Available online at www.sciencedirect.com

Borsa İstanbul Review

Borsa İstanbul Review 17-4 (2017) 199–215

http://www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Full Length Article

Diversification benefit and return performance of REITs using CAPM and Fama-French: Evidence from Turkey☆

Yener Coşkun [a,*], A. Sevtap Selcuk-Kestel [b], Bilgi Yilmaz [b]

[a] *Capital Markets Board of Turkey, Eskisehir Yolu, 06530 Ankara, Turkey*

[b] *METU, Institute of Applied Mathematics, Middle East Technical University, 6800 Ankara, Turkey*

Received 27 December 2016; revised 9 August 2017; accepted 11 August 2017

Available online 21 August 2017

Abstract

This paper analyzes return enhancement patterns of Turkish REITs (T-REITs) from various perspectives over the period of July 2008 and March 2015. We find that T-REITs portfolio provides a slightly lower level of risk diversification benefit than investment trusts, but higher than the banks. The evidence suggests that portfolio managers and investors may not only be able to utilize knowledge deriving from the CAPM, but also utilize information retrieved from Fama-French model due to its relatively better performance on capturing the variation in T-REITs returns. Results also disclose that T-REITs show a degree of diversity in property focus, and reveal mainly defensive, small and financially distressed characteristics. Finally, based on the multiple observations, a case can be made for a possible linkage between property focus and yield improvement/risk taking structure of T-REITs. This study provides implications for the capacity of T-REITS and improve return enhancement capacity in an efficient portfolio management.

JEL codes: R30; G12; G17

Keywords: REIT; CAPM; Fama-French model; Turkish REITs; Borsa Istanbul

1. Introduction

In recent years, the link between real estate and finance has received increasing attention in the property literature, due to the growing importance of property as a significant asset class in direct/indirect investments. This study focused on the positive externalities of REIT investment, which may be important in inducing both macroeconomic variables for short-term economic growth and also added value to the socio-economic importance of real estate. Therefore, despite its inherent risks, and the recent failures during the global financial crisis, real estate economy has become the key area of focus for supply/demand side actors, from industry (developers, contractors, investors, bankers, etc.) to governments and households. In the past decade, the real estate economy has also become a major priority for macroeconomic policy in Turkey. As a result of intensive state and private sector activities, real estate industry has made positive contributions to the macroeconomic variables such as GDP, employment, and mortgage credit volume, despite weak linkage between the real estate and finance industries. In this respect, it has been observable that compared with international banking counterparts, the volume of housing credit to GDP ratio is relatively low in Turkish banking, at about 6.1 percent as of 2015 (Hypostat, 2016). More importantly, the Turkish secondary mortgage market and mortgage-related insurance market have remained significantly underdeveloped. Understandably, this picture raises concerns over the effectiveness and sustainability of the benefits of the real

☆ An earlier version of this study presented at the European Real Estate Society (ERES) 22nd Annual Conference in 2015.

* Corresponding author.

E-mail addresses: ycoskun@spk.gov.tr (Y. Coşkun), skestel@metu.edu.tr (A.S. Selcuk-Kestel), ybilgi@metu.edu.tr (B. Yilmaz).

Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

http://dx.doi.org/10.1016/j.bir.2017.08.003

estate economy. In this respect, the role of REITs is critical to improving real estate-finance linkage in Turkey.[1] Making a major combination to the booming real estate economy in the last decade, T-REITs industry is the example of a rapidly growing market with unique regulatory support through tax benefits and dividend payout exemption in Turkey (see Appendix 1).

The theoretical background of the paper relies on two well-known and well established methodologies commonly studied in the literature: Mainly CAPM and Fama-French three factor models. As a single factor model, CAPM explains the expected return of an asset relative to market risk. Fama-French model expands CAPM by spreading the risk sources through adding size and value variables. Along with the classical factors, additional influential factors may be employed to capture the variations in asset returns in emerging economies. The two most important countable ones are currency risk, which has a high impact on asset prices (Ajayi & Mougoué, 1996; Ma & Kao, 1990), and political risk, which is mostly triggered by various factors such as elections or changes in regulations (Cashman, Harrison, & Seiler, 2016; Günay, 2016; Kaya, Güngör, & Özçomak, 2014; Yapraklı and Güngör, 2007). Therefore, these risk factors employed as the additional variables represent an innovation in this study. Moreover, we also add the impact of global financial crisis into the equation as the global risk variable.

The primary goals of this paper are to analyze return enhancement quality and return variability of T-REITs from various perspectives over the period of July 2008 and March 2015. To accomplish these objectives, the study opens up four new areas of research. First, as one of the important research goals, the diversification benefit of REIT stocks is defined by comparing bank and trust company' stocks in Borsa Istanbul (BIST). Second, as indicated above, the main body of the research consists of an investigation of the return variability of REITs adopting CAPM and Fama-French three factor models into T-REITs, followed by a comparison of both models to illustrate their relative efficiency. Third, we attempt to expand Fama-French model by employing foreign exchange rates, election periods, and global financial crisis as the specifically critical components in emerging economies. Therefore, the study introduces new variables beyond the classical Fama-French settings to reflect the impacts of additional local/global risk factors. Finally, we also define for the first time specialty (property focus), management structure, size, the financial state of T-REITs, and additionally analyze the connection between specialty and risk taking/yield improvement structure of T-REITs.

As a result of these innovations, the paper allows for a greater understanding of the time series properties of REIT returns from several innovative perspectives, and provides a critical input to asset allocation decision-making in BIST and T-REITs market in particular. The implications of the Turkish experience extend beyond local analysis framework, providing the REITs analysis with internationally usable strategies, since empirical analyses on the covered subjects are still at an embryonic stage, particularly in emerging economies. The analyses have also another international dimension due to the high percentage of foreign portfolio investments in BIST and some T-REIT stocks.

The remainder of the paper is organized as follows. Section 2 documents the stylized facts on the REITs industry in selected emerging markets, and in the case of Turkey, provides additional analysis for the connection between real estate sub-sectors and REITs. Section 3 reviews the literature. Section 4 lists the preliminaries on the methods utilized. The application of the proposed research on the data is in Section 5. The final section is reserved for the conclusion and comments. Appendix 1 also presents comparative advantages and critical aspects of REITs regulations in Turkey.

2. REITs in emerging markets and Turkey

2.1. Emerging market REIT indices and T-REITs

The importance of REIT market in the global financial system has been determined using global REIT indices. In this respect, the MSCI Emerging Markets IMI Core REIT Index covers large, mid and small-cap stocks. As of March 2016, the index covers 28 REITs with a 28 billion USD market cap. The leading countries in terms of their weights are South Africa (52%), Mexico (33%), Malaysia (8.3%), China (3.8%) and Turkey (1.8%). According to the sub-industry classification, the major REIT types in the MSCI index were as follows: diversified (62.2%), retail (24.54%), industrial (9.95%), hotel and resort (2.14%) and office (1.17%) (MSCI, 2016).

According to FTSE EPRA/NAREIT Emerging Index (the Index), as of May 2015, the number of leading REITs and their net market caps were 153 and 165.5 billion USD, respectively. March 2016 Index results provides several interesting facts. For example, REIT market in the emerging countries has shown a downturn and the number of REITs and their net market cap have fallen to 149 and 142 billion USD, respectively. China was the leading country, with 54 REITs with 65.7 billion USD net market cap, and 46.3% weight in the Index, followed by South Africa, Philippines, and Mexico with market weights of 11.3%, 8.1%, and 6.6%, respectively. Turkey had 1.7% weight in the Index, with 2.4 billion USD net market cap as of March 2016 (Table 1). The property sector breakdown showed that diversified REITs had 83.9 billion USD net market cap with the 59.1% industry weight. Residential and retail REITs ranked as the second and third largest REIT classes in the Index, with 35 billion USD (24.7% industry weight) and 13.7 billion USD (9.7% industry weight) net market caps, respectively (FTSE, 2016).

MSCI Emerging Markets IMI Core REIT Index provides 8.59% gross annualized return during November 1994 and March 2016 (MSCI, 2016). The year-on-year performance of

[1] It should be noted that publicly held real estate investment firms are officially named as Real Estate Investment Companies (REICs) instead of REITs in Turkey. Taking into account that the regulatory definition and activities of REICs are close to those of REITs (see Appendix 1), we use internationally accepted term of REITs in the study.

Table 1
Overview of FTSE EPRA/NAREIT emerging index (May 2015–March 2016).

Country	Number of REITs		Net market Cap (USD mn)		Weight (%)	
	May 2015	March 2016	May 2015	March 2016	May 2015	March 2016
Brazil	20	17	8254	7183	4.99	5.07
Chile	1	1	998	1029	0.60	0.73
China	50	54	75,219	65,715	45.44	46.34
Egypt	1	2	405	511	0.24	0.36
Greece	–	1	–	326	–	0.23
India	5	5	2262	1929	1.37	1.36
Indonesia	12	11	8625	7727	5.21	5.45
Malaysia	14	11	6249	6083	3.77	4.29
Mexico	6	6	9519	9332	5.75	6.58
Philippines	6	7	11,908	11,505	7.19	8.11
Poland	1	–	390	–	0.24	–
Russia	1	1	2511	1953	1.52	1.38
South Africa	12	11	18,461	16,028	11.15	11.30
Taiwan	1	1	177	179	0.11	0.13
Thailand	14	14	5990	5788	3.62	4.08
Turkey	4	4	2564	2372	1.55	1.67
UAE	5	3	12,012	4140	7.26	2.92
Total	**153**	**149**	**165,544**	**14,1801**	**100.00**	**100.00**

Source: FTSE (2015; 2016).

the following FTSE indexes suggest that although the Index does not necessarily provide a better total return, it may show high return volatility[2] similar to other indexes over the period of 2006–2015 (Table 2).

These facts indicatively highlight the significant impact of emerging market REITs, including T-REITs, on the global financial system, and their potential to provide diversification benefits for global portfolio management.

2.2. Real estate economy in Turkey and T-REITs

The Turkish real estate market has grown dramatically, and has demonstrated remarkable performance recent years. In parallel to the increase in demand and high-quality office and retail space, the recently introduced mortgage system and decreasing interest rates have been the main catalysts for the noteworthy revival of the real estate market (EPRA., 2014).

Over the past decades, foreign investors have shown interest in the Turkish real estate and construction market, and in 2013, the total value of M&A transaction volume reached 17.5 billion USD, with 217 deals (Deloitte, 2014, p. 35). From the sub-sector perspective, the modern hotel and office markets are relatively young in Istanbul (Kok, 2014). Investment market for shopping center projects emerged after 2005 and residential, office and commercial properties have performed strongly in the Turkish real estate market since 2008 (Deloitte, 2014). Moreover, rental yields and selling prices for retail and residential properties have continued to grow over the last three years. An analysis of retail, office, logistics, and hotel markets shows significant developments in recent years, but the outlook is uncertain/modest for the second half of 2015 in terms of retailer demand, supply, prime rent, and retail density (JLL, 2015). Additionally, the Class-A office vacancy rates in Istanbul market has risen to 25.88% and the rents decreased in some regions, as of September 2015 (Colliers International, 2015). Retail and residential market analyses reveal the strength of the shopping center and housing markets in Turkey, despite some risks (Coskun, 2015; Yalçıner and Coskun 2014). These significant market developments in the real estate subsectors were the primary causes of the recent market boom in T-REITs.

Although there exist emerging political/economic risks in the Turkish economy, the REITs have recently shown dramatic developments, due to the positive economic environment in the real estate industry, and also comparative advantages of the T-REITs (see Appendix 1). Therefore, total asset value and the market capitalization of the T-REITs have increased in terms of USD by 518% and 281% respectively, and the number of REITs has increased from 14 to 31 during the 2008 and 2015 period (CMB, 2015). It seems likely that increasing the number of REITs during the recent IPO boom made positive contributions to both of the industry performance criteria (Fig. 1). The increasing importance of the real estate as the asset category may also result in growing volume of investments in T-REITs stocks at BIST. From the international perspective, the market weight of T-REITs is 1.7% in FTSE EPRA/NAREIT Emerging Index, and 1.8% in MSCI Emerging Markets IMI Core REIT Index, as of March 2016 (FTSE, 2016; MSCI, 2016).

