

**STRATEGIES OF INVESTING IN THE CONSTRUCTION
SECTOR BASED ON MARKET ANOMALIES
OCCURRING AT WARSAW STOCK EXCHANGE**

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Key words: construction sector, market anomalies, market efficiency, investing.

A b s t r a c t

During the last twenty years, the importance of construction sector in the economy of the country was subject to fluctuations a number of times. This is noticeable as the change in the dynamics of construction-assembly production against the background of the GDP. For this study, two objectives were assumed. The main goal was to determine the strategy of investing in the construction sector at the Warsaw Stock Exchange based on market anomalies. Identification of those anomalies was the auxiliary objective of the paper. Determination of deviations from the market efficiency will give the average investor the possibility of generating abnormal rates of return atmosphere at the capital markets.

In the paper, the method of literature studies, the method of comparisons and the method of studies on historical material were applied. Indicator analysis was necessary for evaluation of selected fundamental indicators. Profitability of investments was computed by applying the logarithmic rate of return.

Based on the results of studies it can be concluded that higher than average rates of return may be obtained independent of the atmosphere at the capital markets and in the entire economy. Based on the analysed time anomalies, the shares of construction companies should be purchased on Wednesdays and sold on Fridays. Purchasing shares of construction companies at the beginning of the year one should sell them at the end of the first year quarter.

**STRATEGIE INWESTOWANIA W SEKTORZE BUDOWLANYM NA PODSTAWIE
ANOMALII RYNKOWYCH WYSTĘPUJĄCYCH NA GIEŁDZIE PAPIERÓW
WARTOŚCIOWYCH W WARSZAWIE**

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Słowa kluczowe: sektor budowlany, anomalie rynkowe, efektywność rynku, inwestowanie.

Abstrakt

W ostatnim dwudziestolecu zmieniało się znaczenie sektora budowlanego w gospodarce kraju. Jest to zauważalne przy zmianie dynamiki produkcji budowlano-montażowej na tle PKB. W pracy przyjęto dwa cele. Celem głównym jest określenie strategii inwestowania w sektorze budowlanym na GPW w Warszawie na podstawie anomalii rynkowych. Celem pomocniczym jest identyfikacja tych anomalii. Ustalenie odstępstw od efektywności rynku stworzy możliwość przeciętnemu inwestorowi wygenerowania anormalnych stóp zwrotu w warunkach zmiennej koniunktury giełdowej.

W pracy wykorzystano metodę studiów literaturowych, metodę porównań oraz metodę badań na materiałach historycznych. Do oceny wybranych wskaźników fundamentalnych niezbędna była analiza wskaźnikowa. Rentowność inwestycji wyliczono za pomocą logarytmicznej stopy zwrotu.

Na podstawie wyników badań można stwierdzić, że ponadprzeciętne stopy zwrotu można uzyskiwać niezależnie od panujących nastrojów na rynkach kapitałowych i w całej gospodarce. Na podstawie analizowanych anomalii czasowych akcje spółek budowlanych należy kupować w środy, a sprzedawać w piątki. Kupować akcje spółek budowlanych należy na początku roku, a sprzedawać pod koniec pierwszego kwartału.

Introduction

The Stock Exchange represents one of the options for investing cash surplus. Year after year the number of new investors there increases, mainly thanks to the new public offers, the so-called IPO – *Initial Public Offering*. Direct access of investors to various financial instruments that are traded at the stock exchange market results in the increased propensity for saving at households in the entire national economy. The development of stock exchange market with a wide range of financial instruments offered expands the investment opportunities. Investors are searching for various methods to achieve higher than average rates of return from their investments.

The main goal was to determine the strategy of investing in the construction sector at the Warsaw Stock Exchange based on market anomalies. Identification of those anomalies was the auxiliary objective of the paper.

In a well-developed economy, stock exchange fulfils a number of important macroeconomic functions that have positive influence on functioning of the economy. The capital market as one of the financial market segments fulfils the role of the capital distributor applying the mechanisms of price i.e. it acts as intermediary in exchange of capital between the buyers and the sellers. Every rational investor aims at placing his capital in the sector of the economy that allows the highest rate of return on investment. The success on the capital market depends on a number of very important aspects. Undoubtedly, one of these aspects is to maintain an effective investment strategy. It is an art of investing that takes into account the practice and theory of comprising transactions. The strategy should describe the desired rate of return based on a specified time horizon with the acceptable level of risk by the investor. The

addition to the above should be the exact description of all the conditions for the decision to be made. The strategy can be built by implementing technical or fundamental analysis, selection of appropriate rating, oscillators and means, market anomalies, stock and planetary cycles and other elements.

