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Does Fundamental Strength of the Company Influence its Investment Performance?

A b s t r a c t. The aim of our research is to find out whether the fundamental strength of the company affects its investment performance. The research is provided for 27 non-financial companies listed on the Warsaw Stock Exchange in the years 2012–2017. These companies belong to the stock indexes WIG20 and mWIG40 portfolios. The obtained results show that the proposed synthetic measure makes it possible to estimate the fundamental strength of listed companies, and the correlation between values of the constructed measure and rates of return is positive but usually statistically insignificant.

K e y w o r d s: capital market; fundamental analysis; taxonomic measure; investment performance.

J E L Classification: : C1, G11

Introduction

In the process of making investment decisions, investors use different supporting tools such as fundamental and technical analysis. The former requires taking into account a number of factors that are particularly important in assessing the current economic and financial condition of the company and to consider the environment in which analyzed firm operates.

Fundamental analysis involves assessing a firm's equity value based on the analysis of published financial statements and other information without

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http://www.dem.umk.pl/dem

reference to the prices at which a company's securities trade in the capital markets (Bauman, 1996, p.1). This analysis attempts to measure a security's intrinsic value by examining related economic and financial factors including the balance sheet, strategic initiatives, microeconomic and macroeconomic indicators, together with consumer behavior. Fundamental analysis is usually used to find long-term opportunities to invest. Studies that employ fundamental analysis to forecast earnings and future stock returns include Ou and Penman (1989a, b), Ou (1990), Greig (1992), Stober (1993), Kerstein, Kim (1995) Seng, Hancock (2012), Muhammad, Gohar (2018) and Bintara, Tanjung (2019), among others.

A modern approach to assessing the economic and financial condition of enterprises is applying the concept of fundamental strength of a company which bases on multidimensional comparative analysis methods. These methods allow to construct aggregated measures on the basis of many different variables, describing the condition of the company. In other words, to examine the state of the enterprise, its major economic and financial factors such as financial liquidity, level of debt, management efficiency, profitability, etc. are taken into account.

The first proposal to measure the fundamental power of the enterprise was so-called taxonomic measure of investment attractiveness (TMAI) proposed by Tarczyński (1994), and further developed by Tarczyński (2002) and Tarczyńska-Łuniewska (2013). TMAI is an application of a synthetic measure of development constructed by Hellwig (1968), which contains diagnostic variables describing financial situation of the company. There have been many attempts to construct taxonomic measures which have been used:

(1) to evaluate the state of enterprises, e.g. Kompa (2019),
(2) to select companies for the investment portfolio construction, e.g. Staszak (2017),
(3) to find relation between financial condition of companies and their performance, e.g. Juszczyk (2015).

Application of taxonomic measures to different purposes requires usage of different variables to their construction.

This study aims to find our if the fundamental strength of the company affects its investment performance. Fundamental strength of the company is measured by taxonomic measure which is constructed using 15 financial indicators evaluated for 27 non-financial companies listed on the Warsaw Stock Exchange in the years 2012–2017. These companies are classified as big and medium size firms since they have been included in the stock indexes WIG20 and mWIG40 portfolios. Investment efficiency is measured by annual logarithmic rates of return.

Investigation consists of several stages. In the first one synthetic measures of development are evaluated for all analyzed companies and years. In the second stage, annual rates of return for each company and the years 2012–2017 are calculated. In the third stage, the hypothesis that fundamental strength of companies influences their investment performance is verified applying regression functions.

1. Data and Methodology

The research concerns companies listed on the Warsaw Stock Exchange which constantly belonged to the stock indexes WIG20 and mWIG40 in the period from 31.12.2012 to 31.12.2017. However, companies:

- without financial statements in the analyzed period,
- with negative equity or zero sales revenues,
- excluded from trading on the Warsaw Stock Exchange since 2017,
- from the sectors defined as: banks, insurance and finance

were excluded from investigation. Therefore, an analysis (that is carried out according to the above assumptions) made it possible to qualify to research 27 non-financial companies.