3. Literature review

The rise in popularity of REITs has provided researchers with the opportunity of analyzing the behavior of the real estate market from different perspectives, with a diversified data structure. The characteristics and components of real estate and REIT returns have been frequently analyzed in the literature. It is possible that REITs is seen as having a similar role to real estate, which is generally viewed as a portfolio diversifier or a risk reducer, and an effective hedging instrument against inflation. An extensive body of research in the literature concerns the benefits of REITs in portfolio management through asset allocation, risk reduction, and diversification aspects (Chandrashekaran, 1999; Hudson-Wilson, Fabozzi, & Gordon, 2003). Chun, Sa-Aadu, and Shilling (2004) illustrate benefits of real estate diversification compared to bonds and small-cap stocks in times of low consumption growth opportunities. In an analysis of the diversification benefits using mean-variance tests, Chen, Ho, Lu, and Wu (2005) find that REITs clearly augment the mean-variance frontier and enlarge the investment opportunity set, and confirm the economic significance of REIT investment from the perspective of asset allocation. Diversification and risk reduction benefits of REITs are found to be significant, especially for certain types of assets, such as mixed and mortgage type REITs, but not for equity REITs (Fugazza, Guidolin, & Nicodano, 2009; Huang & Zhong, 2013; Hung,

[2] For deeper analysis on return and volatility relationship, see Berument and Dogan (2011).

Table 2
Year-on-year performance (total return %) of selected FTSE indexes (2006–2015).

Index % (USD)	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
FTSE EPRA/NAREIT Emerging	63.7	42.9	−63.5	91.2	15.2	−29.2	42.4	−14.0	5.2	−4.8
FTSE Emerging	33.1	39.7	−52.9	82.6	19.8	−19.0	17.9	−3.5	1.6	−15.2
FTSE EPRA/NAREIT Developed	42.4	−7.0	−47.7	38.3	20.4	−5.8	28.7	4.4	15.9	0.1

Source: FTSE (2016).

Onayev, & Tu, 2008; Lee & Stevenson, 2005; Lu, Tse, & Williams, 2013). Chaudhry, Rohan, and Webb (2010) depict two co-integrating vectors between equity REITs and energy-related assets. From a global investor's perspective, there is a greater scope for risk diversification in segmented markets compared to developed markets, as the latter are already fully integrated into the global capital markets. Despite this potential, diversification benefits of REITs in emerging markets have rarely been studied (Di Nardo & Anderson, 2009; Nai-Chiek, 2012; Ooi & Liow, 2004).

Regarding REITs specialization and risk/return (performance) linkage, Capozza and Seguin (1999: 614) demonstrate that diversification across property types (office, warehouse, retail or apartment) adversely affects value, and also find no evidence of variations in cash flows available to shareholders based on focus. Benefield, Anderson, and Zumpano (2009) find that diversified REITs significantly outperform specialized REITs over the period of 1995–2000. Comparing the performance of specialized versus diversified REIT portfolios during 1997–2006 using CAPM and the Fama-French three-factor model with momentum, Ro and Ziobrowski (2011) find no evidence of superior performance associated with REITs specializing in a single property type. Consistent with theory, the authors of this study find a higher market risk for specialized REITs compared to diversified REITs.

Time series properties of REIT returns, specifically through CAPM and Fama-French three-factor model, have been extensively studied. Karolyi and Sanders (1998) indicate that there exists an important economic risk premium for REITs stock returns, which traditional multiple-beta asset pricing models fail to capture. Chiang, Lee, and Wisen (2004) warn that observation could mislead investors who use a CAPM-based asset pricing model to estimate REITs' risk and factor sensitivities, which are largely symmetric in the case of the Fama-French three-factor model. Chiang, Kozhevnikov, Lee, and Wisen (2008) highlight the limited capacity of the CAPM or the Fama-French model to describe REIT returns. Despite these clear drawbacks, numerous studies in the literature have applied Fama-French and CAPM models in the risk-return analysis of REITs. In this context, the utilization of Fama-French method on REITs initially enabled researchers to confirm the robustness of the existing results, and the empirical usefulness of the methodology (He, 2002; Hsieh & Peterson, 2000; Lee, Lee, & Chiang, 2008; Peterson & Hsieh, 1997). By examining REIT price and return performance using the five-factor model of Fama and French (1993), Peterson and Hsieh (1997) find that mortgage REIT risk premiums were significantly related to the three stock market and two bond market factors. Chiang, Lee, and Wisen (2005) also illustrate that the three-factor model is superior to the single-factor model in explaining the variation in the equity real estate investment trust (EREIT) returns, and in providing stable estimates of market betas. Xiao, Zhao, Rahnama, and Zhou (2012) follow the classical CAPM and the multi-factor model developed from four-factor model (Clayton & Mackinnon, 2003) as the frame to investigate the link of REITs with other asset classes. By taking this approach, they are able to explain that REITs return exhibits the greatest

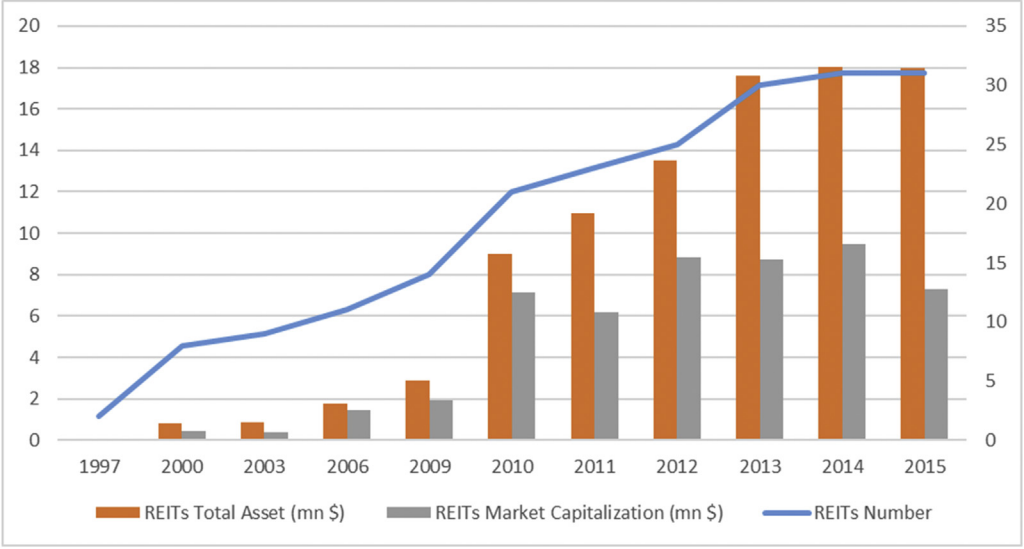


Fig. 1. Facts of T-REITs industry (1997–2015) (CMB, 2015).

sensitivity to market return, followed by large-and small-cap stock index, bond index and real estate index. Chang and Chang (2013) argue that the size effect is one of the reasons for portfolios of REITs outperforming portfolios of common stocks. Therefore, it seems that the studies employing CAPM and Fama-French model have mostly focused on REITs in advanced markets suggesting a literature gap for the analysis on emerging markets.

The literature also reveals that it is rare in either advanced or emerging REIT markets to define management structure of REITs as either defensive or aggressive. By estimating the time-varying US REITs betas for the periods from 1972 to 2013, Sing, Tsai, and Chen (2016) find that a fundamental change occurred in time-varying beta characteristics of the two REIT in 2000's. While the mortgage REIT betas continued to decline, the equity REIT betas showed a sharp reversal of the downward trend. Glascock, Michayluk, and Neuhauser (2004) note that REITs are viewed as a low risk/low return stocks that exhibit defensive stock characteristics. However, using dynamic conditional correlations bivariate threshold GARCH model, Wu, Liau, and Wang (2010) find for Taiwan that more of the seven listed TREITs are defensive. In their analysis for Taiwan, Hong Kong, Singapore and Japan, Chiang, Tsai, and Sing (2013) suggest that REITs are currently less defensive compared to times of market stability, and therefore may not be a good shelter during financial chaos. However, contrasting results are reported by Newell and Osmadi (2009), who find that Islamic REITs display defensive characteristics in Malaysia, and Wu, Liau, and Wang (2012), who find that the ten property-type REITs in the US functioned as defensive stocks between 2007 and 2010 period.

There are manifold applications of CAPM and Fama-French models in Turkish financial markets. There is evidence that the significancy on factors are yielding by company size, book to equity market ratio, and his application of three factor model in BIST (Canbas & Arioglu, 2008; Kalac, 2012; Eraslan, 2013; Ersoy and Unlu, 2013). This approach emphasizes that the three factors model captures the variation in common stock returns in BIST, and shows that the returns are positively affected by BE/ME and negatively correlated to the company size. Gokgoz (2007) finds that CAPM and three-factor model are applicable on the BIST, but that three-factor model has superior performance in terms of pricing errors. Dalgin et al. (2012) show that CAPM fails to explain sufficiently the excess return of the company. Bereket (2014) compares CAPM, Fama-French three-factor, and four-factor models, and demonstrates the superiority of Fama-French three-factor model.

The studies on risk-return characteristics of T-REITs remain relatively scarce. In this respect, Erol and Tirtiroglu (2008), find that T-REITs, in general, provide a better hedge against both actual and expected inflation compared to BIST common stock indices. Altınsoy et al. (2010) find no evidence of the asymmetric time-varying behavior of T-REIT betas. Erol and Ileri (2013) investigate the macroeconomic sources of time-varying risk premia in the T-REITs within the arbitrage pricing theory framework. Mandaci, Aktan, and Cagli (2014) find the lack of co-movement between the Turkish and US REIT indexes between 2003 and 2009. Akinsomi, Coskun, and Gupta (2017) find herding behaviors, the presence of directional asymmetry and the linear relation between volatility and herding in T-REITs over the period of July 2007 to May 2016. Two rare examples of CAPM application to T-REITs are: Aktan and Ozturk (2009), and Hayta (2009). Aktan and Ozturk (2009) show that CAPM fails to adequately capture the market information. Similarly, Hayta (2009) addresses CAPM and Fama-French comparison in Turkey for the period between 2002 and 2008 and concludes that eight T-REITs returns are sensitive to the fluctuations in the market. However, Fama-French three-factor model illustrates that the small caps ratio referring to the company size has a greater impact on returns than the price-to-book ratio. Additionally, Lu et al. (2013) find that smaller markets (e.g. South Korea and Turkey) are exposed to greater downside risk to an international REIT portfolio under normal market conditions.

The literature review reveals a general lack of analysis on time and market dependent properties of REITs in emerging countries such as Turkey. In this respect, there are obvious literature gaps in the following fields in emerging REITs markets: return variability of REITs by comparing and expanding CAPM and Fama-French three-factor models, diversification benefits, management structure and property focus and return enhancement/risk taking linkages. This paper attempts to fill these knowledge gaps for the T-REITs.

4. Preliminaries

4.1. CAPM

The capital asset pricing model (CAPM) prescribes that only the non-diversifiable systematic risk matters in asset pricing. Idiosyncratic risk, on the other hand, should not matter because it can be completely diversified away according to modern portfolio theory (Ooi, Wang, & Webb, 2009). In an idealized framework for an open market, all the risky assets refer to all tradable stocks available to the market participants. In addition, there is a risk-free rate, r_f, which is used for lending and borrowing purposes in unlimited quantities. We assume that all information is available to all such as covariance, variance, and mean rate of return of stocks. Then the systematic and unsystematic risks of a security can be computed (Sharpe, 1963) by employing CAPM.

