STOWARZYSZENIE EKONOMISTÓW ROLNICTWA I AGROBIZNESU
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FINANCIAL PERFORMANCE OF CORPORATIONS AND MARKET VALUE

WYNIKI FINANSOWE KORPORACJI A ICH WARTOŚĆ RYNKOWA

Key words: financial performance, market value
Słowa kluczowe: wyniki finansowe, wartość rynkowa

Abstract. We present the first results of a bigger investigation which aims to justify effects of fundamental phenomena. We investigate whether the financial situation and profitability of companies has an effect on market value. We used a huge financial database which contains fundamental and technical information. By applying discriminant analysis we created a model which is capable of choosing the companies with high punctuality which increase their values and by the increase of their financial performance, holding period return increases.

Introduction

The reasoning of capital market investors is influenced by two large schools of methodology. Technical analysts move out of the presumption that every commodity is worth exactly the price for which it can be bought at the market. This presumption involves that technical analysts only concentrate on market signals and draw inferences from the relationship of price figures and the indicators examined at different times. Technical investors mainly concentrate on timing and search for signals of the moment of opening and closing. The approach of the fundamental school is quite different. Its representatives define the value of an investment by cash flow and the financial fundamentals of the instrument. They suppose that the value of an instrument can be estimated by cash flow in every case and – depending on market effectiveness – this value is not necessarily the same as its market price. In case the price differs from its value, the instrument is under- or overpriced, so investors adjust investment decisions accordingly, thus they buy underpriced instruments and sell overpriced ones. To justify or confute the two approaches there has been methodological debates recently, but professional practice uses both methods in many cases complementing each other [Bodie et al. 2005].

The basic problematic area of the two theories is that the market value of companies is not always related to their financial performance. That is why it is important to know which financial indicators and in what way (by the description of which state) explain figures of market value. In international literature there are several references on how financial characteristics affect changes of prices. According to Keim and Stambaugh [1986] the difference between the yield of high and low quality bonds affects the prognosis of market yields. Fama and French [1988] points out that higher dividend yields induce higher values. Camobel and Shiller [1988] examined the effect of accounting profit on the prognosis of market yields.

Takács [2008] did not find a relationship between profitability ratio and market price per share, enterprise value per share based on a discounted Cash-flow and stock price, and also the changes of them, as well as economic value added per share and stock price. He noted strong positive movement between earnings after taxes per share and stock price, holding period returns derived from accounting profit and stock price.

In our paper we use the practical approach and present the first results of a bigger analysis. By examining the results of fundamental phenomena we try to answer two major questions:

– Does the financial state of companies result in the increase of its market value?
– Does financial instability result in the decrease of the value of the company?

Database and methodology

To answer these questions we use a huge financial database developed and maintained by the publisher of Forbes magazine, which contains fundamental and technical information about over 6000 listed companies in the world. The companies involved in our research were chosen on the basis of the quantity and quality of available and controllable information about them. On this basis we processed the data of 3453 companies.

The database contains more than 70 up-to-date fundamentals about companies. We began to work with the indicators that are used the most frequently to describe the financial state of companies. We gathered the data about the return of assets (ROA), return on equity (ROE), debt/equity ratio and current ratio. This way we can describe the capital structure, liquidity and profitability of the company. When choosing the appropriate indicators we relied on our previous investigations [Zakár, Liebmann 2008].

To measure market performance we chose the indicator holding period return (HPR). We suppose that holding period return increases if the company is financially stable and profitable. Of course we also aimed to analyze whether the instability and deteriorating profitability of companies result in the decrease of holding period return. It is important to note that in this paper we do not aim to examine the relationship of dividend yields and price gains.

The standard deviation calculated for all indicators for the data of the chosen almost 3500 companies is quite big – and in many cases there are extreme values. Heteroscedasticity is characteristic of the data [Ramanathan 2003]. Meanwhile, the most frequent values are located in a small interval. Figure 1 shows the density function of the distribution of ROA on the whole sample. Comparing the distribution of ratio with the normal probability density function kurtosis can be seen easily with long symmetric tails.

The phenomenon can be traced accordingly in case of all the examined influential variables, and this characteristics of the variables made us not apply the cutting of outliers in any cases. We believe that the large standard deviation with the extraordinary extreme values carries important information, and thus it is reasonable to look at it as the speciality of the sample.

Looking at the correlation matrix we can realize that the correlation of the variables is low, so they can be handled as independent ones (Tab. 1).