As it was already mentioned, investigation is provided in several steps. In the first one synthetic measures of development are evaluated for all analyzed companies and years. These measures base on financial coefficients which are evaluated for the end of each year under consideration, using data from balance sheets and annual financial reports provided by selected companies. Taxonomic measure of investment attractiveness ($TMAI_{it}$) is calculated for the *i*-th company in the *t*-th year as (Łuniewska and Tarczyński, 2004, p. 43):

$$TMAI_{it} = 1 - \frac{d_{it}}{\overline{d_t} + 2S_{dt}} \tag{1}$$

where: d_{it} – the distance (from the benchmark) of the *i*-th company ($i = 1, 2,\ldots, n$) in the *t*-th period of time ($t = 1, 2,\ldots, T$), $\overline{d_t}$ – the average of distances d_{it} in time *t*, S_{dt} – the standard deviation of distances d_{it} in time *t*. Euclidean distance in *m*-dimensional space is defined as:

$$d_{it} = \sqrt{\frac{\sum_{j=1}^{m}(z_{jt}^{i} - z_{jt}^{0})^2}{m}} \tag{2}$$

where: z_{jt}^{i} – is the standardized variable describing the *j*-th feature ($j = 1, 2,\ldots, m$) in the *i*-th company in time *t*, z_{jt}^{0} – is the value of the *j*-th variable of the benchmark in time *t*, the benchmark is defined for each year and described by

m variables. Standardization of all variables used for the measure construction is provided according to the formula:

$$z_{jt}^{i} = \frac{x_{jt}^{i} - \bar{x}_{jt}}{S(x_{jt})} \tag{3}$$

where: x_{jt}^{i} – observation of the *j*-th variable in the *i*-th company in the *t*-th year, $\bar{x}_{jt}, S(x_{jt})$ – average and standard deviation of the *j*-th variable in the *t*-th year, respectively.

The benchmark used in the formula (2) might be either real or hypothetical object. Since it is difficult to determine a company which will be the pattern for others, the hypothetical object is usually used. Such benchmark is constructed from *m* variables as maximal value of stimulants and minimal values of de-stimulants i.e.:

$$z_{jt}^{0} = \begin{cases} \min z_{jt}^{i} \ if \ x_{jt}^{i} \epsilon D \\ \max z_{jt}^{i} \ if \ x_{jt}^{i} \epsilon S \end{cases} \tag{4}$$

where: *D*, *S*, – are sets of de-stimulants and stimulants, respectively. Stimulants are variables whose rise in quantity indicates an increase of economic and financial standing of the enterprise whereas de-stimulants are variables with the opposite direction of influence.

In the second stage, annual logarithmic rates of return are calculated, according to the formula:

$$R_{it} = ln\left(\frac{y_{it}}{y_{it0}}\right) \tag{5}$$

where y_{it}, y_{it0} – quotations of share price of the *i*-the company on the last and the first day of Warsaw Stock Exchange quotation in the *t*-the year (t = 2012, 2013,…,2017), respectively.

In the third stage, the hypothesis that fundamental strength of companies influences their investment performance is verified, applying Pearson correlation coefficients and regression functions. In other words, the relations between logarithmic annual rates of return from shares of considered companies and values of synthetic measure TMAI (for current and lagged dependencies) are estimated.

2. Evaluation of Companies Based on Taxonomic Measure

To evaluate the fundamental strength of companies, it is necessary to apply numerous indicators that are of particular importance when assessing the current state of the enterprise and its further development prospects. In the

construction of the aggregated measures, the selection of diagnostic variables is extremely important since it determines the quality of evaluation and signals the proper functioning of companies, taking into account their economic and financial situation (Tarczyński and Łuniewska, 2004).

