

# Emerging Markets Under Basel III: Can Moral Hazard Lead to Systematic Risk and Fragility? Analysis of REIT's in Turkey

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**Abstract** This paper is an attempt to explain Emerging market of Turkey REIT's performance, concerning finance sector reforms and REIT's with respect to Basel III requirements; as government interference in the sector. Findings presents performance comparison of Turkish direct real estate investments and real estate investment companies (REICs) by three property types (residential, retail and office) using risk-adjusted return. Extant literature on performance of direct and indirect real estate has been investigated by different property types and time periods using various methods. The common data used in the studies are appraisal-based (IPD) and transaction-based (NCREIF) indices for direct real estate, while EPRA and FTSE/NAREIT indices for REITs covering the major international markets. In this paper, first REICs are classified regarding their property portfolio by type (residential, retail and office) to compare benchmark direct real estate investment. Since no index (such as NCREIF, INREV) is available for direct real estate investments in Turkey, quarterly return is calculated for direct commercial investments based on transaction indices while for direct residential investments based on valuation indices. Finally, Sharpe Ratio is used to compare the performance of REIC versus direct real estate for each property types. Two different time period is used; first period covers 43 quarters from 2002Q1 to 2012Q3. Second period runs for 11 quarters from 2010Q1 to 2012Q3, which data for all three property types are available. The performance of direct real estate investments in all property types is quite well compared to REICs in Turkey. In other word, direct real estate provides great return for less risk, however REICs provided less return for the same risk. The weak performance of REICs can be attributed to their portfolio allocation. The current asset composition of REICs emphasizes development of

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their own assets, due to the lack of investment grade property portfolios in Turkey. REICs become a “developer’s vehicle” for construction companies and contractors. They act like “developer” instead of “investor” and also focus on “developer’s profit” instead of “rental income and “capital gains”. Their behaviours indicate unique characteristics of Turkish REICs, and therefore they may call as “Real Estate Development Companies—REDCs”. Among direct real estate investments, residential provide higher return. It can be attributed to the unique residential investment characteristics in Turkey. Residential are considered for sale instead of income producing asset, compared with mature markets. No large companies invest in residential portfolios for leasing purposes, because residential properties provide much more return from capital gains and less income yield. Also considering two different periods in the study the negative effect of the global credit crunch observed especially on commercial markets in Turkey. Both office and retail markets witnessed a slowdown in rentals and property values. Due to low housing loan ratio in Turkish market, the effect was quite limited on residential market and no sharp decline was observed in residential prices.

**Keywords** Emerging market · Basel III · CAPM · REIC

## 1 Introduction

The relationship between private (unsecuritized) and public (securitized) real estate markets are well documented in literature by both academics and industry practitioners. Primary reason for this interest has been to assess portfolio allocations between private and public assets and to evaluate the substitutability of these two assets.

Investors and portfolio managers may generally prefer public real estate investment exposure to direct, private real estate investment due to the transparency, liquidity, and, in terms of management, simplicity of listed investment in real estate investment trusts (REITs) (Yunus et al. 2012). Although recent research consistently documented a long run equilibrium relation between public and private returns, the answer is still not conclusive in the literature. The transition from private to public market real estate investment raises the question of whether REITs share the same investment performance characteristics as the underlying direct property. The numerous studies have examined the accurate indicator of the risk and return characteristics of investment vehicles, and have compared performance of direct and indirect real estate by property types. REICs were introduced as a capital market institution in Turkey several years ahead of many developed countries, including Germany, France, UK, Japan, Singapore and Hong Kong. The legal framework for Turkish Real Estate Investment Companies (REICs)—Gayrimenkul Yatırım Ortaklıkları (GYO)—was prepared by the Capital Markets Board (CMBT) in 1995. First REIC was established in 1996 and REICs became publicly listed in Istanbul Stock Exchange (ISE) starting from 1997. Turkish Real

Estate Investment Companies are established in the form of joint-stock corporations and they have a legal personality. They don't have a trust status and are not managed by a board of trustees. REICs may be constituted by establishing new joint stock companies, or existing joint stock companies can convert into REICs by amending their articles of association in accordance with the procedures of the Communiqué and Capital Market Law. For either the establishment or the conversion of a company into an REIC, CMBT approval must be obtained. The company's name must include "real estate investment company". Similarly of REITs around the world, Turkish REICs must deal primarily with portfolio management. In accordance with the Communiqué, the REICs portfolio is required to be diversified based on industry, region and real estate and is to be managed with a long-term investment purpose. It is also required that 75 % of the portfolios of the companies, established with the purpose of operating in certain areas or investing in certain projects, must consist of assets mentioned in their titles and/or articles of association. A REIC must invest at least 50 % of its portfolio value in real estate, rights to real estate and real estate projects. At most, 10 % of its portfolio value may be invested in time deposits or demand deposits. Investments in foreign real estate and capital market instruments regarding may only constitute no more than 49 % of REICs portfolio value. The land and lots in the portfolio of the REIC, on which any project has not been realized for five years as of the acquisition date, may not exceed 10 % of its portfolio value. In order to promote the growth of the Turkish REIC industry, the significant tax incentives have been granted to REICs. Profits generated from the portfolio management activities of REICs are exempt from the general applicable 20 % corporate tax. In addition, although an official exemption has not been granted, the income tax rate has been determined to be "zero" for REICs. Aside from these two incentives, REICs are subject to all other applicable taxes, such as VAT, title deed fee, except stamp duty. An important difference of Turkish REICs from other REITs in the developed economies is that Turkish REICs do not have to pay out dividends to the shareholders on an annual basis. The Turkish real estate market has entered an upward trend, especially from 2004 onwards, following the political stabilization, economic improvements and declining interest rates. As illustrated in Fig. 1 the number of REICs increased in line with these developments, and their portfolios specialized in certain sectors, as well (Pekdemir and Soyuer 2012).

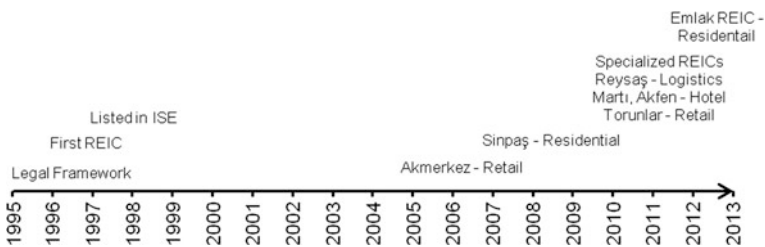
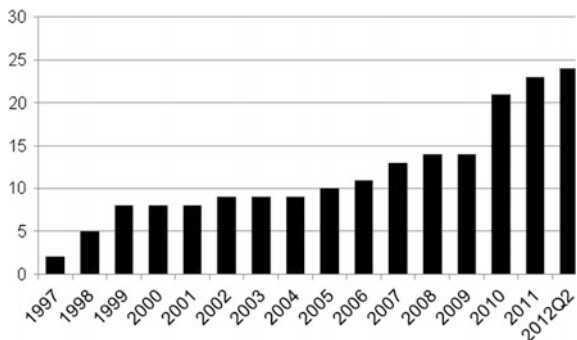


Fig. 1 Historical background of Turkish REICs

**Fig. 2** Turkish REICs development (data compiled from CMBT)



Most Turkish REICs have a particular portfolio of properties, in many cases the REIC management had been operating the properties for a period of time and was, in effect, transferring ownership and refinancing existing assets. As Fig. 2 shows, since 1997 REIC IPOs in Turkey have shown both “hot” and “cold” market waves. The first “hot” market occurred between 1997 and 1999 when 8 REICs came to the market. There then followed a “cold” period until 2007 when very few REICs came to the market, followed by a new “hot” market from 2007 and especially 2010 (Arslanlı et al. 2011).