We began our investigation with cluster analysis as it is a dimension decreasing process, and our aim was to create a variable with a low level of measurement, which can be the depending variable of our investigation. We used the k-means algorithm as unhierarchical clustering is the most suitable method for large sample sizes [Székelyi, Barna 2002]. The process which created 5

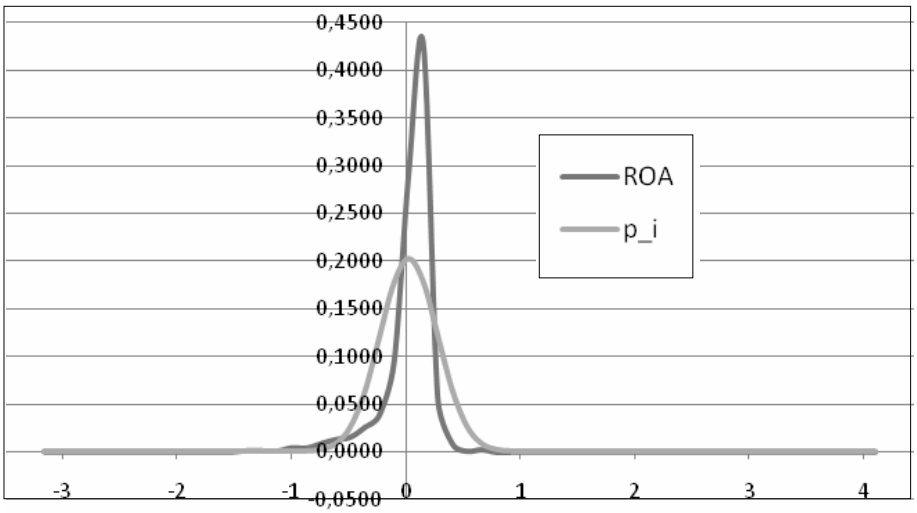

Figure 1. The histogram of ROA on the whole company sample
Rysunek 1. Histogram ROA dla całej próby badawczej
Source: own study
Źródło: opracowanie własne

Table 1. The correlation matrix of the variables
Tabela 1. Macierz korelacji zmiennych

Ratios/ ***Wskaźniki***	**ROA/*ROA***	**ROE/*ROE***	**Current ratio/** ***Płynność bieżąca***	**Debt/Equity/** ***Zobowiązania/ Kapitał***	**HPR/*HPR***
ROA/*Zwrot z aktywów*	1				
ROE/*Zwrot z kapitału*	0.370	1			
Current ratio/*Płynność bieżąca*	-0.092	-0.012	1		
Debt/Equity/*Zobowiązania/Kapitał*	-0.014	-0.039	-0.010	1	
HPR/*HPR*	-0.012	-0.011	-0.025	-0.007	1

Source: own study
Źródło: opracowanie własne

groups was the most reliable one statistically. Even though the method created a variable with a low level of measurement, the clusters could not be ranked ordinally. They made up homogenous groups with special characteristics different from each other, but they did not explain the change of market values clearly. As a result we decided to ignore cluster analysis.

We decided to use a different approach. We divided our sample into two parts based on the positive or negative sign of the holding period return. If HPR ≤ 0, than the unit of observation belongs to the first group, where the change of value is negative. If HPR ≥ 0 than the unit of observation was grouped by the model into group 2 with a positive change of value.

A particularly suitable method to examine the influential variables with a high level of measurement and the depending variables with a low level of measurement is the multi-variable discriminant analysis [Kecskeméti, Izsó 2005]. The essence of the method is to span a hyperplane in multi dimension space in order to separate the units of observation along the biggest difference and create groups that differ from each other the most significantly. In this case our aim was to divide companies with a positive and a negative change of value based on financial stability and profitability by the model.

The discriminant function

The model we created by the process can be described with the following equation:

$$z = 4{,}084x_1 - 0{,}038x_2 - 0{,}019\,x_3 - 0{,}009\,x_4 + 0{,}255$$

where:
z – discriminating variable,
x_1 – ROA, x_2 – ROE, x_3 – current ratio,
x_4 – leverage ratio (debt/equity).

The explanation of the model is given based on the standardized canonical discriminant function coefficients as the original coefficients of the model do not only depend on how strongly the measured variable affects the new variable but on the standard deviation of the measured variable as well. In Table 2 we present the standardized variables and the so called structure matrix.