Table 1. TMAI values of selected companies for the years 2012–2017

Company	TMAI Value						
	2012	2013	2014	2015	2016	2017	Average
AMREST	0.15	0.13	0.18	0.11	0.11	0.08	0.13
ASSECOPOL	0.36	0.39	0.36	0.19	0.24	0.20	0.29
BOGDANKA	0.30	0.31	0.27	0.11	0.27	0.38	0.27
BORYSZEW	0.14	0.15	0.18	0.10	0.16	0.15	0.15
BUDIMEX	0.23	0.35	0.12	0.19	0.27	0.29	0.24
CCC	0.27	0.32	0.20	0.15	0.11	0.19	0.21
CDPROJECT	0.45	0.32	0.35	0.28	0.41	0.34	0.36
CIECH	–0.04	0.18	0.19	0.15	0.24	0.25	0.16
CYFRPLSAT	0.27	0.35	0.18	0.14	0.16	0.16	0.21
ECHO	0.21	0.29	0.36	0.35	0.33	0.23	0.29
ENEA	0.24	0.42	0.36	0.14	0.23	0.21	0.27
EUROCASH	0.07	0.12	0.08	0.05	0.05	–0.06	0.05
GTC	0.09	–0.10	–0.04	0.18	0.16	0.27	0.09
INTERCARS	0.16	0.21	0.20	0.11	0.14	0.11	0.15
KERNEL	0.32	0.26	0.12	0.11	0.22	0.22	0.21
KETY	0.28	0.34	0.29	0.18	0.25	0.22	0.26
KGHM	0.42	0.37	0.23	0.01	0.06	0.13	0.20
KRUK	0.22	0.06	0.10	0.13	0.16	0.18	0.14
LOTOS	0.09	0.10	0.14	0.05	0.15	0.20	0.12
LPP	0.28	0.32	0.24	0.14	0.17	0.23	0.23
NETIA	0.08	0.15	0.18	0.08	0.09	0.04	0.10
ORANGEPL	0.16	0.17	0.18	0.11	0.06	0.07	0.13
ORIBS	0.34	0.44	0.46	0.23	0.38	0.31	0.36
PGE	0.28	0.31	0.37	0.11	0.23	0.18	0.25
PGNIG	0.25	0.32	0.33	0.21	0.25	0.25	0.27
PKNORLEN	0.18	0.18	0.13	0.14	0.24	0.27	0.19
TAURONPE	0.23	0.25	0.23	0.09	0.05	0.09	0.16

Note: Bold letters denote the State Treasury companies.

Synthetic measures of development (TMAI) are constructed employing 15 financial indicators belonging to four groups:

1. profitability ratios: return on assets ratio (ROA), return on equity ratio (ROE) and return on sales ratio (ROS);
2. liquidity ratios: current ratio, acid-test ratio (quick ratio) and cash ratio;

3. efficiency (activity) ratios: average collection period, average payment period, fixed asset turnover ratio, asset turnover ratio and inventory turnover ratio;
4. leverage (debt) ratios: debt ratio, debt to EBITDA ratio, interest coverage ratio and long-term debt to equity ratio.

Obtained TMAI values for considered companies in the years 2012–2017 are presented in Table 1.

According to (Łuniewska and Tarczyński, 2006, p. 95), the level of synthetic measures for companies with strong foundational and being attractive in terms of investment is determined by TMAI in the range of 0.3–0.5. Analysing values of constructed measure in Table 1, it may be noticed that in each of the audited periods there are several companies in good economic and financial condition, for which TMAI values equal 0.3 and above. Namely for rounded measure values, there are 15 such firms in 2013, 11 companies in 2012, 9 enterprises in 2014, 6 companies in 2017, 5 enterprises in 2016, and 2 firms in 2015 (i.e. there are only 48 such cases, and among them only in 33 cases TMAI is bigger than 0.3). It means that the majority of companies under study are characterized by weak economic and financial results in the years 2015–2017 (i.e. in more than 70% of all analysed cases).

Among analysed companies only four of them can be classified into the group of the best companies, i.e. CDPROJEKT in all analysed years, ORBIS together with BOGDANKA in five years and ECHO in four years. Ten enterprises are characterized by values of the synthetic measure below 0.3 in all years of investigation, which means low investment attractiveness and fundamental strength. Other companies show low values of TMAI in three and more years (among six considered years).

