of the nonlinearity of the variables, it is not appropriate to use linear model for estimation.

There is a unit root test results in the Table 7. Based on the ADF, KSS and Sollis tests, all the variables are stationary in the first difference. For this reason, predictions are done with the first-difference of the variables in the following steps of the analysis.

The theoretical model of investigated in this paper states in Eq. (15). But it is important to not to ignore the dynamic relationship of the variables in the time series analysis. Because an event that occurs at time t is highly likely to result from the lags of both itself and other variables in the model. Therefore, Eq. (15) can be extended to the Eq. (16) with the handling the dynamic relationship. In Eq. (2), ε is the error term with i.i.d.N(0,σ) and k, l, m, n, p, r and s are the lag lengths.

$$XGMYO_t = f\left(XU100_t, DEPOSIT_t, GDS_t, INF_t, EXC_t, INT_t\right) \quad (15)$$

$$XGMYO_t = \alpha_0 + \sum_{i=1}^{k} \alpha_i XGMYO_{t-i} + \sum_{i=0}^{l} \beta_i XU100_{t-l} + \sum_{i=0}^{m} \delta_i DEPOSIT_{t-m} + \sum_{i=0}^{n} \phi_i GDS_{t-n} + \sum_{i=0}^{p} \varphi_i INF_{i-p} + \sum_{i=0}^{r} \gamma_i EXC_{t-r} + \sum_{i=0}^{s} \theta_i INT_{t-s} + \varepsilon_t \quad (16)$$

Since dependent variable is nonlinear, Eq. (16) estimate with the Markov Switching Model proposed by Hamilton (1994) for modelling the regime changing. The theoretical framework of the regime switching model is given in Eq. (17):

$$XGMYO_t = \alpha_0(s_t) + \sum_{i=1}^{k} \alpha_i XGMYO_{t-i}(s_t) + \sum_{i=0}^{l} \beta_i XU100_{t-l}(s_t) + \sum_{i=0}^{m} \delta_i DEPOSIT_{t-m}(s_t) + \sum_{i=0}^{n} \phi_i GDS_{t-n}(s_t) + \sum_{i=0}^{p} \varphi_i INF_{i-p}(s_t) + \sum_{i=0}^{r} \gamma_i EXC_{t-r}(s_t) + \sum_{i=0}^{s} \theta_i INT_{t-s}(s_t) + \varepsilon_t \quad (17)$$

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Table 6. Nonlinearity test results