Strategies of investing on a capital market

In the history of the development of world finance there had been many concepts of investment strategies. Most of them are concerning potential means of obtaining the maximum level of return on invested capital (ROIC – Return On Invested Capital) in the given period of time.

The basic and, at the same time, oldest investment strategies are technical and fundamental analyses. There are, of course, other, more complex strategies, for instance wallet analysis developed by Harry Markowitz, the momentum strategy or the contradictory investment strategy (SZYSZKA 2006, p. 38). The selection of a right strategy depends on a couple of factors, such as: time horizon, investment risk, market development level, the knowledge of a particular investor, the information resource (JAJUGA 2009, p. 5). During the last decades investment strategies that are based on a selection of stocks from the regulated markets chosen by an analysis of a couple of fundamental ratings had gained high recognition and popularity. By an idea of a “fundamental rating” one should understand the evaluation of a company’s financial attractiveness based on a relation of its price to its real value.

The concept of fundamental ratings in this thesis concerns the ratings that are created on the basis of data published by the companies and the information about the share prices of stock companies. Those ratings are based mainly on the data that provide the opportunity to evaluate the value and the price of the company (P/BV, P/E), as a distinction from other ratings, for example from the family of technical analysis that take into account the changes of share prices in a specific period of time. The aim of those strategies is to maximize the probability to choose a portfolio of companies that are undervalued in a given moment (CZAPIEWSKI 2009, pp. 55–56).

The next allotment of investment strategies unfolds typically on a line that describes the attitude towards risk, which a particular investor is vulnerable to when using this strategy. The basic from this group are aggressive, balanced and defensive strategies. In the thesis there were adopted researches based on aggressive strategies in which the investor accepts a high level of risk. Those strategies belong to the group of strategies that are described as those with a high probability of capital downfall and with an expected return much higher than the so-called risk-free rate of return. Choosing this type of strategies, the

investors are primarily concern with the maximalization of the level of potential return (JACOBS 1999).

Other methods of investing are: constant dollar plan, constant ratio plan. The first is about maintaining the same amount of equity in shares or other risky stocks (for example 10 t PLN). A simple mechanism is being implemented here: if the prices go up the shares are sold starting with the group of stocks that went up the most. The latter strategy means maintaining a stable relation between an active and passive part of the portfolio. The active part concerns stocks with a relatively high volatility. On the other hand, the passive part consists of different kinds of bonds, which prices undergo relatively low hesitation so the risk of a loss is relatively low. The proportion between active and passive parts depend of the preferences of the owner of the portfolio and should be relatively stable (MORGAN, RAYMOND et al. 2010).

Characteristic of the construction sector in Poland

Construction is the third largest sector of Polish economy after industry and trade. The share of construction in generating the GDP in 2011 was 7.9% (105.5 billion PLN) and according to the estimates of the Central Statistical Office (GUS), in 2012 a decrease by 0.5% as compared to the preceding year is possible. Because of its general character, construction is an inseparable component of economic and social activities. Investment activity of economic entities and economic situation of the population are the decisive factors generating demand for construction services and hence development of construction as a sector of the economy (*Polska 2012. Raport o stanie...* 2012, pp. 181–182). In April 2012, employment in the construction sector represented 9% of the total employment in the sector of enterprises. However, in 2012, the sector recorded a high rate of bankruptcies. During the first half of 2012, around 300 construction companies in Poland bankrupted. The average general debt rate for the 8 largest companies from the WIG-BUDOWNICTWO index was ca. 60% of their value (BARANOWSKA-SKIMINA 2012).

The construction sector is among the most unstable sectors of Polish economy. Continual fluctuations of its development indicators such as, e.g. industrial production and investment outlays for development of construction take place. The development of the construction market cycle in Poland indicates clearly the direct correlation between changes in construction sector and fluctuations in the activity of the entire Polish economy.

The data concerning industrial production (industry production sold) is presented in Figure 1. Those data represent the basic measure of economic activities of industrial enterprises and companies.