CDPROJEKT obtains the highest value of taxonomic measure of investment attractiveness in 2012 (TMAI= 0.45) and keeps the TMAI value above 0.3 in five following years, that proves its strong financial situation and proper management. The second place in 2012, in terms of investment attractiveness, belongs to KGHM company, which in the following years does not perform well, and keeps the last place in the constructed ranking for 2015. The years 2013 and 2014 are favourable for ORBIS, which seems to be of the best financial standing, and the values of aggregate measures equal 0.44 and 0.46, respectively. TMAI values for ORBIS in the considered period 2012–2017, are regularly in the range between 0.3 and 0.5, with the exception of 2015, when the measure decreases to 0.23.

Definitely unfavourable results in 2013 and 2014, in terms of TMAI, belong to GTC, which is the weakest among all companies in both years. In

2015, ECHO reaches the highest TMAI level, while in the following year the first place is taken by CDPROJEKT again, whereas TAURONPE turns out to be the least attractive investment. BOGDANKA is the highest ranked company in the ranking in 2017, while EUROCASH characterizes by the lowest TMAI level among all companies.

ORBIS and CDPROJEKT have the highest average values of TMAI which for both companies over the six examined years are above 0.36. These two firms should be classified as companies with strong fundamental and being attractive for investment. Other companies achieve much worse results thus their investment attractiveness is at an average level. It is worth mentioning that among the State Treasury companies, ENEA from the energy sector and PGNIG, belonging to the WIG-OIL&GAS industry index, keep the highest place in the created ranking of companies. The least level of taxonomic measure of investment attractiveness is observed for EUROCASH. The company fares by far the worst in the period under review, reaching an average TMAI of 0.05. It is worth mentioning that the TMAI negative values presented in Table 1 are irrelevant since values of the measure depend on the normalization formula (1), which is the special case of the formula presented by Tarczyński (1994, p. 177).

3. Rates of Return of Analyzed Listed Companies

Annual logarithmic rates of return, calculated for all companies, are presented in Table 2. It is visible, that average annual rates of return in the years 2015–2017 are below 20% (only 14% in 2015) whereas they are over 20% in three first years of investigation (25% in 2014).

The rates of return of companies listed on the Warsaw Stock Exchange were characterized by high volatility in the period 2012–2017. Among the selected companies, there are those that systematically generated positive returns on the capital employed by investors, e.g. BUDIMEX, INTERCARS, CCC, KĘTY, KRUK, ORBIS. The shares of CCC brought on average 31.66% of profit per year. In the case of KRUK, the return was 30.43%, while investors obtained 17.92% on shares of ORBIS.

The highest rate of return in 2012 is recorded by LPP (83.76%), while ORANGEPL generated the lowest value i.e. 25.01% losses. CDPROJEKT achieved the highest rate of return among all selected enterprises in 2013 (104%). The main factor was the high sales of the popular game series translating into high and positive financial flows of the company. CDPROJEKT was keeping the leader position in 2016 and 2017, and also achieved the highest average rate of return over the entire period (48.75%).

CIECH company was successful in 2014 and 2015 (70.23%). The highest losses were generated by GTC (i.e. 32.37% in 2014) and BOGDANKA (i.e. 101.18% in 2015). Other raw material and energy companies, e.g. KGHM, ENEA, PGE and TAURONPE, did not avoid losses in 2015.

Taking into consideration average returns obtained by analyzed companies, it is visible that CDPROJECT keeps the first place (48.75% average annual rate of return) and is followed by CCC (31.66%), AMREST (30.97%) and KRUK (30.42%). ORBIS, which is a leader in the TMAI classification, achieved average returns of 17.92% over the entire period but it did not generate losses in any year. There are 7 companies which generated negative average annual rates of returns. Among them ORANGEPL had the lowest average rate of return from shares in all years 2012–2017. On average, it generated losses of 12.96% per year.