Variables:	XGMYO	BIST100	GDS	DEPOSIT	INF	INT	EXC
	Tsay F Test						
Lag	F-stat	F-stat	F-stat	F-stat	F-stat	F-stat	F-stat
1	1.597 (0.206)*	0.821 (0.442)	0.432 (0.649)	33.072 (0.000)	0.095 (0.909)	2.311 (0.103)	2.622 (0.076)
2	2.281 (0.051)	1.059 (0.386)	1.998 (0.083)	0.019 (0.999)	0.540 (0.745)	5.818 (0.000)	3.784 (0.003)
3	1.975 (0.048)	0.706 (0.701)	1.515 (0.150)	0.017 (0.999)	0.544 (0.839)	3.324 (0.001)	5.114 (0.000)
4	1.803 (0.047)	0.627 (0.836)	1.815 (0.044)	0.019 (0.999)	0.912 (0.547)	3.956 (0.000)	4.447 (0.000)
5	1.822 (0.027)	0.762 (0.751)	1.801 (0.029)	0.008 (1.000)	1.029 (0.435)	4.139 (0.000)	3.502 (0.000)
6	1.931 (0.011)	0.633 (0.911)	1.751 (0.025)	0.009 (1.000)	1.099 (0.357)	3.470 (0.000)	2.714 (0.000)
7	1.988 (0.005)	1.033 (0.438)	1.432 (0.093)	0.009 (0.999)	1.249 (0.203)	2.704 (0.000)	2.281 (0.001)
8	1.608 (0.036)	1.028 (0.450)	2.366 (0.000)	0.012 (1.000)	1.527 (0.054)	2.253 (0.001)	1.880 (0.008)
9	1.588 (0.041)	0.925 (0.612)	2.053 (0.003)	0.004 (1.000)	1.443 (0.083)	2.672 (0.000)	1.532 (0.054)
10	2.037 (0.005)	1.221 (0.237)	0.585 (0.977)	0.008 (0.999)	2.104 (0.004)	3.094 (0.000)	1.271 (0.194)
11	1.769 (0.035)	1.249 (0.241)	1.297 (0.205)	0.032 (1.000)	2.481 (0.002)	2.361 (0.003)	1.255 (0.236)
12	1.265 (0.293)	2.406 (0.018)	0.057 (1.000)	0.003 (1.000)	4.523 (0.000)	3.040 (0.005)	0.815 (0.741)
	BDS						
Sub-dimension**	BDS-stat	BDS-stat	BDS-stat	BDS-stat	BDS-stat	BDS-stat	BDS-stat
2	0.069 (0.000)	0.129 (0.000)	0.175 (0.000)	0.206 (0.000)	0.181 (0.000)	0.134 (0.000)	0.235 (0.000)
3	0.056 (0.000)	0.138 (0.000)	0.214 (0.000)	0.268 (0.000)	0.282 (0.000)	0.219 (0.000)	0.357 (0.000)
4	0.035 (0.000)	0.119 (0.000)	0.214 (0.000)	0.287 (0.000)	0.334 (0.000)	0.264 (0.000)	0.422 (0.000)
5	0.021 (0.000)	0.098 (0.000)	0.206 (0.000)	0.292 (0.000)	0.358 (0.000)	0.279 (0.000)	0.455 (0.000)
6	0.013 (0.000)	0.080 (0.000)	0.196 (0.000)	0.294 (0.000)	0.367 (0.000)	0.283 (0.000)	0.471 (0.000)

*probability values are in pharanthesis. **It is reported for only 1 std. dev. in subdimensions in BDS test. It is controlled for 0.5 and 2 st dev and there is no difference about non-normality of variables

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Table 7. Unit root tests results

Variable	Level			First difference		
	ADF	KSS	Sollis	ADF	KSS	Sollis
XGMYO	-1.692	0.49	0.443	-10.565	-10.447	55.678
XU100	-2.802	1.374	0.977	-11.648	-11.232	133.653
DEPOSIT	-1.231	2.254	2.772	-5.861	-3.153	7.201
GDS	-2.478	2.683	4.082	-10.406	-9.982	49.583
INF	-1.231	1.519	1.489	-5.872	-0.891	7.780
EXC	-0.504	3.971	7.875	-6.588	-0.574	29.222
INT	-3.238	-2.185	1.422	-7.998	0.222	9.148
1% C.V.*	-4.05	-2.82	8.53	-4.05	-2.82	8.53
5% C.V.	-3.45	-2.22	6.46	-3.45	-2.22	6.46
10% C.V.	-3.15	-1.92	5.46	-3.15	-1.92	5.46

*The critical values are reported from Fuller (1976), Kapetonias et al. (2003) and Sollis (2009).

st is the unobserved regime variable in Eq. (17). The lag lengths of the variables select with the Akaike information criteria and they are k=10, l=4, m=7, n=6, p=0, r=3 and s=0. In Table 8, the estimation results are indicated. The insignificant coefficients in both regimes are dropped from the model.

