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LISTING OF DEVELOPER COMPANIES AS A PREDICTOR OF THE SITUATION ON THE RESIDENTIAL REAL ESTATE MARKET

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Abstract

The stock exchange is considered one of the most important financial institutions in the market economy. The stock market reacts to the state of the economy almost immediately, and, in the end, the quotations of companies affect the state of other markets. The author decided to look at companies from the WIG Real Estate index as important entities shaping the real estate market. When comparing the situation on the capital market with the situation on the residential real estate market, one could, building an appropriate model, conclude how much these markets interact.

Purpose - The purpose of the article is to present the links between two important markets, the capital market, with real estate companies as its representatives, and the secondary housing market. In order to achieve the goal, a research hypothesis was formulated: the economic situation on the real estate companies market will be reflected in the situation on the secondary housing market.

Design/methodology/approach - Cross-sectional regression analysis was used in the study. Using the data from the Warsaw Stock Exchange and the National Bank of Poland, regression models where price changes in the secondary housing market are explained by the quotations of real estate companies and selected stock exchange indices were built. The study was carried out from the first quarter of 2011 to the third quarter of 2017.

Findings - Two models were built in which the rates of return on investments in real estate companies explain the price changes in the secondary housing market in a statistically significant way. Thus, the research hypothesis was positively verified, showing that the real estate market and the stock market of real estate companies are interrelated.

Originality/Value - The alternative method of analyzing the real estate market can be considered as the original value of the presented results. A demonstration of the connections between both markets allows us to validate the methods used on the stock market to analyze the real estate market. An example application is the use of methods for estimating the cost of capital from the stock market in the real estate market.

Key words: *real estate market, stock market, stock and real estate correlation, share and real estate dependence*.

JEL Classification: *G11, G17, R30, R31, R39*.

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1. Introduction

Intuition suggests that housing prices influencing the condition of real estate companies should be reflected in the quotes of developer companies on the stock exchange. If such a relationship exists, the prices of the shares of the real estate companies included in the WIG Real Estate index should explain the changes in the level of prices on the real estate market. Finding such a link will have a significant impact on the entire market. First of all, the modest analysis of the processes taking place on it will be

facilitated by extending the range of methods explaining the state of the market. In addition, the linking of the stock market with the real estate market may give rise to the extension, in a manner that is in agreement with the research results, of the methods used on the stock market for the real estate market. Thus, such a study may affect, for example, the methodology of calculating the level of systemic risk in the real estate market. The beta factor described by the CAPM (e.g. JENSEN 1968) is commonly used to determine the level of the cost of equity capital, and thus the valuation of commercial real estate using the income method (e.g. DCF). This problem has been known to researchers for a long time, causing doubts about the calculation of the beta with the use of the stock index, which does not include real estate prices (VOICU, SEILER 2013). On the other hand, beta calculation using the real estate price index leads to a narrowing of the analysis of the risk level only to the real estate market, causing a lack of comparison with the risk of other investments (WOLSKI 2014). From the point of view of the author of this article, such an application of the model being built is the most important, but it should be clearly stated that it is not the only one. One can imagine a situation in which an appropriate model allows for a price forecast on the real estate market. Such an action, as well as linking real estate prices with the prices of real estate companies, may lead to an increase in the credibility of data from the real estate market (WILSON et al. 1996). It is known that this market is struggling with specific problems of the foreign stock market, including, above all, the lack of transparency of transactions, continuity of quotations, and finally, the incomparability of the objects of transactions (MACLENNAN et al. 1998). Thus, the purpose of the article is to present the links between two important markets, the capital market, with real estate companies as its representatives, and the secondary housing market. In order to achieve this goal, a research hypothesis was formulated: the economic situation on the real estate companies market will be reflected in the situation on the secondary housing market.

