

## THE PROBLEMS AND EFFICIENCY OF INVESTMENT IN SHARES OF COMPANIES WITH A HIGH PRICE-TO-BOOK VALUE RATIO IN THE CONTEXT OF INTELLECTUAL CAPITAL ISSUE

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**Purpose:** The main aim of the article was to present the problems with application of the investment strategy based on companies with high P/BV ratio and to examine its efficiency, taking also into account the enterprises' intellectual capital issue.

**Design/methodology/approach:** The study was conducted with respect to companies listed on the main market of the Warsaw Stock Exchange in the period 2010–2022 and was based on data published by WSE, which for individual companies included in particular P/BV ratio, P/E ratio, share price, EPS and ROE. The study was conducted in four approaches: (i) growth companies identified only on the basis of P/BV ratio, (ii) growth companies with an additional result criterion, (iii) companies with an estimated high level of intellectual capital identified only on the basis of P/BV ratio and (iv) companies with an estimated high level of intellectual capital with an additional efficiency criterion.

**Findings:** The study carried out in the field of analyzing the efficiency of investment strategies based on companies with high P/BV ratio values, including taking into account the issue of intellectual capital in the enterprise, allows to conclude that, at least from the point of view of the considered period of the study, this is an approach that allows "to overcome" market. At the same time, however, the results of the study showed that the use of easily accessible and popular additional criteria identifying companies in the portfolio does not necessarily provide an advantage over the broad market or the usual approach without additional criteria. This applies especially to a longer time horizon.

**Research limitations/implications:** A certain limitation of the study and its results and final conclusions is the adopted, not very long, time frame (10 years), which was partly due to the availability of data and adaptation to the stock market cycle.

**Practical implications:** Investment strategies based on companies with high price-to-book value ratios are not on the losing end when compared to the market index.

**Originality/value:** The article presents an original approach to application of the investment strategy based on companies with high P/BV ratio and to examination its efficiency, taking also into account the enterprises' intellectual capital issue. The article is addressed in particular to researchers dealing with the subject of valuation and measurement of intellectual capital in an enterprise, as well as analysts and stock market investors.

**Keywords:** price-to-book value ratio, intellectual capital, growth stocks, investment strategy.

**Category of the paper:** Research paper.

## 1. Introduction

Among many investment strategies used by investors on the capital market (Damodaran, 2012; Zaremba, 2013), some of the most popular and compared in terms of results are the strategy of investing in shares of growth companies and the strategy of investing in shares of companies with value potential (Miller, Prondzinski, 2020). Regardless of certain differences in the characteristics of growth companies and companies with value potential, the former are most often associated with high values of price multipliers, such as price-to-book value (P/BV) or price-to-earnings (P/E), and the latter with their low values (Zarzecki, Wołoszyn, 2016; Donnelly, 2014; Miller, Prondzinski, 2020; Penman, Reggiani, 2018).

As Chan and Lakonishok (2004) note, considerations regarding investments in growth companies and companies with value potential are also one of the best examples of a fruitful exchange of ideas between academic research and investment practice. On the one hand, the results of academic research created the basis for investment strategies that were implemented on the capital market, and on the other, the investment community developed procedures for identifying growth companies and companies with value potential and created benchmark indices for them, which subsequently allowed for the continuation and deepening of scientific research in this area.

The beginnings of the division of companies into the two groups mentioned above, and the increase in interest in the effectiveness of investment strategies based on them, are associated in particular with the works of Fama and French (1992) as well as Lakonishok, Shieifer, and Vishny (1994), in which attention was paid to higher rate of return on shares of companies with potential value than on shares of growth companies - the so-called "the value premium". This premium is explained, on the one hand, by the higher risk of companies with low market multipliers, identified with their financial problems and poor results (Fama, French, 1992), and, on the other hand, by the market's underestimation of shares of companies in difficult financial and earnings situations (companies with value potential) and the market's revaluation of shares of growth companies characterized by improving financial and earnings conditions (Billings, Morton, 2001; Skinner, Sloan, 2002; Haugen, 1995; Lakonishok et al., 1994; Penman, Reggiani, 2018).

The existence of "the value premium", especially in a longer time horizon, is confirmed by numerous studies from various stock markets (Fama, French, 1992; Bauman et al., 1999; Sun, 2012; Gupta, Arora, 2019). This situation also undermines the efficient market hypothesis formulated by Fama (1970), according to which share prices reflect all information available at a given moment, which means that investors cannot expect above-average profits (Malkiel, 2003).