Table 2. The expalanatory power of the model and its correlation with the discriminating variable
Tabela 2. Wyjaśnienie mocy modelu i jego korelacji z dyskryminacjną zmienną

Ratios/ ***Wskaźniki***	**Standardized Coefficients/** ***Standaryzowane współczynniki***	**Structure Matrix/** ***Macierz struktury***
ROA/*Zwrot z aktywów*	0.968	0.888
ROE/*Zwrot z kapitału*	-0.245	-0.352
Current ratio/*Płynność bieżąca*	-0.177	-0.250
Debt/Equity ratio/ *Zobowiązania/Kapitał*	-0.368	0.137

Source: own study
Źródło: opracowanie własne

Based on the standardized coefficients we can see that ROA has the biggest effect on the performance of the company, that is if the company is capable of increasing its operative result with its assets, it has a direct positive effect on the increase of its market value. In case of the other indicators we can experience a smaller negative sign relationship. Their aggregated effect is also weak compared to ROA.

The structure matrix is the Pearson linear correlation between the explaining variables and the value of the discriminant function. The connection is the strongest in case of ROA, and weak correlation can be seen in case of the other variables. The difference between the sign of the coefficient of debt/equity and the sign of the value of the correlation shows an interesting contradiction. According to the model if debt/equity increases, the value of z decreases, while correlation shows a weak positive relationship.

The results of the investigation, consequences

The model gives the value of the discriminating variable z for all units of observation. Therefore it classifies every unit of observation either into the positive or into the negative range of HPR (Tab. 3). The precision of this classification can be measured compared to the original depending variable.

The resulting probability values shows that the model is capable of showing companies which can increase their value based on fundamentals at a probability of 92.15%. It means that if a company is profitable on assets, and if it does not increase its leverage and liquidity in an aggressive way, then a significant increase in the market value will occur at the market of the company's shares. On the huge company sample it can be justified that financial stability and profitability have a positive effect on the market value of the company during one year.

Looking at decreasing market performance we get a more nuanced picture. The model chooses the companies which are not stable financially and profitable, and thus their values decrease at a low level of reliability. This level is quite low, only 34% of these companies is put in the adequate group. It may be hypothesized that the decrease of market value does not squarely occur as the effect of financial instability and low profit or loss-profit. However based on the model we can not give appropriately which ratios influence this.

In Table 4 we sum up the means of the measured characteristics of the different groups and the calculated the results of the discriminating value on these means.

Table 3. Grouping variables which can be used to validate the model
Tabela 3. Grupowanie zmiennych, które mogą być wykorzystane do walidacji modelu

		Original Grouping/*Oryginalne grupowanie*			
		missing/*brakujące*	(-) HPR	(+)HPR	total/*ogółem*
Cross-validated grouping/ *Grupowanie za pomocą sprawdzianu krzyżowego*	missing/*brakujące*	0.0000	0.0000	0.0000	0.0000
	(-) HPR	0.0003	0.0061	0.0127	0.0191
	(+) HPR	0.0006	0.0588	0.9215	0.9809
	total/*ogółem*	0.0009	0.0649	0.9343	1.0000

Source: own study
Źródło: opracowanie własne

Table 4. Group means according to the result of discriminancy analysis
Tabela 4. Grupy średnich na podstawie wyników analizy dyskryminacyjnej

Averages/*Średnie*	**ROA/ *ROA***	**ROE/ *ROE***	**Current ratio/ *Płynność bieżąca***	**Debt/Equity/ *Zobowiązania/ Kapitał***	**HPR***	**z**
1. group/ *1. grupa*	-0.9618	-4.9616	25.8471	161.9348	-0.4198	-5.433
2. group/*2. grupa*	-0.0135	0.0721	3.2870	1.0040	1.7355	0.125
1-2 corss-valideted group/ *1-2 połączona grupa*	-0.1672	-0.4232	3.5356	1.0250	-0.2450	-0.488
2-1 corss-valideted group/ *2-1 połączona grupa*	-1.0917	-1.8049	4.0307	0.2491	1.6777	-4.214
Original Group 1/*Oryginalna grupa 1*	-0.2417	-0.8487	5.6273	16.1103	-0.2614	-0.952
Original Group 2/*Oryginalna grupa 2*	-0.0282	0.0465	3.2971	0.9937	1.7348	0.066

Source: own study
Źródło: opracowanie własne

High level of indebtedness, high level of loss-profit per equity is characteristic of group 1 of the model, which companies try to compensate with high liquidity which results in a significant deprecation. The leverage and liquidity of Group 2 shows stability and companies belonging to this group are capable of making profit per equity, in which an extra 3-5% premium is also present beside risk-free yields. We think that the negative sign of ROA does not have a significant role, as we know from the large standard deviation (18.53%) that we should evaluate it as a lower level of operative earnings, because it takes its value from a one-sigma interval – 19.88% and 17.77% – around the mean. Our statements are supported by the observed positive mode and median values. It is worth looking at the values of the misgrouped variables. These are the ones which belong to group 1 but were grouped into group 2, and the ones which belong to group 2 but were grouped into group 1.