2. Literature overview

A number of researchers deal with the problem of the correlation between the real estate market and the stock market. Research is conducted in the context of the wealth effect, the crowding-out effect, the substitution effect and portfolio theory. These effects also explain the integration of both markets. Xiaohui et al. showed that the stock market and real estate markets could, in some way, be correlated, and the results of tests such as the ADF test, co-integration test or Granger Causality test show that these markets are integrated (XIAOHUI et al. 2012). And so, in the context of portfolio theory, KIM HIANG showed positive relations between the real estate market and the stock market, pointing out that this relationship could be used to diversify investment directions and make the composition of the investment portfolio more attractive (KIM HIANG 2006). Similar conclusions have also been drawn by OKUNEV and WILSON in the context of portfolio analysis. In their research, they showed that a relationship between the real estate market and the stock market exists, however, it is quite weak and non-linear (OKUNEV, WIISON 1997). Similar conclusions were also drawn in the work of OKUNEV et al., though this time the researchers pointed out a strong dependency between the real estate market and the stock market, where the real estate market was represented by REITs and the S&P 500 stock market (OKUNEV et al. 2000). Subsequent studies of the same authors were made on the Australian market. This time, in the context of investment portfolio diversification, the relationship between the stock market and the real estate market was examined, with the stock market being represented by the oldest and the widest Australian All Ordinaries share price index, while the real estate was represented by the real estate price index. Research has shown that both markets are interrelated, with the stock market influencing prices on the real estate market. A weak linear relationship and a nonlinear relationship were detected. However, price movements on both markets are delayed, with the stock market outstripping the price movement in the real estate market. As the authors point out, this delay can be used to obtain an above-average rate of return on investment (OKUNEV et al. 2002). In the context of investment decisions, this time however referring to the Arbitrage Pricing Model, WILSON et al. studied various asset portfolios checking the degree of integration of real estate and stock markets in Australia. It was not possible to draw statistically significant conclusions from the study, but it seems that shares and real estate cannot be included in the same asset class (WILSON et al. 1996). Meanwhile, research carried out by WOLSKI showed that the Capital Asset Pricing Model can be successfully applied on the residential real estate market in Poland (WOLSKI 2014). QUAN and TITMAN extended their real estate and stock market research to 17 countries. In the long run, a positive

correlation was found everywhere between the markets. The analysis also shows that real estate is an effective investment that protects capital against the effects of inflation (QUAN, TITMAN 1999).

Studies on the relationships between stock and real estate markets have been conducted in many countries using different research methods. So many have been used that it seems unnecessary to cite them all, especially in the context of the results. Although they usually differ from each other, they do have one conclusion in common – relationships between real estate and stock investments are always found (HEANEYI, SRIANANTHAKUMAR 2012; TIEN FOO SING, ZHUANG YAO TAN 2013; KIM HIANG et al. 2009; YANG et al. 2012; SZUMILO et al. 2018).

In Polish conditions, research on the relationship between the stock market and the real estate market is not as common as on developed markets; however, the issue of price and the rate of return on the real estate relationship with other economic factors, or the impact of certain factors on property prices, is quite widespread (ŻELAZOWSKI 2011; TROJANEK 2012; BEŁEJ, KULESZA 2015; DITTMANN 2016; KUBUS 2016; FORYŚ, TARCZYŃSKA-ŁUNIEWSKA 2017; WOLSKI 2017).

3. Evidence on real estate and stock markets

The study was designed to verify how both types of markets, real estate and stock markets, interact with each other. The purpose of the study is to present the links between two important markets in the economy, i.e.: the capital market, with real estate companies as its representatives, and the secondary housing market. In order to achieve the goal, a research hypothesis was put forward: the economic situation on the real estate development market will be reflected in the situation on the secondary housing market.

3.1. Data

The analysis was based on data from the secondary market of residential real estate represented by the hedonic price index of the National Bank of Poland for 10 (Bialystok, Bydgoszcz, Katowice, Kielce, Lublin, Olsztyn, Opole, Rzeszow, Szczecin, Zielona Gora), 7 (Gdansk, Gdynia, Lodz, Krakow, Poznan, Warsaw, Wroclaw) and 6 (Gdansk, Gdynia, Lodz, Krakow, Poznan, Wroclaw) cities in Poland, as well as data from the Warsaw Stock Exchange. Stock exchange data included the WIG and WIG Real Estate indices as well as all companies from the WIG Real Estate index. The quotations included splits, dividends and pre-emptive rights. For all observations, the quarterly percentage rates of return were calculated. The equation to calculate quarterly percentage rate of return is presented below:

$$R_{qr} = (P_2 - P_1)/P_1 \tag{1}$$

where:
R_{qr} – quarterly percentage rate of return,
P_1 – starting price,
P_2 – ending price.

The collected data covered the period from the third quarter of 2006 to the third quarter of 2017. However, due to the availability of quotations of individual companies and the desire to keep important variables which explain the scope of the data for the regression analysis in the study, it was limited to the period from the first quarter of 2011 to the third quarter of 2017.