At the same time, it should be noted that the advantage of companies with value potential over growth companies in terms of the rate of return on investment is not sustainable over time. As long-term statistics for the US market show, periods of advantage of one group over the other alternate, with companies with value potential more often coming out on top and the average rate of return on investment for them is higher (Giannotto, 2023; Hartford Funds, 2023). Nevertheless, recent years have seen the dominance of growth companies, associated mainly with rapidly developing modern technology sectors, which benefited from easy access to low-interest capital resulting from quantitative easing after the financial crisis in 2008 (Lynch, 2021; Bevanda et al., 2021).

At this point, it is also worth paying attention to the above-mentioned considerations, including in particular those relating to growth companies, issues related to the intellectual capital of enterprises, which in a simplified approach is identified with the difference between the market and book value, which is a direct reference to the price-to-book ratio (Edvinsson, Malone, 1997; Sveiby, 2010).

For this reason, the main aim of the article was to present the problems with application of the investment strategy based on companies with high price-to-book value ratio and to examine its efficiency taking also into account the enterprises' intellectual capital issue. The study was conducted in relation to companies listed on the Warsaw Stock Exchange based on their share quotations in the period 2010-2023.

The article consists of a theoretical introduction and its expansion in relation to the perception of the P/BV ratio, methodological part, research results and summary.

## 2. The price-to-book value ratio as a measure of the investment attractiveness of company and its intellectual capital

### 2.1. P/BV ratio in general

The price-to-book value ratio is one of the most popular price multipliers used on the capital market as part of the financial analysis of companies (market indicators), their valuation (comparative methods), or generally assessing their investment attractiveness (Nawrocki, 2011). It is calculated according to the formula (Czekaj and Dresler, 2005):

$$\frac{P}{BV} \text{ ratio} = \frac{\text{Market Value}}{\text{Book Value}} = \frac{\text{Share Price}}{\text{Book Value per Share}} \quad (1)$$

where:

$$\text{Book Value per Share} = \frac{\text{Shareholders' Equity} - \text{Preferred Equity}}{\text{Number of Common Shares Outstanding}} \quad (2)$$

Depending on whether the equity in the company, which is the basis for the denominator of the P/BV ratio, is positive or negative, the P/BV ratio values may also be positive or negative, but often in the case of negative equity in the company, the indicator simply does not count and denotes with an "x" or "-".

In general, the P/BV ratio is the ratio of the company's market value (company's capitalization on the stock exchange) to its book (balance sheet) value, identified with the value of equity, and gives an indication of how investors perceive a given company. The limit value of the indicator can be 1, which means that the capital market values the company's shares at the same level as their book valuation (equity per share). Index values higher than 1 mean a market valuation higher than the book valuation, and values below 1 mean a market valuation lower than the book valuation (Czekaj, Dresler, 2005). At the same time, however, it should be borne in mind that high P/BV ratio values (well above 1) do not necessarily mean that the shares of a given company are overvalued, and low values (well below 1) mean that they are undervalued. The perception of overvaluation or undervaluation of a given company's shares by investors, apart from the P/BV ratio itself is also determined by its financial condition and earning capacity, in particular expectations regarding the improvement of financial results (Sierpińska, Jachna, 2000; Nawrocki, 2011). In this regard, a specific two-dimensional P/BV ratio – financial condition and results matrix can be used (Table 1).

**Table 1.**

*Price-to-book value ratio – financial condition and results matrix*

		P/BV ratio	
		low	high
financial condition and results	bed	weak company with low valuation	overvalued company
	good	undervalued company	good company with high valuation

Source: own work.

Therefore, the shares of a given company can only be said to be overvalued when its high P/BV ratio is matched by its poor financial condition and lower earnings expectations. Companies in which high P/BV ratio values correspond to good financial condition and systematic improvement of financial results are usually positively assessed by the capital market and highly valued, and are referred to as growth companies. Such companies, apart from high price multipliers such as P/BV or P/E, are particularly distinguished by an upward trend in results in the past, which, according to forecasts, is to be maintained also in the future, high profitability of sales and return on equity (ROE) and the lack of dividend payments (earned profits are invested in further development) (Segal, 2021; Mikołajewicz, 2014). In turn, the shares of a given company can be said to be undervalued in a similar way when the low P/BV ratio corresponds to an improvement in its financial condition and an increase in earnings expectations. Companies for which low P/BV ratio values correspond to poor financial condition and deterioration of financial results are usually negatively assessed by the capital market and lowly valued. Companies of this type are called value due to a certain value potential that can be released if the problem they are facing is removed and they return to the growth path (Mikołajewicz, 2014).

