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Statistical Analysis of Real Estate Stocks

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Abstract: *Real estate costs and profits change in cycles, sometimes anticipated in type but not in severity or length. It is known that there are two forms of cycles: 'capital markets' cycle which refers to stages of investor request for commercial real estate assets and the costs and value at which they trade and there is 'space market' cycle which express the demand for and source of real estate space. For a long-term investor, it is recommended to buy and maintain the stocks event if the estate assets pass through their unavoidable ups and downs. Real estate investors should be conscious of these cycles which can impact dividend growth and cash flow, and also stock prices. The main purpose of this paper is to analyze if potential investors should buy or not stock prices. In order to summarize this analysis, I use a binary logistic regression because it is important to verify if some financial ratios could have an impact on real estate stocks. Binary logistic regression estimates the probability of an event occurring, in this case the probability of potential traders to buy or not real estate stocks. The software that I have used in order to clean and arrange the data is Tableau Prep Builder and the software that I have used in order to express my findings is IBM SPSS Statistics.*

Keywords*: Stocks, Real Estate, Binary regression, Statistics.*

I. Introduction

Everyone thinks that knows real estate, and it is true that we all have been implicated with this sector in one way or another. All the buildings around us, our houses, our apartments, the mall and centers where we all shop, the hotels where we go on vacation, all of them represent real estate. So, we are surrounded by real estate. The question is: do we really understand it?

Years and years, we all had a weird relationship with this sector. Even with the housing market issues of last year, we still buy houses and completely assume that over the years will appreciate. Moreover, we think real estate to be an insecure investment at how presumably complex institutional investors have spent a plenty amount of money on office buildings, hotels and other properties just to see their values addition in real estate recessions, most from 2007 to 2009. During the last 20 years, we all faced some drastic changes in property valuations.

Is real estate a good investment? Indeed, real estate investments have provided extraordinary returns to their investors. The question is: can the investors make money even if there are unavoidable ups and downs of real estate cycles? Real estate investors have been capable to earn returns close to an average equal to 12% annually, over the last 40 years, along with, throughout most market periods, stable income, low market price instability and investment safety.

Real estate investors now have a larger option of investment properties than before and can select from some of the most skilled and qualified management teams that have ever invested in.

Stocks and real estate are a very valuable resource for many investors. It is well known that economic conditions (financial crisis, inflation, economic growth, etc.) can powerfully determine and condition stocks and real estate.

II. Review of the scientific literature

According to Liu et al. (1990), that has a study which investigate the relationship between stock market and real estate, he defined terms "segmentation" and "integration". Segmentation appears if the risk priced for real estate is methodical risk corresponding to the real estate market, so real estate investors do not automatically gain the same anticipated return on stocks and real estate. As soon as it is defined an integration relationship between investments, then the assets are replaceable. (Liow and Yang, 2005). Integration appears only it the risk price for real estate and stocks methodical risk corresponding to the overall market. Investors will gain the same risk-adjusted return on real estate and stock. So, if the investments are segmented, then the assets could be retained together in order to have portfolio variability.

III. Research Methodology

The database that I used in my research paper contains 200+ financial indicators, that are commonly found in the 10-K filings each publicly traded company releases yearly, for a plethora of US stocks. The data was cleaned and arranged using the Tableau Prep Builder software. The field of interest that is at the center of the analysis is real estate, and the data correspond to the period 2014-2018. The dataset was extracted from kaggle.com. The dataset consists of approximately 3700 records, filtered for Real Estate sector only.

In order to establish from a trading perspective, if a hypothetical trader should buy or should not buy stocks, I used a binary logistic regression. The dataset was imported in IBM SPSS Statistics and all the variables were coded accordingly.

The independent variables that were in used in my analysis are: Revenue, Revenue Growth, EBITDA, Profit Margin, and the binary dichotomous dependent variable is Class. The binary variables "Class" describes if a trader should buy or not stocks and was coded with 0 and 1. (1-should buy, 0-should not buy). For each stock, if the PRICE VAR [%] value is positive then class = 1. From a trading perspective, the 1 identifies those stocks that a hypothetical trader should buy at the start of the year and sell at the end of the year for a profit. for each stock, if the PRICE VAR [%] value is negative, class = 0. From a trading perspective, the 0 identifies those stocks that a hypothetical trader should not buy, since their value will decrease, meaning a loss of capital.

Revenue represents the sales value of a company in a period. So, revenue is the sales of goods or services.

Revenue formula is written:

*Revenue = Number of Units Sold * Average Price or Revenue = Number of Customers + Average Price of Services.* (1)

Revenue Growth indicates a rise in revenue over a period of time.