3.2. Methodology

The study used linear regression analysis using the classic least-squares method. At the outset, the available time series were analyzed, including descriptive statistics such as mean and standard deviation for all data. Next, an attempt was made to construct six models for three explanatory variables, i.e: hedonic residential price indices on the secondary market in three groups of selected cities. At the first stage, a model was created where the explanatory variables were all development companies and stock exchange indices selected for the study, so that only the statistically significant explanatory variables would be left by the elimination of the least significant explanatory variables. A similar procedure was repeated for one-quarter delayed explanatory variables. In the case of the explained variable – the index of residential prices for 10 cities and the explanatory variables – it was not possible to build a reliable model. It was also not possible to build any reliable model for the explained variables for three hedonic indices from the real estate market and explanatory variables delayed by one quarter. However, in two cases, the models proved to be reliable and well-matched.

These were models with a variable explained by the hedonic index of residential prices for 7 and 6 cities. For both models, important tests were performed to test their credibility: White's test for heteroskedasticity of residues, a normality test for residual distribution, and the LM test for autocorrelation up to order 4. The collinearity of explanatory variables was also evaluated in models using the VIF - Variance Inflation Factors. Apparent regression in the model was excluded by investigating autocorrelations of the rests verified by Durbin-Watson statistics.

At the last stage of the study, a correlation analysis was performed using the Pearson correlation coefficient.

3.3. Research results

An analysis of literature, including the previously cited papers, allows us to assume that the relationship between the real estate market and the capital market, including primarily real estate companies, can be linear (see OKUNEV et al., 2002). This assumption allows the classical least-squares method to be used to assess to what extent the share prices of developer companies explain the price movements in the secondary market of residential real estate.

Table 1 presents the basic descriptive statistics of all companies and indices, which were then used to create the model. Attention is drawn to the low risk measured by the standard deviation for residential price indices. This is in line with theory and expectations; standard deviations range from 4.18 to 4.52%. In the case of development companies, ATT and Elkop are the riskiest, with a standard deviation of 77.37%. The analysis of average quarterly returns does not continue to show such differences. The highest rates are recorded by ATT and Elkop, at almost 9%; rates of near 0% were recorded by the WIG Real Estate, Celtic, EDInwest and the Wikana index. Real estate indices, like the WIG index, LCCorp, Marvipol, Ronson and three hedonic indices for real estate market recorded quarterly average returns of close to 1%. Among the analyzed companies, there were also those that recorded negative average quarterly rates of return. The lowest average monthly rate of return was recorded by PlazaCntr at -5%. A quick analysis allows us to notice substantial differences between the real estate market and the wide stock market, represented by WIG, as well as the real estate company sector. A high level of standard deviation, with low average quarterly rates of return, means highly volatile share prices. In the author's opinion, investments in residential real estate stand out against this background in a positive way – they ensure a stable profit without bearing a high investment risk. This preliminary analysis does not bode well for any attempt to build a model in which real estate companies will explain price volatility in the secondary residential market. Both markets seem to differ materially. This feature may be very welcome when building a diversified investment portfolio. On the other hand, the analysis of coefficients of variation sheds a slightly different light on the investments under study. As expected, real estate indices have small volatility coefficients ranging from 3.34% to 4.33%. Some companies, such as Robyg and Ronson, noted similar results. However, many companies or stock market indices, have either high double-digit coefficients of variation, or this measure has negative values. Theoretically, the smaller the coefficient of variation, the better the risk-to-profit ratio of a given investment, but the appearance of negative volatility coefficients goes beyond this principle, and their value makes it impossible to draw rational conclusions about a given investment.

Table 1

Descriptive statistics for original data before selection for regression

	Mean rate of return %	Standard deviation %	Coefficient of variation %	Number of Observations
WIGNier	-0.35	15.44	-43.77	44
WIG	1.46	10.80	7.42	44
ATT	8.84	77.37	8.75	44
BBIDev	-1.80	26.10	-14.50	44
Celtic	-0.50	32.77	-65.77	27
DomDev	2.20	21.91	9.98	43
Echo	3.76	19.18	5.10	44

