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ACCURACY OF VALUATIONS IN STOCK RECOMMENDATIONS

ABSTRACT

The purpose of the article. The purpose of the article is to assess the accuracy of equity recommendations issued by brokerage institutions on the Polish capital market. The study focuses on sell-side recommendations and aims to verify the hypothesis that stock exchange recommendations are characterised by low accuracy, leading to significant deviations between target and market prices.

Methodology. The research was conducted on a unique dataset comprising 5,295 recommendations for 303 companies listed on the Warsaw Stock Exchange, covering the period from October 2005 to May 2023. The methodology is based on a static approach, evaluating the accuracy of each recommendation by comparing its target price with the actual market price on the expiration date. Statistical tests such as the one-sample t-test and chi-square test were used to validate the research hypotheses and determine the effect size.

Results of the research. The results reveal that 71% of the recommendations demonstrated an unacceptable level of inaccuracy (defined as a deviation greater than 15%), while only 11% were deemed accurate. The average overvaluation reached 51.38%. These findings indicate that equity recommendations, while widely used by investors, may not be fully reliable as a basis for investment decisions due to systematic forecasting errors and behavioral biases among analysts.

Keywords: relevance, brokerage recommendations, valuation, financial market, brokerage houses

JEL Class: G12, G24



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Introduction

Modern capital markets are characterized by high complexity and a dynamic flow of information, which significantly complicates investment decision-making. In this context, stock exchange recommendations published by brokerage houses and financial institutions play a vital role. They serve as an information channel between analysts and investors, offering structured forecasts regarding the future value of financial instruments and providing indications on whether to buy or sell them (Dąbrowski, 2013).

Despite their popularity, stock exchange recommendations are subject to considerable controversy concerning their accuracy and objectivity. Literature highlights multiple factors that may contribute to the limited effectiveness of these forecasts, including analysts' cognitive biases, reliance on simplified or heuristic valuation models, and potential conflicts of interest stemming from institutional affiliations (Imam et al., 2008; Bradshaw, Brown & Huang, 2010).

The primary objective of this article is to empirically verify the accuracy of stock exchange recommendations on the Polish capital market, with particular emphasis on sell-side recommendations. The study covers over 5,295 recommendations issued between 2005 and 2023 for companies listed on the Warsaw Stock Exchange. The breadth of this dataset makes the research one of the most comprehensive studies on the accuracy of stock recommendations in the context of the Polish market.

The study employs a static approach, comparing the target price stated in the recommendation with the actual market price on the recommendation's expiration date. This allows for a clear and measurable evaluation of the accuracy of analysts' forecasts. The main hypothesis assumes that stock exchange recommendations are characterized by low accuracy, understood as a statistically significant deviation between the forecasted and actual prices.

The subsequent sections present a literature review, a description of the research methodology, an analysis of the empirical results, and final conclusions that provide a foundation for further reflection on the effectiveness and credibility of stock exchange recommendations.

Literature Review

Opinions and recommendations¹ made public by institutions engaged in capital market analysis and brokerage houses are a popular source of information for both institutional and individual investors. For many investors, the overwhelming volume of information about companies listed on the Warsaw Stock Exchange (WSE) constitutes a significant challenge. Recommendations

¹ In the literature, recommendations can be found under many names. They appear as recommendations or reports of brokerage, stock exchange, investment analysts. The term brokerage only refers to recommendations issued by licensed securities brokers and investment advisors, as well as by financial institutions with the appropriate authorization.

can serve as an initial filter for instrument selection and may provide a basis for investment decisions. One of the roles of stock recommendations is to direct attention to specific securities, attract new potential investors, and interest individuals seeking capital growth opportunities. Financial institutions continue to be perceived as professional and trustworthy providers of financial services, despite reputational turbulence in recent years (Dąbrowski, 2013).

The popularity of stock recommendations remains high, especially during periods of market instability (Loh & Stulz, 2018). This may be explained by the tendency of investors to transfer the responsibility for investment decisions to analysts (Majewski, 2008). Recommendations aim to encourage investors to buy (buy recommendations) or sell (sell recommendations) financial instruments. Typically, these analyses are based on fundamental and ratio analysis. Financial institutions issuing recommendations have an advantage over individual investors due to simplified access to information directly from companies, which results in more comprehensive and detailed data (Dąbrowski, 2013).