## 2.2. High price-to-book value ratio as a determinant of intellectual capital in companies

The interest in the P/BV ratio is not limited only to the investment sphere, but has also appeared for many years in the discussion on the measurement or assessment of the intellectual capital of enterprises in the management literature. The key issue in this context is to perceive the intellectual capital (IC) in an enterprise as the difference between its market value (MV) and book value (BV) (Edvinsson and Malone, 1997; Sveiby, 2010):

$$IC = MV - BV \quad (3)$$

Due to the same variables, this approach to intellectual capital can be easily translated into the P/BV ratio (1).

Although the concept of intellectual capital appeared in the literature many years ago (Pirogova et al., 2020), it remains a category that is difficult to clearly define (Buenechea-Elberdin, 2017). Therefore, both in the literature and in economic practice, there are different definitions of this category, and in research on the nature of intellectual capital, a certain terminological heterogeneity can be noticed. Most often, it is identified with intangible assets, hidden assets, invisible assets, non-tangible assets, non-financial assets, intellectual resources, intangible resources, knowledge capital or intellectual matter (Bombiak, 2016; Sledzik, 2011). Generally speaking, it can be said that the definitions of intellectual capital approach this category in two ways, treating it as (Sydler et al., 2014; Bombiak, 2016; Hussinki et al., 2017):

- a factor that creates value for the company and strengthens its competitive advantage,
- the sum of its components, including in particular:
  - human capital – the intellectual potential of employees and the possibilities of using it determined by their motivation;
  - structural capital (internal, organizational) – organizational culture, systems, methods and processes as well as organizational and information infrastructure facilitating the flow of knowledge in the organization and the use of human potential;
  - relational capital (external, network architecture) – all relationships with external stakeholders (investors, suppliers, customers), as well as the reputation resulting from these relationships.

In relation to considerations on intellectual capital, its specificity is well reflected in the "iceberg" model and the "tree" metaphor. In the "iceberg" model, the company's resources are presented divided into tangible (e.g. land, buildings, equipment, inventories, securities) and intangible (e.g. employee competences, management philosophy, organizational culture, reputation, customer loyalty, brand), with which indicates that the latter, unlike the former, are less visible to the environment and more difficult to value, but at the same time have a greater ability to generate added value for the company (Dobiegała-Korona, Herman, 2006). In turn, the "tree" metaphor indicates that what is visible to the surroundings (crown, i.e. trunk and leaves) is the so-called the external image of the company, which is the result of invisible, hidden values inside the company identified with intellectual capital (tree roots). We can draw

the conclusion that when the roots of a tree no longer perform their tasks well, the entire tree will be destroyed (Adamska, 2015).

Returning to the issue of using the P/BV ratio as an identifier of companies with a high level of intellectual capital ( $P/BV > 1$ , especially significantly above 1), it should be noted that this is a simple but highly imperfect approach. On the one hand, it is criticized due to its far-reaching generality and combining the monetary value of intellectual capital with the value also generated by other types of capital in the enterprise (Jardon, Martinez-Cobas, 2021). On the other hand, attention should also be paid to the significant burden of this approach, which often occurs in the case of listed companies, with high dynamics of changes in their market quotations (prices), which may lead to distortions in the measurement and assessment of the level of intellectual capital of the analyzed entities (Nawrocki, 2022). In this respect, it is worth bearing in mind that the price of company shares on the stock exchange market is not determined solely by objective, fundamental factors, but is, to a large extent, the result of investors' emotions regarding various information and related expectations (Zaremba-Śmietański, 2013).

Therefore, this method is more suitable for the initial identification of entities with a potentially high level of intellectual capital than for its precise measurement. At the same time, its credibility can be increased based on the quotations, or P/BV ratio, of the analyzed companies in the form of an average or median over a longer period (preferably several years). Thanks to this, single high readings, which are often the result of a temporary increase in emotions among investors, will only have a limited impact on the situation of the analyzed entities. Moreover, indications of the high level of intellectual capital of the surveyed entities based on the P/BV ratio should be verified based on the assessment of changes in their economic and financial situation (Nawrocki, 2022).