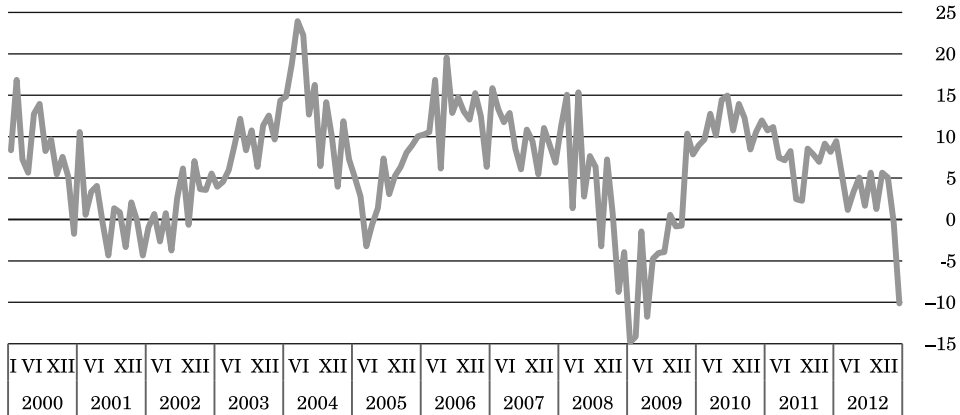


Fig. 1. Change in the value of industrial production in Poland during the years 2000–2012 (y/y) in %
Source: own work based on the data obtained from bankier.pl website (access: 18.01.2013).

The sample of the above indicator includes companies employing more than 9 people. The studies cover, among others, the value of products, semi-finished products, part of own production sold as well as value of works and services provided at a fee. It was noticed that the last data from December 2012 published on 18 January 2013 were much worse than the projections (actual -10.6% as compared to the forecast at -6.9%). In this case we deal with the situation similar to that from the turn of the years 2008–2009, where the industry production indicator decreased to the historical minimum by over -15% .

Together with the data on industrial production, the Central Statistical Office (GUS) publishes data for construction-assembly production. They concern works of investment and refurbishment type completed in Poland by construction enterprises employing more than 9 persons. The data encompass, among others, the works in erection of buildings and structures, construction and covering of roofs, as well as assembly, installation and finishing works, i.e. works involved in construction, reconstruction, extension, rebuilding, refurbishment and conservation of fixed and temporary buildings and structures. Figure 2 presents the dynamics of construction-assembly production against the background of the GDP of Poland.

The dynamics of construction-assembly production increase during the second half of 1990-s generally exceeded the GDP growth rate (in current prices). Then, the slow-down from the beginning of the last decade influenced the sector much more than it influenced the other sectors of the economy. Consequently, in 2001 and 2004 a decrease in construction-assembly production was even recorded while during the years 2002–2003 the sector growth rate was marginal. The situation improved significantly as of 2005, and

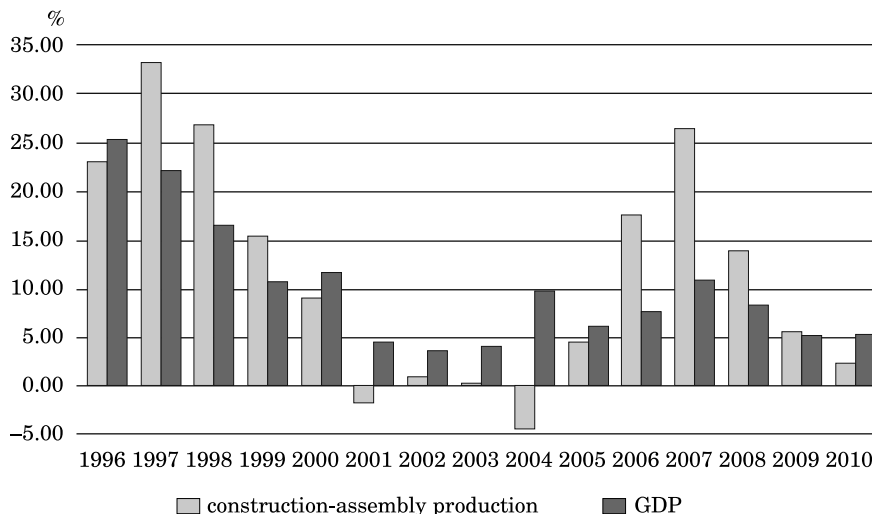


Fig. 2. Dynamics of construction-assembly production against the background of the GDP during the years 1996–2010 (y/y) in %

Source: own work based on http://www.bcc.org.pl/blz/pliki/raporty/BUDOWNICTWO_XI_2011.pdf (access: 18.01.2013).

particularly during the years 2006–2007 when the construction industry growth rate was significantly higher than that of the economy as a whole. Economic revival in the country and rapid increase in the volume of road and infrastructural investment projects resulting from Poland's accession to the European Union were the determinants of that growth. The global economic crisis that started in 2008, slowed-down the rapid development of the construction sector although until 2010 the construction-assembly production growth dynamics was higher than that of the GDP. That situation resulted from the large volume of works in road and engineering construction areas.