Given a set of returns, $r_i, \quad i = 1, .., n$ and risk free asset, r_f, the CAPM model is defined as

$$R_i = \alpha_i + \beta_i R_M + e_i, \tag{1}$$

where $R_i = (r_i - r_f)$ denotes the excess return, R_M refers to the excess return from the market index, α_i is the nonmarket return component, β_i is the beta of security 'i' and e_i is the random error with zero mean and constant variance. It should be noted that, in the case of an abnormal return or an intercept value of $\alpha_i = 0$, then this model coincides with original CAPM model.

Analogously, the excess return on a portfolio of stocks, R_P, where assets are equally weighted, CAPM model in Eq. (1) can be re-written as

$$R_P = \alpha_P + \beta_P R_M + e_P\,, \tag{2}$$

where $\alpha_P = \frac{1}{n}\sum_{i=1}^{n}\alpha_i$; $\beta_P = \left(\frac{1}{n}\sum_{i=1}^{n}\beta_i\right)$ and $e_P = \frac{1}{n}\sum_{i=1}^{n}e_i$.

The portfolio has a sensitivity to the market given by the average of the individual β_i's including the average of the firm-specific components. Therefore, the portfolio variance becomes

$$\sigma_P^2 = \beta_P^2\sigma_M^2 + \sigma^2(e_P). \tag{3}$$

The first component on the right-hand side of Eq. (3), $(\beta_P^2\sigma_M^2)$, is the systematic risk component of the portfolio variance and it depends on the sensitivity coefficients of each individual security. The second component, $\sigma^2(e_P)$, is the nonsystematic risk component of the portfolio variance and it is attributable to firm-specific risks. Since e_i's are independent for each asset, nonsystematic risk can be decomposed as follows:

$$\sigma^2(e_P) = \sum_{i=1}^{n}\left(\frac{1}{n}\right)^2\sigma^2(e_i) = \frac{1}{n}\overline{\sigma}^2(e), \tag{4}$$

where $\overline{\sigma}^2(e)$ represents the average of the firm-specific variances. Since this average is independent of the number of securities, n, the variance becomes negligible for large n. This means that as the number of securities in the constructed portfolio increases, the part of the portfolio risk attributable to firm-specific events becomes gradually smaller, as the risk resulting from firm-specific events is diversified away. However, systematic risk remains, regardless of the number of securities added into the portfolio. On the other hand, the risk-taking structure of a stock is defined by the management structure analysis as part of the CAPM. In this respect, a stock has an aggressive attribute in the market when the absolute value of its β exceeds one (Bodie, Kane, & Marcus, 2010; Tofallis, 2008).

4.2. Fama- French three factor model

In capital asset pricing, computations are greatly simplified by the assumption that only one systematic factor affects stock returns. However, this approach neglects other factors affecting the security returns, such as the effect of the business cycle, interest rate fluctuations, inflation rates, and oil prices. Exposure to any of these factors is likely to affect securities' risk and expected return. To address this problem, researchers have proposed the Fama and French (1996) model, a multi-factor asset-pricing model that incorporates the impact of additional factors to describe the behavior of returns. Two classes, reflecting to the market behavior based on order statistics, are added to the linear model to determine the impact of small caps (SC) and price-to-book (P/B) ratio on portfolio's performance. In the model, the influence of macroeconomic factors is specified according to the firm characteristics, and this, when on empirical grounds, seems to proxy for exposure to systematic risk.

The Fama-French factors take into consideration of the relative to the sizes of the big (B), small (S), and three quartiles as low (L), medium (M) and high (H) within specified period. SC is the difference between the average returns of three small and three big portfolios, whereas P/B stands for the difference between the average returns of two value portfolios and two growth portfolios, which are represented as Small Minus Big (SMB) and High Minus Low (HML).[3] SMB is the amount by which the return of a portfolio of small stocks is in excess of the return on a portfolio of large stocks, and HML is the amount by which return of a portfolio of stocks with a high book-to-market ratio which is in excess of the return on a portfolio of stocks with a low book-to-market ratio.[4]

Therefore, Fama-French three-factor model, describing the return, R_{it}, of an ith asset at time t, is expressed in below equation:

$$R_{it} = \alpha_i + \beta_{i,M}R_{Mt} + \beta_{i,SMB}SMB_t + \beta_{i,HML}HML_t + e_{it}. \tag{5}$$

Analogous to β in CAPM, the model incorporates two additional βs explaining the size (market capitalization) and financially distressed status of the security in the market and e_{it} is defined previously. If $\beta_{i,SMB}$ and $\beta_{i,HML}$ are interpreted based on their magnitude and sign, respectively. The REIT is referred as small (S) if $\beta_{i,SMB} > 0$ and distressed (D) if $\beta_{i,HML} > 0$ (Bodie et al., 2010).

4.3. Additional risk factors

CAPM or the Fama-French model may have limited capacity to describe REIT returns (Chiang et al., 2008). In this respect, considering the potential for different macroeconomic and industry specific conditions to have positive/negative impacts on the return of REIT shares, expanding Fama-French models may improve the explanatory power of the models. We therefore employ three unique additional factors in the model political risk, currency risk and global crises. As the political risk, the most dominant incidence in the election period, when the market usually moves into standby position, because of even Knightian uncertainty. For this reason, we inserted the pre- and post-election periods into the model as dummy variables. Secondly, taking into account foreign exchange rate volatilities may have destructive consequences on variations in asset returns, as observed recently in Brazil, Russia, Turkey and South Africa, we also employ exchange

[3] SMB and HML portfolios depend respectively on market capitalization and book-to-market. Whereas book-to-market is related to financial distress problems, size is associated with profitability. Smaller stocks lead to lower earnings than larger stocks, and consequently to a higher expected return, after control of book-to-market. Firms with high book-to-market systematically present lower earnings on book equity, indicating signals of financial distress problems (Alves, 2013).

[4] As indicated by Fama and French (1993), low book-to-market ratios may refer to growth companies (Emin, 2016).

rate volatilities (USD) as a further variable in the model. Finally, we also implemented the impacts of the global financial crises into the three-factor model. There exist studies, which investigate the effect of these three factors on financial indicators (Bilsona, Brailsforda, & Hooperb, 2002; Kaya et al., 2014; Kandil & Trabelsi, 2015; Gunay, 2016; Cashman et al., 2016); however, this is the first study to implement these three factors into the Fama-French model to measure the changes in sensitivity of REITs returns.

During the period of 2008–2015, there were three general, two local and one presidential elections in Turkey, causing various impacts on finance and real estate sectors. Therefore, to determine how the REITs return react to political risks, the election dates were included into the Fama-French model as two dummy variables. Below D_{1t} detects the impact of the month where the election took place, whereas D_{2t} measures the impact of 5 months pre- and post-election dates.

$$D_{1t} = \begin{cases} 1 & \text{election at time } t \\ 0 & \text{otherwise} \end{cases} \text{ and } D_{2t} = \begin{cases} 1 & \text{election at time } t\pm5 \\ 0 & \text{otherwise} \end{cases}. \quad (6)$$

Significant volatilities in foreign exchange rates, mainly EUR and USD were observed in Turkish financial markets during the study period. In order to illustrate its influence on the market, USD is included into the model as an independent variable. In all analyses, the structural break tests measuring the impact of the global financial crisis are used to understand whether it is necessary for the series to be treated accordingly.

5. Empirical analyses

5.1. Data, property focus and summary statistics of T-REITs

The major selection criteria for the T-REITs are the data availability and market share of the firms extended over the longest possible period. As Fig. 2 depicted, the selected 11 active T-REITs among 17 T-REITs in 2008 July constituted 96% of the market value (CMB 2008). Time series data from BIST and google finance were utilized to implement CAPM and Fama-French three-factor model and to define diversification benefits of T-REITs over the period of July 2008–March 2015.[5] The excess returns were observed by subtracting the monthly returns of portfolio performance repo index (DSM)[6] as the risk-free rate from the market returns.

This paper makes an important contribution as providing the first comprehensive classification attempt of T-REITs according to their property focus, thus allowing more nuanced evidence.[7] In this respect, we stimulated that T-REITs show equity REIT characteristics, because overall industry portfolio has not historically involved mortgage obligations. Second, in terms of fungibility, the T-REITs analyzed in the paper are classified as publicly traded firms. Third, as the innovative classification attempt, we also identify T-REIT types according to their property focus. Specifically, we focused on major weighted property type of T-REITs by utilizing portfolio weights presented in the audit/financial reports, and in some cases corporated expert views. The value of this effort lies in its longer period coverage and its unique approach.[8] To define specializations of T-REITs, we utilize several classification approaches (Clayton & Mackinnon, 2003; EPRA., 2015, p. 225; FTSE 2016; MSCI 2016; S&P, 2012).[9] In our decision-making, we primarily use the appraised values of inventories and ongoing real estate projects provided in the audit/financial reports of the T-REITs to define major asset portfolio of a T-REIT during 2008 and 2014. It was observed that the defined property focus of T-REITs showed no significant change during this period. The analysis suggests that the T-REITs show a degree of diversity in property focus with four residential, six diversified, six retails, and one specialty REITs. Moreover, a high number of retail and residential T-REITs reflect the main trends in Turkish real estate industry (Table 3).

T-REITs market data is divided into two periods: global crisis (2007 Q2-2009 Q1) and post-global crisis (after 2009 Q1) periods. The latter period may be further divided into two sub-periods, as the early period (approximately 2009 Q2-2011 Q2), and the late period (roughly 2011 Q3-2015 Q2). The first observation is that all T-REITs shares are in

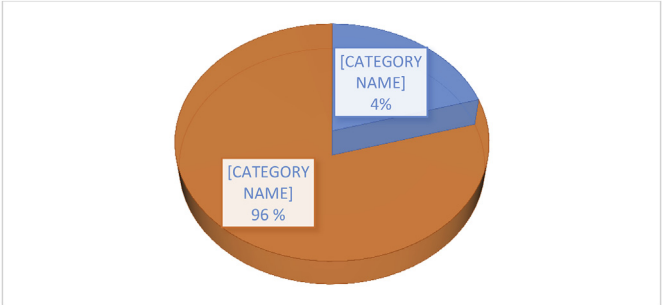


Fig. 2. Selected T-REITs dominance in the market (2008 July). Source: CMB (2008). Abbreviations: PGC; post-global crisis. WE; with exception(s).

[5] Available at: https://www.google.com/finance (accessed on: 8/12/2015).

[6] BIST DSM Portfolio Performance Indices measure the yield earned by the investor with reference to both the variation in interest rate and the reduction in the number of days to maturity (Available at: http://www.borsaistanbul.com/en/indices/bist-dsm-indices, accessed on: 8/12/2015).

[7] Beside for portfolio managers, defining specialty of T-REITs would be useful for policy-makers aiming to analyze risks of T-REIT classes, and to develop risk-based regulation/supervision strategies.

[8] Erol and Ileri (2013) made the initial T-REIT classification attempt in the literature according to business focus of T-REITs for the date of 30 June 2011. Moreover, based on predominant property types over the period of 2002Q1 to 2012Q3, Arslanlı and Pekdemir (2017) classified 11 T-REITs by focusing on only office, retail and residential property types.

[9] A REIT is classified as specialized if its portfolio consists of 75% or more in one type of property. Otherwise it may be classified as diversified (Ambrose & Linneman, 2001; Benefield et al., 2009).

Table 3
Property focus and summary statistics: Excess returns of T-REITs.