### **3. Research methodology**

The main aim of the article was to present the problems with application of the investment strategy based on companies with high P/BV ratios and to examine its efficiency taking also into accounting the enterprises' intellectual capital issue. The study was conducted in relation to companies listed on the main market of the Warsaw Stock Exchange in the period 2010-2022, which was dictated by the availability of data, while verifying the following research hypotheses:

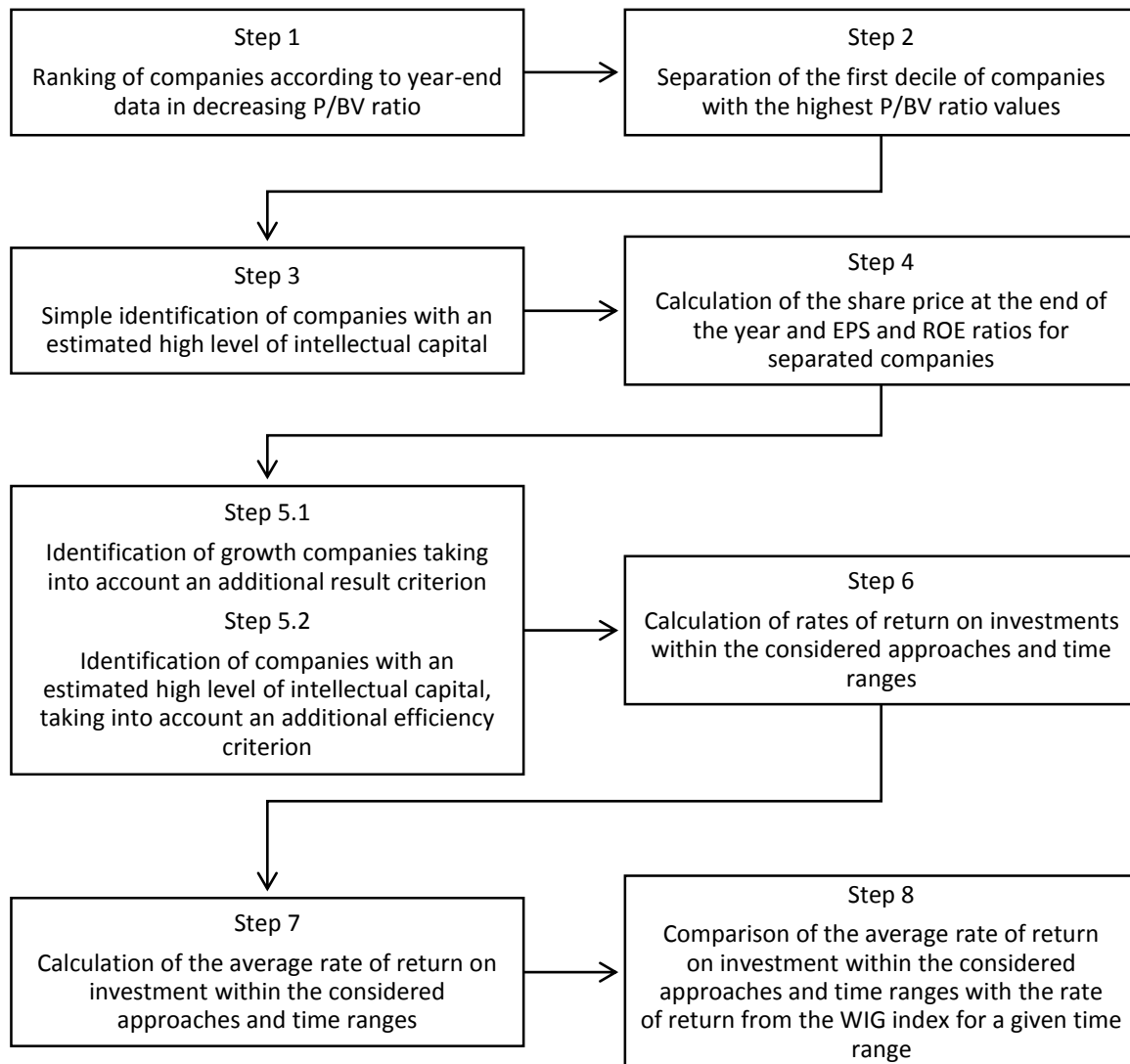
- H1: The use of an additional resulting criterion identifying growth companies increases the investment efficiency compared to relying solely on the P/BV ratio.
- H2: The use of an additional efficiency criterion identifying companies with a high level of intellectual capital increases the investment efficiency compared to relying solely on the P/BV ratio.
- H3: The efficiency of investments in companies with a high level of intellectual capital is higher than the efficiency of investments in "ordinary" growth companies.
- H4: Investing in companies with a high P/BV ratio allows you to beat the market, i.e. achieve a higher rate of return than the rate of return from the main market index.
- H5: Investing in companies with a high level of intellectual capital allows you to beat the market, i.e. achieve a higher rate of return than the rate of return from the main market index.
- H6: The efficiency of investing in companies with a high P/BV ratio increases with the extension of the investment period.
- H7: The efficiency of investments in companies with a high level of intellectual capital increases with the extension of the investment period.