We can see from the structure matrix (Tab. 2) that ROA plays the major role in the model. Beside this the negative effect of the increase of leverage ratio is emphasized. The model is confused by ROA's major effect. Although we can say that the companies which belong to the second group are financially stable and have a safe financial policy based on leverage and liquidity, if profitability is low, then in the model the very influential ROA makes the value of z negative, which leads to these companies being put into the wrong group. It also means that the combined effect of financial stability and liquidity does not reach the effect of positive operative profitability (ROA) on the increase of market value. Thus we can say that financial stability is a precondition of the increase of market value, as it is clearly shown by the sample that the market does not necessarily react to aggressive financing and high profitability with a positive change of value. A high level of liquidity or a high level of leverage may result in a quick decrease of profitability (the large standard deviations in the sample), so its effect may be reflected in market deprecation. The results of the model do not explain the reasons of this deprecation clearly. We can say that inadequate financial stability contributes to lower market value, but its effect is not exclusive. The phenomenon outlined by the results can be called 'the effect of high risk' but it is not a significant observation, so it requires the improvement of the model. The anticipated indirect effect of high risk overlaps with the general theoretical statement [Miller 1977, Modigliani 1982], according to which the risk deriving from financial policy has a significant negative effect on the increase of market value.

Further testing of the model and possible alterations

As the grouping accuracy of (-) HPR does not give a reliable result (Tab. 5), the model has to be modified. The refinement of the grouping accuracy of the model was tested on a database which was completely independent from the previous sample. This new database was a sample of only 60 companies, but it was a time series sample, it contained the financial performance of the companies for the past 5 years. As there was no radical change in the financial characteristics of the companies from one year to the next, the new sample strengthened the identifiably of financial characteristics.

The grouping accuracy of the model shows an essential change, heteroscedasticity which is characteristic of the data is lower, that is why extreme values are expressed more precisely by the model.

It is important that the sample was classified based on annual profit, but we plan to make tests for more years with the model, as it is anticipated that financial stability affects price figures not for just one but for more years. It is an important and confirmable statistical observation, as it can be justified that financial stability is essential in the trend of increasing market value.

In case the financial indicators of the company are volatile – high risk – a deprecation is more probable in the future than in case of those companies which are able to hold their fundamentals steadily. As a continuation of the investigation we divide the question into several directions, first we plan to measure temporariness, secondly we plan to measure a wider set of indicators, on the basis of which we will look for complex background phenomena – e.g. by the use of factor analysis – that may give further explanations to understand the effect of financial stability on the market value of companies.

Table 5. Grouping probabilities that can be used on the new database to validate the model
Tabela 5. Grupowanie prawdopodobieństw, które mogą być wykorzystane w nowej bazie danych w celu walidacji modelu

		(-) HPR	(+)HPR
Cross-validated grouping/ ***Grupowanie mieszane***	**(-) HPR**	0.871	0.107
	(+) HPR	0.129	0.893
	total/*ogółem*	1.000	1.000

Source: own study
Źródło: opracowanie własne

Conclusions

In our paper we present the first results of a bigger investigation which aims to justify effects of fundamental phenomena. We wanted to know whether the financial situation and profitability of companies has an effect on market value. To answer this question we used a huge financial database which contains fundamental and technical information. We processed the data of 3453 companies. By applying discriminant analysis we created a model which is capable of choosing the companies with high punctuality which increase their values and by the increase of their financial performance, holding period return increases. However, the model classifies the companies the market value of which decreases with the deterioration of profitability, liquidity ratio and leverage ratio.

In the next phase of the investigation it seems practical to choose a sample in which the number of profitable and unprofitable companies are equal. We suppose that it will improve the grouping of companies. The involvement of more explaining variables could also cause higher accuracy. Such variables could be the ones which are capable of explaining risk. It is important that the involved explaining variables should be easily available, e.g they could be calculated and be accurately quantified from financial statements. The large standard deviation of financial data in the sample also direct our attention on methodological improvements.

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Streszczenie

W artykule podjęto próbę oceny czy sytuacja finansowa i rentowności przedsiębiorstw ma wpływ na ich wartość rynkową. Dzięki zastosowaniu analizy dyskryminacyjnej, przy wykorzystaniu danych z ponad 3 tys. firm stworzono model, który jest zdolny do wyboru firm, które zwiększają swoją wartość w wyniku wzrostu ich wyników finansowych.

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