The REICs portfolio composition, which came to the market in the different stages, is displayed a notable difference (Table 1). The REICs that came to the market in the first “hot” market from 1997–1999, following introduction of the Communiqué, are more evenly spread across on the traditional real estate sectors than the REICs that came later. In contrast, the REICs from the “cold” period are focused on the retail and office sectors. The REICs from the latest “hot” market in comparison are much more divers, with relatively large holdings in hotels, logistics and warehouse properties as well as state owned residential REICs.

Turkish REICs have growth potential, although total REIC market capitalization is relatively small with a share of 3 % of total stock market capitalisation, compared with REITs in developed capital markets. As of the end of 2012Q3, 24 REICs were listed on the ISE with a total net asset value of USD 7.48 billion, while market capitalization was USD 12.59 billion (see Appendix 1, Table 13).

REICs have played an important role in institutionalisation of Turkish real estate market. The legal framework makes REICs more transparent providing reliable and quality information. Furthermore, their structure brought international standards and professionalism to the broader real estate industry and fostered foreign investments in Turkey, especially at the institutional scale (Erol and Tırtıroğlu 2008). Turkish REICs present an alternative investment vehicle for both individual and institutional investors. The aim of this study is to evaluate the performance of direct real estate investments and REICs in Turkey. For this purpose, the market performances of REICs and direct real estate investments by different property types; residential, retail and office, are compared by measuring risk-adjusted

**Table 1** Asset allocation of Turkish REICs

Asset types	97–11 (%)	97–99 (%)	00–06 (%)	07–10 (%)	2012Q3 (%)
Land	12	14	0	13	25
Retail	23	13	64	21	16
Office	9	14	14	6	5
Residential	10	8	0	13	9
Hotel and entertainment	5	4	3	6	3
Logistics and warehouse	8	0	0	13	3
Development commercial	4	2	0	6	9
Development residential	9	10	0	12	15
Securities and money market	14	24	20	7	10
Participation	5	11	0	2	5
Total	100	100	100	100	100

performance of return. The rest of the paper is organized as follows. In the following section a literature review is presented to provide evidence on the link between direct and public real estate. In the third section the method and data used to compare risk adjusted return between direct real estate and REICs. Section 4 presents preliminary tests and the empirical results on comparison of risk-adjusted return of REICs and direct real estate. In the final section, concluding remarks are presented.

## 2 Literature Review

Several papers have investigated the linkage between real estate investments alternatives, by both academics and industry practitioners. Recent studies are concentrated on the linkage between direct real estate and REITs (Tuluca et al. 2000; Pavlov and Wachter 2011; Boudry et al. 2012; Hoesli and Oikarinen 2012; Yunus et al. 2012; Gyamfi-Yeboah et al. 2012). Although no consensus on the relation in the short time, the latest research confirmed that the relation between REITs and direct real estate returns appears to be stronger at longer horizon (Boudry et al. 2012; Hoesli and Oikarinen 2012; Yunus et al. 2012). Most of the studies focus on the U.S market, due to longer time series data availability. In recent years, more papers investigate international markets including European markets (Baum 2006; Daveney et al. 2012; Yunus et al. 2012). Although these studies mainly concentrate on large and mature markets, a few new studies focus on developing markets (Hamzah et al. 2010; Pham 2012). Extant literature on

performance of direct and indirect real estate has been investigated by different property types and time periods using various methods. The common data used in the studies are appraisal-based (IPD) and transaction-based (NCREIF) indices for direct real estate, while EPRA and FTSE/NAREIT indices for REITs covering the major international markets. The recent studies indicated that transaction based indices may facilitate a greater understanding of the relationships between direct and listed real estate (Pavlov and Wachter 2010; Boudry et al. 2012; Yunus et al. 2012). Return and risk characteristics of REITs compared to their direct market benchmarks by different property types to allocate capital between these alternatives (Pavlov and Wachter 2010; Boudry et al. 2012; Hoesli and Oikarinen 2012; Gyamfi-Yeboah et al. 2012).

To explore the dynamic relationship between assets, various methods have been utilized in these studies. Vector error correction model (VECM) is one of the common methods (Tuluca et al. 2000; Ling and Naranjo 2003; Boudry et al. 2012; Hoesli and Oikarinen 2012; Gyamfi-Yeboah et al. 2012) and correlation analysis as well (Baum 2006; Boudry et al. 2012). Also recent studies adopted alternative methods, such as spectral and cross-spectral analysis (Daveney et al. 2012) and wavelet method (Zhou 2012) to examine the cyclical attributes of the data or correlations between time series data. The performance of REITs is investigated by analyzing return and volatility dynamics in the literature, based on the capital asset pricing model (CAPM). It was improved to calculate risk-adjusted return in the mid-1960. Three standard performance measurement methods are employed to evaluate the performance of REITs; Treynor and Jensen index consider systematic risk while Sharpe considers total risk of portfolio. As one of the common risk-adjusted index, some researchers used Sharpe ratio not only to measure performance of REITs, but also to compare performance of direct real estate and REITs. Springer and Cheng (2006) use Sharpe ratio to test for the effects on risk and risk-adjusted return of REITs by property level using operational, ownership and financial characteristics. The office and industrial models have the best results, however other three models for apartment, healthcare and hospitality are not overly revealing. In addition, portfolio age and demographic trend measures inconsistently explain risk and risk-adjusted returns.

Baum (2006) examines the performance characteristics of direct and unlisted indirect property markets of the UK, U.S.A, Germany and Netherlands using Sharpe ratio. The result confirms that the performances of direct and unlisted markets are largely similar with the exception of the UK, there is not a significant difference between the ratio of returns to volatility in the direct and unlisted sectors. Chou et al. (2013) analyse the diversification effects of real estate investment trusts in order to give improvement for investment opportunities by additional REIT into the portfolio. Including international REITs for equity portfolios experience significant diversification by improved Sharpe ratio and reduction of overall risk. Hamzah et al. (2010), employ three standard performance measurement methods (Sharpe Treynor and Jensen Indexes) on the performance of REITs on pre-crisis,

during-crisis and post-crisis. REITs are found to outperform market portfolio during-crisis but underperform in the pre and post-crisis periods. The average systematic risks of REITs are slightly higher than market portfolio during pre-crisis but lower in the post crisis periods. The studies on Turkish REICs are very limited, although REICs legal framework was prepared in 1995. These studies concentrate on characteristics of REICs, relationship with capital markets and also return performance regarding their unique structure. Despite certain number of studies, research on REICs performance and underlying reasons are incomplete. Erol and Tirtiroğlu (2008) examine the Turkish REICs inflation hedging abilities over a period of 1999–2004. Different from developed capital markets, Turkish REICs tax incentives and flexibility in managing portfolios result to provide better hedge against actual and expected inflation than the ISE common indices. Study provides good results to test for hedging behaviour of real estate stocks on high and moderate inflation rates. Authors report that number of the REICs is not adequate to analyze into sub-sectors such as hotels or apartments in the study. High inflation rate period is performed better hedging abilities than moderate inflation period. Another finding of the study is strong inflation hedging performance of REICs influenced by idiosyncratic risk on the ISE REIT price index. Results suggest that REIC managers form accurate inflation expectations and write lease contracts for office and shopping malls with clauses for rapid rent adjustments. However, these results could be criticized that commercial rentals are quoted in Dollar or Euro as a common practice in Turkey against high inflationary pressure on the market. Aktan and Öztürk (2009) investigate the risk-return relationship of Turkish REICs within the framework of modern portfolio theory (MPT) using the standard version of the capital asset-pricing model (CAPM) and the single index model (SIM) over the period 2002–2008. Results indicate that linearity assumption for both the CAPM and the SIM are rejected. The coefficient of ex-post beta has negative explanatory power on average asset returns that is contradictory with the fundamental relationships between risk and return under the framework of the CAPM and the SIM.