The study was based on data published by WSE (WSE, 2010-2022), which for individual companies included: number of issued shares, market value, book value, P/BV ratio, P/E ratio, DY (Dividend Yield). All data is provided on a given day. Moreover, based on the data mentioned above, the following was also calculated for individual companies: share price (market value/number of issued shares), EPS (share price/P/E ratio) and ROE (P/BV ratio/P/Eratio).

Taking into account the main purpose of the article, the formulated research hypotheses and the availability of data, the study was conducted in four approaches:

1. limited to the first decile of companies with the highest P/BV ratio values on a given day (growth companies identified only on the basis of P/BV ratio);
2. limited to the first decile of companies with the highest P/BV ratio values on a given day, while taking into account the y/y increase in EPS (growth companies with an additional result criterion);
3. limited to the first decile of companies with the highest P/BV ratio values on a given day, while taking into account the condition that the minimum P/BV ratio of a given company over a period of 3 years is higher than the P/BV ratio of the company closing the first decile (companies with a high level of intellectual capital identified solely on the basis of P/BV ratio);
4. limited to the first decile of companies with the highest P/BV ratio values on a given day, while taking into account the conditions that the minimum P/BV ratio of a given company over a period of 3 years is higher than the P/BV ratio of the company closing the first decile and that the ROE of a given company for the last 12 months is at least 20% (companies with a high level of intellectual capital with an additional efficiency criterion).

The calculations were assumed to be carried out based on the adopted algorithm (Figure 1).



**Figure 1.** Algorithm for performing calculations.

Source: Own work.

The ordering of companies listed on the WSE main market according to data at the end of the year after decreasing P/BV ratio (step 1) was assumed to start from 2012 and end in 2021. Then (step 2), it was assumed to separate for each year the first decile of companies with the highest P/BV ratio values (simple identification of growth companies) and, in step 3, calculate for previously separated companies in each of the years considered the difference between the minimum P/BV ratio in the last 3 years and the P/BV ratio of the company closing the first decile in a given year (simple identification of companies with a high level of intellectual capital). In step 4, it was assumed to calculate additional data, i.e. EPS and ROE, which will then be the basis for identifying growth companies, taking into account an additional result criterion confirming the improvement of financial results over time, i.e. y/y increase in EPS (step 5.1) and companies with a high level of capital intellectual, taking into account an additional efficiency criterion confirming the high effectiveness of the adopted business



model, i.e. ROE of at least 20% (step 5.2). Step 6 assumed the calculation of investment growth rates within the considered approaches and time ranges (price from the examined period/price from the base period – 1), and then (step 7), on their basis, calculation of average rates of return (arithmetic mean). Taking into account also annual shifts within the time ranges of investments longer than one year, this gave for each of the considered approaches 10 one-year cases, 9 two-year cases, 8 three-year cases, 7 four-year cases, 6 five-year cases, 5 six-year cases, 4 seven-year cases, 3 eight-year cases, 2 nine-year cases and 1 ten-year cases. In the last, eighth step, it was planned to compare the average rates of return calculated in step 7 within individual approaches and time ranges with the rate of return from the WIG index for a given time range, which will allow us to determine whether a given approach allows us to beat the market.