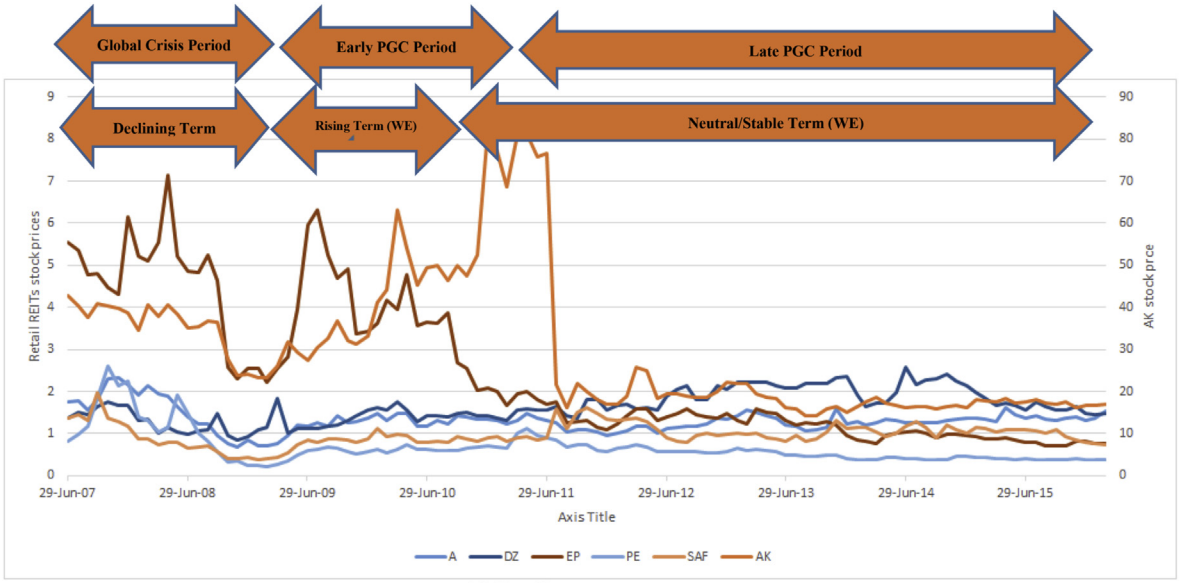
T-REIT	Code	Specialization	Mean	Median	St. Dev.	Skewness	Kurtosis	JB[a]
Alarko	AL	Diversified (resort, industrial, retail)	1.577	1.948	12.39	−0.020	1.001	0
Avrasya	AV	Specialty (lease)	4.259	0.000	24.33	0.592	4.447	1
Dogus[19]	DG	Diversified (retail, office)	3.596	1.266	18.01	2.912	13.643	1
Is[20]	IS	Diversified (office, retail-mall)	1.988	2.299	10.73	−0.014	1.728	1
Nurol	NU	Residential	3.895	−1.081	18.67	1.714	4.761	1
Ozderici	OZ	Residential	1.039	−1.282	18.00	2.680	14.947	1
Pera	PE	Retail (mall)	−1.382	−1.613	13.16	0.061	2.191	1
Saf	SAF	Retail (mall)	1.859	0.741	15.36	1.492	5.441	0
Vakıf	VK	Diversified (land investment/retail)	3.834	0.707	18.76	0.851	2.648	1
Yapı Kredi	YK	Residential	1.075	1.869	14.76	−0.963	3.826	1
Yesil	Y	Residential	0.479	−1.493	18.47	0.937	2.938	1
Sinpaş	SN	Diversified (residential/land investment)	−0.012	−0.007	0.168	0.084	2.633	1
Akmerkez	AK	Retail (mall)	0.007	0	0.158	−0.220	7.097	1
ATA	AT	Diversified (retail/land investment)	0.009	0.009	0.082	−0.734	2.906	1
Deniz	DZ	Retail (mall)	0.013	0.009	0.138	0.414	4.870	1
EDIP	EP	Retail (mall)	−0.012	−0.019	0.158	0.552	1.936	1
Atakule	A	Retail (mall)	0.003	−0.008	0.118	0.618	0.845	1
Market	MT	–	0.945	0.287	8.623	−0.057	0.434	0

[a] Jarque-Bera test: The null hypothesis refers to the normality of the data set denoted by zero when it is justified.

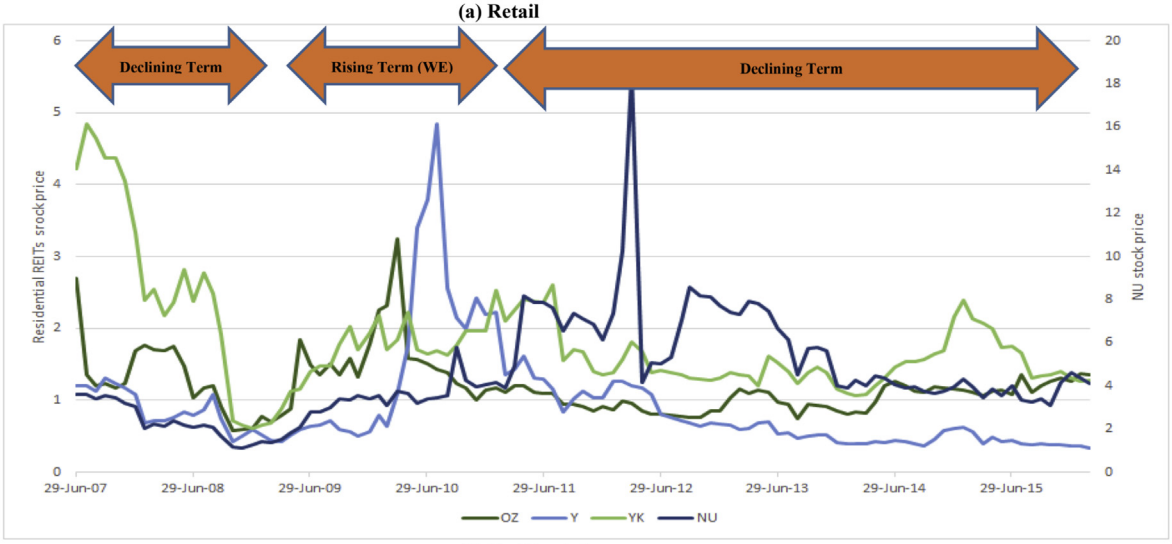
decline during the global crisis period, but during the post crisis period, trends are generally changed, with obvious firm-specific exceptions. Second, most retail T-REITs shares show neutral/stable characteristics, specifically observable for all retail shares during late post global crisis period. Third, there are stable, rising and declining T-REITs in the late post global crisis period. In the context of property focus, some diversified T-REITs have partially rising trends, but residential T-REITs are generally in decline after June 2011 (Fig. 3). Therefore, we may speculate that the price dynamics of T-REITs show no clear and direct connection between property focus and price variations for all sub-periods. However, it may be interesting to note that some diversified T-REITs show a relatively better performance in certain parts of late post-global crisis period, compared to a generally declining trend for many residential T-REITs, and an almost inactive trend for retail T-REITs.

Summary statistics show three noteworthy trends in T-REITs in Table 3. First, the majority of stocks appear to have right skewed distribution. Second, average return performance for individual REITs over the period of July 2008–March 2015 ranges between −1.4 and 4.3, yielding AV as the highest, PE lowest. From property focus perspective, retail T-REITs show by the weakest return performance shorten with 0.49 average excess return, which diversified and residential T-REITs show performances, with 3.14 and 2.00 average excess return, respectively. Therefore, the highest excess return performance of diversified T-REITs may imply a link between property focus and the yield improvement in T-REITs. However, it is clear that this very indicative observation should be tested with more robust analyses. Finally, it seems that some T-REITs show higher volatilities than the others and volatility level may be related to specialty to some extent. Return volatilities may be related to real factors, depending on the efficiency of T-REITs market, such as increasing appraisal values, growing asset portfolios, expectations of the near future of the market, and firm-specific conditions. In this respect, while AV, VK, and NU have relatively higher volatilities, AT, A, SN, AK, EP, and DZ have significantly lower volatilities. Interestingly, retail T-REITs have shown the lowest volatilities during observation period except for PE and SAF (see Table 3; Fig. 4). Therefore, we may conclude that the majority of retail T-REITs generally shown a low return-low risk profile compared to the high risk-high return profiles of the majority of the diversified and residential T-REITs.

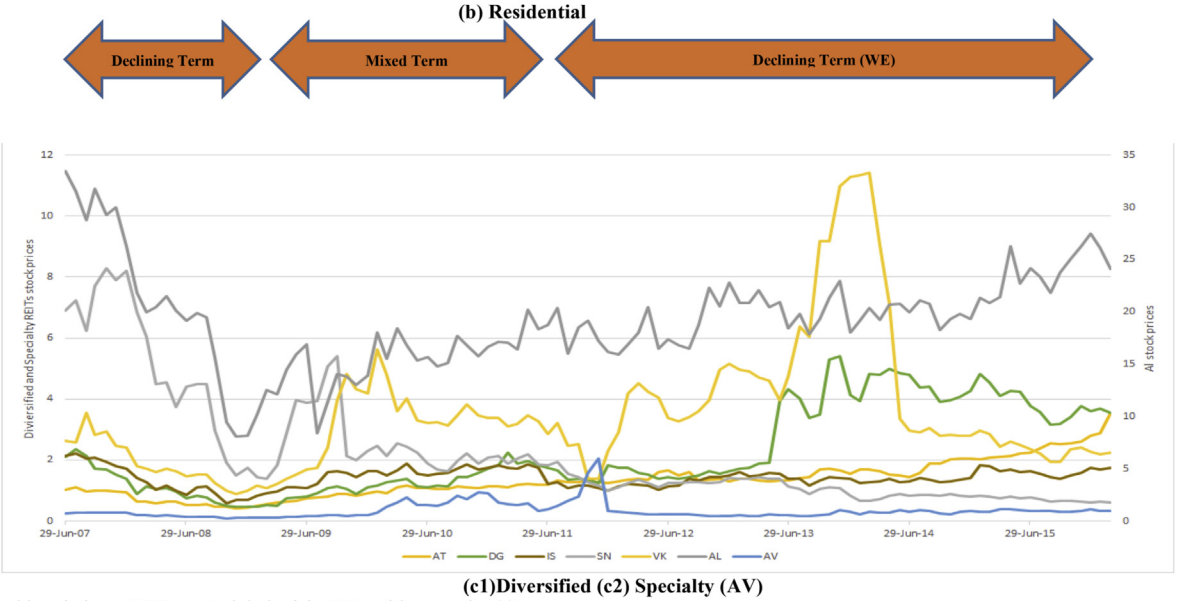
The joint behavior of the T-REIT stocks and BIST-100 (market index) is determined by correlation coefficients, depicted in Table 4. The table reveals some interesting points. First, the correlations among T-REITs are generally low, which suggests that diversification across different T-REITs may provide benefits. Second, except for one negatively correlated diversified T-REIT (SN), all T-REITs have a positive correlation with the market index, ranging from 10% to 71%. Third, it is also noted that T-REITs have mostly positive correlations with each other. These three points suggests that T-REIT price movements are to a certain extent parallel with the market. Finally, correlation with the market on the basis of property focus may provide interesting information on the return characteristics. In this respect, IS, having the largest (in our sample) and a diversified asset portfolio, is much more dependent on the market compared to the other stocks. Having less income producing assets in their portfolios and/or less active real estate portfolio management strategies, DZ, EP, VK, AV and A have the lowest correlation with the market. Average correlation with the market is 0.326 in the diversified T-REITs; 0.507 in residential T-REITs, and 0.263 in the retail T-REITs. Consequently, taking into account greater sensitivity of residential T-REITs to the market index, we may further



(a) Retail



(b) Residential



(c1)Diversified (c2) Specialty (AV)

Abbreviations: PGC; post-global crisis. WE; with exception(s).

Fig. 3. The time series of T-REITs. **Source:** http://www.kap.gov.tr/(accessed on: 4/3/2016).

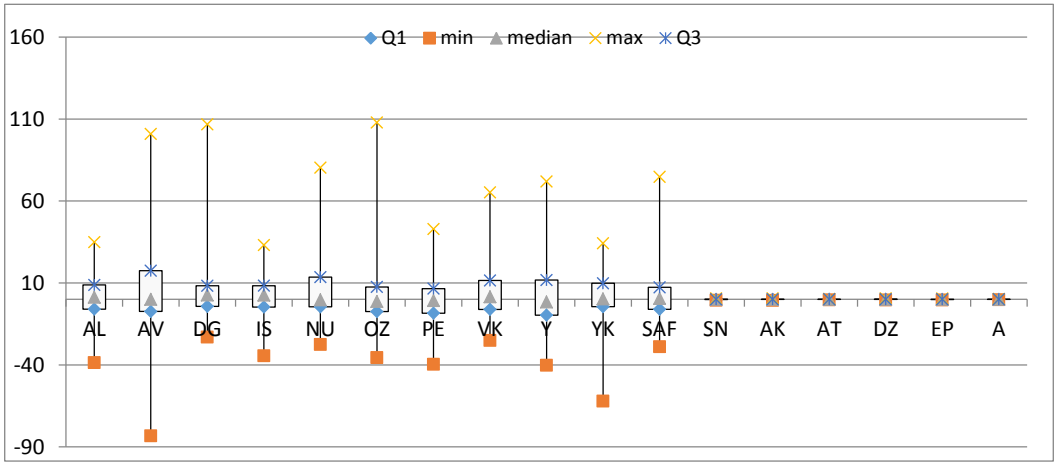


Fig. 4. The box-plots of excess returns.