The development of the index reflecting the market situation in construction sector companies is presented in Figure 3. The WIG-BUDOWNICTWO index consists of 26 companies of various sizes listed at Warsaw Stock Exchange.

The largest share in the portfolio belongs to three companies with the aggregated share of 59.239% in the whole index (BUDIMEX 24.945%; ELEKTROBUDOWA 23.574% and POLIMEXMS 10.720%)¹. Currently, the sectoral index is at the level of ca. 1800 points. It was at that level previously in 2004 and 2000. In 2004, the WIG-BUDOWNICTWO index started increasing systematically and at the turn of 2005 and 2006 the clear trend appeared that led the index to the levels of historical maxima in 2007 (exceeding 12,500 points).

¹ According to the data at www.gpw.pl (access: 22.01.2013).

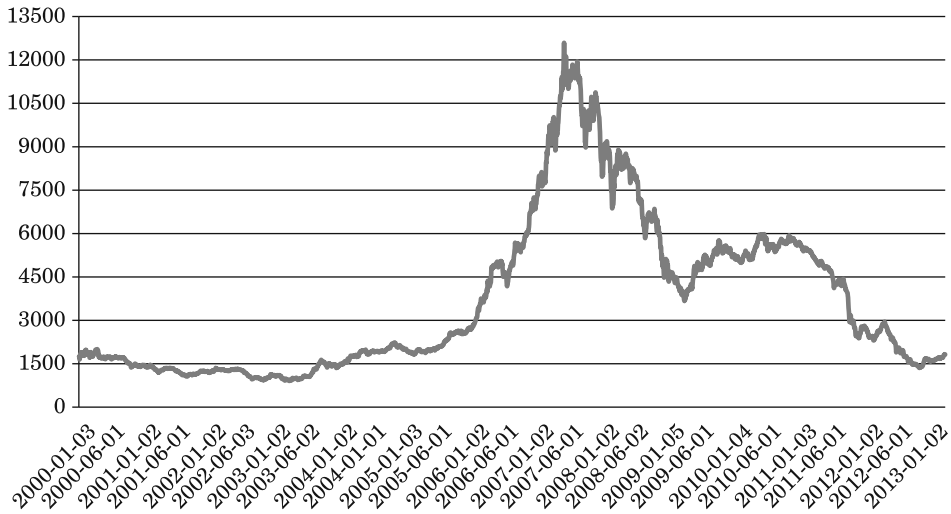


Fig. 3. WIG-BUDOWNICTWO index value during the period from 2000 until 22.01.2013 (according to day closing prices, in points)

Source: own work based on the data obtained from gpwinfstrefa.pl (access: 22.01.2013).

Similar to the indicator of construction-assembly production also the WIG-BUDOWNICTWO index reached its peaks during the years 2006–2007 and then the trend reversed to the decreasing one, which continues.

Methodological assumptions for the studies

Identification of anomalies at Warsaw Stock Exchange in the construction sector and presentation of proposals for investing in the market of construction industry during the periods of bull and bear market is the main objective of the study.

The method of literature studies that aims at explanation and understanding the nature of market efficiency and market anomalies is one of the research methods applied in this paper. The method of comparisons that involves comparing (at least two) variables describing the specific economic parameters (e.g. comparison of the rates of return for indexes WIG20 and WIG-BUDOWNICTWO) was used for correct interpretation of the results. The method of studies on historical materials was also used for computation of rates of return from selected indexes and companies from the construction sector.

In the work the secondary source materials were used. The data necessary for conducting the studies were obtained from the financial portals of Warsaw Stock Exchange, GPWInfoStrefa, Bankier and from data processed and appro-

priately selected by advanced software for technical analysis MetaStock ver. 11.0 as well as the SDIG system (Stock Exchange Information Distribution System). The financial data of companies concerning the indicators computed in that study were obtained from the above-mentioned Internet portals as well as balance sheets of the individual companies. Next, appropriately standardised data was processed using the Microsoft Excel software.

During determination of profitability, for simplification of computations, the dividends from individual companies were excluded. For investigation of the rates of return on selected companies and market indexes the logarithmic rate of return was used defined in the following way:

$$R_{it} = \ln(P_{it}) - \ln(P_{it-1})$$

where:

R_{it} – rate of return from index i or company i during the period t ,

P_{it} – closing price of index i or company i during the period t ,

P_{it-1} – closing price of index i or company i during the period $t-1$ (JAJUGA 2007, pp. 92–93).