Erol and Tirtiroğlu (2010) analyze capital structure of Turkish REICs, where they don't have to pay dividends and exempt from corporate and income taxes. Findings are revealed that Turkish REICs employ low long term debt in their capital structure. Turkish REICs tend to reduce short-term debt and also not to borrow in the long-term market. Thus, they appear to use inexpensive internal equity resources only for their short-term financing needs. The firm size, REICs engagement in development and stock market development have influence debt ratios positively where tangibility, ownership and country specific determinants appear to have no influence. Altınsoy et al. (2010) investigate time varying behaviour of beta for Turkish REICs from 2002 to 2009. Findings of the study are similar to other emerging and developed REITs markets that Turkish REICs have a declining beta. Empirical results suggest that REICs return more closely track stock market in high growth economic conditions. Türkmen and Demirel (2012) analyze the effects of macroeconomic conditions and financial ratios on performance of REICs. Results

indicate that net profit after tax/equity ratio of REIC has significant effect by Dollar/Turkish Lira currency volatility, however consumer price ratio, benchmark interest rates and Euro/Turkish Lira currency do not have significant effects.

### 3 Data and Methodology

This study measures the performance of direct real estate investment and real estate investment companies by property types, using risk-adjustment return. The main stages are given as below to calculate return and to compare performance between direct real estate investment and real estate investment companies:

- Classification of REICs regarding their property portfolio by type (residential, retail and office) and selection of benchmark REICs for each property type,
- REICs return calculation; quarterly return of the selected REICs by property type is calculated based on ISE monthly return data,
- Direct real estate return calculation; quarterly return of commercial properties is calculated by using DTZ Pamir and Soyuer's investment transaction database (ITD) and property market indicators (PMI), while quarterly return of residential properties is calculated by using DTZ Pamir and Soyuer's property market indicators (PMI) and Central Bank of Turkish Republic (CBTR) new housing price index (TNHPI),
- Performance analysis of REICs and direct real estate by property types (residential, retail and office); the Sharpe Ratio is used in comparing the performance of REIC versus direct real estate for each property type.

### 4 Data Sources

Turkish REICs became publicly listed in ISE (re-named as Borsa İstanbul-BIST) since 1997 and monthly return data is available for all REICs and also for REIC sector index (XGMYO) since 2000. However, limited data is available for the historical return of unlisted or direct real estate vehicles in Turkey. No public data or indices (such as NCREIF, INREV) is available for direct real estate investments. Therefore, the available data by different source is used to calculate direct real estate return, which is described in the next section. Due to direct real estate data is available since 2002Q1 and also the latest available REIC return data is 2012Q3, all quarterly return series is obtained from 2002Q1 to 2012Q3. Similarly, residential price index is available since 2010, therefore direct residential real estate return series is obtained from 2010Q1 to 2012Q3. The data sources and measurement are summarized in Table 2.



**Table 2** Data source and measurement

	Source	Measurement
REICs	ISE return index	Quarterly total return (2002Q1–2012Q3) <sup>a</sup>
<i>Direct RE</i>		
Office	DTZ Pamir and Soyuer investment transaction database (ITD) and property market indicators (PMI)	Quarterly total return using transaction based index (2002Q1–2012Q3) <sup>b</sup>
Retail	DTZ Pamir and Soyuer investment transaction database (ITD) and property market indicators (PMI)	Quarterly total return using transaction based index (2002Q1–2012Q3) <sup>b</sup>
Residential	Central Bank of Turkish Republic (CBTR) new housing price index (TNHPI) and DTZ Pamir and Soyuer property market indicators (PMI)	Quarterly total return using valuation based index (2010Q1–2012Q3) <sup>c</sup>
Risk-free rate	Central Bank of Turkish Republic (CBTR)	91-day government bond

*Note* <sup>a</sup>The latest available data cover 2012Q3

<sup>b</sup>DTZ Pamir and Soyuer ITD and PMI database is available since 2002Q1

<sup>c</sup>TNHPI is available since 2010

## 5 Return Calculation

Past researches have often used valuation based indices for the direct real estate market, but an extensive literature exists that highlights problems with such indices. These are criticised with regard to their perceived smoothing and lagging of market performance, due to issues in the valuation process, such as the availability of sales evidence, using past evidences when conducting a new valuation (Daveney et al. 2012). Transaction based indices for direct real estate markets have been researched for many years, but the most widely known is developed for the US by the MIT Centre for Real Estate in collaboration with National Council of Real Estate Index Fiduciaries (NCREIF). Since such indices are not available for direct real estate market in Turkey, total return is calculated using different sources; for direct commercial investments based on transaction indices while for direct residential investments based on valuation indices. In real estate investment industry, total return ( $r$ ) accounts for two components of return: income ( $y$ ) and capital appreciation ( $g$ ). Income return component is more directly relevant to the income objective of investors, while the appreciation return component is more directly relevant to the growth objectives (Geltner et al. 2001). Total return is calculated as given below:

$$r_t = y_{t-1} + g_t$$

For retail and office properties, PMI data is used for income return (y), while ITD is used for appreciation return (g) based on DTZ Pamir and Soyuer database which is available since 2002Q1.

For residential properties, DTZ Pamir and Soyuer PMI database is used for income return (y), while CBRT new housing price index (TNHPI) is used for appreciation return (g). TNHPI is available since 2010Q1, therefore total return series of residential property is obtained for the period 2010Q1 to 2012Q3.

## 6 Performance Measure: The Sharpe Ratio

The Sharpe ratio is a risk-adjusted measure of return that is often used to evaluate the performance of a portfolio. The ratio helps to compare the performance of different portfolios by making an adjustment for risk. Since the Sharpe ratio was derived in 1966 by William Sharpe, it has been one of the most referenced risk/return measures used in finance, and much of this popularity can be attributed to its simplicity. William Forsyth Sharpe developed what is now known as the Sharpe ratio in 1966. Sharpe originally called it the “reward-to-variability” ratio (Sharpe 1966) before it began being called the Sharpe ratio by later academics and financial operators. Sharpe’s 1994 revision acknowledged that the basis of comparison should be an applicable benchmark, such as the risk free rate of return or an index (S&P 500, etc.), which changes with time (Sharpe 1994). It is broken down into just three components: asset return, risk-free return and standard deviation of return. After calculating the excess return, it’s divided by the standard deviation of the risky asset to get its Sharpe ratio. The ratio describes how much excess return you are receiving for the extra volatility of holding the risky asset over a risk-free asset. The Sharpe ratio is expressed mathematically as;

$$S(x) = \frac{r_x - R_f}{StdDev_{(x)}}$$

where;

- X is the investment
- $r_x$  is the average rate of return of x
- $R_f$  is the best available rate of return of a risk-free security (i.e. T-bills)
- StdDex (x) is the standard deviation of  $r_x$ .

The return ( $r_x$ ) measured can be of any frequency (i.e. daily, weekly, monthly), as long as they are normally distributed, as the returns can always be annualized. However, because it is based on the mean-variance theory, it is valid only for either normally distributed returns or quadratic preferences. If returns are not normally distributed, the Sharpe ratio can lead to misleading conclusions and unsatisfactory paradoxes (Zakamulin and Koekebakker 2008; Ziemba 2005; Hodges 1998). Abnormalities like kurtosis, fatter tails and higher peaks, or skewness on the

distribution can be a problematic for the ratio, as standard deviation doesn't have the same effectiveness, when these problems exist.