EDInvest	-0.27	29.89	-112.27	27
Elkop	8.56	77.11	9.00	44
GTC	-0.67	18.00	-26.90	44
IIAAV	1.57	28.46	18.19	44
JWConstr	-1.66	27.38	-16.51	41
LCCorp	1.43	24.47	17.07	41
Marvipol	1.46	20.59	14.07	37
Orion	7.27	34.11	4.69	34
PlazaCntr	-5.21	35.91	-6.90	43
Polnord	5.25	50.39	9.60	44
RankProgr	-0.78	35.71	-46.06	28
Robyg	5.00	14.49	2.90	27
Ronson	0.71	22.61	31.99	39
SohoDev	1.78	29.55	16.59	44
Triton	3.27	40.57	12.39	44
Warimpex	-1.46	23.81	-16.32	42
Wikana	-0.16	40.29	-249.78	44
7-cities	0.97	4.22	4.33	44
10-cities	1.25	4.18	3.34	44
6-cities	1.05	4.52	4.31	44

Source: own study.

Table 2 presents the results of the regression analysis carried out with the classic method of least squares. The regression model can be presented by the following general formula:

$$7-\text{cities} = \alpha + \beta_1\text{WIG} + \beta_2\text{BBIDev} + \beta_3\text{Echo} + \beta_4\text{IIAAV} + \beta_5\text{JWConstr} + \beta_6\text{LCCorp} + \beta_7\text{Polnord} + \beta_8\text{RankProgr} + \beta_9\text{Robyg} + \beta_{10}\text{Triton} + \beta_{11}\text{Warimpex} + \beta_{12}\text{Wikana} + \varepsilon.$$

The model seems well-matched; one of the most popular assessment criteria, i.e., R-squared, reaches the level of 84%, with the adjusted R-squared still remaining at a relatively high level of 71%. Explanatory variables show a high statistical significance, at 1% 2-tailed significance, except for WIG, which is statistically significant at 5%. The F statistic allowed us to reject the null hypothesis assuming zero values of explanatory variables coefficients. The Durbin-Watson statistics are inconclusive. However, the low correlation coefficient of residues suggests that there is no apparent correlation in the model. This was confirmed by the LMF statistics and the 4th order autocorrelation test, where the null hypothesis about the lack of autocorrelation of residues could not be rejected. Regarding White's test for heteroscedasticity with a null hypothesis, heteroscedasticity in the model does not occur, which also did not allow us to reject the null hypothesis. Regarding the test for the normality of residual distribution with a null hypothesis, the error has a normal distribution, which also did not allow us to accept the alternative hypothesis. The study on the co-linearity of all explanatory variables resulted in all VIF statistics being less than 10 each time, which means that the co-linearity of explanatory variables in the model does not occur. All tests carried out, as well as the quality of explanatory variables measured with the value of the Student's t-test, allow us to say that the model fits well, and thus allow us to draw the correct conclusions.

Table 2

Ordinary Least Squares, using observations 2011:1-2017:3 (T = 27), dependent variable: $7-cities$

	coefficient	standard error	t-Student	p value
const	0.00	0.00	0.13	0,90
WIG	0.07	0.03	2.18**	0,05
BBIDev	-0.13	0.02	-5.52***	0,00

Echo	0.07	0.02	4.05***	0,00
IIAAV	0.15	0.03	5.53***	0,00
JWConstr	0.10	0.01	6.84***	0,00
LCCorp	0.10	0.02	5.42***	0,00
Polnord	-0.04	0.01	-3.28***	0,01
RankProgr	-0.02	0.01	-3.17***	0,01
Robyg	-0.16	0.03	-4.81***	0,00
Triton	0.03	0.01	4.16***	0,00
Warimpex	-0.08	0.01	-5.32***	0,00
Wikana	0.06	0.01	6.02***	0,00

Mean dependent var	0.00	S.D. dependent var	0.02
Sum squared resid	0.00	S.E. of regression	0.01
R-squared	0.84	Adjusted R-squared	0.71
F(12, 14)	6.26	P-value(F)	0.00
Log-likelihood	98.13	Akaike criterion	-170.27
Schwarz criterion	-153.42	Hannan-Quinn criterion	-165.26
Autocorrelation coefficient rho	-0.16	Durbin-Watson	2.14
White's test for heteroskedasticity LM	21.25	P-value (LM)	0.62
Test for normality of residual: Chi-square(2)	1.75	P-value (Chi-square(2))	0.42
LM test for autocorrelation up to order 4	0.38	P-value (LMF)	0.82
Variance Inflation Factors for all variables	<10		

5% critical values for the Durbin-Watson statistic, n = 27, k = 12: dL = 0.4748, dU = 2.7301.
*** Significant at 0.01 (2-tailed significance).
** Significant at 0.05 (2-tailed significance).

