RISK AND RETURN IN THE REAL ESTATE, BOND AND STOCK MARKETS

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Abstract

Studies investigating the relation between risk and return occupy an important place in the discussion about the effectiveness of investing in real estate. A review of the available studies shows that real estate investments are less profitable than stocks, but in terms of risk and return, are usually the best option. This worldwide regularity may not necessarily be presented in Poland, as the Polish market is not fully fledged yet. The analysis presented in this article was performed with a view to reducing a research gap resulting from the lack of comprehensive Polish studies in this field.

In the article, data spanning the years from 2006 to 2016 are examined by means of descriptive statistics, measures of risk, and the analysis of variance (ANOVA) to determine which of the following investment vehicles – bonds, real estate or stocks – offer the best risk-return ratio.

The article has two parts. The analytical part is a review of studies on risk measurement methods and of earlier studies investigating risk and return by a class of assets (particularly real estate). In the empirical part, assets are compared with the use of statistical methods.

The results of the risk-return analysis point to the money market as the best option for investors. Stocks and real estate ranked second and third, respectively.

Key words: risk, real estate market, standard deviation, semi-standard deviation.

JEL Classification: G11, G12, R31.

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1. Introduction

The globalization of economies, free flows of capital and, last but not least, households' increasing knowledge of economic issues have caused investors to be increasingly interested in new investment opportunities. This leads to the demand for information about the effectiveness of various investment vehicles. Because investment effectiveness can be considered as a ratio between risk and return, both of these factors gain importance. An analysis of risk and return becomes one of the prerequisites in making investment decisions. The ranking of investments by risk usually arranges them in the following order: bonds, real estate and stocks, with bonds being the safest and stocks the riskiest. A closer analysis of risk-return ratios shows, however, that real estate is frequently more effective as an investment vehicle than stocks are (see NEWELL, et al. 2013). This contradicts the theory that, in a balanced market, greater risk comes with higher return. The pattern is thoroughly discussed in the literature, starting with portfolio analysis through the market equilibrium models (BODIE, et al. 2014 p. 168; BRZEZICKA, WIŚNIEWSKI 2014). It was also adopted as the starting point for this study, which was designed to reduce the gap in the Polish scientific debate. The knowledge of how investment vehicles differ in term of risk-return ratios is of practical value for investors, as it provides them with a better insight into the labor market situation. The study was also intended as a stepping stone in the analysis of risk-ratio patterns contributing to the advancement of science.

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The Polish market most likely differs from mature markets, seeing as how research shows that the perception of investment risk may be significantly influenced by the type of investment and the level of market development (DIETTMANN 2007). Moreover, investors tend to assess investments using criteria such as capital security, liquidity, inflation, nominal interest rates, return, expected dividends, and the likelihood of the invested capital gaining in value, and these factors can be specific to a given country (MCCUE, KLING 1994; TROJANEK 2008; AYODELE, OLALEYE 2015; PAVLOV, et al. 2015)

All these aspects were addressed in formulating the objective of this article, which seeks to establish which of the three investment vehicles – bonds, real estate and stocks – should be preferred in regards to the risk-return ratio. The research hypothesis states that, in the Polish market, as it is observed in mature markets, indirect investments in housing property are the most effective. The hypothesis is tested using descriptive statistics, measures of risk, and the analysis of variance (ANOVA) that allows capturing relations between the means of the investigated statistics. ANOVA was also used in similar studies of the world markets.

2. Measures of investment risk

The selection of risk measures, a topic widely covered in the literature, is still a debatable issue. The question about whether standard deviation or semi-standard deviation is a better measure of total risk has not been answered yet. When the standard deviation is applied, each difference between the real value and the expected value is considered to represent risk. In the case of the semi-standard deviation, only downside standard deviations from the value expected by the investor involve risk. Risk is therefore perceived as the probability of earning lower income than expected, i.e. as a real or relative loss (measured against expectations). The use of a standard deviation as a measure of risk arises from the classical approach, represented mainly by the portfolio analysis. (MARKOWITZ 1952). A semi-standard deviation assesses the risk of an investor earning a lower return than they expected when making the investment. It gives investors a much more realistic insight into the level of risk and likely gains than a standard deviation does, because it shows them the true risk that an investment will fall short of their expectations, rather than sugarcoating the reality (CHENG 2005). Studies based on the classical equilibrium model show that investors using the downside risk measures are awarded with a higher market premium (SIVITANIDES 1998; SING, ONG 2000, ANG et.al. 2006). Some authors attribute this phenomenon to financial data skewness. Risk measured with a semi-standard deviation is understood as the probability of return being lower than expected (HARLOW, RAO 1989). The analysis of risk in the framework of behavioral finance leads to similar conclusions. It has been observed that investors tend concentrate on successes rather than failures. When investors give as much attention to downside standard deviations as to upside standard deviations as a measures of risk, they run the risk that their return will be lower than expected. The phenomenon is known as "excessive optimism" (Tyszka, Zielonka 2002; Utkus 2006; Fellner 2009; de la Rosa 2011; Gajdka 2013 p. 37). According to some studies, using the downside measures of risk may lead to the underestimation of investment risk when asset prices, e.g. real property prices, are rising fast (WOLSKI 2013).