The risk-free rate of return (Rf) is used to see if you are being properly compensated for the additional risk you are taking on with the risky asset. Traditionally, the risk-free rate of return is the shortest dated government T-bill (i.e. U.S. T-Bill). In this study, 91-day Central Bank of Turkish Republic (CBTR) Bond return index is used to calculate risk free rate. While the Treynor ratio works only with systemic risk of a portfolio, the Sharpe ratio observes both systemic and idiosyncratic risks. The Sharpe ratio characterizes how well the return of an asset compensates the investor for the risk taken. When comparing two assets versus a common benchmark, the one with a higher Sharpe ratio provides better return for the same risk (or, equivalently, the same return for lower risk). In general, a higher number is better, since the higher number indicates a greater return for less risk.

## 7 Classification of REICs

24 REICs were listed on the ISE, as end of 2012. We focus on only office, retail and residential property types which are invested predominantly in one property type and other types (hotel, industrial) are excluded from the analysis. Of those we chose REICs that are 35 % or more invested in one property type and the remaining shares comprise of mostly land and/or on-going development projects. Regarding their predominant property types, REICs are classified and 11 REICs are selected, given as in Table 3.

Preliminary tests are applied for further analysis to compare return performance of REICs and direct real estate. The detailed information is given in the Sect. 9. Preliminary Tests.

## 8 Return Calculation

The total return of direct real estate and REICs are computed as explained in the previous section. Two different periods are used to calculate for direct real estate return regarding data availability. First period cover 43 quarters from 2002Q1 to 2012Q3, which retail and office return data is available. Second period runs for 11

**Table 3** Classification of REICs

Property type	REICs
Residential	EKGYO, IDGYO, SNGYO,
Retail	AGYO, AKMGYO, PEGYO, TRGYO, TSGYO
Office	ISGYO, NUGYO, VKGYO

*Note* Abbreviations are explained in Appendix 1 Table 13

**Table 4** Direct real estate and REIC return and standard deviation

	Direct real estate		REICs		
	Average return	Standard deviation		Average return	Standard deviation
2002–2012			XGMYO	0.046	0.201
2010–2012				0.039	0.150
<i>Office</i>			ISGYO	0.047	0.211
2002–2012	0.123	0.067	NUGYO	0.122	0.421
2010–2012	0.119	0.052	VKGYO	0.098	0.345
<i>Retail</i>			AGYO	0.063	0.239
2002–2012	0.110	0.076	AKMGY	0.052	0.260
2010–2012	0.113	0.063	PEGYO	0.051	0.462
			TSGYO	-0.033	0.120
			TRGYO	0.002	0.194
<i>Residential</i>			SNGYO	0.009	0.203
2010–2012	0.152	0.049	EKGYO	0.056	0.194
			IDGYO	0.344	0.997

quarters from 2010Q1 to 2012Q3, which is governed by availability of the residential return. REIC return series is computed for the time period which all series are available for both REIC and the related direct real estate type. In addition, REIC sector return (XGMYO) data is also included into the analysis. Return data is summarized in Table 4 and also historical returns for all property types are given in Fig. 3.

Regarding properties types, similar results are obtained for both direct real estate and REICs. In terms of average return, residential REICs and also direct residential properties, performed better compared to office and retail REICs, they provided higher return with less volatility. Direct office and retail properties have quite similar average return, 12.3 and 11 %, respectively. However, return of office REICs are better than retail REICs, ranged between 4.7 and 12.2 %, while return of retail REICs ranged between -3.3 and 6.3 %. As mentioned above, second return data series covering 2010Q1–2012Q3 period is calculated to obtain a comparable return series for all property types. Based on this period, residential properties provided the highest average return at 15.2 %, while office and retail assets provided relatively lower average returns, which were 11.9 and 11.3 %, respectively. For the same period, REIC sector average (XGMYO) was only 3.88 %. It should be noted that real estate market has started to recover in 2010, following the negative effect of the global credit crunch. Therefore, residential return data is not included the effect of the global crisis and declining residential price.

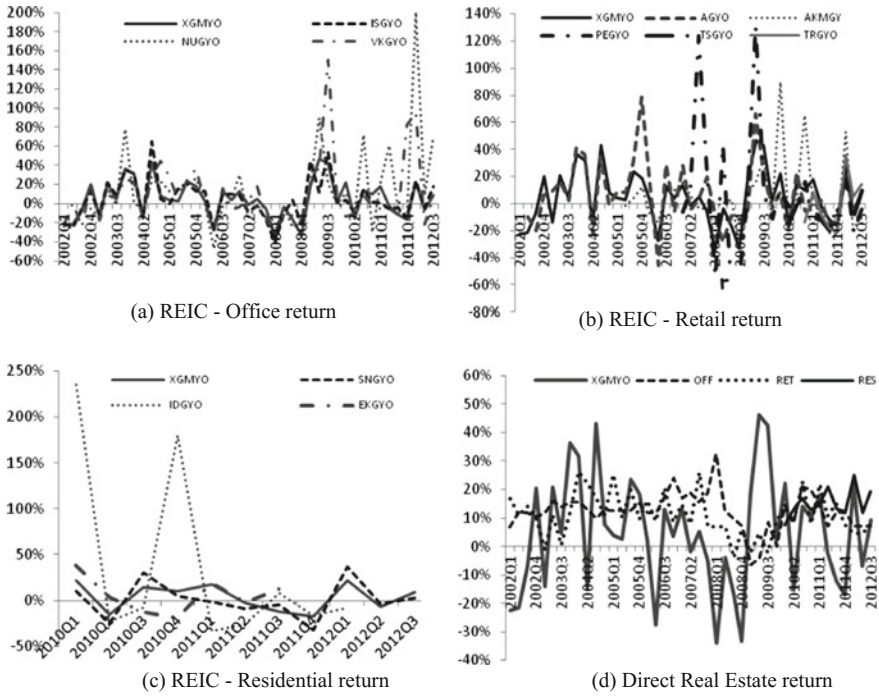


Fig. 3 Historical return of direct real estate and REIC

## 9 Preliminary Tests

Selected 11 real estate investment companies are analysed according to quarterly returns. In order to understand the characteristics of real estate investment companies performance, the distribution of returns analysed for normal distribution tests. In Table 5 shows the distribution of total rates of returns in quarterly and ranges from minimum  $-64\%$  to maximum  $234\%$  with an average of  $7\%$  return.