#### 4. Research results

The efficiency analysis of the investment strategy based on companies with high P/BV ratios, taking also into account the enterprises' intellectual capital issue, was carried out in accordance with the methodology outlined in the previous section.

Due to the significant volume of calculations and obtained results, the following sections were limited only to the presentation of final results (investment growth rates) within individual approaches and time ranges (Table 2 - Table 5), including, as a reference point, the results for WIG index (Table 6).

**Table 2.**

*Individual and average rates of return on investments in growth companies identified solely on the basis of the P/BV ratio. Values for particular time ranges*

Start year	Investment time range in years									
	1	2	3	4	5	6	7	8	9	10
2012	36%	13%	19%	45%	75%	69%	131%	150%	128%	112%
2013	-15%	-12%	-1%	16%	7%	32%	36%	38%	32%	
2014	12%	25%	41%	23%	47%	51%	64%	51%		
2015	13%	33%	18%	37%	42%	56%	45%			
2016	3%	-12%	9%	54%	47%	34%				
2017	-16%	3%	32%	44%	31%					
2018	8%	51%	54%	23%						
2019	55%	84%	52%							
2020	-2%	30%								
2021	-18%									
<b>Average</b>	<b>8%</b>	<b>24%</b>	<b>28%</b>	<b>34%</b>	<b>41%</b>	<b>49%</b>	<b>69%</b>	<b>80%</b>	<b>80%</b>	<b>112%</b>

Source: Own calculations based on WSE data.

**Table 3.**

*Individual and average rates of return on investments in companies with an estimated high level of intellectual capital identified solely on the basis of the P/BV ratio. Values for particular time ranges*

Start year	Investment time range in years									
	1	2	3	4	5	6	7	8	9	10
2012	43%	23%	27%	60%	100%	90%	179%	205%	170%	146%
2013	-14%	-19%	0%	35%	39%	84%	69%	55%	24%	
2014	10%	28%	58%	46%	81%	90%	96%	82%		
2015	14%	45%	39%	70%	77%	89%	78%			
2016	10%	-6%	21%	60%	56%	39%				
2017	-14%	15%	63%	69%	55%					
2018	21%	70%	70%	37%						
2019	41%	53%	33%							
2020	-16%	-29%								
2021	-10%									
<b>Average</b>	<b>8%</b>	<b>20%</b>	<b>39%</b>	<b>54%</b>	<b>68%</b>	<b>78%</b>	<b>106%</b>	<b>114%</b>	<b>97%</b>	<b>146%</b>

Source: Own calculations based on WSE data.

**Table 4.**

*Individual and average rates of return on investments in growth companies identified taking into account P/BV ratio and EPS growth. Values for particular time ranges*

Start year	Investment time range in years									
	1	2	3	4	5	6	7	8	9	10
2012	46%	18%	16%	35%	54%	29%	31%	55%	66%	48%
2013	-7%	-1%	14%	31%	21%	75%	93%	89%	85%	
2014	16%	30%	44%	10%	18%	32%	60%	58%		
2015	15%	35%	32%	60%	65%	80%	71%			
2016	3%	-12%	10%	57%	49%	28%				
2017	-14%	4%	49%	60%	41%					
2018	30%	102%	107%	65%						
2019	37%	57%	39%							
2020	-10%	-17%								
2021	-20%									
<b>Average</b>	<b>9%</b>	<b>24%</b>	<b>39%</b>	<b>45%</b>	<b>42%</b>	<b>49%</b>	<b>64%</b>	<b>67%</b>	<b>75%</b>	<b>48%</b>

Source: Own calculations based on WSE data.

**Table 5.**

*Individual and average rates of return on investments in companies with an estimated high level of intellectual capital, identified taking into account the P/BV ratio and ROE. Values for particular time ranges*

Start year	Investment time range in years									
	1	2	3	4	5	6	7	8	9	10
2012	58%	44%	51%	75%	102%	47%	68%	70%	103%	127%
2013	-13%	-16%	-5%	16%	-2%	7%	2%	9%	5%	
2014	9%	29%	57%	31%	40%	63%	91%	94%		
2015	19%	59%	62%	114%	125%	130%	119%			
2016	12%	1%	42%	90%	75%	62%				
2017	-18%	14%	43%	55%	60%					
2018	37%	126%	119%	87%						
2019	59%	63%	51%							
2020	-6%	-13%								
2021	-17%									
<b>Average</b>	<b>14%</b>	<b>34%</b>	<b>53%</b>	<b>67%</b>	<b>67%</b>	<b>62%</b>	<b>70%</b>	<b>58%</b>	<b>54%</b>	<b>127%</b>

Source: Own calculations based on WSE data.