An important element of the analysis of risk is its variability in time, i.e. changes occurring over the maturity period (Ferson, et.al. 1987, Cooper, Priestley, 2009). Because investors tend to form their expectations from the historical rates of return, it is very likely that they also use historical data also to assess risk. This observation is of significance for this analysis.

3. Studies on the level of risk

The available studies present a classical and intuitive ranking of investment vehicles by the level of risk. Investments in the money market are considered the least risky, and then investments in real estate and investments in the capital market that offer a range of options. This ranking can be found in many studies, the authors of which also stress that investing in real estate is relatively safe. For instance, it has been confirmed by the results of US studies reviewed by KUCHARSKA-STASIAK (2006, p. 202). A different ranking is, however, obtained when investments are analyzed in terms of their effectiveness, i.e. risk-return ratios. Studies investigating risk and return with respect to individual assets are readily available, so it is easy to find works relevant to this subject. For instance, in the introduction to their article on the probit model of losses in the housing property market, JUD et.al. (2005) compared risk and return between US stocks included in the S&P500 index and investments in housing properties represented by the OFHEO index of house prices in the years 1975-2003. Risk was

assessed for investment periods of 1 ,3 ,5 and 7 years by means of a standard deviation. The authors concluded that stocks were a more profitable investment, but also riskier. WEBB and RUBENS (1995) reached a similar conclusion. They considered a wide range of assets such as T-bonds, corporate bonds, stocks, small companies' stocks, housing and commercial properties and farming land based on the 1960-1986 data on the US market and measured their risk using standard deviation. They found T-bonds to be the safest investment option and small companies' stocks the riskiest; real estate ranked in between. CHAN et.al (1990) analyzed returns on REITs in the years 1973-1987 by studying risk-return ratios based on the monthly rates of return. Compared with stocks, REITs proved to be a less risky investment option. HUTCHINSON (1994) compared the 1984-1992 rates of return on investments in the UK housing property market with other investment vehicles, finding the former to be safer as well as less profitable.

The conclusions of most studies on the developed US market are not different from the results of investigations into other markets. LIOW (2001) analyzed the rates of return and standard deviations for all stocks and real estate companies listed at the Singapore Stock Exchange (SGX) using to this end the respective indices. Real estate was analyzed with respect to three indices: for residential properties, commercial properties and industrial properties. The study showed that although in the years 1975-1996 stocks yielded higher returns than real estate, they were also a less certain option.

The profitability and risk of real estate as an investment vehicle is discussed in many papers on the Polish market. TROJANEK and TROJANEK (2012) studied price changes in the real estate markets in the biggest Polish cities from 1997 to 2011 to estimate returns on investments in real estate. DITTMANN (2016) analyzed the stocks of Polish development companies in the years 2001 2015 focusing on the differences in risk and rates of return. She found the market to be was heterogeneous, as well as significant differences in the characteristics of stocks of individual developers. WOLSKI (2016) studied the housing property market and the capital market to determine risk-return ratios for both markets. Investments in housing property proved safer as well as more profitable, a finding contrasting with what is observed in developed markets. The identified discrepancy, probably due to the specifics of the geographical region, substantiates further research, particularly that the mainstream research in Poland rarely extends to the comparative analysis of the markets. The author of this article was unsuccessful in finding relevant scientific reports on this topic.

4. Investigation into the levels of risk and return

This study of the money, real estate and capital markets was inspired by the wish to reduce the area omitted by studies on risk and return. To accommodate different risk measurement methods, both standard deviation and semi-standard deviation measuring downside risk were employed. A research hypothesis was formulated that in Poland, as in developed markets, indirect investments in housing properties are the most effective (have the best risk-return ratio).

3.1. Data

The analysis focused on the T-bond index (TBSP.Index) representing the money market and the main stock market indices (the broadest-based WIG index, the WIG20 index made up of 20 companies with the largest capitalization, and the WIG Nieruchomości index measuring the performance of companies in the real estate sector). Information about the indices was sourced from the Warsaw Stock Exchange. The real estate market was analyzed using the hedonic index of housing prices in the secondary market. The necessary price quotations of the index were obtained from Narodowy Bank Polski. Almost all of them concern the period from the 3rd quarter of 2006 to the 3rd quarter of 2016. On account of the limited availability of the data, somewhat shorter data series were used to study the TBSP.Index (from the 4th fourth quarter of 2006) and the WIG Nieruchomości index (from the 1st quarter of 2007). For all indices, the quarterly rates of return were computed. From the 2nd quarter of 2010 on, the quarterly rates of return from the preceding period were used to calculate standard deviations and semi-standard deviations. The average rates of return were estimated for the same periods as standard deviations. Except for the TBSP.Index and WIG Nieruchomości for which initial deviations and rates of return were calculated for shorter periods because of insufficient data series, all other standard deviations and average rates of return were calculated for a moving period of 15 quarters.

