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Teodora Petrova, '10
Illinois Wesleyan University

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Abstract

This paper estimates the effect of real estate on the Bulgarian stock index over the period 2007-2008. Part II presents the theoretical basis for this research. Part III includes a description of the data and empirical model, as well as an explanation of the variables used in the model. Part IV presents the empirical results after running OLS regressions and Granger causality tests. Finally, Part V summarizes the main results.

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I. Introduction

In a recent speech about the financial market crisis in the U.S., Mr. Ben Bernanke said, "Indeed, many of the necessary changes that have been identified, including increasing transparency, improving risk management and attaining better coordination among regulators, could provide important support to the process of normalizing our financial markets." (Randall and Pulizzi, 2008).

A variety of transparency rules and government regulations as well as risk management policies in Bulgaria set the basis for the establishment of the young Bulgarian Stock Exchange (BSE) the way it exists today. Similar to other Eastern European countries, Bulgaria started its mass privatization process and re-established the Bulgarian Stock Exchange Market in 1995. By the end of 1999 the Bulgarian Parliament approved an act which guaranteed investor protection, market integrity, and transaction transparency in a more effective way. In October of 2000, the BSE launched its official index – SOFIX. Changes in the financial markets were accompanied by significant growth in the Bulgarian housing market. In September of 2007 the BSE launched its official Real Estate Investment Trust Index (BG REIT). The index is based on the free-float adjusted market capitalization of the twelve special investment companies in Bulgaria that operate in the field of securitization of real estate and/or land.

Even though housing is often considered a consumer good, its investment value should not be ignored. Both housing and stocks are forms of assets that investors consider when concerned with portfolio diversification and seek ultimate risk reduction (Middleton, 2007).

Figure 1 represents the changes in the Bulgarian Stock Index (SOFIX) and the changes in the average dwellings prices in Bulgaria for the period between 2001 and 2007. In Bulgaria, housing prices have reached extreme levels due to increased demand. Over the same period of time, the stock market index on the Bulgarian Stock Exchange (BSE), SOFIX, has grown rapidly. The similar trend of the two indices leads to the analysis of the relationship between housing and equity markets.

This paper estimates the effect of real estate on the Bulgarian stock index over the period 2007-2008. Part II presents the theoretical basis for this research. Part III includes a description of the data and empirical model, as well as an explanation of the variables used in the model. Part IV presents the empirical results after running OLS regressions and Granger causality tests. Finally, Part V summarizes the main results.

II. Background

Analyzing the relationship between stock and real estate prices requires an understanding of market integration. The theory of real estate and stock market co-integration assumes that capital gains and risk reduction are possible through holding assets in both markets. Unfortunately, the literature on this issue has not produced unified results regarding the direction of integration between real estate and stock markets (Apergis and Lambrinidis, 2007). One group of researchers claims that a connection between the

two markets exists (Grossman, 1981; Okunev and Wilson, 2000), while other economists support the idea that the two markets are independent from one another (Quan and Titman, 1999). Kapopoulous and Siokis (2005) explain that the stock market and the housing market in Greece are integrated based on a thorough investigation of the Greek Stock Exchange Index (GSE) and the real estate prices in Athens and other urban areas in Greece.
Most previous studies use the Dickey-Fuller unit root test for integration analyses, the vector autoregression (VAR) model and dynamic least-squares (DOLS) model to estimate co-integration, and Granger Causality tests to predict market causality. However, this paper uses only OLS regressions and causality analysis in order to estimate the relationship between real estate and stock prices. The analysis of the Greek stock and housing markets serves as a basis for this paper and helps explain the effect of real estate on the equity market in Bulgaria. (Apergis and Lambrinidis, 2007). Previous literature reveals a cyclical relationship between stocks and real estate prices.