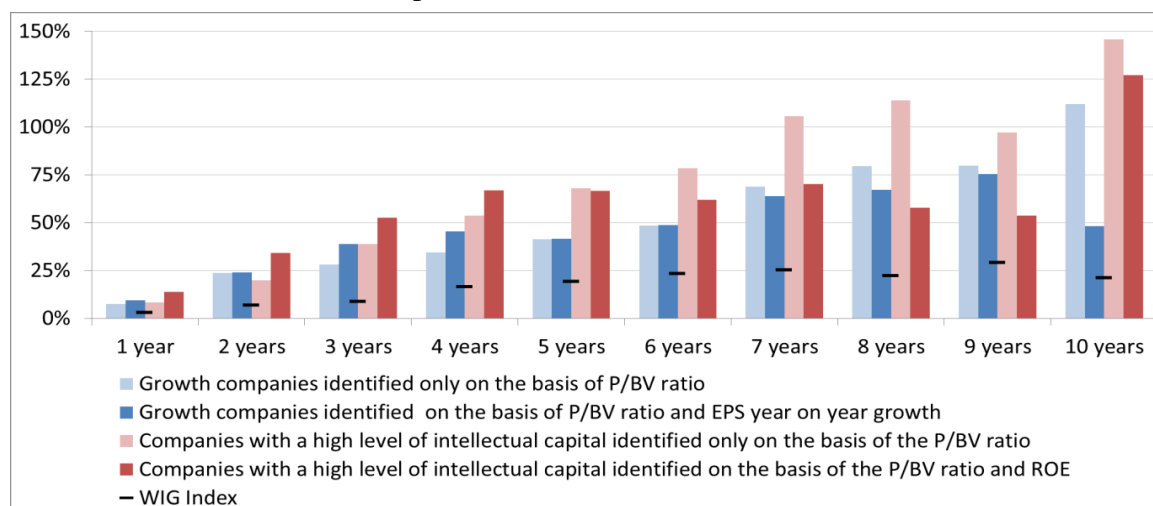
**Table 6.**

*Individual and average rates of return on the WIG index. Values for particular time ranges*

Start year	Investment time range in years									
	1	2	3	4	5	6	7	8	9	10
2012	8%	8%	-8%	9%	34%	22%	23%	20%	46%	21%
2013	0%	-15%	1%	24%	13%	14%	11%	35%	12%	
2014	-15%	1%	24%	12%	14%	11%	35%	12%		
2015	18%	46%	32%	34%	30%	58%	31%			
2016	23%	11%	13%	10%	34%	11%				
2017	-9%	-8%	-11%	9%	-10%					
2018	2%	-1%	20%	0%						
2019	-3%	18%	-2%							
2020	22%	1%								
2021	-17%									
<b>Average</b>	<b>3%</b>	<b>7%</b>	<b>9%</b>	<b>16%</b>	<b>19%</b>	<b>23%</b>	<b>25%</b>	<b>22%</b>	<b>29%</b>	<b>21%</b>

Source: Own calculations based on WSE data.

To better illustrate the differences in the obtained research results, Figure 2 presents the average rates of return within the considered approaches and time ranges, including the results for the WIG index as a reference point.



**Figure 2.** Average rates of return on investments for specific time ranges.

Source: Own calculations based on WSE data.

Taking into account the obtained results, first of all, it should be stated that investments in companies with a high level of P/BV ratio (both growth and with an estimated high level of intellectual capital) from the perspective of average rates of return allowed to beat the market (WIG index) in all considered approaches and time ranges. When it comes to individual comparisons within specific time ranges, the WIG index beat the considered approaches only in the case of one-year investments (2013, 2016, 2017 and 2020) and two-year investments (2016). Therefore, from the perspective of average rates of return on investments, hypotheses H4 and H5 can be considered true, and from a detailed perspective, they can be considered conditionally true, i.e. for the investment time range of over 2 years.