After analysis of normality in the returns of REICs for Sharpe ratio calculations EKGYO, SNGYO, TRGYO, TSGYO, ISGYO passed all normality tests. AGYO with a slightly on edge of rejection of normality also had taken into calculations which less than 1.14 skewness. In general the distribution of returns being skewed toward positive returns with 1.07 and degree of kurtosis of 2.01. Normal distribution test of Shapiro-Wilk and Kolomogorov-Smirnov detect problems in NUGYO, VKGYO, AKMGY, PEGYO, IDGYO. Consequently data analysis results in excluding some of them in further stages of model. Box-plot graph shows that returns of residential REICs are homogeneous and clustered around the median, office returns are more dispersed and retail has highest IQR (Fig. 4). These

**Table 5** Descriptive analysis result of REICs

Stock	N	Min	Max	Mean	Std dev.	Skewness	Kurtosis	K-S	Sig	S-W	Sig
XGMYO	43	-0.339	0.464	0.046	0.201	0.113	-0.406	0.058	0.200 <sup>a</sup>	0.983	0.762 <sup>a</sup>
ISGYO	43	-0.407	0.646	0.047	0.211	0.615	0.950	0.092	0.200 <sup>a</sup>	0.972	0.375 <sup>a</sup>
NUGYO	43	-0.471	2.003	0.122	0.421	2.440	8.760	0.212	0.000	0.786	0.000
VKGYO	43	-0.325	1.506	0.098	0.345	2.155	6.310	0.164	0.005	0.811	0.000
AGYO	42	-0.460	0.783	0.063	0.239	0.819	1.528	0.120	0.134	0.954	0.090 <sup>a</sup>
AKMGY	30	-0.331	0.895	0.052	0.260	1.692	3.492	0.209	0.002	0.840	0.000
PEGYO	23	-0.642	1.308	0.051	0.462	1.480	3.074	0.192	0.027	0.839	0.002
TSGYO	10	-0.200	0.183	-0.033	0.120	0.484	-0.472	0.127	0.200 <sup>a</sup>	0.971	0.899 <sup>a</sup>
TRGYO	8	-0.219	0.355	0.002	0.194	0.729	-0.063	0.180	0.200 <sup>a</sup>	0.935	0.566 <sup>a</sup>
SNGYO	11	-0.317	0.364	0.009	0.203	0.251	0.089	0.146	0.200 <sup>a</sup>	0.952	0.666 <sup>a</sup>
EKGYO	7	-0.188	0.379	0.056	0.194	0.492	-0.220	0.125	0.200 <sup>a</sup>	0.975	0.930 <sup>a</sup>
IDGYO	9	-0.334	2.346	0.344	0.997	1.638	1.160	0.381	0.000	0.673	0.001
Mean	26	-0.353	0.936	0.071	0.321	1.076	2.017	0.167	0.114	0.891	0.358 <sup>a</sup>

Note <sup>a</sup>Normal distribution under null for Kolmogorov-Smirnov and Shapiro-Wilk tests. Normality assumption limit for skewness is +1.14 and kurtosis +3

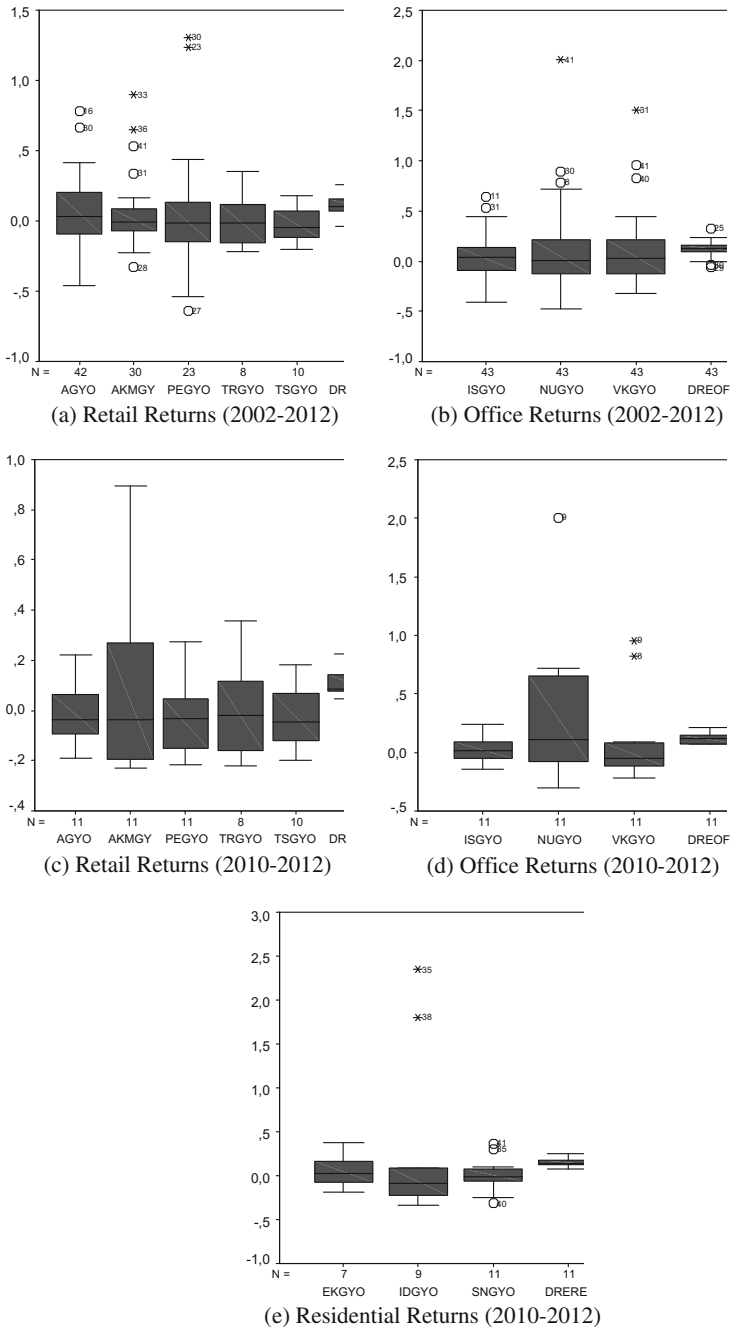


Fig. 4 Box-plot graph of retail, office and residential REICs and direct real estate returns

observations are in line with the general assumption that higher the variability in returns the riskier the REICs where retail displays higher volatility. Furthermore the outlier percentage is different from general assumptions that office REICs also has as much as the retail REICs. Some of the listed REICs traded in ISE with small real estate portfolio left outside of the analysis. Expected pattern of retail oriented REICs more volatile returns than office REICs and residential, particularly. Table 6 and Fig. 4 confirm mean and median total returns of residential are considerably lower than office and retail. Furthermore for the all property types of returns, standard deviation is the lowest for residential over time and higher for retail market returns.

Distribution of direct real estate returns in normality test for skewness and kurtosis passed for 1.14 and  $\pm 3$ . Shapiro-Wilk test passed for retail and residential with high level of significance. Where office distribution found to be problematic but skewness and kurtosis levels are inside confidence limits. For better comparison of different property type returns, time-span of quarterly data is divided into two sets. First set of data covering 2002–2012 and second is 2010–2012 which based on residential return availability. For the second set starting from 2010 gives more clear comparison for all property types, where the Turkish REICs for residential shows better performance compared to other property types. This type of unusual/unexpected behaviour where risk is low and return is higher could be described as aggressive pricing competition of REICs for residential properties. Volatility of retail and office properties are in line with expected returns performance. Correlation analysis is conduct to examine relationship between REICs and the benchmark direct real estate by property types and time periods. As given in Table 7, direct retail investment and retail REICs returns found to be uncorrelated and insignificant for both 2002–2012 and 2010–2012 periods. Direct office investment and office REIC returns are also found insignificant which correlation coefficients diverse from  $-0.259$  to  $0.061$  between two time periods (Table 8). Only residential direct returns found to be correlated and significant with residential REICs (Table 9). This can be interpreted as residential REICs behave like direct real estate residential vehicle.