Two primary types of recommendations are commonly distinguished: sell-side² and buy-side³, based on the issuing entities and the target recipients (Prusak, 2015). This study focuses on sell-side recommendations. The process of creating stock recommendations involves the use of fundamental and ratio-based methods, which should rely on objective market data and incorporate rational assumptions made by analysts (Radke, 2023).

Stock recommendations can be evaluated using various criteria and over different time horizons. This study concentrates specifically on the criterion of forecast accuracy, particularly on whether the market price of the financial instrument reaches the target price specified in the recommendation on its expiration date.

The choice of this evaluation criterion is justified by its universal nature, allowing for comparability regardless of the internal classification procedures and price range definitions used by individual brokerage houses. The essence of the adopted method lies in measuring the deviation between the market price and the target price indicated in the recommendation. The smaller the deviation, the higher the assessed accuracy of the recommendation.

The accuracy and effectiveness of investment recommendations have been the subject of numerous empirical studies. Most of these focus on verifying the hypothesis that it is possible to achieve abnormal returns by relying on analyst recommendations (e.g., Keller, 2020; Soucek

² These are recommendations made by brokerage firms for their clients (corporate and individual ones). They play a supply-side role, that is, they are designed to increase the turnover of the brokerage firm and at the same time increase profits through the commission earned.

³ They are prepared by analysts working for companies, engaged in investment management, such as pension funds, investment funds or insurance institutions. They are intended to support the demand side, i.e., they provide recommendations on how to shape their investment portfolio.

& Wasserek, 2014). Alternative approaches include evaluating whether the target price is achieved at any point during the recommendation's validity period (e.g., Prusak, 2011; Zaręba & Konieczka, 2014; Brycz & Włodarczyk, 2017), commonly referred to as the dynamic approach. Another concept assumes the analysis of whether the market price reaches a target price range specified in the analytical report.

In this article, the authors focus on the so-called static approach to assessing recommendation accuracy, wherein the key point of reference is the congruence between the market price and the target price on the strictly defined expiration date.

The issue of recommendation accuracy has been widely examined in both international and domestic research. A comprehensive example is the study conducted by Bradshaw, Brown, and Huang (2010), which analyzed U.S. market data from 2000–2009. The authors found that only 38% of the recommendations reached the indicated target price within a 12-month investment horizon. The remaining 62% failed to achieve the forecasted price level, suggesting significant deviations caused by excessive optimism or pessimism in analysts' forecasts. Asquith et al. (2005) examined 1,126 analytical reports from 1997–1999 in the U.S. For recommendations based on the multiplier method, the target price was reached in 48.4% to 55.1% of cases. For those using the discounted cash flow (DCF) method, accuracy was 52.3%, indicating moderate effectiveness of valuation techniques.

In Europe, Bolliger (2004) analyzed data from 14 capital markets and found that older forecasts exhibited significantly lower accuracy than the newer ones, suggesting the usefulness of applying time-based weights when assessing the predictive value of analyst reports.

In Poland, Biedrzyński (2008) studied 516 recommendations issued between January 1, 2006, and February 1, 2008, assessing forecast accuracy over two timeframes: after nine months and at the end of the observation period. The average deviation between market and target prices was 44.77% and 60%, respectively. In the nine-month analysis, 271 cases were undervalued and 120 overvalued, indicating a predominance of pessimistic forecasts. By the end of the study period, only 36.5% of recommendations had reached the target price, while 63.5% were inaccurate, confirming significant forecast deviations.

Prusak (2011), analyzing 470 recommendations with target prices over 6-, 9-, and 12-month horizons, used a 10% deviation threshold as the criterion for forecast accuracy. The accuracy rates were 30% (6 months), 68% (9 months), and 21.92% (12 months), confirming a negative correlation between forecast horizon and accuracy. The financial daily *Parkiet* analyzed 71 reports concerning selected WSE-listed companies and found that forecasts issued during bull markets were significantly overestimated compared to actual outcomes.

Kowalke (2015) focused on the usefulness of recommendations in terms of achieving target prices. In his study, only 30% of recommendations deviated less than 10% from projected levels, indicating a relatively low predictive accuracy of equity analysis.