3.2. Methodology

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To carry out the investigation, 26 observations, standard deviations, semi-standard deviations and moving average rates of return were used. The analysis of risk-return ratios started with the calculation of volatility coefficients for each index. In the next step, the one-way ANOVA was used to assess the probability that successive samples would yield the same expected values. Should they proved to be different, the research hypothesis about particular investment vehicles differing in risk and rates of return would be confirmed.

To find out if variances between two groups were statistically significantly equal, the Levene's tests were additionally performed. The results of the tests caused that a null hypothesis about the equality of means from the samples was tested using the Welch test and the less rigorous Brown-Forsythe test. Thereafter, both these tests and the one-way ANOVA were used to test the null hypothesis about the equality of means against its alternative. Using the Levene's tests, the null hypothesis about the homogeneity of variances and the alternative hypothesis were verified. All tests were performed with the use of the SPSS software package.

3.3. Research results

First of all, a preliminary analysis of the descriptive statistics of the selected investment vehicles was carried out. In addition to measuring total risk with standard deviation and semi-standard deviation, the average rates of return and the volatility coefficient (calculated as a quotient of standard deviation or semi-standard deviation and a rate of return) were also analyzed.

The volatility coefficient as a measure of risk-return ratios pointed to investments in the money market (the TBSP.Index) as the most advantageous. Investments in the stock market (the WIG index) ranked second. The ranking of investment vehicles based on the risk-return ratios was unaffected by whether a standard deviation or a semi-standard deviation was used to measure risk. Volatility coefficients for investments in housing property, WIG Nieruchomości and WIG 20 were not analyzed because their values were negative.

								Table 1
		Descripti	ve stat	tistics of s	uccessive inves	stments		
	Standard							
					coefficient			
					the observed			
			Ν	Mean	variable	Minimum	Maximum	
Standard	housing		26	.0224	.01224	.01	.07	-12.1709
deviation	Bonds		26	.0160	.00159	.01	.02	1.0006
	WIG Nier	ruchomosci	26	.1543	.06664	.06	.24	-8.0306
	WIG		26	.1054	.03855	.06	.16	8.7342
	WIG20		26	.1005	.03207	.05	.15	-73.1955
	Total		130	.0797	.06480	.01	.24	n/o
	Model	Fixed effects			.03770			
Downside semi-standard deviation	housing		26	.0136	.00121	.01	.02	-7.3771
	Bonds		26	.0067	.00127	.00	.01	0.4196
	WIG Nier	ruchomosci	26	.0934	.03496	.03	.14	-4.8635
	WIG		26	.0582	.02169	.02	.09	4.8264
	WIG20		26	.0634	.01643	.03	.09	-46.1343
	Total		130	.0471	.03804	.00	.14	n/o
	Model	Fixed effects			.01983			
Average rate of	f housing		26	0018	.00808	01	.03	n/o

REAL ESTATE MANAGEMENT AND VALUATION



return	Bonds		26	.0160	.00229	.01	.02	n/o
	WIG Nieru	WIG Nieruchomosci		0192	.02250	05	.02	n/o
	WIG		26	.0121	.01470	01	.05	n/o
	WIG20		26	0014	.01438	03	.04	n/o
	Total		130	.0011	.01867	05	.05	n/o
	Model	Fixed			01414			
		effects			.01414			

Source: Own study.

The comparative analysis of descriptive statistics created a classical risk-based ranking of investments. At the same time, the different values of descriptive statistics within an asset class were not found to affect the ranking of investments based on risks measured by standard deviation and semi-standard deviation. The money market investments proved the least risky again, followed by investments in the secondary housing market. The riskiest investment vehicle was stocks. The ranking of assets turned out to be sensitive to the type of risk measure. As far as total risk is concerned, it was the highest for developers' stocks, smaller for stocks included in the WIG index and the smallest, regarding this class of assets, for the WIG20 stocks. The highest downside risk was noted for the WIG Nieruchomości stocks, lower for the WIG20 stocks and the lowest for the WIG stocks. Interestingly, the type of risk measure used had little effect on changes in the ranking of investments. The observed changes were small and unimportant for the research conclusions.



Fig. 1. Risk and rates of return. Source: developed by the author.