**Table 6** Descriptive analysis result of direct real estate

	N	Min	Max	Mean	St. dev	Skewness	Kurtosis	Kol-S	Sig.	Shap-W	Sig.
Office	43	-0.063	0.325	0.123	0.067	-0.150	2.576	0.132	0.057	0.934	0.017*
Retail	43	-0.038	0.262	0.110	0.076	0.216	-0.299	0.130	0.064	0.965	0.213*
Res	11	0.075	0.252	0.152	0.050	0.681	0.314	0.202	0.200	0.936	0.480*



**Table 7** Correlations of retail REICs returns to direct retail returns

2002–2012						
	X100	XGMYO	DRERET	AGYO	TRGYO	TSGYO
X100	1.000	0.868	0.030	0.737	0.899	0.626
XGMYO	0.868	1.000	0.141	0.731	0.772	0.789
DRERET	0.030	0.141	1.000	0.148	-0.210	-0.241
AGYO	0.737	0.731	0.148	1.000	0.888	0.689
TRGYO	0.899	0.772	-0.210	0.888	1.000	0.707
TSGYO	0.626	0.789	-0.241	0.689	0.707	1.000
2010–2012						
	X100	XGMYO	DRERET	AGYO	TRGYO	TSGYO
X100	1.000	0.715	0.099	0.904	0.899	0.626
XGMYO	0.715	1.000	0.312	0.785	0.772	0.789
DRERET	0.099	0.312	1.000	0.177	-0.210	-0.241
AGYO	0.904	0.785	0.177	1.000	0.888	0.689
TRGYO	0.899	0.772	-0.210	0.888	1.000	0.707
TSGYO	0.626	0.789	-0.241	0.689	0.707	1.000

**Table 8** Correlations of office REICs returns to direct office returns 2002–2012

2002–2012				
	X100	XGMYO	DREOFF	ISGYO
X100	1.000	0.868	-0.161	0.734
XGMYO	0.868	1.000	-0.170	0.868
DREOFF	-0.161	-0.170	1.000	-0.259
ISGYO	0.734	0.868	-0.259	1.000
2010–2012				
	X100	XGMYO	DREOFF	ISGYO
X100	1.000	0.715	0.098	0.884
XGMYO	0.715	1.000	0.342	0.793
DREOFF	0.098	0.342	1.000	0.061
ISGYO	0.884	0.793	0.061	1.000

**Table 9** Correlations of residential REICs returns to direct returns 2010–2012

	X100	XGMYO	DRERES	EKGYO	SNGYO
X100	1.000	0.715	0.513	0.535	0.923
XGMYO	0.715	1.000	0.254	0.932	0.821
DRERES	0.513	0.254	1.000	0.436	0.456
EKGYO	0.535	0.932	0.436	1.000	0.590
SNGYO	0.923	0.821	0.456	0.590	1.000

**Table 10** The Sharpe ratio for direct real estate by asset types

	2002Q1–2012Q3			2010Q1–2012Q3		
	Mean	St. dev	Sharpe ratio	Mean	St. dev	Sharpe ratio
XGMYO	−0.01	0.208	−0.03	0.02	0.149	0.12
Office	0.07	0.078	0.90	0.10	0.054	1.82
Retail	0.06	0.086	0.68	0.09	0.065	1.43
Residential	–	–	–	0.13	0.048	2.75

## 10 Performance Analysis: Sharpe Ratio

The Sharpe Ratio, which is a risk-adjusted measure of return, is used to compare the performance of REICs versus direct real estate for each property types; residential, retail and office. The Sharpe ratio of direct real estate by property types is given in Table 10. Two different time period is used to compare across property types. First period cover 43 quarters from 2002Q1 to 2012Q3. Second period runs for 11 quarters from 2010Q1 to 2012Q3, which data for all three property types are available.

As stated in earlier section, higher Sharpe ratio indicates a greater return for less risk. According to results, residential properties provided higher return compared to office and retail properties during 2010Q1–2012Q3 period. Office properties provided relatively higher return compared to retail properties, although both of them performed well for two different periods. Besides, all three property types performed better compared to REIC sector average. Considering these two periods, it should be noted that real estate market started to recover in the beginning of 2010, after global credit crunch, which had a negative effect especially on commercial markets in Turkey. Both office and retail markets witnessed a slowdown in rentals and property values (DTZ Pamir and Soyuer 2010). Due to low housing loan ratio in Turkish market, the effect was quite limited on residential market and no sharp decline was observed in residential prices. Sharpe ratio is improved for office and retail sector for recovery period. It increased from 0.90 to 1.82 for office, while it increased from 0.68 to 1.43 for retail. To compare direct real estate and REIC performance by property types, the Sharpe ratios are computed for the same time period which both direct real estate and REIC data is available. The period start time and Sharpe ratio calculation are summarized in Table 11.

**Table 11** The Sharpe ratio for direct real estate and REICs by property types

	Period <sup>1</sup>	Direct real estate			REICs			
		Mean	St. dev	Sharpe		Mean	St. dev	Sharpe
Office	2002Q1	0.07	0.078	0.90	ISGYO	−0.01	0.217	−0.03
Retail	2002Q2	0.06	0.086	0.69	AGYO	0.01	0.241	0.05
	2010Q2	0.09	0.068	1.33	TSGYO	−0.05	0.118	−0.46
	2010Q4	0.08	0.062	1.27	TRGYO	−0.03	0.123	−0.21
Residential	2010Q1	0.13	0.048	2.75	SNGYO	−0.01	0.201	−0.06
	2011Q1	0.15	0.049	2.99	EKGYO	0.04	0.194	0.18

**Table 12** Turkish REICs characteristics

Characteristics	ISGYO	AGYO	TSGYO	TRGYO	EKGYO	SNGYO
Investor type	Developer/investor	Developer/investor	Developer/investor	Developer/investor	Developer	Developer
Investment strategy	Develop/hold	Develop/hold	Develop/hold	Develop/hold	Develop/sell	Develop/sell
Investment product	Income producing assets	Income producing assets	Income producing assets	Income producing assets	Residential sales	Residential sales
Core properties	Office	Retail	Retail	Retail	Residential	Residential
IPO date	1999	2002	2010	2010	2010	2007
Core business	Banking	Investment	Banking	Construc. company	Governm. institution	Construc. company

Direct real estate properties displayed quite well performance for all property types, compared to REICs performance for the same periods. The major characteristics of REICs may help to understand underlying reasons, which are summarized in Table 12. Turkish REICs can be categorized regarding their investor type, investment product and strategy (Pekdemir and Soyuer 2012). Among the selected REICs in this study, office and retail REICs focus on income producing property. They have conservative strategies and take less risk. In contrast, residential REICs are focused on residential sale, which force them to apply aggressive strategies with higher risk (Pekdemir 2013).

For office property, direct office properties provided good performance for 2002Q1–2012Q3 period. However, the negative Sharpe ratio for office REIC (ISGYO) indicates that its return is lower than the risk-free rate of return. As pointed above, ISGYO is a “developer/investor” REIC and has a “develop-hold” strategy. As one of the early period REICs, ISGYO developed its properties, mainly due to lack of investment grade product in Turkey. Considering long time period, the negative effect of the both Turkish banking crisis and also global credit crunch can be observed on its return. For retail properties, performance of direct retail properties is much better in all periods against retail REICs. Among retail REICs, only AGYO has positive Sharpe ratio, which means it generated an excess return for the holding period, although at a lower rate. The rest of them, TSGYO and TRGYO have negative Sharpe ratio. It can be explained that short time series data of TSGYO and TRGYO, which is not enough to explain risk adjusted return for the short term. Like office REIC, all selected retail REICs are also “developer/investor”, and their returns include “developer risk”. Compared to AGYO, the portfolio age of TSGYO and TRGYO are quite young and their portfolios have more development risk than AGYO. For residential properties, direct residential properties performed very well against residential REICs. Among residential REICs, only EKGYO can be able to produce excess return, although at a lower rate. It can be attributed to different characteristics and strategies of two companies. EKGYO is a government-oriented company and is the largest REIC, representing almost half of the total REIC market cap and NAV.