Radosław Pastusiak (2016) examined recommendations for ten WSE-listed companies to determine whether excessive optimism was present among analysts. His study, covering 2000–2013 with a 250-session recommendation horizon, found that valuations were on average overestimated by approximately 30%, indicating a bias toward optimistic predictions not reflected in market prices.

In his subsequent study (2018), Pastusiak analyzed over 10,500 recommendations between 2000 and 2014. He found that buy recommendations were, on average, overestimated by 29%, while sell recommendations were underestimated by 12%.

Dąbrowski (2013) analyzed recommendations for five blue-chip companies between 2007 and 2012. He found that analysts were overly optimistic, with 70% of recommendations being “buy” and only 30% being “sell”. Only 44.63% of the recommendations reached the target price within the planned timeframe.

One of the earliest studies in this field was conducted by Cowles (1933), who concluded, based on historical data, that analysts’ forecasting performance was no better than chance. Bradshaw (2002), analyzing 103 reports published in 1998–1999, found that analysts often used target prices merely to justify their recommendations rather than as independent forecasts of a security’s value.

Methodology

To fulfill the research objective concerning the accuracy of stock recommendations, the study analyzed sell-side⁴ recommendations issued by Polish and foreign brokerage houses for companies listed on the main and alternative markets of the Warsaw Stock Exchange (WSE). To verify the analysts’ bias defined as the difference between the target price and the market price on the recommendation’s expiration date — it was necessary to collect the stock prices of each examined company on that date. Quotations were obtained using the Stooq [www.stooq.pl] and WSE [www.gpw.pl] platforms. This data enabled the calculation of the deviation between the target price and the market price at the end of the recommendation’s validity period, which was essential for verifying the main hypothesis related to the presence of excessive optimism among analysts.

The research sample, constructed according to the aforementioned criteria, consisted of 5,295 recommendations issued by 28 different institutions (brokerage houses) for 303 companies.

⁴ These are recommendations issued by analysts/institutions that also offer to sell and buy or handle trading in the instruments being evaluated. The paper focuses only on recommendations made by brokerage houses, while knowing that this type of report can also be prepared by other entities.

In exploring the presence of excessive analyst optimism in equity valuations based on brokerage reports, the research adopted maximally broad sampling criteria to construct a comprehensive database, while maintaining methodological consistency and integrity. An inherent limitation in examining the Polish stock market is the historical constraint imposed by the Warsaw Stock Exchange's inception date – April 6, 1991. However, the early years of the WSE differed significantly from the present in terms of the number of listed companies, institutional participation, frequency of valuations and recommendations, investor activity, and regulatory framework.

Another important consideration is that legal regulations concerning stock recommendations were not fully developed at the WSE's inception. The relevant legal framework was only introduced with the Regulation of October 19, 2005, on information constituting recommendations related to financial instruments, their issuers, or sponsors (Dz.U. 2005 no 206 item 1715). Therefore, the present study includes only those recommendations issued after October 24, 2005, the date the regulation came into force.

Ultimately, the sample covers the period from October 25, 2005, to May 12, 2023 – more than 17 years. This timeframe is one of the longest among all studies related to stock recommendations conducted on the Polish capital market. Consequently, the conclusions drawn from this analysis should provide a more comprehensive view of the capital market than prior research efforts.

It is also important to note that the analyzed period encompasses multiple business and market cycles, thereby enabling the assessment of the studied phenomena under both bear and bull market conditions, as well as during periods of general economic prosperity and downturn.

The span from October 2005 to May 2023 covers 211 months. Based on several prominent economic and financial cycle theories, it is noteworthy that according to Wośko (2005), the average business cycle in Poland lasts about 52.7 months, while a full stock market cycle lasts about 31.2 months. Thus, the study period includes approximately four full business cycles and nearly seven full market cycles. Furthermore, the Kitchin cycle, which lasts about 40 months (Godłówn-Legiędź, 2018), is represented almost five times in this period. As for the Juglar cycles, lasting 8–10 years (Szarzec, 2019), the sample covers approximately two full cycles.

In summary, the timeframe was selected based on regulatory compliance, data availability, and its capacity to reflect all phases of the economic and market cycles. This allows for a full and nuanced depiction of the studied phenomenon.