Figure 2 presents the two most debated theories among authors. The wealth effect assumes that consumption is a function of present disposable income and total wealth. Total wealth is the sum of all financial assets (stocks, bonds, etc.), housing, and the expected future value of disposable income. The wealth effect theory also assumes that housing is both a consumer and an investment good (Middleton, 2007). According to the theory, an increase in stock prices increases total wealth and, consequently, future consumption. As a result, firms increase reinvestment in real estate, which increases the demand for housing and shifts the demand curve upward. In the end, the new housing demand raises real estate prices.

The wealth effect pairs with the "pure" credit-price effect and works together to form the so called "credit cycle" effect. The credit-price effect hypothesis assumes that firms are credit-constrained. In addition, it considers that both commercial and residential property serve as collateral for loans. The "pure" credit-effect theory suggests that high housing prices results in higher collateral values for loans. Thus, loans become cheaper for individuals and businesses. As a result, firms borrow more and invest in the production process. Both sales and expected future profits increase. Finally, stock prices rise bid up by investors (Kapopoulous and Siokis, 2005).

Granger Causality tests prove that the wealth effect is stronger in Athens than in the other urban areas in Greece. Once again, the "credit-price" cycle holds true in its full form only in Athens. In other words, the phenomenon of housing prices increasing, resulting in increased stock prices exists only in the Capitol, which is the center of most stock investments (Kapopoulous and Siokis, 2005).

Other determinants that affect the SOFIX are economic activity, investors' expectations, and stock market maturity. Middleton (2007) analyzes portfolio investments of countries in Eastern Europe and compares them with those in Western European and U.S markets. He concludes that Central and Eastern European markets significantly outperform the Western mature markets. Furthermore, his study suggests that the rapid growth in the Bulgarian Stock Exchange market could be a result of its immaturity. For this reason, a trend variable accounting for the growth of the BSE is included in the theoretical model of this paper. The willingness to invest in the stock market rather than in the real estate market is measured by investors' expectations (Grossman, 1981). GDP and unemployment are often used to control for the effects of economic activity on stock prices. For the above reasons, expectations and economic activity should also be considered as factors that influence SOFIX.

Studies on the risk and return in real estate show that adding real estate to a portfolio of stock and bonds provides diversification with a significant reduction in volatility. Mull and Soenen (1976) use an empirical analysis of the U.S Real Estate Investment Trusts index and compare them with those of the G-7 countries (United States of America, France, Germany, Italy, Japan, United Kingdom, and Canada).

Their research reveals that investments in real estate through REIT in international markets promote more effective diversification than investments in international bonds and stocks. In other words, the use of international REITs is an efficient method of reducing risk while maintaining moderate returns. Nowadays, in a time of market volatility, many investors are interested in finding ways to keep returns and reduce volatility. Thus, elaborate research on international REITs is important for both scholars and investors.

Scholars have done extensive research on the returns of stocks and bonds in the past but there has not been much research done on the real estate market. Smith and Shulman (1976) elaborate on the performance of equity real estate investment trusts. Their comparison of REITs and closed-end investment companies shows that investments in REITs have advantages such as no liquidity risk and no uncertainty regarding the market value of the traditional real estate investments.

This paper investigates real estate performance and equity market movements in Bulgaria as discussed in the "credit-price" cycle theory. In order to estimate real estate performance, this paper uses the Bulgarian REITs index and the Bulgarian stock index, SOFIX. As noted above, the wealth effect theory is weaker in the general case in Greece and holds true only for Athens. Like the Greek Stock Exchange market, the BSE shares a lot of common features as a young Eastern European market. It is reasonable to expect then that real estate effects stock prices more than the other way around.

III. Data and Empirical Model

Data for SOFIX's rate of returns is taken from the Bulgarian Stock Exchange. Real estate data comes from the Bulgarian Real Estate Database and the Bulgarian Statistical Institute. Unfortunately, the Bulgarian REIT index has only existed since September 2007, and as a result our data is limited to weekly values for the period of September 2007 to December 2008. Data for GDP growth also comes from the Bulgarian Statistical Institute for the same period. In order to provide accurate data results, the quarterly GDP data are estimated with a cubic equation method, which proved to best fit the available observations. Unfortunately, the empirical model cannot include unemployment as another control variable for economic activity because EUROSTAT standards required a change in the definition of unemployment in Bulgaria in 2000. As a result there are no comprehensive and comparable data for unemployment rates in Bulgaria for the period of consideration. Furthermore, data limitations restrict the usage of investors' expectations in the model. Before further processing, I adjust the data for the effect of inflation using the monthly rates available from the Bulgarian National Bank.