First of all, the likelihood ratio (LR) test result show that the ability of representing the data is provided with the Markov regime switching model. The null hypothesis of the LR test is that linear model estimates are significantly different from the Markov switching model. The fact that the probability of the test statistic is lower than 5% shows the estimations are different for linear and Markow switching model. Hence, it is extrapolated significantly that XGMYO has to predict with the Markov Regime switching model. The transition probabilities show that the probability of staying in Regime 1 is 87.1% and 71.8% in Regime 2 for XGMYO. The probability of the transition from Regime 1 to Regime 2 to is 12.9% and 28.2% from Regime 2 to Regime 1. As the average duration time in Regime 1 is 8.6 months, it is 3.89 months in Regime 2. This results show that XGMYO has higher probability staying in Regime 1 than staying in Regime 2. The predicted coefficients indicate that DEPOSIT is the most affecting variable to XGMYO both in Regime 1 and Regime 2. EXC is predicted significantly in both regimes but it is more effective in Regime 2 than the Regime 1. While INF is not significant in Regime 1, it has negative effect on XGMYO in Regime 2, significantly. Despite the GDS is significantly predicted at time t, t-1, t-2, t-3 and t-6 in Regime 1, it is significantly predicted at the time t, t-2 and t-3 in Regime 2. INT is only significantly predicted in Regime 2 for α=0.10. In short, except of AR coefficients, EXC, GDS and XU100 affect the XGMYO in both regimes. While DEPOSIT has significantly impact on XMYO in Regime 1, INF and INT have this impact in Regime 2.

There is a time series plot of XGMYO with regimes in Figure 1. Regime 1 is reflected with the grey area in it. In general, it is pointed out that XGMYO increases in Regime 1 and decreases in Regime 2. With the results of the Table 8, it can be said that DEPOSITt-1 causes XGMYO to increase in Regime 1 and it is the most effective variable for staying XGMYO in Regime 1. Besides the autoregressif variables of XGMYO, GDSt-3 and XU100t-4 are the most effective variables to stay XGMYO in Regime 2.

In Figure 3, there are smoothed and filtered probabilities of XGMYO with the dates. they reflect that the probability condition ($0 \leq p \leq 1$) provides for both of them. The prominent dates of Regime 2 are 2012M12, 2013m12-2014M02, 2016M09-2017M03, 2017M08, 2018M02-2019M03, 2020M08-2020M10, 2021M02-2021M04 and 2021M11.

Table 8. The Results of the Markov Switching Model

Variable	Regime 1				Regime 2			
	Coefficient	Std.Error	t-value	prob	Coefficient	Std.Error	t-value	Prob
Constant	0.001	0.007	0.160	0.873	-0.071	0.016	-4.410	0.000
$XGMYO_{t-1}$	0.075	0.039	1.910	0.060	-0.258	0.071	-3.630	0.001
$XGMYO_{t-2}$	0.143	0.045	3.200	0.002	-0.537	0.092	-5.810	0.000
$XGMYO_{t-3}$	0.145	0.052	2.780	0.007	-0.543	0.105	-5.180	0.000
$XGMYO_{t-4}$	-0.019	0.057	-0.332	0.741	0.527	0.117	4.490	0.000
$XGMYO_{t-7}$	0.101	0.032	3.210	0.002	-0.076	0.072	-1.060	0.293
$XGMYO_{t-8}$	0.107	0.035	3.030	0.003	0.587	0.100	5.840	0.000
$XGMYO_{t-9}$	0.165	0.035	4.780	0.000	0.131	0.089	1.480	0.143
$XGMYO_{t-10}$	0.190	0.035	5.420	0.000	0.190	0.064	2.990	0.004
EXC_{t-1}	0.410	0.124	3.320	0.001	0.614	0.230	2.670	0.009
INF_t	0.000	0.003	-0.002	0.999	-0.019	0.005	-3.490	0.001
GDS_t	0.354	0.144	2.460	0.016	0.602	0.169	3.570	0.001
GDS_{t-1}	0.390	0.119	3.290	0.002	0.191	0.214	0.895	0.374
GDS_{t-2}	0.591	0.123	4.810	0.000	1.128	0.323	3.500	0.001
GDS_{t-3}	0.619	0.123	5.030	0.000	-0.406	0.159	-2.550	0.013
GDS_{t-6}	0.460	0.105	4.390	0.000	0.320	0.175	1.830	0.071
$DEPOSIT_t$	-14.560	2.985	-4.880	0.000	0.416	5.462	0.076	0.939
$DEPOSIT_{t-1}$	15.038	3.338	4.510	0.000	-8.515	6.759	-1.260	0.212
$DEPOSIT_{t-6}$	8.763	2.355	3.720	0.000	13.772	5.823	2.370	0.021
$DEPOSIT_{t-7}$	-12.155	2.277	-5.340	0.000	1.233	5.662	0.218	0.828
$XU100_t$	0.823	0.046	17.800	0.000	0.399	0.069	5.750	0.000
$XU100_{t-3}$	-0.342	0.059	-5.820	0.000	0.204	0.115	1.780	0.080
$XU100_{t-4}$	-0.096	0.080	-1.210	0.232	-0.389	0.128	-3.030	0.003
INT_t	-0.001	0.002	-0.244	0.808	-0.006	0.003	-1.950	0.055
p_{ii}				0.871				0.718
d				8.6 months				3.89 months
σ(st)								0.017 [13.343]*
LR								96.949 (0.000)**
Portmanteau (12)								11.485 (0.487)
Normality								1.303 (0.521)
ARCH (1): 0.376 (0.541)			ARCH (6): 0.263 (0.951)					ARCH (12): 0.306 (0.985)