Secondly, the use of additional criteria identifying companies for investment, either growth companies (EPS increase) or those with an estimated high level of intellectual capital (ROE of at least 20%), did not provide a clear decision regarding the improvement of investment efficiency. From the perspective of average rates of return on investments, generally up to a period of 4 years such an improvement can be identified, and in the case of longer investment ranges, the additional criterion either ceases to be important (similar results) or translates into a deterioration of investment effectiveness. The situation is quite similar from a detailed point of view, where approaches with an additional criterion identifying companies for investment prevail even up to the investment time range of 5 years. At the same time, however, it should be noted that this predominance is not complete and even in these shorter investment time ranges, there were cases where the application of an additional criterion did not translate into a higher rate of return on investment. Therefore, from the perspective of average rates of return on investments, it can be concluded that hypotheses H1 and H2 are only partially confirmed, limited to shorter investment time ranges (1, 2, 3 or 4 years), and from a detailed perspective they cannot be considered as true even when limited to shorter investment time frames.

As for hypothesis H3 and the comparison of the effectiveness of investments in "ordinary" growth companies and companies with an estimated high level of intellectual capital, both from the perspective of average rates of return on investment and from a detailed perspective, the advantage of the latter can generally be seen. At the same time, however, this advantage is not complete, i.e. it does not always apply to both approaches (with and without an additional criterion). Therefore, hypothesis H3 cannot be considered fully true.

The last issue to be verified concerns whether the effectiveness of investments within the four approaches considered increases with the extension of the investment time frame (hypotheses H6 and H7). Taking the perspective of average rates of return, the results obtained indicate that in general such a growing tendency can be noticed, although it is not ideal (especially in relation to approaches taking into account additional criteria identifying companies for investment). A similar situation is seen taking into account the individual perspective within individual "starting years". The longest sequence of increasing cumulative rate of return on investment was recorded for approach iv (companies with an estimated high level of intellectual capital identified taking into account P/BV ratio and ROE, Table 5) for the years 2015 (6) and 2017 (5). Moreover, within the considered approaches there were 5 cases with a duration of 4 years and 7 cases with a duration of 3 years. Thus, although a positive cumulative rate of return on investment was recorded over a time horizon of over 2 years for all the approaches considered, it did not systematically increase from year to year as the investment period lengthened, but withdrawals of one year or longer occurred. Therefore, from the perspective of average rates of return on investments, hypotheses H6 and H7 are only partially true, in particular with regard to shorter investment time ranges (up to 4 years), and from a detailed perspective they cannot be considered true even when limited to shorter investment time frames.

## 5. Summary

The study carried out in the field of analyzing the effectiveness of investment strategies based on companies with high P/BV ratio values, including taking into account the issue of intellectual capital in the enterprise, allows us to conclude that, at least from the point of view of the considered period of the study, this is an approach that allows "to overcome " market. At the same time, however, increasing the effectiveness of this investment approach and consolidating it over time (by eliminating random companies) requires the implementation of more sophisticated additional criteria identifying growth companies or companies with an estimated high level of intellectual capital. As the study results showed, the use of easily accessible and popular additional criteria identifying companies in the portfolio (EPS and ROE) does not necessarily give an advantage over the broad market or a simple approach without additional criteria. This applies especially to a longer time horizon. At the same time, however, it must be borne in mind that using other, more sophisticated additional criteria is, due to their limited direct availability, much more time-consuming and labor-intensive in the application of a given investment strategy.

It is also worth paying attention to the fact that even if the research hypotheses considered showed an advantage of one approach over the other (strategies without additional criteria vs. strategies with additional criteria, growth companies vs. companies with an estimated high level of intellectual capital; growth companies and companies with an estimated high level of intellectual capital vs. the broad market), this advantage was not total, i.e. it did not apply to all the cases considered. In this regard, it should be borne in mind that changes in company share prices on the capital market do not always result from their fundamental or technical situation. Moreover, in the capital market, just like in the economy, we are dealing with a cyclical phenomenon, which means that even fundamentally good entities experience weaker trading periods and their share prices fall. Therefore, the expectation of achieving higher and higher rates of return over time, or beating the market year after year for an extended period of time, has a low probability. These issues are discussed more broadly by the market efficiency theory or the random walk theory (Fama, 1970; Malkiel, 2014).

Undoubtedly, a certain limitation of the conducted research and its results as well as final conclusions is adopted, not very long, time frame (10 years), which was partly due to the availability of data and adaptation to the stock market cycle.

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