In order to test the "credit-price " cycle theory fully, the empirical model tests the effect of real estate and equity market performance in both directions in Bulgaria as follows:

(1) $R_{SOFIX}=\alpha_1 + \alpha_2 R_{BGREITs} + \alpha_3 \Delta GDP + \alpha_4 Time + u$

(2) $R_{BGREITs}= \alpha_1 + \alpha_2 R_{SOFIX} + \alpha_3 \Delta GDP + \alpha_4 Time + u$

Where:

R_{SOFIX} is the rate of return for the Bulgarian Stock Exchange Index(SOFIX), adjusted for inflation on a weekly basis for the period from September 2007 until December 2008.

$R_{BGREITs}$ (+) is the rate of return on Bulgarian Real Estate Investment Trusts in Bulgaria, adjusted for inflation for same time period. As previously noted, previous research suggests that an increase in housing prices, corresponding to the credit-price effect theory, should cause an increase in stock prices and Rsofix.

ΔGDP (+) is the change in real GDP, adjusted for inflation for the investigated period. Theory suggests that economic activity should increase stock market values.

Time is a trend variable that helps explain the trend of growth rate of over the period of interest. The basic assumption of this model is that the trend variable is a linear function for the 67 observed periods.

Important deficiencies of the empirical model include the high volatility of the stock market as well as the information limitations regarding data availability for other measurements of economic activity and of investors' expectations, making the empirical model theoretically incomplete.

IV. Results

In order to estimate whether the credit-price effect or the wealth effect dominates in the case of Bulgaria, we use Granger Causality tests. This is a method to determine if one time series is useful for forecasting another time series. In this case, we use Granger Causality tests to determine if changes in housing prices help to predict changes in stock prices or vice versa.

In mathematical formula:

$$Y_t = \sum_{i=1}^{p} \alpha_i Y_{t-i} + \sum_{j=1}^{q} \beta_j X_{t-j} + u_t$$

where p is the order of the lag for Y, and q is the order of the lag for X. The null hypothesis that X

does not Granger-cause Y is $\beta_j = 0$ for $j = 1, 2, \ldots q$.

Table 1 presents the F-statistics and the probability that the null hypothesis is true after testing for a null H_0: X does not Granger Cause Y. Tests in the two directions show that neither of the hypotheses can be rejected. The results suggest that the null hypothesis that $R_{BGREITs}$ does not "Granger Cause" the R_{SOFIX} is rejected with a 0.05 significance level. In other words, the first test shows that the return rates on the Bulgarian REITs index "Granger cause" the changes in the return rates on the Bulgarian Stock index. The test in the other direction also proves with a 0.10 significance level that the changes in the return rates of SOFIX affect the changes in the returns rates of the REITs in Bulgaria. The Granger Causality tests in both directions support the "credit-price" cycle theory. Or in other words, the results suggest that increases in the REITs prices lead the "pure" credit-price effect and cause an increase in stock prices, while at the same time stock prices lead the wealth effect and cause an increase in the REITs return rates. Important implications of the results from the Granger Causality tests prove the existence of the "credit-price" cycle in its full form in Bulgaria.

Upon testing for heteroscedasticity with White's test, the null hypothesis was not rejected, showing a lack of heteroscedasticity in both models (1) and (2). The results of the Durbin-Watson test show no signs of autocorrelation in model (1) and autocorrelation presence in model (2). Table 2 and 3 present the Durbin-Watson statistics after correction for autocorrelation of model (2).