Not: pii is the probability of staying in regimes; d is the average duration time in regimes. Portmanteau, Normality and ARCH(p) are the tests of serial correlation, normality and heteroscedasticity test for residuals, respectively. * t-stats in brackets. **probability values in parentheses.

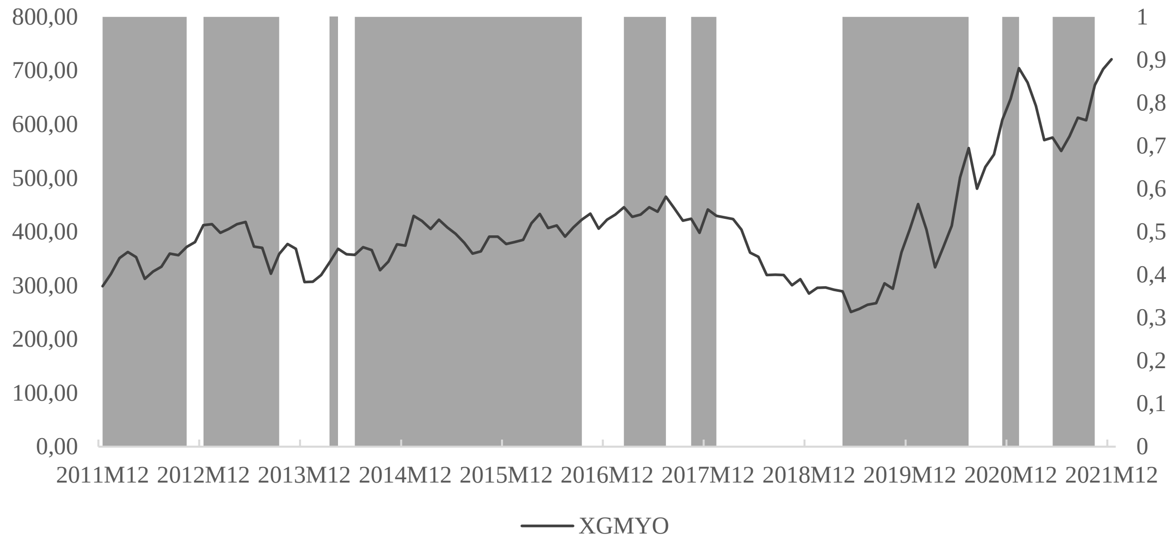

Figure 2. XGMYO according to regimes

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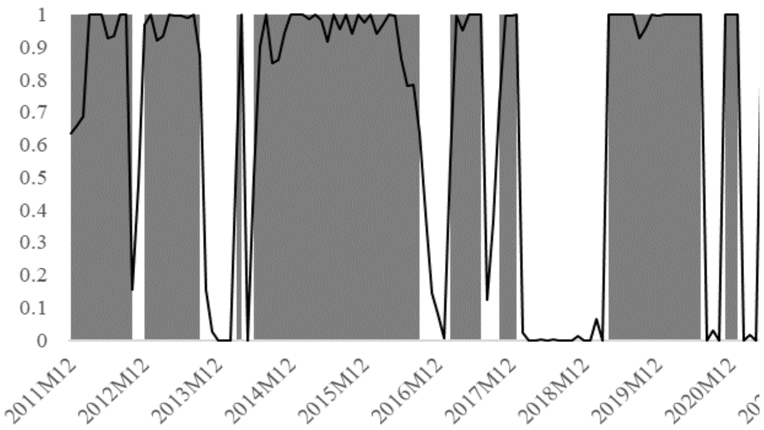
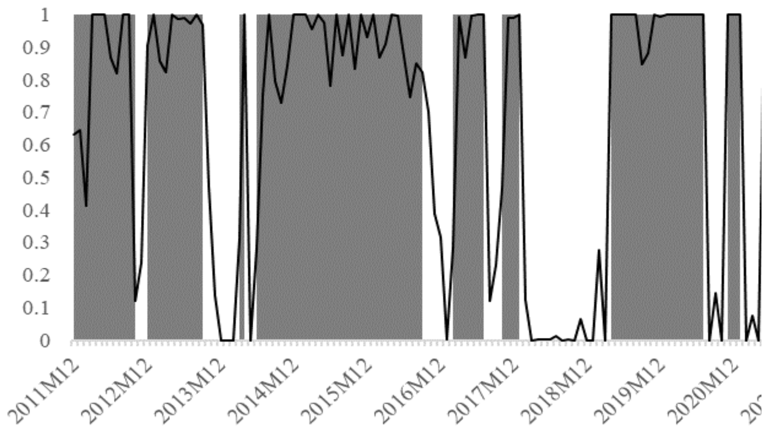
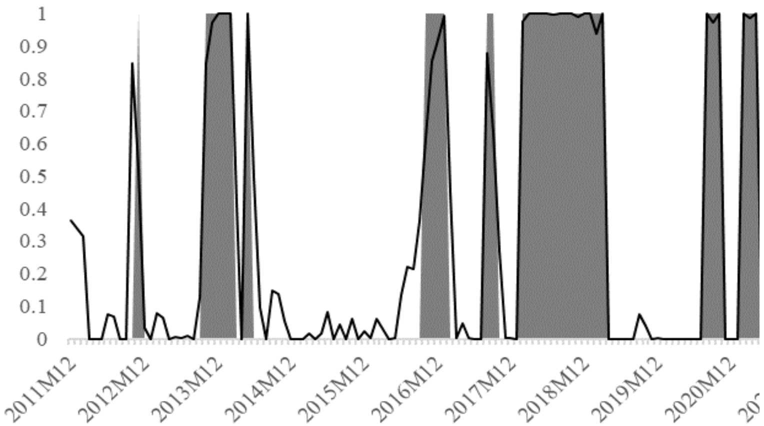