Indicator analysis (investing in value) allowing evaluation of selected indicators, i.e. book value to market price (BV/P), market price to net earnings (P/E), was applied for identification of anomalies related to the characteristics of the companies (DOLESZCZAK 2011, pp. 45–48).

Companies and indexes listed at Warsaw Stock Exchange are the subject of study. The investment portfolios and their rates of return developed based on the emergence of selected capital market anomalies are the object of study. The timeframe of the study covers the period from January 2000 until 18 January 2013. The financial data of companies concerning indicators computed in this study were obtained from balance sheets of the individual companies.

Efficiency of the market and selected anomalies

The shape of the current definition of the efficient capital market was influenced by scientific approaches and definitions originating mainly from the 20th c. (e.g. Bachelier, Cootner, Malkiel) (BULSKI, GÓRSKI 2012, pp. 141–143).

The market efficiency theory was developed and expanded mainly to satisfy the needs and in the context of capital markets' analysis. Eugen Fama, who claims that the market is efficient when important current information are available to all participants at almost no cost and where a large number of rational investors acting with the focus on maximisation of profit and attempting at projecting the shares price development compete actively, is considered

the creator of the theory. Competition in the efficient market among rational participants causes that the current price of stocks at each moment reflects the information related to the past and the future events in the market (FAMA 1970, pp. 383–397).

The capital market efficiency is understood differently by practitioners and by theoreticians. The practitioners attempt at foreseeing the changes of prices based on the information concerning their levels during the preceding period while theoreticians prove that variability of prices is unpredictable and caused by factors that are external to minimisation of the shares portfolio management risk. The empirical analysis of markets initially generally confirmed their efficiency within the timeframe considered indicating at the same time the presence of numerous deviations from efficiency, i.e. market anomalies (STARZEŃSKI 2011, p. 49).

“Anomaly” means deviation from the expected result, an exception from the rule. In the capital market context, anomaly is the “technique or strategy that is contrary to the efficient markets theory assumptions” and “the situation allowing achievement of positive, higher than average rates of return” (CZERWONKA, GORLEWSKI 2008, p. 152).

The systematics of anomalies is very extensive. Some authors divide anomalies into three or four groups while others classify a higher number of groups. This paper focuses on time (seasonal) anomalies and those offering the possibility of projecting rates of return based on the characteristics of companies.

Calendar (time) anomalies represent the search for differences between the average rates of return during selected stock exchange sessions or selected time periods (e.g. a week, month). Determination of presence of such differences may be helpful to the investors in achieving higher than average profits on investments, higher than those they could achieve at the efficient market (GORLEWSKI 2003, p. 12).

In this paper the author was searching for anomalies of the seasonal distribution of the rates of return, i.e. the month-of-the-year effect and the day-of-the-week effect in construction industry. The month-of-the-year effect also referred to as the year-end effect or “January effect” is represented by achievement of much higher average rates of return by companies during the first month of the year. In practical terms, the investors have the opportunity of generating higher than average profits on investments initiated at the end of December and closed during the last days of January (SZYSZKA 2007, pp. 141–145).

The day-of-the-week effect is represented mainly by lower prices on Monday and higher on Friday (FRĄCZEK 2006, pp. 268–269). The presence of the day-of-the-week effect was confirmed not only in the American market but

also in Great Britain, Turkey, Australia, Japan, Canada, Czech Republic and Rumania. In Japan and Australia, lower rates of return were generated not on Monday but on Tuesday (SZYSZKA 2003, pp. 64–65).

The subject literature contains abundant research indicating significant correlations between the characteristics of companies and rates of return on their stocks. An example of anomaly of that type is the indicator of market price to book value (P/BV). It provides the information on the relation between the actual price to the book value. The other type of anomaly of fundamental type is the dependence of changes in the rates of return and the indicator of price to earnings (P/E). It reflects the amount the investor must pay to buy a single zloty of the book profit of the company (BUCZEK 2005, pp. 73–80).

Possibilities of investing in the construction sector based on the empirical studies

Making use of the system of rates of return over time represents one of the methods for generating higher than average rates of return. Figure 4 presents the average day rates of return on WIG-BUDOWNICTWO index and the benchmark, which in this case WIG20 index is.