Table 2 represents the results of the OLS regressions of the initial models. In model (1) the return rates on the SOFIX index are the dependent variable. It appears that the changes in the return rates on the Bulgarian REITs have an effect on the SOFIX changes with a 0.01 significance level. In other words, a 1% change in the Bulgarian REITs reflects a 1.43% change in the SOFIX. In addition, the results for economic performance are also significant at the 0.05 level and together with the coefficients imply hat a 1% change in GDP reflect in a 0.85% in the SOFIX. These results coincide with the initial predictions. However, the trend variable for time seems to be insignificant and with an unpredicted negative sign. In model (2), the rates of return on the Bulgarian REITs index is the dependent variable. The results prove to be significant for both the effect of the return rates on SOFIX and GDP. It seems that a 1% change in the SOFIX index results in a 0.355% increase in the BGREIT index. Furthermore, an increase in GDP leads to a decrease in the performance of the BGREIT index. Model (2) shows two major contradictions with the initial expectations: a negative sign and insignificant results for both the effect of the GDP changes and the trend variable for time. Thus, it seems reasonable to revise the models and exclude the trend variable. A theoretical explanation could be that the effect of time on the changes in the return rates on both indexes does not follow a linear function pattern.

Table 3 presents the modified models and the OLS results from the regression. Similar to the initial models, model (2) is the only model having first order serial correlation. The results in Table 3 are presented after correction for autocorrelation. The results show that the returns on the REIT index in Bulgaria affect the stock index significantly more than the changes in GDP growth. Furthermore, the results from Model (2) show a similar unexpected coefficient for the GDP variable. Not only does the GDP variable in Model (2) have a negative coefficient but it is also insignificant and cannot help forecast the effect that economic growth has on the real estate market.

Model (1) seems to be consistent with the initial expectations and assumptions regardless of whether or not it includes the trend variable for time. Changes in the real estate market appear to have a stronger effect on the return rates in the SOFIX. In addition, economic performance correlates positively with the index changes as a result of better economic conditions. Model (2) has several contradictions with the initial expectations which can be interpreted with the fact that the "credit-price theory" does not hold equally strong in both directions.

The results suggest a stronger "pure-credit price effect theory", which means that the changes in housing prices reflect the investments made in real estate and raise the REIT index values which lead to increased performance and eventually higher equity market performance. The analysis of the data suggests that the real estate market affects the equity market. In addition, the negative coefficient of GDP in model (2) suggests that additional factors need to be taken into consideration when analyzing the wealth effect theory. Additional conditions include overall market performance, market maturity, investors' expectations and rationality.

The most important implication of this paper is that it proves the effect of the real estate market on the stock market based on the "pure-credit price theory". We cannot conclude, however, that this notion holds

true in the opposite direction. The results from model (2) show that SOFIX affects the REITs index but lesser than the REIT affects the SOFIX index. Another problem with model (2) is the fact that none of the control variables are significant.

V. Conclusions

Changes in housing prices and GDP have significant influence on stock prices in Bulgaria. Unfortunately, as a result of the lack of data for multiple control variables, the variable accounting for economic activity in one of the models is inconsistent with initial expectations. In addition, this study estimates the causality relationship between changes in the REIT index and changes in the stock index. The results show that changes in real estate and changes in stocks cause each other. This study is important for understanding the relationship between the young financial market in Bulgaria and its constantly growing real estate market.

The most important implications that can be drawn from this paper are the fact that real estate investments do have an effect on the equity market as explained by the credit-price cycle theory. Eastern European emerging markets have always been a topic of interest for many investors but not much has been written or researched on the correlation and development of these markets. By looking at one emerging Eastern European market, this study explains the correlation between two major markets in Bulgaria and their importance in the portfolio diversification of investors. Important conclusions that can be derived from the study are that changes in housing prices, reflected by the REITs index in Bulgaria, show a cyclical relationship with changes in the stock market, providing a better understanding of the way the two markets work. When an investor using REITs as an asset allocation method of his portfolio has an understanding of the market correlations and movements, then this particular investor could also expect that changes in prices observed in the changes of REITs would cause a consequent change in stock prices. The model investigated, however, can tell us little about the effect of other economic factors on the two indices.