In the study, 3-, 6-, 9-, and 12-month time horizons were applied. Accuracy was defined as the percentage deviation between the target price and the stock's closing price at the respective time intervals (i.e., after 3, 6, 9, and 12 months from the recommendation issuance date). The

deviation was calculated using the following formula (Bonini et al., 2010; Kerl, 2011; Flotyński, 2015; Prusak, 2015; Drewniak, 2017):

$$O_k = \left| \frac{CD - C_k}{C_k} \right| * 100\%$$

where: O_k – the deviation of the target price from the market price at the end of the studied period (after 3, 6, 9, or 12 months); CD – the target price specified in the recommendation report; C_k – the actual closing market price at the end of the studied period (i.e., on the recommendation expiration date).

Subjective accuracy thresholds were established, as illustrated in the following table:

Table 1

Subjective accuracy

Accuracy	Deviation Range
Accurate	<0% to 5%>
Acceptable	(5% to 15%>
Unacceptable	Above 15%

Source: Own study.

This subjective classification was based on earlier studies by Błażej Prusak (2015), Sebastian Majewski and Agnieszka Majewska (2017), and Jarosław Klepacki (2019) on recommendation accuracy. Majewski classified recommendations as accurate when the deviation was $\pm 5\%$, while Klepacki considered deviations $\leq 3\%$ as very accurate, 3%–5% as accurate, 5%–10% as acceptable, and $>10\%$ as unacceptable. Prusak's scale included: 0–5% (very good), 5–10% (good), 10–15% (average), 15–20% (poor), and $> 20\%$ (very poor).

To test the main hypothesis, the study employed the one-sample t-test for means. The t -distribution is a theoretical distribution of relative frequencies of t -values obtained from an infinite number of randomly drawn samples of a specific size from a population (King & Minium, 2020). The test statistic for the one-sample t-test is given by:

$$t = \frac{\bar{X} - \mu_x}{s_{\bar{x}}}$$

where: \bar{X} – sample mean; μ_x – hypothetical population mean; $s_{\bar{x}}$ – estimated standard error of the mean.

This test determines whether the average characteristic value in the population is equal to a specific hypothesized value. The null hypothesis takes the form $H_0: \mu = \mu_x$, where μ_x is a hypothetical value. while the alternative hypotheses may be expressed as (Malska & Koziarowska, 2015): H_1 : (I) $\mu \neq \mu_x$; (II) $\mu > \mu_x$; (III) $\mu < \mu_x$.

The student's t -test used quantitative data: attitudes – understood as the deviation of the target price from the market price at the end of the study period, i.e., after 3, 6, 9 and 12 months after the stock market recommendation. According to a subjective assumption based on the literature, a threshold for the occurrence of over-optimism above 15% deviation of the target price from the market price at the end of the period under study, i.e., after 3, 6, 9 and 12 months after the stock market recommendation was made, was adopted.

The fundamental research decision is to determine how large the difference between the hypothetical value of μ_x and the true value of μ_x must be. In the general case, it is convenient to express the size of the difference between μ_{hip} and μ_{praw} in terms of the number of standard deviations of the measure used. Such an indicator is called the effect size and is denoted by the symbol “ d ” (King & Minium, 2020).

$$d = \frac{\mu_{hip} - \mu_{praw}}{\sigma}$$

For practical purposes, this formula has been transformed to post:

$$d = \frac{\bar{X} - \mu_{praw}}{\sigma_x}$$

The dCohen index expresses the difference related to the size of the standard deviation of a set of observations, not the standard error. If we do not know the value of σ_x , we can estimate it using s . The resulting estimate of d is called g (Hedges correction).

$$estimated\ d = g = \frac{\bar{X} - \mu_{praw}}{s_x} = \frac{\bar{X} - \mu_{praw}}{\sqrt{\frac{SS_x}{n-1}}}$$

The effect size proposed by Cohen is defined as: 0.2 – small; 0.5 – average; 0.8 – large.

In order to confirm the presence of over-optimism among stock analysts, inference was also carried out on the frequency, that is, the number of observations that appear in each category of the distribution of abundances. The discrepancy between observed counts and expected counts is expressed as a statistic that is called Chi-square (χ^2). This test was developed for categorical data, that is, expressed in terms of qualitative categories. It can be thought of as

a test comparing proportions. Due to the probability of one out of five attitudes, equal proportions of 0.2 were assumed.