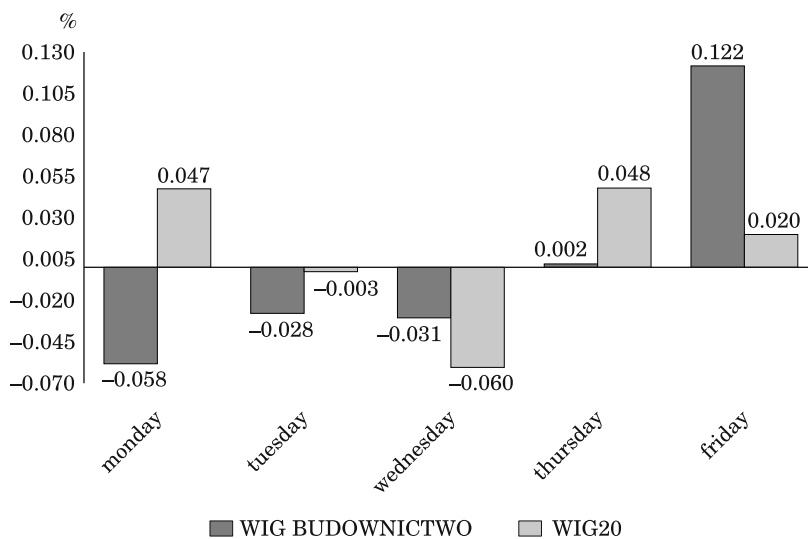


Fig. 4. Average day rates of return for individual days of the week on WIG-BUDOWNICTWO and WIG20 indexes during the period from 2000 until 18.01.2013 (in %)

Source: own work based on the data obtained from the MetaStock software.

Monday and Friday, when the difference between the rates of return from both indexes exceeds 0.1% deserve attention. On Monday, WIG-BUDOWNICTWO loses in average almost 0.06% (WIG20 gains almost 0.05%) while on Friday it gains over 0.12% (the rate of return on WIG20 index is just 0.02%). The so-called weekend anomaly can be explained by the fact that companies that are components of WIG-BUDOWNICTWO index present the unfavourable information for the public on Friday as at the end of the day. The individual investors pay less attention at that time to the new information coming on Friday to the market as at the end of the session and after the session waiting for the weekend. On Monday they show increased activity in the market discounting the Friday information published by companies, which leads to significant sale-out in the market. This is also the effect of excessively nervous reaction and the so-called snowball effect causes increased supply and decreases in prices of stocks.

Figure 5 was presented for the purpose of comparing the day rates of return from 3 largest in capitalisation companies of the WIG-BUDOWNICTWO index and the index it self. Those companies represent almost 60% share in that index² and hence they have significant influence on the development of rates of return in the investigated index.

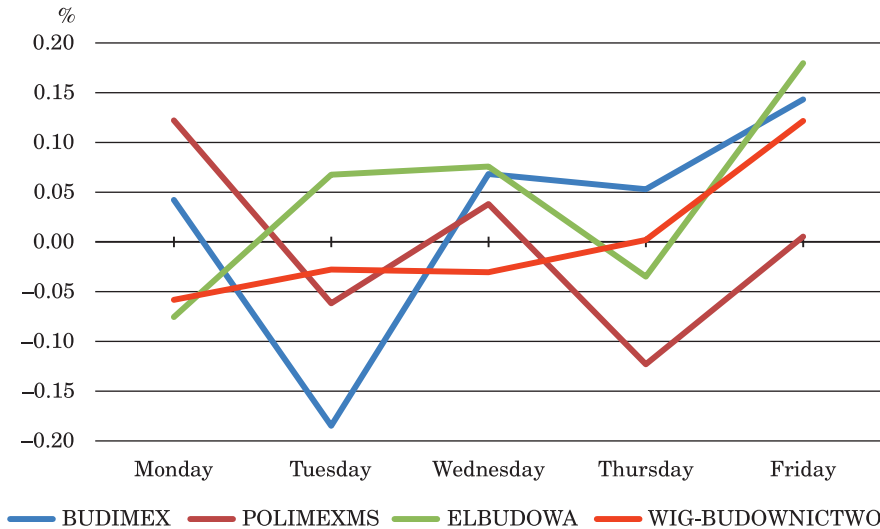


Fig. 5. Average day rate of return on the largest companies of WIG-BUDOWNICTWO index and the industry index during the period from 2000 until 18.01.2013 (in %)

Source: own work based on the data obtained from the MetaStock software.

² data of 22.01.2013.