This paper aims to set the basis for research on the relationship between housing and stock prices. Future research on the topic can include testing for integration with Dickey-Fuller unit root tests and estimating vector autoregression model. Finally, data for multiple control variables as well as quarterly index data can be analyzed to get more precise and less distorted results for the impact of the relationship between the two indexes.

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Appendices

Figure 1

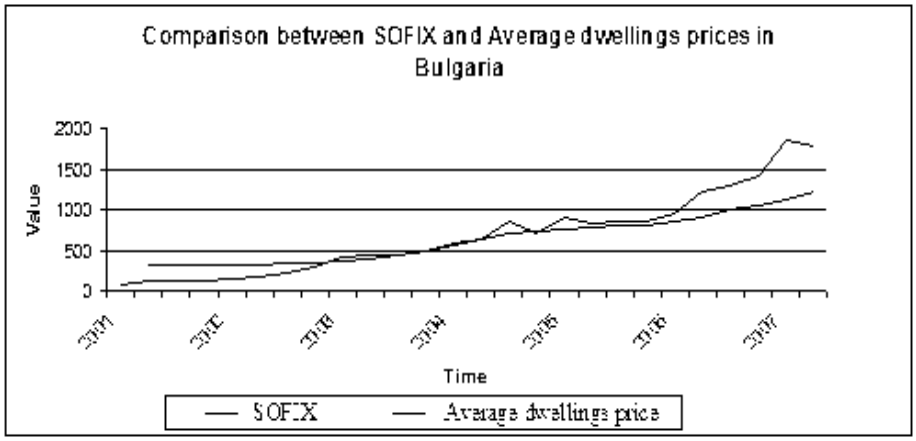

Figure 2: "Credit-price" cycle

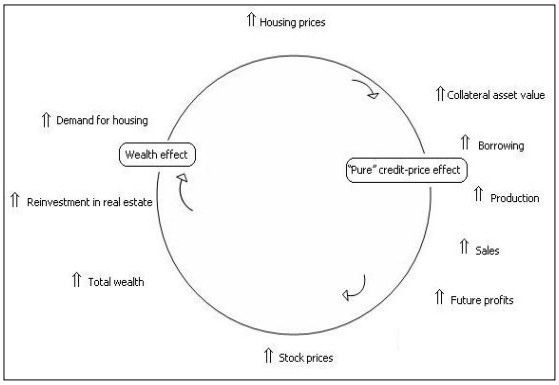

Table 1 Granger Causality tests

Null hypothesis	F-statistics	Probability null is true
$R_{BGREITs}$ does not "Granger Cause" R_{SOFIX}	3.667	0.0314
R_{SOFIX} does not "Granger Cause" $R_{BGREITs}$	2.556	0.0860

Table 2: OLS Regression

	R_{SOFIX}	$R_{BGREITs}$	GDP	Time	Durbin-Watson	Adjusted-R^2
Model (1)	Dependent	1.43 (6.790)**	0.85 (2.336)*	-0.0002 (-0.999)	1.614	0.563
Model (2)	0.355 (8.134)**	Dependent	-0.380 (-1.169)	-0.0002 (-1.292)	1.960	0.611
Sample size				67		
Open values are coefficients and closed values are t-statistics						
* indicates significance at 0.05 level; ** indicates significance at 0.01 level;						

Table 3: OLS Regression - the Modified Models

	R_{SOFIX}	$R_{BGREITs}$	GDP	Time	Durbin-Watson	Adjusted-R^2
Model (1)	Dependent	1.49 (6.779)**	0.717 (1.667)*	Excluded	1.584	0.564
Model (2)	0.369 (4.402)**	Dependent	-0.500 (-1.673)	Excluded	1.953	0.607
Sample size				67		
Open values are coefficients and closed values are t-statistics						
* indicates significance at 0.05 level; ** indicates significance at 0.01 level;						