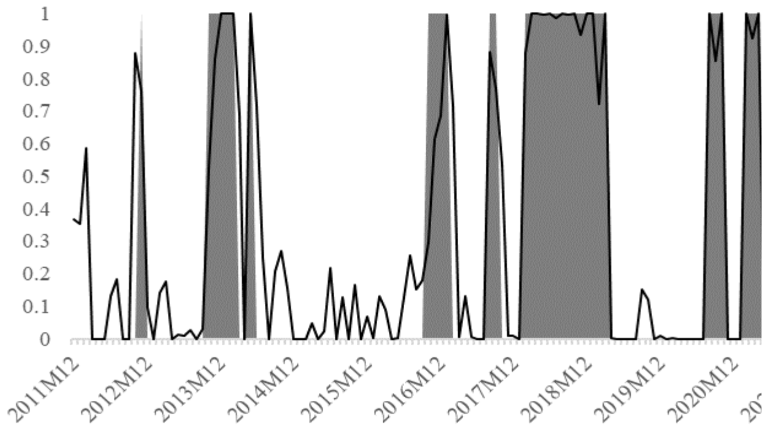
	Smoothed	Filtered
Regime 1		
Regime 2		

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4. CONCLUSION

This study reviews real estate investment trusts, which are commonly called as REITs and the relation between BIST REITs Index, XGMYO, and the leading financial financial indicators. REITs are financial intermediaries that make funding (financing) much easier for real estate properties, in this way play an important role in the growth and enhancement of the market of real estate.