Source: own study.

Table 3 presents the results of regression analysis, estimated by the classic least-squares method for the explained variable: the hedonic price index on the residential market in the six largest cities, excluding Warsaw. The estimated regression model can be presented with the following general formula:

$$6-\text{cities} = \alpha + \beta_1 BBIDev + \beta_2 Celtic + \beta_3 Echo + \beta_4 Elkop + \beta_5 IIAAV + \beta_6 JWConstr + \beta_7 LCCorp + \beta_8 Polnord + \beta_9 Ronson + \beta_{10} SohoDev + \beta_{11} Wikana + \varepsilon.$$

The model includes 11 explanatory variables. As before, the criterion for selecting companies for the model was the elimination of the least significant variables. The five explanatory variables that remained in the model were statistically significant at 1%, with six at 5%. The model is characterized by a fairly good fit, R-squared is 81%, although the already corrected R-squared dropped to 67%. The F statistic allowing us to verify the null hypothesis with zero values of explanatory variables coefficients allowing us to assume an alternative hypothesis of non-zero values of these coefficients at a significance level of 1%. The residual autocorrelation coefficient is very low. It can be concluded on this basis that the model is not burdened with apparent regression. However, the Durbin-Watson statistic is not conclusive. To strengthen inference, the test was repeated by performing a fourth order autocorrelation test. An alternative hypothesis was not accepted for the hypothesis of the lack of autocorrelation of residues, thus confirming the lack of apparent correlation in the model. In White's test for heteroscedasticity, verifying the zero hypothesis, heteroscedasticity in the model does not occur, which did not allow for the adoption of an alternative hypothesis. Similarly, the test for the normality of the distribution of residues did not allow the adoption of an alternative hypothesis against the null hypothesis: the error has a normal distribution. The VIF statistics on the collinearity of explanatory variables had values below 10 for all cases, meaning no collinearity. The results of the

tests carried out, as well as the statistical significance of the explanatory variables, indicate a good fit of the model, and thus, this model also allows for correct inference.

Table 3

Ordinary Least Squares, using observations 2011:1-2017:3 (T = 27), dependent variable: 6-cities

	coefficient	standard error	t-Student	p value
const	-0.01	0.00	-1.56	0.14
BBIDev	-0.21	0.04	-5.19***	0.00
Celtic	0.04	0.01	2.73**	0.02
Echo	0.06	0.02	2.56**	0.02
Elkop	0.05	0.02	2.78**	0.01
IIAAV	0.24	0.05	4.44***	0.00
JWConstr	0.11	0.02	5.91***	0.00
LCCorp	0.10	0.02	4.19***	0.00
Polnord	-0.04	0.02	-2.36**	0.03
Ronson	-0.07	0.03	-2.91**	0.01
SohoDev	-0.08	0.02	-3.96***	0.00
Wikana	0.03	0.01	2.37**	0.03

Mean dependent var	0.00	S.D. dependent var	0.02
Sum squared resid	0.00	S.E. of regression	0.01
R-squared	0.81	Adjusted R-squared	0.67
F(11, 15)	5.73	P-value(F)	0.00
Log-likelihood	86.60	Akaike criterion	-149.20
Schwarz criterion	-133.65	Hannan-Quinn criterion	-144.57
Autocorrelation coefficient rho	-0.01	Durbin-Watson	1.99
White's test for heteroskedasticity LM	23.05	P-value (LM)	0.40
Test for normality of residual: Chi-square(2)	0.24	P-value (Chi-square(2))	0.89
LM test for autocorrelation up to order 4	1.37	P-value (LMF)	0.31
Variance Inflation Factors for all variables	<10		

5% critical values for Durbin-Watson statistic, n = 27, k = 11: dL = 0.5439, dU = 2.6000.
*** Significant at 0.01 (2-tailed significance).
** K Significant at 0.05 (2-tailed significance).

Source: own study.

Table 4 presents the results of the Pearson correlation analysis carried out in pairs for all statistically significant variables from both models. The most important correlations, from the point of view of the research hypothesis, are those of WIG and the shares of real estate companies with hedonic residential price indices. Linear correlations are not strong and, additionally, statistically insignificant in almost every case. The only case of such is the correlation of Wikana and the hedonic index of residential prices for 6 cities. This correlation has a value of 0.91, which is high, and is statistically significant at 1%.