Table 4
The correlation coefficients (%) among T-REIT returns and the market index.

	AL	AV	DG	IS	NU	OZ	PE	VK	Y	YK	SAF	SN	AK	AT	DZ	EP	A
AV	18	100															
DG	37	100	100														
IS	60	15	33	100													
NU	47	12	11	36	100												
OZ	38	9	16	35	22	100											
PE	50	24	30	46	41	53	100										
VK	35	−13	16	27	26	8	17	100									
Y	35	25	16	45	25	34	56	12	100								
YK	56	5	44	61	40	28	58	29	46	100							
SAF	56	24	20	36	29	37	42	24	38	45	100						
SN	−10	1	−2	−5	5	−7	−1	−13	20	−12	−2	100					
AK	45	8	20	30	23	21	26	14	33	43	29	3	100				
AT	1	1	23	10	1	11	8	−12	20	13	10	36	14	100			
DZ	17	1	11	−2	0	17	−6	−1	5	−8	9	15	28	30	100		
EP	9	−8	5	1	5	1	1	−3	7	−6	0	35	21	22	24	100	
A	−11	−10	−6	−11	−8	−11	−14	−15	5	−18	14	61	1	36	20	29	100
MT	56	14	32	71	46	44	60	16	51	62	40	−1	25	22	13	10	10

argue that there may be a linkage between properties focus and yield improvement capacity.

5.2. The diversification benefit of T-REITs

The diversification benefit is comparatively analyzed in T-REIT, bank[10] and investment trust stocks in BIST over the period of July 2008 and March 2015. To determine the diversification effect, stocks are ranked according to their risk rankings within each sector.[11] The risk, measured by standard deviation (σ) over time, is included in the portfolio, ranked from highest to lowest. For the eleven companies with the highest risk, it was indicated that the diversification level was not affected by the inclusion of another stock into the portfolio. This demonstrates that although risk level falls as the number of stocks increase, systematic risk prevents it from approaching to zero. It is clearly seen from Fig. 5 that T-REITs composed of equally weighted portfolio yield a better risk diversification compared to banks, yet their diversification benefit remains lower than that of trust companies.

The definition of return enhancement and risk reduction benefits of T-REIT shares over the bank shares at BIST implies a challenge for domestic/foreign fund managers, who traditionally tend to invest in major bank stocks for their portfolios.

5.3. CAPM and management structure of T-REITs

Table 5 presents the estimates of the parameters of all T-REITs[12] based on observed excess returns and the inferences

[10] According to market capitalization, bank shares represent the major stock class at BIST. In this respect, the banking industry consists of roughly 36% of the market cap of the BIST 30 index, covering blue chips of the BIST, as of 10/20/2015 (Available at: http://www.ist30.com/page/bist-30-index-components, accessed on 10/21/2015).

[11] It may be interesting to note that BIST is the sole stock market in Turkey and investors do not have close substitutes for stock investment (Tasci & Ozdemir, 2017).

[12] It should be noted that among 17 T-REITs, 11 stocks yield a plausible CAPM model, as the coefficients of some companies are found to be zero. Therefore, statistically insignificant variables are eliminated in the further analyses.

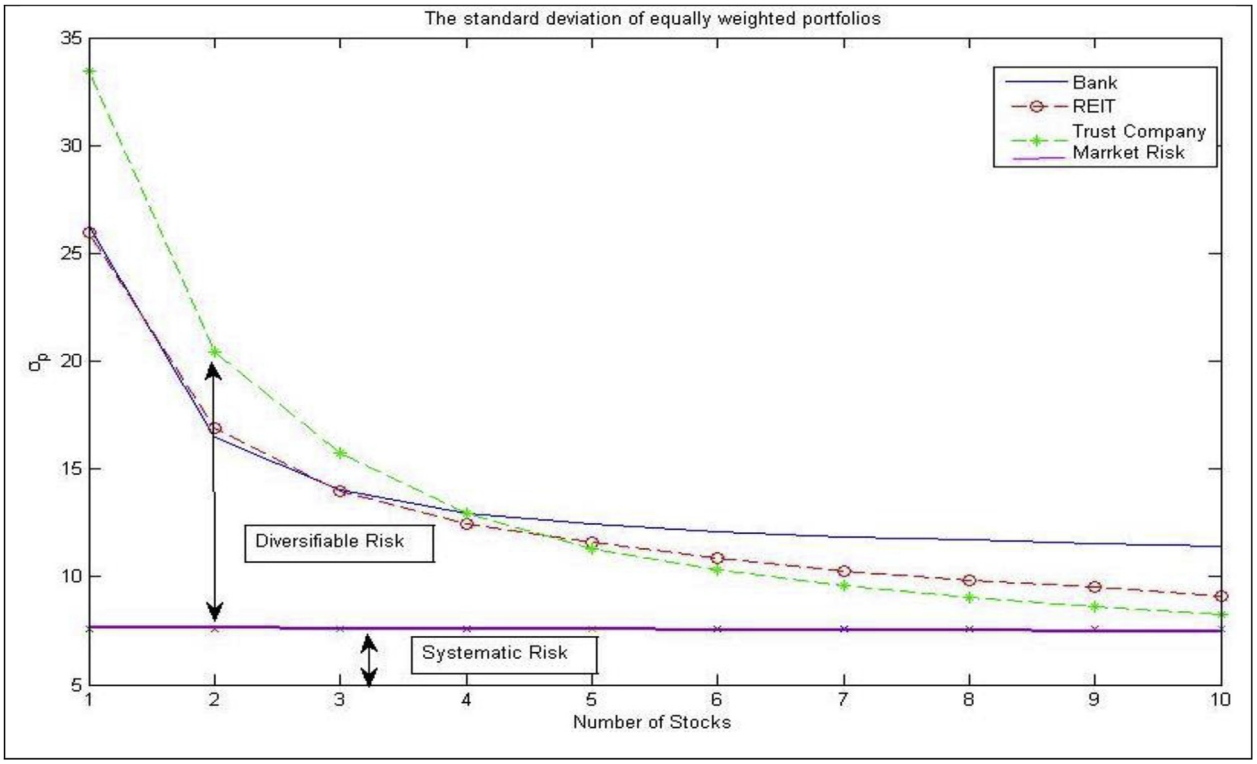


Fig. 5. Diversification benefits in REIT, bank, and investment trust stocks.

Table 5
Estimates of the single index model (CAPM).

T-REIT	α	β	R^2(%)	*p-value*	Management Structure
AL	0.424 (0.3682)	0.852 (6.083*)	32	0.000*	Defensive
AV	3.420 (12.631*)	0.420 (1.277)	2	0.206	Defensive
DG	2.549 (13.291*)	0.705 (3.023*)	10	0.003*	Defensive
IS	0.786 (0.9208)	0.919 (8.853*)	50	0.000*	Defensive
NU	2.614 (14.02)	1.029 (4.541*)	21	0.000*	*Aggressive*
OZ	−0.194 (−0.1068)	0.962 (4.356*)	19	0.000*	Defensive
PE	−2.623 (−22.128)	0.974 (6.755*)	37	0.000*	Defensive
VK	3.029 (14.583*)	0.372 (1.473)	3	0.145	Defensive
Y	−0.888 (−0.4979)	1.148 (5.290*)	26	0.000*	*Aggressive*
YK	−0.284 (−0.2198)	1.136 (7.217*)	40	0.000*	*Aggressive*
SAF	0.780 (0.4926)	0.750 (3.896*)	16	0.000*	Defensive
SN	−0.557 (−12.0845)	0 (0.748)	0.7	0.456	NA
AK	−0.542 (−11.705*)	0 (1.648)	3.32	0.100	NA
AT	−0.538 (−12.144*)	0 (1.290)	1.9	0.218	NA
DZ	−0.534 (−11.865*)	0 (1.199)	1.78	0.234	NA
ED	−0.558 (−12.296*)	0 (1.132)	1.59	0.261	NA
A	−0.541 (−12.125*)	0 (0.546)	3.8	0.586	NA

t-values are in the parenthesis, * at 5% significance level; NA: not applicable.

regarding their results. Despite the low R-squared (R^2) values of the models, the single index models are significant in the coefficients of nine selected T-REITs (except AV and VK). The same pattern is observed in the t-statistics (t_β) of β coefficients.

Consistent with the literature (i.e., Glascock et al., 2004; Wu et al., 2012), T-REITs are mostly found defensive. AV and VK stocks have respectively two of the lowest correlation with the market, also defined as “defensive (D)” T-REITs, where their absolute β value is smaller than one. These outcomes may be related to firms' property management strategies. In this context, balance sheet analysis of the AV over the period of 2008−2014 reveals that company's income producing real estate investment portfolio generated relatively limited income and showed little change in the composition of the asset structure, due to the lack of new investments. In the case of VK, the limited income producing capacity of the company's real estate investment portfolio is also observable between 2008 and 2014. In this respect, we may speculate that the implied less active real estate investment strategy and limited income producing capacity in T-REITs may have negative impacts on correlation with the market, resulting in a defensive management structure. Three residential T-REITs stocks (NU, YK, Y) yield an aggressive impact on its return movements, where their absolute β value exceeds one compared to the risk-taking patterns of other stocks.[13] Such an outcome suggests two points. First, there might be a link between risk-taking and property focus, due to higher risk-return pattern in residential T-REITs. Second, if a T-REIT portfolio is actively managed, the portfolio return may also reflect investors' expectations for the future profits. This increases the variability of the returns, possibly leading to an unexpectedly higher spread, reflecting β parameter to capture the portfolio's value.

[13] Values of the real estate portfolios (inventories and ongoing real estate projects) of NU, YK, and Y have showed important increases over the period of 2008 and 2014, according to our dynamic balance sheet analysis.

Table 6
The parameter estimates of Fama-French Model.

T-REIT	α	β_M	β_{SMB}	β_{HML}	R^2 (%)	*p-value FF*	Size	State
AL	0.237 (0.168)	0.909 (5.548*)	0.604 (1.918)	−0.011 (−0.033)	40	0.000*	S[21]	ND
AV	2.952 (0.877)	0.288 (0.740)	1.045 (1.400)	0.259 (0.342)	5	0.385	S	D
DG	2.954 (1.217)	0.686 (2.440*)	−0.168 (−0.312)	0.055 (0.100)	10	0.0100*	B	D
IS	0.510 (0.502)	0.941 (7.981*)	0.272 (1.201)	0.343 (1.494)	55	0.000*	S	D
NU	3.852 (1.627)	0.970 (3.540*)	1.097 (2.083*)	0.698 (1.308)	24	0.0023*	S	D
OZ	−1.110 (−0.490)	0.938 (3.571*)	1.538 (3.046*)	0.784 (1.533)	29	0.000*	S	D
PE	−3.680 (−2.51*)	1.015 (5.990*)	1.011 (3.103*)	0.714 (2.162*)	45	0.000*	S	D
VK	3.727 (1.626)	0.576 (2.171*)	0.250 (0.490)	−0.434 (−0.840)	11	0.085*	S	ND
Y	−1.790 (−0.847)	1.156 (4.698*)	1.706 (3.609*)	0.660 (1.379)	40	0.000*	S	D
YK	−1.490 (−0.979)	1.216 (6.838*)	1.172 (2.977*)	0.405 (1.169)	50	0.000*	S	D
SAF	0.878 (−0.049)	0.792 (3.749*)	0.939 (2.314*)	0.361 (−0.089)	25	0.0005*	S	D

S: Small, B: Big, D: Distressed, ND: Not Distressed, t-values are in the paranthesis.
*At 1% significance level.