Research question of this paper is whether financial bencmark returns have significant impact on XGMYO, which is REITs index in Borsa-Istanbul (Istanbul Stock Exchange). For this purpose, data is received from Borsa- Istanbul and Turkish Central Bank (official web site-statistics) to examine the period between 2011 and 2021 –on a monthly basis-. Therefore, this paper considers 132 months. The scope of the study is Turkey that has a fast growing capital market. The influence of inflation, FX parity, BIST-100 (Istanbul Stock Exchange leading index as a proxy) and interest rates are regarded as explanatory variables in the econometric analysis carried out to find an answer to the research question of this paper.

Markov Switching Model is employed in this paper. The empirical findings show that XGMYO (BIST REIT Index) has two regimes. In Regime 1, XGMYO tends to decline from its average, but it has a upward trend in Regime 2. DEPOSIT (deposit interest rate), XU100 (BIST100 Index-Return), GDS (All-Bond Traded in BIST Bond Market) Return Index, EXC (Currency Basket Index) all have statistically signicant impact on XGMYO in both regimes. However, INF (CPI-Annual Inflation) and INT (Interest rate applicable for Housing-Loans Granted By Turkish Banks) have significant impact solely in Regime 2. All in all, it is found that deposit (index for return of time-deposits) is statistically much more significant than other explanatory variables.

In the final analysis, given the significance of the inflation and housing-loan-interest-rates, the monetary policies are being much more important factor when the BIST REIT Index tends to decline or incline.

REFERENCES

Afşar, A., Karpuz, E. (2019). Makroekonomik Değişkenlerle Borsa Istanbul Gayrimenkul Yatırım Ortaklıkları Endeksi Arasındaki İlişki. Anadolu Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 20(1), 52-64.

Akkaya, G.C., Kutay, N., Tükenmez, M. (2005). Real Estate Investment Trusts and Fundamentals of Real Estate Investments: A Case of Turkey. Yönetim ve Ekonomi, 12 (1), 39-46.

Ayrancı, A. E., Gürel, C.A. (2020). Gayrimenkul Yatırım Ortaklıklarının Finansal Performansı: BİST İşletmeleri Örneği. International Journal of Applied Economic and Finance Studies, 5(1), 1-14.

Aytekin, S., Kahraman E. (2015). BIST Gayrimenkul Yatırım Ortaklıkları Endeksindeki (XGMYO) Şirketlerin Finansal Etkinliklerin Veri Zarflama Analizi Yöntemi ile Değerlendirmesi. Niğde Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 8(1), 289-301.

Brock, W., Dechert, W. D., and Scheinkman, J. (1987). A test for independence based on the correlation dimension. Working paper, Department of Economics, University of Wisconsin, Madison.

CBRT Financial Stability Report, May 2022.

CMB. Manual for Investor – IV. https://www.spk.gov.tr/Sayfa/Dosya/72

Corgel, J. B., McIntosh, W., Ott, S. H. (1995). Real Estate Investment Trusts: A Review of the Financial Economics Literature. Journal of Real Estate Literature, 3, 13-43.

Çelik, Ş., Manan, M.T. (2018). Gayrimenkul Yatırım Ortaklıklarının Risk ile Performans İlişkisi. Muhasebe ve Finans İncelemeleri Dergisi, 1(1), 60-79.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. Journal of the American statistical association, 74(366a), 427-431.

Dickey, D. A., & Fuller, W. A. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. Econometrica: Journal of the Econometric Society, 49(4), 1057-1072.

Ewing, B., Payne, J. (2005). The Response of Real Estate Investment Trust Returns to Macroeconomic Shocks. Journal of Business Research. 58(3). 293-300.

Fang, H., Chang, T.Y., Lee, Y.H. and Chen, W.J. (2016). The impact of macroeconomic factors on the real estate investment trust index return on Japan, Singapore and China. Investment Management and Financial Innovations, 13(4-1), 242-253.