This test allows us to answer the question of whether the relative abundances observed in the specified categories of the sample distribution of abundances are consistent with the set of such hypothetical (expected) abundances, which we assume to be true in the population distribution. The χ^2 statistic for a single sample is calculated from the formula:

$$\chi^2 = \sum \left(\frac{(f_0 - f_e)^2}{f_e} \right)$$

where: f_e – expected count; f_0 – observed count, we sum the values calculated for all the categories that were considered in solving the problem.

Jacob Cohen would propose an appropriate measure of effect size for χ^2 compliance tests was the ω ratio. To calculate the ω -ratio, one must first convert the abundance to a ratio. The formula for the effect size is as follows:

$$\hat{\omega} = \sqrt{\sum \left(\frac{(p_0 - p_e)^2}{p_e} \right)}$$

where: p_0 – observed ratio; p_e – expected ratio.

The effect size proposed by Cohen is defined as: 0.1 – small effect; 0.3 – average effect; 0.5 – large effect.

Results

In Table 2, the authors presented descriptive statistics of the study group. The average overvaluation was 51.38%, standard deviation was 73.59%. The highest overvaluation of the recommendation price was 1034.55%. It was observed for a buy recommendation issued on 24.11.2021 for Aforti Holding S.A., where the recommended price was PLN 15.6, the price on the day of issuance was PLN 5.7, while the market price on the maturity date was 1.38. However, perfectly hit recommendations, i.e., when the modulus from the deviation of the recommended price and the market price was 0.00%, there were 12 for 9 companies.

Table 2

Stats

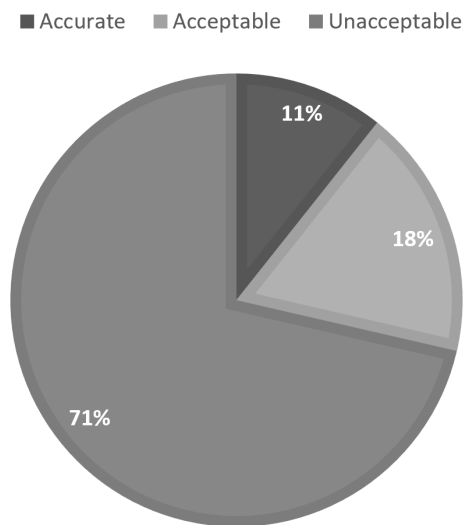
Variable	Type	Accuracy
Sample number	Statistic	5295
Range	Statistic	1034.55%
Minimum	Statistic	0.00%
Maximum	Statistic	1034.55%
Mean	Statistic	51.38%
	Std. Error	1.01%
Standard Deviation	Statistic	73.59%
Variance	Statistic	5415.78
Skewness	Statistic	4.454
	Std. Error	0.034
Kurtosis	Statistic	31.731
	Std. Error	0.067

Source: Own study.

The frequencies of the recommendation relevance scale, i.e., accurate, acceptable, unacceptable, are illustrated in Figure 1.

Figure 1

Frequencies of recommendation relevance scale



Source: Own study.

From the frequency distribution presented above for the entire sample, it can be deduced that for 71.00% of the recommendations the relevance was unacceptable, i.e., the recommended price differed from the target price by more than 15.00% at the end of the maturity period. Relevance at the acceptable level was shown by 18% of recommendations. In contrast, for only 11% of recommendations the target price was accurately predicted.

To test whether the hypothesis that stock market recommendations characterize low accuracy is true, the student's t-test for one mean was applied, assuming a significance level of 0.05. The following hypotheses were put forward:

$$H_0: \mu_x = 15\%$$

$$H_1: \mu_x > 15\%$$

Table 3

One-sample Test (test Value = 0.15)

Variable		Value
t		50.652
df		5295
Significance	One-Sided p	<.001
	Two-Sided p	<.001
Mean Difference		51.22638%
95% Confidence Interval of the Difference	Lower	49.2437%
	Upper	53.2090%

Source: Own study.