Table 7
Parameter estimates of CAPM and Fama-French models.

T-REIT	CAPM			FAMA-FRENCH					
	α	β	$\sigma(e_p)$	α	β_M	β_{SMB}	β_{HML}	$\sigma(e_p)$	ΔR^2(%)
AL	0.424	0.852	10.32	0.237	0.909	0.604	−0.011	10.81	25
AV	3.420	0.420	24.27	2.952	0.288	1.045	0.259	25.73	150
DG	2.549	0.705	17.19	2.954	0.686	−0.168	0.055	18.55	0
IS	0.786	0.919	7.65	0.510	0.941	0.272	0.343	7.77	10
NU	2.614	1.029	16.71	3.852	0.970	1.097	0.698	18.08	14
OZ	−0.194	0.962	16.28	−1.110	0.938	1.538	0.784	17.34	53
PE	−2.623	0.974	10.63	−3.680	1.015	1.011	0.714	11.20	22
VK	3.029	0.372	18.62	3.727	0.576	0.250	−0.434	17.51	267
Y	−0.888	1.148	15.99	−1.790	1.156	1.705	0.660	16.25	54
YK	−0.284	1.136	11.60	−1.490	1.216	1.017	0.405	11.74	25
SAF	0.780	0.750	14.19	0.878	0.792	0.939	0.361	13.94	56

5.4. Fama-French three-factor model

Over the period from July 2008 to March 2015, indices with respect to rank statistics, SMB and HML were utilized to estimate Fama-French model for the 11 selected T-REITs. The test results, presented in Tables 6 and 7, illustrate that T-REITs yield a good fit, recognizably improving R^2 values, except DG.

Table 6 reveals three details that particularly interesting. First, while all residential (NU, OZ, Y, YK) and two retail (PE and SAF) T-REITs positively react to SMB values, only a retail T-REIT (PE) positively reacts to HML values in the market (BIST 100 index). Therefore, we may argue that the SMB is more influential than the HML on explaining return variability of T-REITs. In the light of this evidence, it is possible that the return (and share prices) of residential and retail T-REITs may be more sensitive to changes in SMB values (and hence changes in market capitalization and profitability), in addition to market index component. This outcome may also imply that T-REITs property management strategies may have some influences on the SMB value.

Second, all T-REITs show small status, except DG. Finally, except two diversified T-REITs, AL, and VK, all T-REITs show financially distressed status. These three points are evidence of a lower earnings (profitability) problem for most of the studied T-REITs. Year-end net profit before tax data of the T-REITs may support this finding. In this respect, for the time period taken into account, T-REITs and the years these made a loss are listed as follows: AV (2008; 2010), DG (2008), NU (2013; 2014); OZ (2012); PE (2008; 2011; 2012; 2013; 2014), SAF (2008; 2012; 2013), YK (2008; 2009; 2010; 2011; 2012; 2013), Y (2008; 2009; 2010). Three diversified REITs, AL, IS, and VK, have declared a net profit in observation period. Therefore, net profits and financially not distressed (ND) status of the IS, AL and VK, and also time series properties of some diversified T-REITs (see Fig. 3c1) tentatively imply superior performance in certain periods compared with specialized REITs. Considering that the residential T-REITs have higher betas than other specialties, we may argue that there are mixed results on property focus and risk taking/yield improvement in T-REITs. This evidence implies the need for market players to improve portfolio performance by carefully analyzing asset values, management strategies, financial information and speculative/realistic components of share prices,[14] and hence returns of T-REITs.

The parameter estimates of CAPM and Fama-French models are summarized in Table 7 for comparison. It can be

[14] There might be several complex factors affecting the share prices of REITs such as management quality, portfolio management strategies, share of institutional/foreign investors, short/long term expectations of investors etc.

Table 8
The effect of elections on T-REIT returns in Fama-French Model.

	T-REIT	α	β_M	β_{SMB}	β_{HML}	β_{D_1}	R^2 (%)	*p-value (FF)*
Election Month	AL	0.532 (0.364)	0.916 (5.566*)	0.646 (2.021*)	0.002 (0.007)	−4.636 (−0.811)	40	0.000*
	AV	2.752 (0.787)	0.281 (0.714)	1.015 (1.327)	0.253 (0.330)	3.420 (0.250)	5	0.546
	DG	3.523 (1.407)	0.701 (2.486*)	−0.086 (−0.158)	0.078 (0.142)	−9.108 (−0.930)	12	0.140
	IS	0.908 (0.878)	0.951 (8.162*)	0.329 (1.455)	0.360 (1.586)	−6.313 (−1.561)	57	0.000*
	NU	3.764 (1.531)	0.967 (3.489*)	1.084 (2.015*)	0.696 (1.292)	1.579 (0.164)	24	0.005*
	OZ	−0.39 (−0.168)	0.958 (3.660*)	1.642 (3.229*)	0.814 (1.598)	−11.583 (−1.275)	31	0.000*
	PE	−4.011 (−2.653*)	1.005 (5.902*)	0.963 (2.911*)	0.702 (2.120*)	5.481 (0.927)	46	0.000*
	VK	4.024 (1.694)	0.584 (2.181*)	0.292 (0.562)	−0.421 (−0.810)	−4.676 (−0.503)	12	0.146
	Y	−1.471 (−0.668)	1.164 (4.690*)	1.753 (3.636*)	0.674 (1.397)	−5.170 (−0.600)	40	0.000*
	YK	−1.821 (−1.149)	1.205 (6.748*)	0.969 (2.795*)	0.393 (1.131)	5.461 0.881	51	0.000*
	SAF	−0.190 (−0.100)	0.789 (3.697*)	0.925 (2.230*)	0.357 (0.860)	1.634 (0.221)	27	0.002*
Pre-and Post-Election	AL	0.247 (0.172)	0.908 (5.302*)	0.605 (1.859)	−0.009 (−0.028)	−0.003 (−0.001)	40	0.000*
	AV	2.067 (0.172)	0.064 (0.164)	1.399 (1.882)	0.301 (0.409)	9.827 (2.182*)	13	0.105
	DG	3.108 (1.261)	0.721 (2.457*)	−0.224 (−0.403)	0.050 (0.090)	−1.587 (−0.470)	11	0.179
	IS	0.739 (0.734)	0.994 (8.294*)	0.187 (0.820)	0.335 (1.485)	−2.401 (−1.739)	24	0.000*
	NU	3.950 (1.643)	0.992 (3.463*)	1.063 (1.955)	0.696 (1.293)	−0.977 (−0.296)	24	0.004*
	OZ	−0.936 (−0.407)	0.979 (3.574*)	1.474 (2.832*)	0.778 (1.512)	−1.821 (−0.577)	29	0.001*
	PE	−3.949 (−2.704*)	0.946 (5.439*)	1.120 (3.391*)	0.727 (2.226*)	3.023 (1.510)	48	0.000*
	VK	3.300 (1.446)	0.466 (1.717)	0.423 (0.819)	−0.413 (−0.809)	4.790 (1.531)	15	0.064
	Y	−1.637 (−0.759)	1.192 (4.644*)	1.647 (3.377*)	0.655 (1.357)	−1.658 (−0.561)	40	0.000*
	YK	−1.641 (−1.057)	1.176 (6.360*)	1.079 (3.073*)	0.413 (1.188)	1.711 (0.803)	51	0.000*
	SAF	−0.571 (−0.321)	0.672 (3.169*)	1.129 (2.803*)	0.382 (0.960)	5.285 (2.165*)	32	0.000*

t-values are in the paranthesis, * at 5% significance level.

noted that Fama-French model generally improved the impact of the market index (β_M) except for AV, DG, NU, and OZ, and the goodness of fit of the model, except DG. The percentage change in R^2 values supports the latter improvement. Additionally, the standard errors of both models appear to be similar, and to show limited dispersion. The findings suggest that three-factor Fama-French method, which is statistically insignificant in only one REIT increases the contribution of the market indicator more than the single-factor (CAPM) model in explaining the variation in the T-REITs return. Additionally, the inclusion of markets' extreme realizations (SMB, HML) improves the coefficient of the market indicator in estimating the returns.

In sum, the above evidence suggests that portfolio managers and investors may be not only able to utilize the knowledge deriving from the CAPM, but also, utilize the information retrieved from Fama-French model due to its partial improvement on capturing the variation in T-REITs returns. However, one may note that the superiority of Fama-French three-factor model over the CAPM is relative, due to its improved but still limited power to explain the return variability of T-REITs.

5.5. The impact of additional risk factors

By considering potential negative/positive impacts of different macroeconomic and industry specific conditions on the return of T-REIT shares, an expanded Fama-French model may be able to improve the explanatory power of the return variability model. Therefore, three dummy variables are employed in the three-factor model: pre- and post-election periods (as the political factor) and global financial crisis. Additionally, the influence of foreign exchange rate, US Dollars, is accounted for the univariate regression model.

A dummy variable included into Fama-French model representing the impact of global financial crisis shows no statistical significance. To measure sensitivity against to political influence, the dummy variables D_{1t} and D_{2t} are analyzed. Even though the financial market in Turkey is known to react to political changes and risks, analyses show that the T-REIT stocks are generally insensitive to the election periods (Table 8). To illustrate the influence of USD on the market, a simple linear regression model is fitted to expose the relation between T-REITs stocks and USD rate. However, the impact of USD on the returns reveals no significant coefficients when included into Fama-French model. For this reason, simple linear regression to measure the influence of this variable on the returns is fitted separately, as described as in below equation:

$$R_i = \alpha_{i,USD} + \beta_{i,USD} R_{USD} + e_i\,, \quad i = 1, \ldots n. \tag{7}$$

We finally find that the impact of USD on T-REITs is generally significant (Table 9). In this respect, we may conclude that T-REITs returns and market index have reverse movement with respect to the USD change.

The above evidence suggests three practical implications. First, it could be useful to employ additional variables to explain the variability of T-REITs returns beyond the (CAPM and) Fama-French model. Second, the generally counter relation defined between USD and T-REIT returns implies that fund managers may be more likely to invest in T-REIT stocks when exchange rates are falling. Third, insensitivity of the T-REIT return to political shocks suggests that these stocks show stability in the face of negative shocks.

Table 9
The impact of USD yield on T-REITs and market index-BIST 100.

T-REIT	α_{USD}	β_{USD}	p-value	T-REIT	α_{USD}	β_{USD}	p-value
AL	1.325 (−3.26*)	−1.032 (1.310)	0.001*	PE	−1.218 (−3.07*)	−1.045 (−0.857)	0.002*
AV	4.3151 (−1.352)	−0.883 (1.581)	0.180	VK	3.893 (−1.782)	−0.889 (1.860)	0.0784
DG	3.468 (−1.259)	−0.610 (1.713)	0.211	Y	1.013 (−3.41*)	−1.598 (0.518)	0.001*
IS	2.277 (−4.82*)	−1.233 (2.13*)	0.000*	YK	1.771 (−5.34*)	−1.842 (1.228)	0.000*
NU	4.390 (−3.24*)	−1.541 (2.21*)	0.001*	SAF	1.810 (−1.779)	−0.728 (1.059)	0.0789
OZ	1.105 (−1.882)	−0.899 (0.553)	0.063	BIST 100	1.506 (−6.46*)	−1.167 (1.995)	0.000*

t-values are in the paranthesis, * at 5% significance level.