## 11 Concluding Remarks

As the government guarantees to subsidize on infrastructure REITs; it might generate a risk of moral hazard in future as stated for other emerging markets. The risk of Basel III requirements for emerging markets, as banks already hold most of their capital in form of equity and not ventured in hybrid forms of capital and transition directly to the more robust definition as Basel III makes the most sense for emerging countries. For construction and real estate industry; “high volatility commercial real estate” financing institutions will change construction loan lending which has to be lower Loan-to-Value ratios, increased down payment equity, and shorter durations and other factors. The changes may give an outcome of moving

commercial mortgage lending out of banking system to a commercial mortgage backed securities market or another unregulated market.

The performance of the direct real estate investments and REICs by different property types, office, retail and residential, is analyzed measuring risk-adjusted return. The results confirmed that the performance of direct real estate investments in all property types is quite well compared to REICs in the examining periods. In other word, direct real estate provides great return for less risk in Turkish market, however REICs provided less return for the same risk.

The analysis conducts for two different periods, 2002–2012 and 2010–2012. Results reveal that direct real estate investments performed better than REICs even in the long term. In contrast with international literature (Boudry et al. 2012; Hoesli and Oikarinen 2012; Yunus et al. 2012), no evidence is found that they can be substituted each other in portfolio allocation.

The weak performance of REICs can be attributed to their portfolio allocation. The current asset composition of Turkish REICs emphasizes development of their own assets, due to the lack of investment grade property portfolios in Turkey. REICs become a “developer’s vehicle” for construction companies and contractors. They act like “developer” instead of “investor” and also focus on “developer’s profit” instead of “rental income and “capital gains”. Their behaviours indicate unique characteristics of Turkish REICs, and therefore they may call as “Real Estate Development Companies—REDCs” (Pekdemir 2013).

In fact, the lack of investment grade product is a chronic problem in Turkish real estate market, both for direct investment and REICs. The investment grade office portfolio is limited with Grade A office properties in the primary areas. Besides, office investors also have started to adopt “develop and sell” strategy to take the advantage of creating source for finance by pre-sale of individual office units in the last a few years. Retail market looks more promising, due to high quality product availability and increasing interest of international investors that are looking for opportunities in emerging markets.

Among direct real estate investments, residential properties provide higher return compared to commercial properties. It should be noted a unique investment characteristic in Turkey, residential assets are considered for sale instead of income producing asset, compared with mature markets. No large companies invest in residential portfolios for leasing purposes, because residential properties provide much more return from capital gains and less income yield. Therefore, both individual and corporate investors prefer to take advantage of capital gain by residential sale. The aforementioned characteristics of Turkish REICs may be attributed to the three major reasons; the lack of investment product, difficulties in financing and benefiting tax advantage of REIC structure (Pekdemir 2013). First, the lack of investment grade products becomes a chronic problem for especially corporate investors. For this reason, REICs prefer to develop their own assets which force them to act like a developer instead of investor. Second reason is difficulties to provide financing. Especially residential properties are able to create source for finance by pre-sale of residential units. Thus, developer/investor can finance the remaining developments or buy land for new projects. Third, REICs provide tax advantage and especially

construction companies can benefit from this advantage. The major challenge to conduct this study is data availability, because no return indices for direct real estate investment are available for Turkish real estate market. The total return is calculated using transaction based data series for capital appreciation and income return components. This is the first attempt to use such transaction based series which is well documented in the international literature (Boudry et al. 2012; Hoesli and Oikarinen 2012; Daveney et al. 2012). Although the results of this study should be viewed with caution due to data availability, they still provide strong evidence on good performance of direct real estate investments against REICs, for both residential and commercial properties. The performance of the direct and indirect real estate investments are analyzed by only risk-adjusted return. Other factors, which may help to measure portfolio performance of the investments, should be incorporated into the analysis and also more sophisticated models should be used in the further studies. Besides, other specialized REICs, hotel and industrial, will be included in the analysis in the forthcoming research, when adequate time series data will be available. Finally, the size of REICs and also investment markets in Turkey is quite low compared to mature markets. However, this study may provide a contribution to international literature by analyzing an emerging real estate market. For further steps, more research is required to understand market characteristics and underlying reasons.

## Appendix 1

See Table 13.

**Table 13** Market capitalization and NAV, 2012Q3 (CMBT)

	REIC	NAV (million USD)	Market cap (million USD)	Premium/discount (%)
AFGYO	AKFEN	611.3	164.3	-73.1
AKMGY	AKMERKEZ	527.1	384.4	308.8
ALGYO	ALARKO	128.1	110.4	-13.8
AGYO	ATAKULE	126.6	54.8	-56.7
AVGYO	AVRASYA	44.8	22.5	-49.8
DGGYO	DOĞUŞ-GE	110.9	82.7	-25.5
EGYO	EGS	75.8	6.1	-91.9
EKGYO	EMLAK KONUT	4266.5	3,459.3	-18.9
IDGYO	İDEALİST	5.2	16.2	213.4
ISGYO	İŞ	725.7	448.6	-38.2
KLGYO	KİLER	265.3	121.1	-54.4
MRGYO	MARTI	119.9	32.5	-72.9
NUGYO	NUROL	276.5	184.6	-33.3
OZGYO	ÖZAK	450.5	197.1	-56.2
OZKGY	ÖZDERİCİ	72.9	42.4	-41.8

(continued)

**Table 13** (continued)

	REIC	NAV (million USD)	Market cap (million USD)	Premium/discount (%)
PEGYO	PERA	122.4	27.9	-77.3
RYGYO	REYSAŞ	245.7	79.6	-67.6
SAFGY	SAF	402.9	450.2	11.7
SNGYO	SİNPAŞ	1,087.7	425.2	-60.9
TRGYO	TORUNLAR	2,372.1	783.9	-67.0
TSGYO	TSKB	193.9	57.8	-70.2
VKGYO	VAKIF	107.6	212.7	97.6
YGYO	YEŞİL	619.5	89.2	-85.6
YKGYO	YAPI KREDİ KORAY	62.7	28.8	-54.1

## Appendix 2

### Endnotes

1. BIST Companies Monthly Price and Return Data: Monthly and compounded returns of equities were calculated by using the closing prices on the last trading day of each month. Compounded returns are calculated with the following assumptions:
  - the dividend received during the month is reinvested to buy back the concerning equity at the closing price at the end of the month,
  - pre-emptive rights are exercised in case the price of the equity exceeds its subscription price.

The prices of new shares (shares that are not entitled to dividends from previous year's net profits) were not taken into account in the calculation of returns. The abbreviations used in the tables and the definitions of the terms are indicated below.

HAF/İİF: Initial public offering or first trading price.

PRICE: The closing price of a equity with a nominal value of TL 1,000/TRY 1 on the last trading day of the month unless stated otherwise. If the equity is not traded during the month, it is the last closing price of the equity.

MONTHLY RETURN: The monthly return of a equity is calculated according to the following formula. US Dollar based monthly returns are calculated by adjusting the TL/TRY based returns according to monthly devaluation rate of US Dollar.

$$G_i = \frac{F_i \cdot (BDL + BDZ + 1) - R \cdot BDL + T - F_{i-1}}{F_{i-1}}$$

$G_i$	Return for the month “i”
$F_i$	The closing price the equity on the last trading day of the month “i”
BDL	The number of rights issues received during the month
BDZ	The number of bonus issues received during the month
R	The price for exercising rights (i.e. subscription price)
T	The amount of net dividends received during the month for a equity with a nominal value of TL 1,000/TRY 1
$F_{i-1}$	The closing price of a equity on the last trading day of the month “i - 1”.