Table 2. Logarithmic rate of return for the years 2012–2017

Company	Annual Rate of Return (%)						
	2012	2013	2014	2015	2016	2017	Average
AMREST	40.83	–6.66	10.54	63.23	45.29	32.58	30.97
ASSECOPOL	–1.96	6.55	16.45	15.74	0.44	–14.86	3.73
BOGDANKA	29.06	–3.32	–21.56	–101.18	73.85	–2.18	–4.22
BORYSZEW	–4.73	–21.51	13.63	–18.10	53.31	14.07	6.11
BUDIMEX	5.51	69.28	15.74	35.08	6.40	12.63	24.11
CCC	47.23	48.27	14.72	5.49	39.66	34.57	31.66
CDPROJECT	16.06	104.00	–4.91	28.24	85.73	63.41	48.75
CIECH	24.43	33.55	35.27	70.23	–33.54	–1.40	21.42
CYFRPLSAT	19.60	18.78	18.37	–11.82	16.40	2.31	10.61
ECHO	40.15	28.27	4.95	–2.01	74.11	–4.83	23.44
ENEA	–11.57	–12.03	14.98	–26.48	–17.35	20.79	–5.28
EUROCASH	39.92	10.14	–20.72	26.53	–18.88	–37.26	–0.05
GTC	15.43	–28.43	–32.37	29.97	13.70	20.78	3.18
INTERCARS	6.48	79.09	17.25	6.15	15.64	11.29	22.65
KERNEL	–2.88	–56.15	–29.10	54.98	30.20	–28.09	–5.17
KETY	37.53	45.30	30.72	14.22	27.23	12.59	27.93
KGHM	69.46	–39.28	–4.04	–50.67	39.68	19.32	5.75
KRUK	1.78	63.04	28.45	46.83	31.93	10.48	30.42
LOTOS	54.04	–15.04	–22.13	5.72	34.84	42.85	16.71
LPP	83.76	69.27	–20.80	–25.99	2.88	45.55	25.78
NETIA	–20.04	20.81	13.56	6.47	–7.37	24.27	6.28
ORANGEPL	–25.01	–15.46	–11.49	–17.98	–12.79	4.96	–12.96
ORIBS	3.63	9.87	12.16	36.50	19.80	25.55	17.92
PGE	–0.78	–7.22	17.19	–27.97	–21.41	13.08	–4.52
PGNIG	24.45	0.94	–11.49	17.48	12.35	14.08	9.63
PKNORLEN	33.25	–15.58	21.06	35.14	26.01	24.42	20.72
TAURONPE	–5.23	–3.62	18.35	–52.41	–1.05	6.78	–6.19

Note: Bold letters denote the State Treasury companies.

4. Relationship Between Fundamental Strength of Companies and their Investment Performance

Supporters of fundamental analysis claim that profits from capital investments can be achieved by investing in companies characterized by good economic and financial conditions. Assuming that the taxonomic measure of investment attractiveness (1) properly describes financial standing of companies and annual rate of return (5) is a good measure of firm performance, we apply Pearson correlation coefficients and linear regression functions to verify the existence of positive relationship between both phenomena. The research is conducted for the following 16 relations between:

(1) values of average returns and average values of synthetic measures,

(2)–(7) values of rates of return in the years: 2012, 2013, 2014, 2015, 2016, 2017 and values of synthetic measures in the same years,

(8) values of rates of return in the whole period 2012–2017 and values of synthetic measures in the six-years period,

(9) values of rates of return in the five-years period 2013–2017 and values of TMAI in the period 2012–2016 (i.e. TMAI is lagged by one year),

(10)–(14) values of rates of return in the period 2013, 2014, 2015, 2016, 2017 and values of synthetic measures lagged by one,

(15) values of rates of return in 2012–2017 and values of TMAI in the six-years period for the companies with the highest average annual returns i.e. CDPROJECT, CCC, AMREST and KRUK,

(16) values of rates of return in 2012–2017 and values of TMAI in the six-years period for companies with the highest values of taxonomic measure i.e. CDPROJECT, BOGDANKA, ORBIS and ECHO.

Values of Pearson correlation coefficients and characteristics of the regression models are presented in Table 3.