The conclusions drawn from the analysis of risk and return and from the analysis of volatility coefficients were consistent with each other. Bonds proved to be the most effective investment vehicle. Stocks included in the WIG index had a positive rate of return, but for the risk-return ratio they were less advantageous than bonds. Investments in housing property, WIG20 index and WIG

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Nieruchomości index are difficult to assess because of negative rates of return. Bonds were also the least risky investment (average risk indicated by standard deviation and semi-standard deviation was 1.6% and 0.67%, respectively) and offered the best rate of return – 1.6%. The second-safest investment vehicle was secondary housing properties. In this case, investment risk was estimated at 2.24% (standard deviation) and 1.36% (semi-standard deviation), but the average rate of return was 0.18%. Of all investments considered in this study WIG stocks were the riskiest. Standard deviation and semi-standard deviation showed their risk to be 15.43% and 9.34%, respectively. At the same time, however, they yielded a positive return of 1.21% on average.

With all differences between the rankings of investments based on risk and return, it is still possible to try to rank them according to effectiveness (risk-return ratios), even if negative rates of return render this approach somewhat doubtful, because assuming that investors would want to consider a negative-yielding investment contradicts the idea of a rational investor. In the ranking of investments by effectiveness as arising from this study bonds are at the top, followed by investments in WIG, WIG Nieruchomosci, housing property and WIG20.

In the next step of the study, differences between the mean values of statistics were investigated using a one-way ANOVA.

Table 2

Table 3

Variance homogeneity test								
	Levene's test	df1	df2	Significance				
Standard deviation	63.201*	4	125	.000				
Downside semi-standard	18.912*	4	125	.000				
deviation								
Average rate of return	17.882*	4	125	.000				

* significant at 0.01.

Source: developed by the author.

An important assumption of one-way ANOVA is that about the homogeneity of variance within the tested samples. To find out if variances were really homogenous, the Levene's test was carried out. Based on its results presented in Table 2, the null hypothesis predicting the equality of variances in all investigated cases was rejected in favor of the alternative. Therefore, for ANOVA to be performed, two rigorous tests for the equality of means (the Welch test and the Brown-Forsythe test) had to be applied. The results of one-way ANOVA are presented in Table 3.

One-way ANOVA								
		Sum of						
		squares	df	Mean square	F	Significance		
Standard deviation	Between groups	.364	4	.091	64.015*	.000		
	Within groups	.178	125	.001				
	Total	.542	129					
Downside semi-	Between groups	.138	4	.034	87.490*	.000		
standard deviation	Within groups	.049	125	.000				
	Total	.187	129					
Average rate of	Between groups	.020	4	.005	24.995*	.000		
return	Within groups	.025	125	.000				
	Total	.045	129					

* significant at 0,01.

Source: developed by the author.

In all cases, the confirmation of the equality of means was statistically significant for both risk and moving average rates of return at a rigorous significance level of 1%.



Table 4

		Statistics ^a	df1	df2	Significance
Standard deviation	Welch	105.037	4	50.523	.000
	Brown-	64.015	4	54.896	.000
	Forsythe				
Downside semi-	Welch	227.113	4	57.203	.000
standard deviation	Brown-	87.490	4	54.027	.000
	Forsythe				
Average rate of	Welch	49.626	4	52.975	.000
return	Brown-	24.995	4	71.383	.000
	Forsythe				

Robust tests of the equality of means

a Asymptotic F-distribution

* significant at 0.01.

Source: developed by the author.

The above results and the results of rigorous tests investigating the equality of means are consistent with each other (see table 4), meaning that the null hypothesis about the equality means should be rejected in favor of its alternative. The results of analysis confirm the rankings of asset classes according to risk and return.

The effectiveness ranking of investments is supported by statistically significantly different values of risk and return obtained from one-way ANOVA.

4. Conclusions

The study showed that the rankings of investment vehicles based on risk measured with standard deviation and downside semi-standard deviation correspond to those presented in all cited studies. However, the analysis of investment effectiveness (risk-return ratios) showed the Polish market and developed markets to be different. Of the investigated assets, T-bonds (the TBSP.Index) were the most effective, stocks (the WIG index) ranked second and the stocks of companies in the real estate sector (WIG Nieruchomości) ranked third. Real properties covered by the hedonic price index for housing properties traded in the secondary market ranked still lower. The least effective turned out to be the stocks of the biggest Polish companies making up the WIG20 index. The correctness of these ranking were confirmed by one-way ANOVA, which showed that different types of investments involved different mean values of risk and return. As a result, the research hypothesis was rejected. In Poland, investments in housing properties are not the most effective, which contrasts with the conclusions of the cited international studies.

Interesting 'added value' of the study is showing that investment in companies in the real estate sector does not reduce risk typical of investing in stocks, and that its level is comparable with the risk related to the blue-chip companies' stocks. The limited scope of analysis of the stock market does not allow deeper conclusions to be drawn, though.

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