Table 4

One-sample effect sizes

Variable	Standardizer*	Point Estimate	95% Confidence Interval	
			Lower	Upper
Cohen's d	73.59198%	.696	.666	.726
Hedges' correction	73.60241%	.696	.666	.726

Source: Own study.

Legend:

* – the denominator used in estimating the effect sizes. Cohen's *d* uses the sample standard deviation. Hedges' correction uses the sample standard deviation, plus a correction factor.

Analysis using a one-sample Student's *t*-test indicates that it is statistically significantly greater than the accepted valuation error threshold of 15%, which is understood as the limit deviation of the target price from the market price at the end of the period under study, above which inaccurate recommendations are found. Thus, it falls into the rejection area, which obliges the rejection of hypothesis H_0 in favor of alternative hypothesis H_1 . The effect sizes of Cohen's *d*, as well as Hedges', are at 0.73–0.74, which is considered an average value close to large (King & Minium, 2020: 339). The plus sign means that the true value is greater than the hypothetical value, which allows the research conclusion that the accuracy of the recommendation is unacceptable.

In order to confirm the presence of over-optimism in stock market recommendations, a χ^2 consistency test was performed for categorical data, viz. The hypothesis H_0 was formulated, that the proportions between categories are equal (there are no differences in the distribution of counts between categories).

$$H_0: P_{\text{Accurate}} = P_{\text{Acceptable}} = P_{\text{Unacceptable}} = 0.3(3)$$

$$H_1: P_{\text{Accurate}} \neq P_{\text{Acceptable}} \neq P_{\text{Unacceptable}} \neq 0.3(3)$$

Table 5

Frequency

	Observed N	Expected N	Residual
Accurate	564	1765.0	-1201.0
Acceptable	949	1765.0	-816.0
Unacceptable	3782	1765.0	2017.0
Total	5295		

Source: Own study.

Table 6

Test value

	Accuracy
Chi-Square ⁵	3499.459
df	2
Asymp. Sig.	<.001

Source: Own study.

⁵ 0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 1765,0.

For the examined randomness of the distribution of variables, the χ^2 test is used for these variables. The χ^2 test ($df = 2, N = 5295$) = 3499.459 and $p < 0.001$. This gives grounds to reject the null hypothesis in favor of the alternative hypothesis that the distribution of the variable is not random. We also calculated the effect size for the Chi-square (ω) concordance test $\hat{=} = 0.66$, a large effect (King & Minium, 2020).

The study of the authors in the case of both statistical tests showed low relevance of recommendations. The results of the research are consistent with the results conducted previously for both the Polish market (Biedrzyński, 2008; Kwołke, 2012; Prusak, 2015; Pastusiak, 2016, 2018) and foreign markets (Bradshawa et al., 2010).

An attempt to explain the lack of relevance of recommendations may be the fact that analysts use both sophisticated and heuristic valuation models to determine target prices (e.g., Demirakos et al., 2010; Imam et al., 2013; Gleason et al., 2013). Analysts' choice of valuation model depends on various factors, such as analyst and company characteristics, customer preferences and market prices (e.g., Glaum & Friedrich, 2006; Imam et al., 2008; Demirakos et al., 2010; Shahed Imam et al., 2013).

Interview-based research indicates that analysts switch from advanced valuation models to heuristic models during periods of a positive sentiment to achieve higher valuations (e.g., Glaum & Friedrich, 2006; Imam et al., 2008). In an interview conducted by Imam et al. (2008), an analyst covering the construction sector stated: "We are staking a guess as to what the share price will be, rather than guessing what the value of the company will be. The stock price is influenced by two things: one is stock market sentiment on earnings and the other is earnings, it's hard to guess what the sentiment on earnings will be and what the earnings will be. Valuations are basically house words. You're trying to guess what the market will do 12 months from now." From there, the interview authors concluded that when the market is doing well and stock prices are trending upward, it is important for analysts to focus on long-term growth, which captures the price-to-earnings (P/E) to earnings growth (PEG) ratio. Demirakos et al. (2010) found, based on a content analysis of stock market reports, that the discounted cash flow (DCF) model is more often used by analysts when sentiment is low. Tan & Yu (2019) confirmed this on a large sample of analysts' reports.