Based on the results in Table 3, it is visible that the relation between fundamental strength of the company and its performance is positive (except for the lagged TMAI in 2015) but usually statistically insignificant. Only correlations between both phenomena, observed for the whole period of analysis and rates of return from 2016 for both current and lagged values of TMAI, are statistically significant. Pearson correlation coefficient obtained for four companies which were selected as the ones with the highest values of taxonomic measure is quite high i.e. 0.31 but it is not statistically significant. In general, values of Pearson coefficient are low and do not excide 0.36, therefore also determination coefficients of regression functions are not bigger than 0.13.

Table 3. Relations between TMAI and rates of return.

Number of the relation	1	2	3	4	5	6	7	8
Constant Number of observations	27	27	27	27	27	27	27	162
Correlation								
Pearson coefficients	0.26	0.09	0.17	0.27	0.28	**0.36**	0.31	**0.22**
Regression functions								
Constant *a*	0.03	0.14	0.01	–0.06	–0.16	–0.02	0.00	0.00
Slope factor *b*	0.50	0.21	0.53	0.46	1.53	1.15	0.69	0.63
t-statistics t_a	0.34	1.22	0.05	–0.69	–0.95	–0.17	0.03	0.00
t-statistics t_b	1.35	0.45	0.86	1.38	1.46	**1.94**	1.64	**2.91**
R^2	0.07	0.01	0.03	0.07	0.08	0.13	0.10	0.05
Number of the relation	9	10	11	12	13	14	15	16
Number of observations	135	27	27	27	27	27	24	24
Correlation								
Pearson coefficients	0.00	0.11	0.24	–0.27	**0.33**	0.18	0.15	0.31
Regression functions								
Constant *a*	0.12	0.06	–0.05	0.27	0.00	0.06	0.28	–0.29
Slope factor *b*	0.00	0.37	0.38	–0.94	1.41	0.39	0.38	1.56
t-statistics t_a	2.03	0.34	–0.57	1.62	0.01	0.65	1.73	–0.84
t-statistics t_b	0.01	0.54	1.25	–1.40	**1.74**	0.89	0.71	1.52
R^2	0.00	0.01	0.06	0.07	0.11	0.03	0.02	0.09

Note: Bold numbers denote significant relations at the significance level 0.05.

Conclusions

An ongoing assessment of the company's operations is necessary to company management and providing development perspectives. For this purpose, the state of the enterprise is examined in terms of its economic and financial condition. In our research we applied linear ordering method to evaluate the fundamental strength of the company. In majority of research, ratios describing financial liquidity, level of debt, management efficiency and profitability are taken into account to construct taxonomic measure of investment attractiveness, and such financial indicators were used in this study.

The aim of our research was to find out if the fundamental strength of the company affects its investment performance. In order to achieve that goal, we constructed the synthetic measure determining the fundamental strength of public companies that are characterized by good economic and financial condition and market value. Then we checked if the statistically significant relation between values of aggregated measure and annual rates of return exists.

The obtained results show that in all cases (but one) correlation between taxonomic measures and logarithmic rates of return is positive. However, statistically significant relationship between TMAI values and the rates of return from the shares of the analyzed public companies is observed only for the whole period of investigation 2012–2017 and for 2016 for both current and lagged relations.

In other words, the statement, that fundamental strength of companies affects their investment performance, seems to be confirmed although our study also shows that there are other factors influencing rates of returns and correlation between both phenomena is usually not strong. These results are consistent with study (Juszczyk, 2015) although in this research different set of companies, considered periods and variables were applied for the taxonomic measure construction. However, lack of significant relations for lagged TMAI values (except one year) shows weak forecasting properties of constructed synthetic measure which cannot be used in the initial selection of companies for the investment portfolio. Our results contradict (Staszak, 2017) who obtained promising results applying constructed by him TMAI to investment portfolio determination. But in his research, portfolios were built using only companies being leaders in the rankings of considered companies. Taking that fact in consideration, we notice the similarity to our results since correlation between fundamental strength and returns evaluated for four companies, selected as the most attractive for investors, is relatively high.

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