On Monday, only the ELEKTROBUDOWA company is characterised by the negative rate of return while the other companies are characterised by positive results (POLIMEXMS shows the highest rates of return at the level of 0.12% on Monday). The highest positive rates of return on Friday obtained on the companies ELEKTROBUDOWA and BUDIMEX, 0.18 and 0.14% respectively, have positive influence on the development of WIG-BUDOWNICTWO index on that day.

Development of the average monthly rates of return in case of WIG-BUDOWNICTWO and WIG20 was also analysed, which is presented in Figure 6. The investigations covered the period from 2000 until 18 January 2013. WIG-BUDOWNICTWO index presented higher than average increases during the months of January and March (the average rate of return during those months was ca. 4% per month). During the other months the index is characterised by negative rates of return or minor increases (from 0.1 to 0.47%). For comparison, WIG20 shows the highest rates of return in December (ca. 2.5%), July (1.65%) and October (ca. 1.6%). The practical indicators for the average investor are evident – investing in WIG-BUDOWNICTWO index should commence at the end or at the beginning of the year and finish at the end of the first or beginning of the second year quarter. The rest of the year should be used for investing in other, better behaving indexes of other sectors.

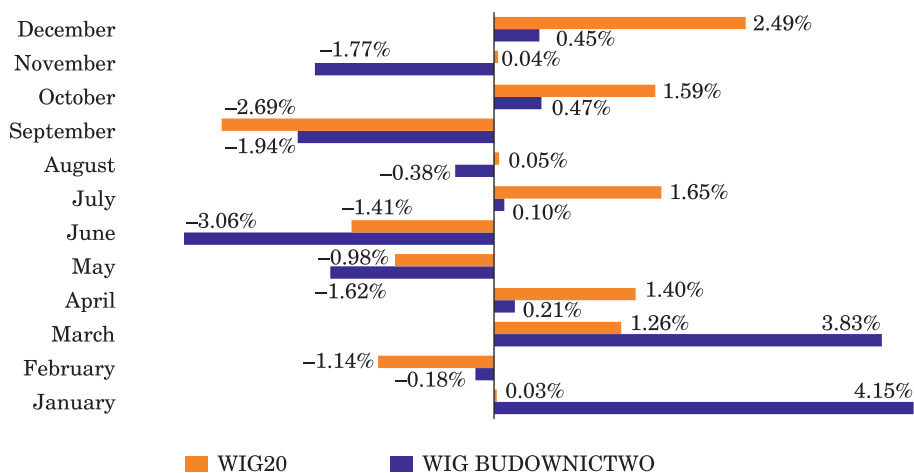


Fig. 6. Average monthly rates of return on indexes WIG-BUDOWNICTWO and WIG20 during the period of from 2000 until 18.01.2013 (in %)

Source: own work based on the data obtained from the MetaStock software.

The studies also covered the largest companies included in the WIG-BUDOWNICTWO index in comparison to that index. Figure 7 presents the results of those studies. Deviations from market efficiency were noticed in January and March in companies BUDIMEX and ELEKTROBUDOWA where rates of return were at the level of over 8% a month in case of BUDIMEX and at the level of over 8% in January and over 4% in March in case of ELEKTROBUDOWA. This probably influences high level of the rates of return in case of the industry index during those months. The behaviour of POLIMEXMS differs slightly from the other companies. POLIMEXMS presented results higher than average in July (over 5% profit) and in May (ca. 3% profit). During those months WIG-BUDOWNICTWO was characterised by rates of return around 0% (in July) or negative (in May). The rates of return for those companies closest to the construction industry index are found in December (from 0.45% to 1.86%) while the other months are characterised by larger variability of prices.