EBITDA is a financial performance indicator, the acronym for "Earnings Before Interest, Taxes, Depreciation and Amortization". EBITDA is measure of a company's operational profitability over time but taking out the potentially distorting effects of changes in interest, taxes, depreciation and amortization, which can all be manipulated by financing and accounting decisions. The argument for using EBITDA is that it allows us to better compare companies and their operational profitability without considering their capital structure.

Formula:

EBITDA = Revenue − Expenses (excluding interest, tax, depreciation, and amortization) (2)

Profit Margin describes the profitability of a service, product or business and it is expressed as a percentage.

IV. Results and discussion

Binary logistic regression estimates the probability of an event occurring, in this case the probability that a trader will buy or not stocks.

Table no. 1. Classification Table

	Observed		Predicted		
Step 0	**National Standards**		**Class**		**Percentage correct**
	Class		Should not buy	Should buy	
		Should not buy	0	705	.0
		Should buy	0	1388	100.0
	Overall Percentage				66.3

Source: Author own research results

According to the classification table (table no. 1), the model always assumes "should buy" because there are more hypothetical traders who should buy real estate stocks from different companies compared to those who should not. (1388 compared with 705). The overall percentage tells us that this approach to prediction is correct with 66.3%, which is a good approximation.

Table no. 2. Variables in Equation

		B	S.E.	Wald	df	Sig.	Exp (B)
Step 0	**Constant**	.677	.046	214.549	1	.000	1.969

Source: Author own research results

The variables in the table of the equation show us the coefficient for the constant (). According to the table, the model with this constant has a statistically significant predictor of the result, because Sig = 0.000. The model has a high accuracy of almost 70%.

Table no. 3. Omnibus Test of Model Coefficients

		Chi-Square	df	Sig.
Step 1	**Step**	11.588	4	.021
	Block	11.588	4	.021
	Model	11.588	4	.021

Source: Author own research results

Omnibus tests of the model coefficients (table no. 3) are used to check if the new model (with explanatory variables included) is an improvement of the basic model. The Chi-Square test was used to see if there was a significant difference between the -2Log likelihood of the base model and the new model. In this case, Chi-Square=155.038 and Sig=000, which means that the null hypothesis is rejected. Because Chi-Square is significant, means that the new model is significantly better. The "Model" row always compares the new model with the original one. The Step and Block rows are important only if the explanatory variables are added to the model in a gradual or hierarchical manner. If the model was built in stages, then these rows would compare -2 Log likelihood of the newest model with the previous version to determine if each new set of explanatory variables determined improvements or not. In this case, I added all five explanatory variables in a single block and therefore there is only one step. This means that the Chi-square values are the same for step, block and model. Sig values are equal to 0.021 which indicates improved model accuracy when the explanatory variables are added.

However, the most important of all the results is the table Variables in the table of equations. This table needs to be studied very closely, as it is at the heart of the answer to our questions about the common association of Revenue, Revenue Growth, EBITDA and Profit Margin.

Table no. 4. Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp (B)
Step 1	**Revenue**	.000	.000	1.098	1	.295	1.000
	Revenue Growth	-.065	.034	3630	1	.047	937
	EBITDA	.000	.000	.797	1	.375	1.000
	Profit Margin	-.003	.012	.044	1	.835	.997
	Constant	.701	.049	203.168	1	.000	2.015