6. Conclusion

The paper analyzes five previously unconsidered primary research questions on Turkish REITs (T-REITs) over the period of July 2008–March 2015. The first concern is the diversification benefit of T-REITs portfolio relative to portfolios involving bank and investment trust company shares trading at Borsa Istanbul (BIST). The second question relates to explaining the return variability of individual T-REIT stocks, based on a comparison between single index (CAPM) and Fama-French three factor models. The third question is related to whether an extension of the Fama-French model is able to improve its explanatory power. In this context, we employ first time to currency risk, global crisis and political risk as the additional factors in Fama-French model to reflect the impacts of global/local economic/political factors on T-REITs returns. Fourth, we also define property focus and analyze management structure, size, the financial state of T-REITs by utilizing CAPM and Fama-French models. Finally, the paper also seeks to discover whether there is a linkage between property focus and risk taking/yield improvement in T-REITs. The empirical evidence and seven implications drawn can be summarized as follows.

First, in the context of diversification benefits, defining return enhancement and risk reduction benefits potential of T-REIT shares over the bank shares at BIST presents a challenge for domestic/foreign fund managers, who tend to choose major bank stocks for their asset allocation. Investors in BIST should consider including T-REITs in their portfolios in order to achieve diversification benefits, and hence, improve their investment opportunity sets. Second, portfolio managers and investors can, in addition to utilizing the knowledge deriving from the CAPM, also incorporate the information retrieved from Fama-French model, due to its relatively improved capacity to capture the variation in T-REITs returns. However, the superiority of Fama-French three-factor model over the CAPM is relative due to its still limited explanatory power for explaining the return variability of T-REITs. Third, we additionally define that the inclusion of the new independent variables to Fama-French model may increase the explanatory power of the model. Based on the expanded Fama-French model outcomes, we find that T-REIT stocks were generally insensitive to the election periods and T-REITs returns and market index have reverse movement with respect to the USD change.

Fourth, by utilizing portfolio weights presented in the audit/financial reports and also corporate expert views, in some cases, we identify that T-REITs show a degree of diversity in property focus with four residential, six diversified, six retails, and one specialty REITs. Moreover, the high number of retail and residential T-REITs available also show the main investment trends in Turkish real estate industry. Fifth, all except one T-REITs show small status, and T-REITs management structures are found to be mainly defensive. Sixth, except for two diversified T-REITs, all T-REITs show financially distressed status. The latter point is the evidence of a lower earnings (profitability) problem for the most of the studied T-REITs. Finally, based on the multiple observations, it is possible to argue that there would be a linkage between property focus and yield improvement/risk taking structure of T-REITs. In this respect, we find that diversified T-REITs show the highest excess return performance and some show a relatively better return performance in certain periods during late post-global crisis period compared to other specialties. On the other hand, the majority of retail T-REITs generally show low return-low risk profile compared to high risk-high return profiles of the majority of diversified and residential T-REITs. We also identify that residential T-REITs are more sensitive to the market index, and have higher betas than other specialties.

In the context of company-specific investment strategy, the above evidence implies that improvement of portfolio performance requires careful analysis of asset values, management strategies, financial information and speculative/realistic components of share prices, and hence returns of T-REITs.

We propose that future research concentrates on investigating the growth patterns in total assets and market caps in T-REITs industry, expanding Fama-French model with additional variables, and exploring the connection between firm-specific idiosyncrasies and return variability in T-REITs. For the latter, some further variables may be added such as management quality, portfolio management strategies, the share of institutional/foreign investors, and short/long term expectations of investors.

Acknowledgements

Authors thank Ms. Pinar Berk and Mr. Burak Sen, Thomson Reuters, Turkey and also Merter Gurgun and M. Kurt Yıldırım, IS GYO, for their contributions in data construction and Dr. Seza Danisoglu for granting access to Fama-French BIST100 indicators.

Appendix 1. Comparative Advantages of T-REITs

TREITs has only recently achieved recognition as an investment tool in Turkey, although its history began in the mid-1990s. A REIT may establish to invest in income producing real estate assets as a public company at BIST. As the financial intermediary, T-REITs have several financial tools and some regulatory limitations. In this context, T-REITs enjoy the positive effects of gaining leverage through the capacity to issue debt instruments, real estate certificates, and asset-covered securities, and the right to borrow amount of up to five times of their shareholders' equity.[15] As the prohibited activities, REITs are not authorized to perform construction works, operate real estates for profit, offer project development and supervision, lend credit, or to have permanent involvement with the short-term trading of real estates in Turkey. The above restrictions are designed to ensure that TREITs are limited to manage real estate portfolios.[16]

The regulation of the REITs in Turkey were first issued in 1995, and the latest updated major regulation was enacted in 2013.[17] The first public listed T-REIT in BIST was in 1997, the number of T-REITs in BIST has increased rapidly in recent years, which may be related to following leverage opportunities and the policies (Coskun, 2011):

(i) Profits of REITs are exempt from corporate tax (20%) and the dividend withholding tax rate is 0% for REITs, although REITs transactions are subject to value added tax and other taxes. At investor level, the sale of shares is subject to a 0% of withholding tax for domestic and foreign investors (Erol & Ozturk, 2011; PwC, 2013). Such a favorable tax provision is very rare in the Turkish public finance tradition, highlighting strong state support for the development of real estate industry through the REIT channel.

(ii) Almost all countries require a certain level of dividend to be paid as a minimum dividend requirement. For example, REITs are required to distribute 90% of their taxable income as dividends to shareholders in the US (SEC., 2012). Because the policies of Capital Markets Board of Turkey (CMB) do not require dividend payout requirements for public firms in Turkey, REITs also have permission to define their own dividend policy. Despite this exemption, industry practices reveal that some REITs may prefer to distribute a dividend. In this respect, we may argue that optional dividend payout policy of REITs represents an important source of support for the T-REITs liquidity management at the expense of shareholders' short-term benefits.[18] In this respect, Stevenson (2013) argues that Turkey's far less restrictive regime facilitates the development of REITs.

(iii) Besides these tax and dividend payout exemptions, the minimum ratio of issued capital for T-REITs declined from 49% to 25% in December 2009 (CMB, 2010), causing, the number of T-REITs to increase to 31 as of 2015, from 14 as of 2009, due to the positive market environment and above mentioned supportive regulatory framework.

In the light of the above factors the existing regulatory structure and policies can be said to provide an industry-friendly environment for T-REITs. The visible reasons behind this categorical support are to improve transparency in real estate industry, to increase tax revenues from the real estate sales, and, more importantly, to enhance contributions of the real estate economy, via REITs, to the economic growth.

References

Ajayi, R. A., & Mougouè, M. (1996). On the dynamic relation between stock prices and exchange rates. *Journal of Financial Research, 19*(2), 193–207.

Akinsomi, O., Coskun, Y., & Gupta, R. (2017). Analysis of herding in REITs of an emerging market: The case of Turkey. *Journal of Real Estate Portfolio Management (Forthcoming)*.

Aktan, B., & Ozturk, M. (2009). Empirical examination of REITs in Turkey: An emerging market perspective. *Journal of Property Investment and Finance, 27*(4), 373–403.

Altinsoy, G., Erol, I., & Yildirak, S. K. (2010). Time-varying beta risk of Turkish real estate investment trusts. *Middle East Technical University Studies in Development, 37*(2), 83–114.

Alves, P. (2013). The Fama French model or the capital asset pricing model: International evidence. *International Journal of Business and Finance Research, 7*(2), 79–89.

Ambrose, B. W., & Linneman, P. (2001). REIT organizational structure and operating characteristics. *Journal of Real Estate Research, 21*(3), 141–162.

Arslanlı, K. Y., & Pekdemir, D. (2017). Emerging markets under basel III: Can moral hazard lead to systematic risk and fragility? Analysis of REIT's in Turkey. In M. d'Amato, & T. Kauko (Eds.), *Advances in automated valuation modeling: AVM after the non-agency mortgage crisis* (pp. 113–138).

Benefield, J. D., Anderson, R. I., & Zumpano, L. V. (2009). Performance difference in property-type diversified versus specialized real estate investment trusts (REITs). *Review of Financial Economics, 18*(2), 70–79.

Bereket, T. (2014). *The validity of Fama-French four factor model in Istanbul stock exchange*. M.S Unpublished Thesis in Department of Economics. Turkey: METU.

Berument, H., & Dogan, N. (2011). Stock market return and volatility relationship: Monday effect. *International Journal of Economic Perspectives, 5*(2), 175–185.

[15] Available at: http://www.cmb.gov.tr/apps/teblig/displayteblig.aspx?id=504&ct=f&action=displayfile (accessed on: 3/21/2015).

[16] For the comparison of REIT structure in Turkey and other countries, see, Chan, Chen, and Wang (2013).

[17] For the detail of the relevant regulation, see, Communique on Principles of Real Estate Investment Companies. Available at: http://www.cmb.gov.tr/apps/teblig/displayteblig.aspx?id =504&ct= f&action=displayfile (accessed on: 3/21/2015).

[18] Early research on REIT dividends conjecture that the dividend distribution requirement represents an important constraint to REIT dividend policy (Danny, Sulganik, & Tsang, 2011).

[19] As the different from our analysis, EPRA. (2015: 225) classifies DG as the retail REIT with non-rental focus.

[20] In parallel to our analysis, EPRA. (2015: 225) classifies IS as the diversified REIT with non-rental focus.

[21] If beta of SMB is positive (negative) the company is small (big) (see, Zaretzky, 2004, p. 148).

Bilsona, C. M., Brailsforda, T. J., & Hooperb, V. C. (2002). The explanatory power of political risk in emerging markets. *International Review of Financial Analysis, 11*, 1–27.

Bodie, Z., Kane, A., & Marcus, A. J. (2010). *Investments*. McGraw-Hill/Irwin Series.

Canbas, S., & Arioglu, E. (2008). Testing the three factor model of Fama and French: Evidence from Turkey. *Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 17*(3), 79–92.

Capozza, D. R., & Seguin, P. J. (1999). Focus, transparency and value: The REIT evidence. *Journal of Real Estate Economics, 27*(4), 587–619.

Cashman, G. D., Harrison, D. M., & Seiler, M. J. (2016). Capital structure and political risk in Asia-Pacific real estate markets. *The Journal of Real Estate Finance and Economics, 53*(2), 115–140.

Chan, S., Chen, J., & Wang, K. (2013). Are REIT IPOs unique? The global evidence. *Journal of Real Estate Finance and Economics, 47*(4), 719–759.

Chandrashekaran, V. (1999). Time-series properties and diversification benefits of REIT returns. *Journal of Real Estate Research, 17*(1/2), 91–112.

Chang, G., & Chang, Y. T. (2013). Time-varying risk premia for size effects on equity REITs. *The International Journal of Business and Finance Research, 7*(4), 13–28.

Chaudhry, M., Rohan, C. D., & Webb, J. R. (2010). REITs: Hedging and diversification possibilities. *Journal of Real Estate Portfolio Management, 16*(3), 217–226.

Chen, H. C., Ho, K. Y., Lu, C., & Wu, C. H. (2005). Real estate investment trusts: An asset allocation perspective. *Journal of Portfolio Management: Real Estate Special Issue, 31*(5), 46–54.

Chiang, K. C. H., Kozhevnikov, K., Lee, M. L., & Wisen, C.-H. (2008). Further evidence on the performance of funds of funds: The case of real estate mutual funds. *Real Estate Economics, 36*(1), 47–61.

Chiang, K. C. H., Lee, M. H., & Wisen, C. H. (2004). Another look at the asymmetric REIT-beta puzzle. *The Journal of Real Estate Research, 26*, 25–42.

Chiang, K. C. H., Lee, M. L., & Wisen, C. H. (2005). On the time-series properties of real estate investment trust betas. *Real Estate Economics, 33*(2), 381–396.

Chiang, M. C., Tsai, I. C., & Sing, T. F. (2013). Are REITs a good shelter from financial crises? Evidence from the Asian markets. *Journal of Property Investment and Finance, 31*(3), 237–253.

Chun, G. H., Sa-Aadu, J., & Shilling, J. D. (2004). The role of real estate in an institutional investor's portfolio revisited. *Journal of Real Estate Finance and Economics, 29*(3), 295–320.

Clayton, J., & Mackinnon, G. (2003). The relative importance of stock, bond, and real estate factors in explaining REIT returns. *Journal of Real Estate Finance and Economics, 27*, 39–60.