Individual companies are not correlated with real estate prices; however, multifactor models show that a relationship exists between the return rates of listed real estate companies and individual residential price indices, and return rates on real estate can be explained by the rates of return of selected listed companies from the WIG Real Estate index. The research hypothesis was thus positively verified.

Table 4

Pearson correlation

	WIG	BBIDev	Celtic	Echo	Elkop	IIAAV	JWConstr	LCCorp	Polnord
WIG	1								
BBIDev	0.46**	1							
Celtic	0	-0.17	1						
Echo	0.39**	0.51***	0	1					
Elkop	0.16	0.35*	0.06	0.35*	1				
IIAAV	0.40**	0.53***	-0.55***	0.04	-0.14	1			
JWConstr	0.43**	0.43**	0.09	0.34*	0.24	0.09	1		
LCCorp	0.38*	0.58***	0.1	0.35*	0	0.34*	0.24	1	
Polnord	0.23	0.39**	0.02	-0.02	0.2	0.38**	0.40**	0.32*	1
RankProgr	0.38*	0.35*	0.06	0.33*	0.01	0.22	0.02	0.46**	-0.05
Robyg	0.54***	0.69***	-0.19	0.45**	0.27	0.40**	0.56***	0.70***	0.54***
Ronson	0.44**	0.49***	-0.02	0.48**	0.29	0.16	0.47**	0.58***	0.32*
SohoDev	0.40**	0.21	0.31	0.24	0.22	0.16	0.31	0.40**	0.08
Triton	0.21	0.29	-0.02	0.03	0.29	0.11	0.29	0.15	0.45**
Warimpex	0.54***	0.46**	-0.01	0.41**	-0.21	0.46**	0.37*	0.55***	0.19
Wikana	0.28	-0.01	0.21	0.2	-0.06	0.09	0.42**	0.15	0.09
7-cities	0.22	0.14*	0.1	0.1	0.18	0.11	0.32*	0.36	0.28
6-cities	0.3	0.07	0.12	0.27	-0.09	0.18	0.45**	0.29	0.16
	RankProgr	Robyg	Ronson	SohoDev	Triton	Warimpex	Wikana	7-cities	6-cities
RankProgr	1								
Robyg	0.29	1							
Ronson	0.29	0.73***	1						
SohoDev	0.29	0.33*	0.38*	1					
Triton	0.11	0.45**	0.21	-0.08	1				
Warimpex	0.28	0.46**	0.53***	0.53***	-0.02	1			
Wikana	-0.03	0.2	-0.01	0.17	0.11	0.13	1		
7-cities	0.04	0.29	0.29	0.12	0.28	0.15	0.49***	1	
6-cities	0.07	0.28	0.03	0.06	0.2	0.17	0.91***	0.55***	1

*** Significant at 0.01 (2-tailed significance).
** Significant at 0.05 (2-tailed significance).
* Significant at 0.1 (2-tailed significance).

Source: own study.

4. Conclusions

As shown by the analysis before the construction of models, the stock market and the secondary residential real estate market differ from each other in terms of such phenomena as investment risk or possible return rates. These differences cause serious doubts as to the adaptation of analytical methods developed for the stock market in the real estate market. However, the research hypothesis put forward in the introduction of the article was positively verified: the economic situation on the real estate companies market (represented by rates of return of stocks) is reflected in the situation on the secondary housing market. The conducted research allowed us to construct two well-matched models in which quarterly rates of return on shares of real estate companies explain, in a statistically significant manner, quarterly rates of return from hedonic indices of residential prices in 6 and 7

selected cities. This is very important for the way the real estate market can be perceived and treated. There are some problems on the market, such as the inability to calculate systematic risk. This influences the process of real estate valuation. The survey shows that real estate markets and the stock market are not separate from each other, and their characteristics may be similar. The effective construction of multivariate models showed that the real estate and stock markets are dependent on each other. A consequence of this may be the effective transfer of analysis methods from the stock market to the real estate market. A successful attempt to build a model also gives the opportunity to predict rates of return on the real estate market using the rates of return on investment in real estate companies. Analysis of descriptive statistics as well as correlation in pairs between particular variables allowed us to conclude that these markets, despite their mutual connections, may be an investment alternative for each other.

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