Source: Author own research results

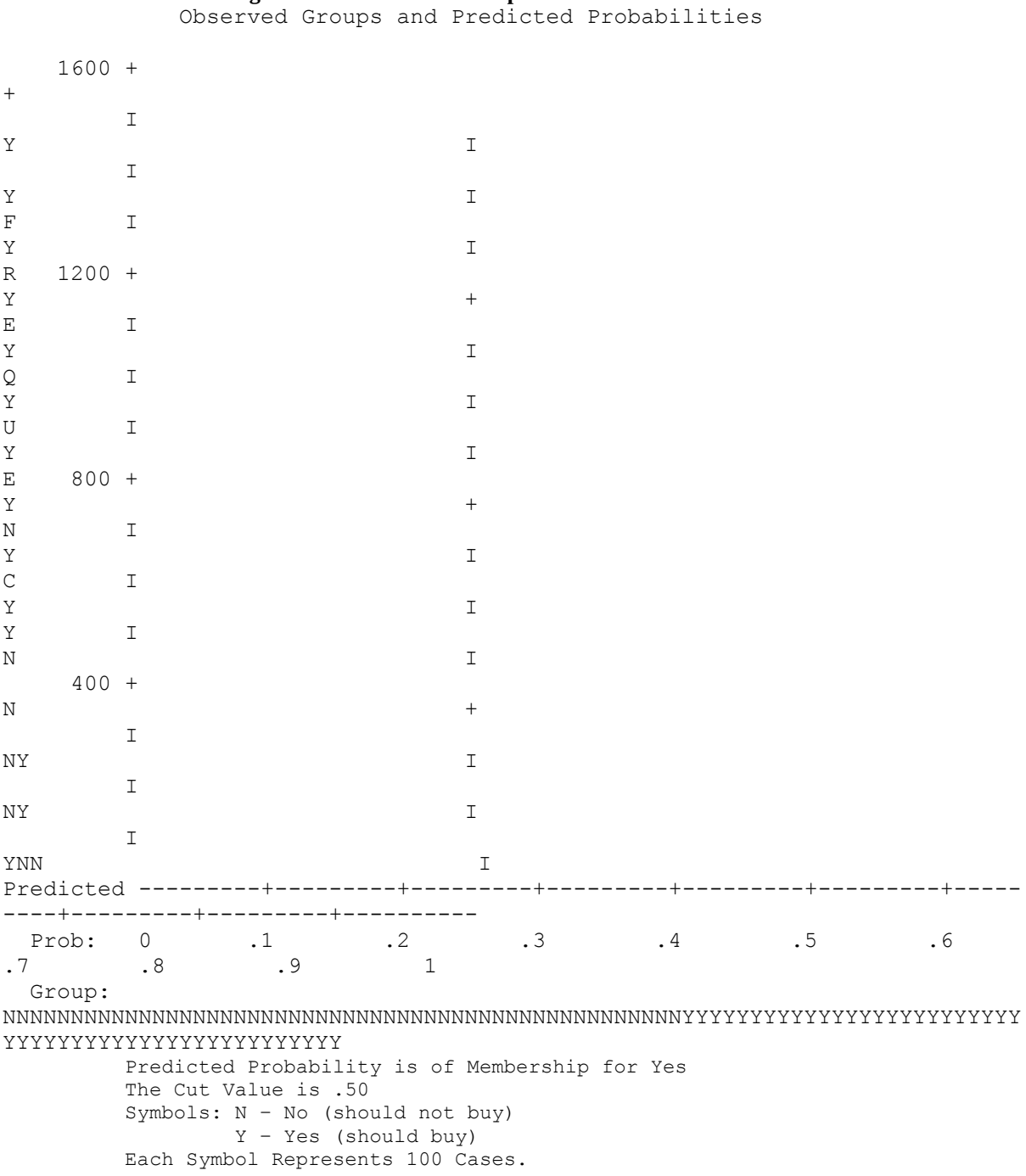
This table provides the regression coefficient (B), Wald statistics (to test statistical significance), and (Exp (B)) for each variable category.

The variable Revenue Growth statistically significant because Sig is less than 0.05. Wald for revenue growth is 3.630.

The classification chart answers a similar question as the classification table which is "How accurate is our model in classifying individual cases"? However, the rating chart provides some finer details. This graph shows the frequency of categorizations for different predicted probabilities and whether there were "should buy" or "should not buy" categorizations. This provides a useful visual guide to how accurate the model is by

showing how many times the model would predict a "should buy" result based on the predicted calculated probability when in fact the participant's result was "should not buy".

Figure no. 1. Observed Groups and Predicted Probabilities



Source: Author own research results

It is observed according to figure 1 that the model is good for predicting the result for individual cases, because there are a lot of observations towards the left and right ends of the graph. Such a diagram shows that where the event took place (on the 0.7th place - indicated by the letter Y on the graph), the predicted probability was also high and that where the event did not occur (letter N on the graph) the predicted probability was low. The graph shows that there are quite a few cases with the letter Y on the graph, which means that the model predicts a 70% probability that the event will happen.

The regression equation is written:

Log(p/1-p) = 0.701 -0.065 * Revenue Growth - 0.003 * Profit Margin

V. Conclusion

There are three fundamental factors of long-run real estate risk: bad management of properties, debt leverage and deficiency of diversification. Despite the fact that real estate investments have usually been greatly leveraged, it is the strong debt leverage, instead of real estate itself, and it is the substantial risk. Real estate possessors could take advantage of inflation, but inflation is not the main reason for having real estate. Interest rates, supply and demand, expected returns and the actual and future power of the economy are market factors thar are more important than inflation in deciding real estate values. In order to establish from a trading perspective, if a hypothetical trader should buy or should not buy stocks, I used a binary logistic regression. Binary logistic regression estimates the probability of an event occurring, in this case the probability that a trader will buy or not stocks. There are more hypothetical traders who should buy real estate stocks from different companies compared to those who should not. (1388 compared with 705). The overall percentage tells us that this approach to prediction is correct with 66.3%, which is a good approximation. The variables in the table of the equation show us the coefficient for the constant (). According to the table, the model with this constant has a statistically significant predictor of the result, because Sig = 0.000. The model has a high accuracy of almost 70%.

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