CMB (Capital Markets Board of Turkey). (2008 July, 2010 Dec, 2015 Dec). *Monthly statistical bulletin*. Available at: http://www.spk.gov.tr. (Accessed 8 April 2016).

Colliers International. (2015). *Turkey real estate review*. Market Report. Available at: http://www.colliers.com/-/media/files/emea/turkey/research/reviews/2015-2-turkey-review-web2.pdf?la=en-GB. (Accessed 21 October 2015).

Coskun, Y. (2011). The establishment of the real estate regulation and supervision agency of Turkey (RERSAT). *Housing Finance International, 25*(4), 42–51.

Coskun, Y. (2015). *Housing finance in Turkey: Problems and suggestions*. Publication No: 310. Istanbul: The banks association of Turkey. April.

Dalgın, M. H., Gupta, K., & Sraiheen, A. (2012). Testing CAPM for the Istanbul stock exchange. *International Journal of Economic Perspectives, 6*(3), 224.

Danny, B. S., Sulganik, E., & Tsang, D. (2011). Funds from operations versus net Income: Examining the dividend relevance of REIT performance measures. *JRER, 33*(3), 415–441.

Deloitte. (2014). *Turkish real estate market 2014*. Available at: http://www2.deloitte.com/content/dam/Deloitte/tr/Documents/Real%20Estate/EN_RealEstate2014_11072014.pdf. (Accessed 3 April 2015).

Di Nardo, D., & Anderson, J. A. (2009). *Diversification benefits of real estate investment trusts in Dubai*, 22nd Australasian Finance and Banking Conference 2009. Available at SSRN: http://ssrn.com/abstract=1447246.

Emin, D. (2016). Stock market Co-Movement at the disaggregated Level: Individual stock integration. *Czech Journal of Economics and Finance, 66*(2), 96–112.

EPRA. (2014). *Global REIT survey 2014*. Available at: http://www.epra.com/media/EPRAREIT_2014_GLOBAL_1417773403962.pdf. (Accessed 3 June 2015).

EPRA. (2015). *Global REIT survey 2014*. Available at: http://www.epra.com/media/EPRA_REIT_2015_EUROPE_1442306413135.pdf. (Accessed 14 April 2016).

Eraslan, V. (2013). Fama and French three-factor model: Evidence from Istanbul stock exchange. *Business and Economics Research Journal, 4*(2), 11–22.

Erol, I., & Ileri, A. (2013). What determines REIT returns in Turkey? An application of time-varying arbitrage pricing model in an emerging REIT market. *Iktisat Isletme ve Finans, 28*(331), 9–32.

Erol, T., & Ozturk, D. D. (2011). An alternative model of infrastructure financing based on capital markets: Infrastructure REITS (InfraREITs) in Turkey. *Journal of Economic Cooperation and Development, 32*(3), 65–88.

Erol, I., & Tirtiroglu, D. (2008). The inflation-hedging properties of Turkish REITs. *Applied Economics, 40*(19–21), 2671–2696.

Ersoy, E., & Ünlü, U. (2013). Size, book to market ratio and momentum strategies: Evidence from Istanbul stock exchange. *International Journal of Economic Perspectives, 7*(3), 28–33.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3–56.

Fama, E. F., & French, K. R. (1996). Multifactor explanations of asset pricing anomalies. *Journal of Finance*, 55–84.

FTSE. (2015; 2016). *FTSE fact sheet/FTSE EPRA/NAREIT emerging index*, 29 May; 31 March. Available at: http://www.ftse.com/Analytics/FactSheets/temp/43e3af5c-e31c-4b85-b43e-a05ee6a7fdc3.pdf. (Accessed 14 April 2016).

Fugazza, C., Guidolin, M., & Nicodano, G. (2009). Time and risk diversification in real estate investments: Assessing the ex post economic value. *Real Estate Economics, 37*(3), 341–381.

Glascock, J. L., Michayluk, D., & Neuhauser, K. (2004). The riskiness of REITs surrounding the october 1997 stock market decline. *Journal of Real Estate Finance and Economics, 28*(4), 339–354.

Gokgoz, F. (2007). Testing the asset pricing models in Turkish stock markets: CAPM vs three factor model. *International Journal of Economic Perspectives, 1*(2), 103–117.

Gunay, S. (2016). Is political risk still an issue for Turkish stock market? *Borsa Istanbul Review, 16*(1), 21–31.

Hayta, O. (2009). *Real estate investment trust and performance appraisal of real estate investment trust: A practice in IMKB*. Unpublished M.Sc. Thesis, in Business Department. Cukurova University.

He, L. T. (2002). Excess returns of industrial stocks and the real estate factor. *Southern Economic Journal, 68*, 632–645.

Hsieh, C., & Peterson, J. D. (2000). Book assets, real estate, and returns on common stock. *Journal of Real Estate Finance and Economics, 21*, 221–233.

Huang, J.-Z., & Zhong, Z. (2013). Time variation in diversification benefits of commodity, REITs, and TIPS. *Journal of Real Estate Finance & Economics, 46*(1), 152–192.

Hudson-Wilson, S., Fabozzi, F. J., & Gordon, J. N. (2003). Why real estate? *The Journal of Portfolio Management: Special Real Estate Issue*, 12–27.

Hung, K., Onayev, Z., & Tu, C. C. (2008). Time-varying diversification effect of real estate in institutional portfolios: When alternative assets are considered. *Journal of Real Estate Portfolio Management, 14*(4), 241–261.

Hypostat. (2016). *A review of Europe's mortgage and housing market*. September. European Mortgage Federation.

JLL (Jones Lang LaSalle). (2015). *Turkey commercial real estate market Overview*. Market Research. Available at: http://www.jll.com.tr/turkey/en-gb/Research/JLL_YARIYIL_RAP_ENG_MAX.pdf?f2388cfe-3717-49ed-b0eb-86ddd224b216. (Accessed 26 October 2015).

Kalac, S. S. (2012). *A test of multi-index asset pricing models: The case of Istanbul stock exchange*. Unpublished M.A. Thesis. Department of Business Administration, Middle East Technical University.

Kandil, M., & Trabelsi, M. (2015). On capital flows and macroeconomic performance: Evidence before and after the financial crisis in Turkey. *Borsa Istanbul Review, 15*(4), 249–258.

Karolyi, G. A., & Sanders, A. B. (1998). The variation of economic risk premiums in real estate returns. *Journal of Real Estate Finance & Economics, 17*(3), 245–262.

Kaya, A., Güngör, B., & Özçomak, M. S. (2014). Is political risk a kind of risk that investors should consider? Borsa Istanbul example. *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 16*(1), 74–87.

Kok, H. (2014). Dynamics of the intra-urban hierarchy in Istanbul's metropolitan area. In Ed F. Nozeman, & A. J. Van der Vlist (Eds.), *European metropolitan commercial real estate markets* (pp. 306–311).

Lee, M. L., Lee, M. T., & Chiang, K. C. H. (2008). Real estate risk exposure of equity real estate investment trusts. *The Journal of Real Estate Finance and Economics, 36*, 165–181.

Lee, S., & Stevenson, S. (2005). The case for REITs in the mixed-asset portfolio in the short and long run. *Journal of Real Estate Portfolio Management, 11*(1), 55–80.

Lu, C., Tse, Y., & Williams, M. (2013). Returns transmission, value at risk, and diversification benefits in international REITs: Evidence from the financial crisis. *Review of Quantitative Finance and Accounting, 40*(2), 293–318.

Ma, C. K., & Kao, G. W. (1990). On exchange rate changes and stock price reactions. *Journal of Business Finance and Accounting, 17*(3), 441–449.

Mandaci, P. E., Aktan, B., & Cagli, E. C. (2014). Co-movements of REIT indices with structural changes before and during the subprime mortgage crisis: Evidence from euro-med markets. *International Journal of Strategic Property Management, 18*(1), 1–10.

MSCI. (2016). *MSCI emerging markets IMI Core REIT index*, 31 March. Available at: https://www.msci.com/documents/10199/0a7cfabe-f4f2-4233-8114-c16b06fd82e6. (Accessed 14 April 2016).

Nai-Chiek, A. (2012). Malaysian real estate investment trusts (M-REITs) and the financial crisis: A performance and comparative analysis. *International Journal of Research in Commerce and Management, 3*(1), 13–18.

Newell, G., & Osmadi, A. (2009). The development and preliminary performance analysis of Islamic REITs in Malaysia. *Journal of Property Research, 26*(4), 329–347.

Ooi, J. T. L., & Liow, K. H. (2004). Risk adjusted performance of real estate stocks: Evidence from developing markets. *Journal of Real Estate Research, 26*(4), 371–395.

Ooi, J., Wang, J., & Webb, J. (2009). Idiosyncratic risk and REIT returns. *Journal of Real Estate Finance and Economics, 38*(4), 420–442.

Peterson, J. D., & Hsieh, C. H. (1997). Do common risk factors in the returns on stocks and bonds explain returns on REITs? *Real Estate Economics, 25*(2), 321–345.

PwC. (2013). *Worldwide REIT regimes*. May. Available at: https://www.pwc.se/sv_SE/se/fastigheter/assets/compare-and-contrast-worldwide-real-estate-investiment-trust-regimes-2013.pdf. (Accessed 4 March 2015).

Ro, S., & Ziobrowski, A. J. (2011). Does focus really matter? Specialized vs diversified REITs. *The Journal of Real Estate Finance and Economics, 42*, 68–83.

S&P. (2012). *Dow Jones indices: REIT/RESI industry classification hierarcy.* August. Available at: https://www.Djindexes.com/mdsidx/downloads/brochure_info/Dow_Jones_REIT_Industry_Classification_Hierarchy.pdf. (Accessed 27 October 2015).

SEC. (2012). *Real estate investment trusts (REITs)*. Available at: http://www.sec.gov/answers/reits.htm. (Accessed 21 October 2015).

Sharpe, F. W. (1963). A simplified model of portfolio analysis. *Management Science*, 277–293.

Sing, T. F., Tsai, I.-C., & Chen, M.-C. (2016). Time-varying betas of US REITs from 1972 to 2013. *Journal of Real Estate Finance and Economics, 52*(1), 50–72.

Stevenson, S. (2013). The global real estate investment trust Market: Development and growth. In R. Sotelo, & S. McGreal (Eds.), *Real estate investment trusts in Europe: Evolution, regulation, and opportunities for growth* (pp. 17–25).

Tasci, M., & Ozdemir, O. (2017). Reactions of dissatisfied investors: Exit, voice or loyalty. *Journal of Financial Services Marketing*. http://dx.doi.org/10.1057/s41264-017-0027-4.

Tofallis, C. (2008). Investment volatility: A critique of standard beta estimation and a simple way forward. *European Journal of Operations Research, 187*(3), 1358–1367.

Wu, M. C., Liau, Y. S., & Wang, Y. C. (2010). Are REITs defensive in emerging markets? Evidence from Taiwan. *Empirical Economics Letters, 9*(11), 1091–1097.

Wu, M. C., Liau, Y. S., & Wang, Y. C. (2012). Which of the property-type REITs is defensive? Evidence from the U.S. *The Empirical Economics Letters, 11*(1), 43–50.

Xiao, Z., Zhao, P., Rahnama, M., & Zhou, Y. (2012). Winner versus loser: Time-varying performance and dynamic conditional correlation. *The Journal of Applied Business Research, 28*(4), 581–594.

Yalciner, K., & Coskun, Y. (2014). Conditions of mortgage market development: A critical empirical review for Turkey. *İktisat İşletme Finans, 29*(339), 59–94.

Yapraklı, S., & Güngör, B. (2007). Ülke Riskinin Hisse Senedi Fiyatlarına Etkisi: İMKB 100 Endeksi Üzerine Bir Araştırma. *Ankara Üniversitesi SBF Dergisi, 62*(02), 199–218.

Zaretzky, K. (2004). *The relation between distress-risk, B/M and return Is it rational with consistent pricing?* Unpublished Ph. D. Thesis. Murdoch University.