Compounded Return: This shows the value of a equity that is sold and bought at the end of each month relative to its value at the beginning period and is calculated according to the following formula. In calculation of US Dollar based compounded returns, US Dollar based monthly returns are used.

$$BG_n = (1 + G_1)(1 + G_2) \dots (1 + G_n) = \prod_{i=1}^n 1 + G_i$$

$BG_n$  The compounded return for the month “n”

$BG_i$  The compounded return for the month “i”

$G_i$  Return for the month “i”

n The number of periods (months)

Source <http://borsaistanbul.com/en/data/data/price-and-return-data>.

- The HPI, which covers the whole country, is constructed for the purpose of monitoring price movements in the Turkish housing market. Price data related to all houses subject to sale, regardless of the construction year are used to develop the HPI. In the housing market, as the prices of properties become available when they are actually sold, house prices indicated in valuation reports prepared at the time of approval of individual housing loans are used as a proxy for price. The actual sale of the property and utilization of the loan is not required and all houses appraised are included in the scope. To construct the House Price Index for Turkey (THPI) representing the whole country, all valuation reports are used, whereas, to construct the New Housing Price Index for Turkey (TNHPI) again representing the entire country, valuation reports for houses built in the current and previous years are used.

New Housing Price Index for Turkey (TNHPI): Price index for houses constructed in the current year and the previous year, which covers the whole country. The HPI series which starts in January 2010 is issued within 40 days following the 3-month reference period it covers (For index release dates, please refer to:

<http://www3.tcmb.gov.tr/veritakvim/calendar.php>) Indices produced are accessible under the Data/Periodic Data/House Price Index menu on the CBRT website.



## References

- Aktan, B., & Öztürk, M. (2009). Empirical examination of REITs in Turkey: An emerging market perspective. *Journal of Property Investment & Finance*, 27(4), 373–403.
- Altunsoy, G., Erol, I., & Yıldrak, S. (2010). Time-varying beta risk of Turkish real estate investment trusts. *Middle East Technical University Studies in Development*, 37(2), 83–114.
- Arslanlı, K., Pekdemir, D., & Lee, S. (2011). Initial return performance of Turkish REIC IPOs. In *Paper presented at the 18th ERES Conference*, Eindhoven, 15–18 June 2011.
- Baum, A. (2006). *Real estate investment through indirect vehicles: An initial view of risk and return characteristics*. Retrieved December 2012 from <http://www.inspen.gov.my/inspen/v2/wp-content/uploads/2009/08/Plenary-IRERS-2006-International.pdf>
- Boudry, W., Coulson, N. E., Kallberg, J. G., & Liu, C. H. (2012). On the hybrid nature of REITs. *Journal of Real Estate Finance and Economics*, 44, 230–349.
- Chou, R. K., Ho, K., & Lu, C. (2013). The diversification effects of real estate investment trusts. *A Global Perspective Journal Of Financial Studies*, 21(1), 1–27.
- Daveney, S., Xiao, Q., & Clacy-Jones, M. (2012). *Listed and direct real estate investment: A European analysis*, EPRA Research Brussels.
- DTZ Pamir & Soyuer. (2010). *Property times 2010 Q1*. Investment Transaction Database: Property Market Indicators.
- Erol, I., & Tırtıroğlu, D. (2008). The inflation-hedging properties of Turkish REITs. *Applied Economics*, 40(19–21), 2671–2696.
- Erol, I., & Tırtıroğlu, D. (2010). Concentrated ownership, no dividend payout requirement and capital structure of REITs: Evidence from Turkey. *Journal of Real Estate Finance and Economics*, 43(1–2), 174–204.
- Geltner, D., Miller, N. G., Clayton, J., Eichholtz, P. (2001). *Commercial real estate analysis and investments* (2nd Ed.). South-Western Educational Publication.
- Gyamfi-Yeboah, F., Ling, D. C., & Naranjo, A. (2012). Information, uncertainty, and behavioral effects: Evidence from abnormal returns around real estate investment trust earnings announcements. *Journal of International Money and Finance*, 31(7), 1930–1952.
- Hamzah, A., Mohammad Badri, R., & Tahir, I. (2010). Empirical Investigation on the performance of the Malaysian real estate investment trusts in pre-crisis, during crisis and post-crisis period. *International Journal Of Economics and Finance*, 2(2), 62–69.
- Hodges, S. (1998). *A generalization of the sharpe ratio and its applications to valuation bounds and risk measures*, Working Paper, Financial Options Research Centre, University of Warwick.
- Hoesli, M., & Oikarinen, E. (2012). Are REITs real estate? Evidence from international sector level data. *Journal of International Money and Finance*, 31, 1823–1850.
- Ling, D., & Naranjo, A. (2003). The dynamics of REIT capital flows and returns. *Real Estate Economics*, 31(3), 405–434.
- Pavlov, A. & Wachter, S. (2010). REITs and underlying real estate markets: Is there a link? Working Paper. Retrieved December 2012 from <http://realestate.wharton.upenn.edu/research/papers/full/693.pdf>
- Pavlov, A., & Wachter, S. (2011). Subprime lending and real estate prices. *Real Estate Economics*, 39(1), 1–17.
- Pekdemir, D. (2013). Turkish REICs: Real estate investment or real estate development companies? In S. McGreal & R. Sotelo (Eds.), *Real estate investment trusts in Europe—Evolution, regulation, and opportunities for growth*. Springer,—forthcoming.
- Pekdemir, D., & Soyuer, F. (2012). *Turkish REICs or REDCs: Analysis of the effect of asset allocation on return*. Paper presented at the 19th ERES Conference, Edinburgh, 15–18 June 2012.
- Pham, A. (2012). The dynamics of returns and volatility in the emerging and developed Asian REIT markets. *Journal Of Real Estate Literature*, 20(1), 79–96.
- Sharpe, W. F. (1966). Mutual Fund Performance. *Journal of Business*, 39(1), 119–138.

- Sharpe, W. F. (1994). The Sharpe ratio. *The Journal of Portfolio Management*, 21(1):49–58. Retrieved December 3, 2012 from <http://www.stanford.edu/~wfsarpe/art/sr/sr.htm>
- Springer, T. M. & Cheng, P. (2006). Real estate property portfolio risk: Evidence from REIT portfolios, real estate research institute, Annual Conference Chicago, Illinois April 27–28 2006.
- Tuluca, S., Myer, F. C. N., & Webb, J. R. (2000). Dynamics of private and public real estate markets. *Journal of Real Estate Finance and Economics*, 21(3), 279–296.
- Türkmen, S. Y., & Demirel, E. (2012). Economic factors affecting financial ratios: Real estate investment trusts case on ISE. *European Journal of Scientific Research*, 69(1), 42–51.
- Yunus, N., Hansz, J. A., & Kennedy, P. J. (2012). Dynamic Interactions between private and public real estate markets: Some international evidence. *Journal of Real Estate Finance and Economics*, 45, 1021–1040.
- Zakamulin, V. & Koekebakker, S. (2008). Portfolio performance evaluation with generalized Sharpe ratios: Beyond the mean and variance (February 8, 2008). SSRN:<http://ssrn.com/abstract=1028715> or <http://dx.doi.org/10.2139/ssrn.1028715>
- Zhou, J. (2012). Multiscale analysis of international linkages of REIT returns and volatilities. *Journal of Real Estate Finance and Economics*, 45, 1062–1087.
- Ziembra, W. (2005). The symmetric downside—risk Sharpe ratio. *Journal of Portfolio Management*, 32(1), 108–122.