Another group is behavioral errors, which in the case of financial analysts are generally translated into reports and recommendations. Because of conflicts of interest between company divisions, and in particular because units are responsible for handling brokerage houses or banks, reports produced by analysts may not be entirely independent and objective (Tan & Yu, 2019). In other words, an analyst may feel pressure to issue buying recommendations if the company

that employs him or her is simultaneously handling the issuance process of a particular company. Investors should take into account the possibility of error on the part of the analyst and take into account the specifics of their company, this will help investors select the most objective reports (Baker et al., 2021).

Information processing error, which involves incorrect processing of information on the basis of which assumptions are made for stock valuations, also plays an important role in stock valuations. Analysts in valuations have to collect and process information, much of which is not related to the valuation, but some of which is crucial to the decision-making process. It is important to include only factual information in the valuation. Analysts often make decisions under the influence of past experience, as well as completely random current events. As a result, they succumb to cognitive errors due to incorrect information processing, which interacts to make potentially erroneous decisions (Baker et al., 2021).

There may also be a self-control error among stock analysts, understood as an error of self-discipline and the translation of immediate gratification into long-term goals. It can lead to ineffective behavior to satisfy desires of a short-term nature (Baker et al., 2021).

In summary, the literature provides two explanations for why target prices have only limited investment value for investors (Buxbaum et al., 2019):

- they are optimistically biased as a result of analysts' work-related incentives,
- they are based on insufficient valuation assumptions and forecasting techniques that do not reflect intrinsic values well.

Discussion / Conclusion

The research conducted allowed for an in-depth analysis of the accuracy of stock market recommendations made by financial institutions operating on the Polish capital market. Based on an extensive sample of more than 5,200 recommendations issued over a period of more than 17 years, it was possible to make an unambiguous assessment of the effectiveness of analysts' predictions, understood as the consistency of the target price with the market price on the date of maturity of the recommendation.

The results of the empirical analysis showed a statistically significant deviation of target prices from actual market valuations. As many as 71% of the recommendations were characterized by a deviation of more than 15%, which – according to the adopted methodology – qualifies them as inaccurate. Only 11% of the recommendations could be considered accurate in a strict sense, and 18% were within the range of acceptable error. Such a high level of divergence indicates the systematic nature of underestimations or overestimations, which largely supports the hypothesis of the presence of excessive optimism in analysts' prognoses.

The use of the student's t-test and the chi-square test of concordance made it possible to statistically confirm the established research hypotheses. Both methods unequivocally showed a significant over-representation of recommendations with low relevance and a high level of effect, which underscores the importance of the problem and its scale.

In light of the presented results, it seems reasonable to conclude that stock market recommendations – despite their informational importance and popularity among investors are not a fully reliable tool to support the process of making investment decisions. The limited accuracy of recommendations may be due to various reasons, including:

- the use of simplified or heuristic valuation models;
- emotional and sentimental influence of the market;
- cognitive errors on the part of analysts (e.g., anchoring heuristics, confirmation effect);
- potential conflicts of interest between analysts and issuers of financial instruments.

It is clear from the analysis and literature review that the complexity of the market is often not fully reflected in the valuation models used. These models, although based on quantitative data, are not immune to analysts' subjective assumptions, which can lead to structural overvaluation of financial instruments. Given that the study covered a period exceeding four economic and seven stock market cycles, it should be emphasized that analysts' forecasts may have been strongly influenced by the phase of the market. An increase in the accuracy of recommendations in downturns or its decrease in bull market periods could be an important topic for future dynamic analysis.

Qualitative analysis indicates that, in addition to the numerical values themselves, the language and formulation of the reports could also affect investors' perception and interpretation of the recommendations. The use of vague statements, overconfidence on the part of analysts or the absence of alternative scenarios can reinforce behavioral heuristics on the part of the audience. In many cases, analysts do not disclose the detailed parameters adopted in valuation models (e.g., the discount rate adopted, growth rates), which limits the possibility of their independent verification. Increasing transparency could promote a better understanding of the sources of deviations.

Given the observed level of predictive errors, it seems reasonable to postulate the introduction of mechanisms to verify the effectiveness of recommendations *ex post* (e.g., in the form of analyst ratings published by independent institutions), which could reduce the phenomenon of the so-called herding effect and promote analytical quality over publication quantity.

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