Fuller, W. A. (1976). Introduction to Statistical Time Series, Wiley, New York.

Gazel, S., Münyas, T. (2021). Gayrimenkul Yatırım Ortaklığı Endeksinin Çeşitli Endekslerle İlişkisi: BİST Üzerine Bir Uygulama. Trakya Üniversitesi Sosyal Bilimler Dergisi, 23, Special Issue: IERFM, 133-148.

GYODER, Turkey Real Estate Sector 2021, 2nd Quarter Report, Issue 25. https://www.gyoder.org.tr/files/202111/8a71c99d-f1f1-4ae9-9017-b41fc5f042f5.pdf

Hamilton, J.D., (1989). A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle. Econometrica: Journal of the Econometric Society, 57(2), 357-384.

Hamilton, J. D. (1994). Time series analysis. Princeton University Press, New Jersey.

İslamoglu, M., Apan, M., Öztel, A. (2015). An Evaluation of the Financial Performance of REITs in Borsa Istanbul: A Case Study Using the Entropy-Based TOPSIS Method. International Journal of Financial Research, 6(2), 124-138.

Kandır, S.Y., Özhan, E. (2018). Gayrimenkul Yatırım Ortaklığı Pay Getirilerini Etkileyen Faktörlerin Araştırılması. BDDK Bankacılık ve Finansal Piyasalar Dergisi, 12(2), 31-45.

Kapetanios, G., Shin, Y., & Snell, A. (2003). Testing for a unit root in the nonlinear STAR framework. Journal of Econometrics, 112(2), 359-379.

Karakuş, R., Öksüz, S. (2021). The relationship between BIST real estate investment trusts index and house price index, interest rate and inflation: ARDL bounds testing approach. Business and Management Studies: An International Journal, 9(2), 751–764.

Özcan, N., Gurol, B. (2020). Gayrimenkul Yatırım Ortaklıklarının Performanslarının İncelenmesi: Türkiye'deki Gayrimenkul Yatırım Ortaklıkları Üzerine Bir Araştırma. Celal Bayar Üniversitesi Sosyal Bilimler Dergisi, 18, 1-16.

Özcelik, O. 2022. The Convergence of Foreign Trade Competitiveness in The Far East Countries: Evidence from Nonlinear Two-Regime TAR Panel Data Analysis, Journal of Yasar University, 17(66), 592-614.

Sarı, S.S., Başakın, E.E. Estimating The Index of Real Estate Investment Trusts With Tree Based Regression Models. International Marmara Social Sciences Congress Proceedings Book, Kocaeli, Turkey, 4 - 5 December 2020, 310-31.

Sırma, I. (2019). Effect of Real Estate Investment Trusts Portfolio Structure on the Market Performance. Alphanumeric Journal, The Journal of Operations Research, Statistics, Econometrics and Management Information Systems, 7(1), 25-36.

Sollis, R. (2009). A simple unit root test against asymmetric STAR nonlinearity with an application to real exchange rates in Nordic countries. Economic Modelling, 26(1), 118-125.

Tsay, R. S. (1986). Nonlinearity tests for time series. Biometrika, 73(2), 461-466.

Yılmaz, M. K., İçten, O. (2018). Borsa İstanbul’da İşlem Gören Gayrimenkul Yatırım Ortaklıklarının Nakit Akımı Odaklı Finansal Performans Analizi (2007-2016) . Finans Politik ve Ekonomik Yorumlar, 55(635) , 73-87.

Zügül, M., Şahin, C. (2015). Faiz Oranı ve Enflasyonun Gayrimenkul Yatırım Ortaklığı Getirisi Üzerindeki Etkisine Yönelik Bir Uygulama. Akademik Bakış Uluslararası Hakemli Sosyal Bilimler Dergisi, 49, 147-162.

Internet Resources (Official Websites)

CMB. Capital Markets Board of Turkey. http://www.cmb.gov.tr

KAP. Public Disclosure Platform. https://www.kap.org.tr

TEFAS. Turkey Electronic Fund Trading Platform. http://www.tefas.gov.tr