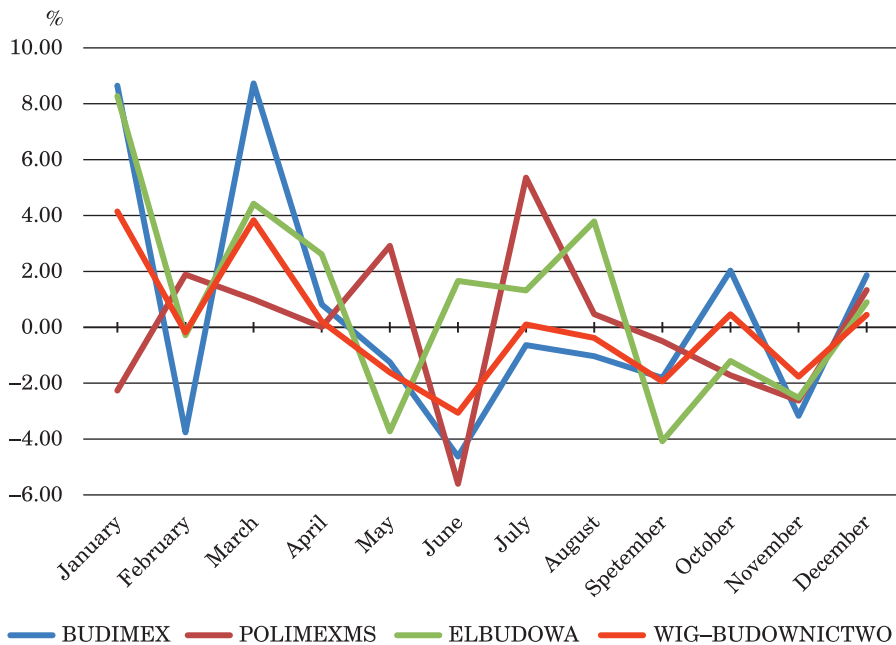


Fig. 7. Average monthly rates of return on the largest companies of WIG-BUDOWNICTWO index as compared to the index during the period of from 2000 until 18.01.2013 (in %)

Source: own work based on the data obtained from the MetaStock software.

In the simulation tests conducted the strategies based on investing in portfolios of construction companies selected according to the level of the fundamental indicators used in practice the most frequently, i.e. the price to book value ratio (P/BV) and price to earnings ratio (P/E) were examined. They were subject of extensive studies worldwide and they are of undoubted importance in investment practice.

The test population consisted of 15 companies included in WIG-BUDOWNICTWO index listed at Warsaw Stock Exchange during the period of from 2000 until 18.01.2013. The companies were divided into two portfolios (7 and 8 companies in each or 7 in each when the given indicator was not available). For each of them the year average logarithmic rates of return were computed. The results of the conducted studies are presented in Table 1.

Table 1
Rates of return on portfolios sorted according to the indicators P/BV and P/E from 15 companies of WIG-BUDOWNICTWO index listed at Warsaw Stock Exchange during the years 2000–2013 (in %)

Indicator	Rate of return on the portfolio with the lowest values of the index	Rate of return on the portfolio with the highest values of the index
P/BV	-11.91	9.98
P/E	-12.23	8.73

Source: own work based on studies.

Simulations of strategies based on the P/BV ratio do not confirm presence of anomaly according to which the companies with the lowest level of the price to book value ratio generate higher than average rates of return, higher than the companies with the highest values of that indicator. Companies characterised by the low level of P/BV ratio generate negative profitability at the level of ca. 12% during the period covered. On the other hand, investing in the portfolio with high values of that indicator will allow the rate of return equal to almost 10%.

Strategies based on the effect of the market price to net earnings ratio (P/E) show a similar trend as the earlier presented P/BV ratio. Share prices of the relatively cheaper companies with low level of the P/E ratio behaved worse than those of companies with high level of that indicator.

The above studies did not confirm presence of anomalies related to P/BV and P/E ratios in the construction sector. Hence, it can be concluded that the construction sector is efficient in the half-strong form. This can also be used in practical terms by selecting companies with the relatively highest indicators from the WIG-BUDOWNICTWO index to achieve abnormal rates of return.

Summary and conclusions

The efficient markets theory, from the very beginning, raised some doubts. Presentation of examples of deviations from that hypothesis, in the literature referred to as anomalies, which in the practical way may be used by the investors to generate a higher than market premiums has been one of the methods used by opponents of that theory to criticise it.

Based on the results of empirical studies conducted at the Polish market of construction sector companies' shares it was possible to achieve the goal of the work and to formulate the following conclusions:

- during the studied period of 2000 – 18.01.2013, in the construction sector, the day-of-the-week anomaly. The strategy that is coming out of this facts is about buying shares on Wednesdays and Fridays. In that scenario we achieve above-average rates of return,

- investment strategy based on monthly anomalies gives the opportunity to achieve above-average profits from shares of construction companies by holding the stock in January and March, when the average monthly rate of return was at the level of 4% (benchmark, i.e. the WIG20 index in January was at the neutral level and in March generates ca. 1.2% profit),

- the strategy created from companies with the potential of value do not offer the opportunity to generate abnormal profits. To the contrary, companies with high P/BV ratio values allow generating higher than average profitability, which is not in contradiction to the efficient markets theory. Similar results can be read from the strategy based on the price/net earnings ratio.

The conducted systematics of the selected anomalies and the studies allow concluding that the main goal of the work has been achieved. In the Polish stock market higher than average rates of return could be generated in the construction sector during the recent years.

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