



## Ze współpracy z zagranicą / International cooperation

### The incremental informativeness of sell-side earnings forecasts. Evidence for the Warsaw Stock Exchange\*

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#### Abstract

We investigate whether earnings forecasts issued by sell-side analysts are incrementally informative about the returns of firms listed on the Warsaw Stock Exchange (WSE), a moderately-developed, post-communist capital market. Our sample covers the fiscal years 2008-2016. The informativeness of earnings (and earnings forecasts) is defined as the association between earnings (earnings forecasts) and returns. Our findings indicate that the mean earnings forecasts issued by sell-side analysts are incrementally informative about firm returns beyond the earnings reported. This result does not depend on firm size, profitability, or market return. The findings indicate that such forecasts incorporate useful incremental valuation information and that the incremental informativeness of these forecasts serves to protect the interests of analysts' clients.

**Keywords:** sell-side analysts' forecasts, forecast accuracy, forecast informativeness, earnings informativeness.

#### Streszczenie

#### Pojemność informacyjna wyników finansowych a pojemność informacyjna ich prognoz. Analiza spółek notowanych na GPW w Warszawie

Celem badania jest odpowiedź na pytanie, czy prognozy wyników finansowych publikowane przez analityków giełdowych (*sell side*) niosą dodatkową informację o stopach zwrotu z inwestycji w akcje spółek notowanych na Giełdzie Papierów Wartościowych w Warszawie (GPW), umiarkowanie rozwiniętym postkomunistycznym rynku kapitałowym. Nasza próba obejmuje lata podatkowe 2008–2016. Pojemność informacyjną wyników finansowych raportowanych (i prognoz wyników) definiuje się jako związek między wynikami (prognozami wyników) a stopami zwrotu. Nasze wyniki wskazują, że średnie

\* The publication was co-financed from the subsidy granted to the Cracow University of Economics.

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prognozy wyników publikowane przez analityków niosą dodatkową informację o stopach zwrotu, ponad informację zawartą w wynikach raportowanych. Nie zależy to od wielkości spółki, jej rentowności ani stopy zwrotu. Wyniki wskazują, że w prognozach inkorporowana jest nowa, użyteczna do wyceny informacja, a zatem służą one ochronie interesów klientów analityków.

**Słowa kluczowe:** prognozy wyników finansowych, trafność prognoz, pojemność informacyjna prognoz, pojemność informacyjna wyników finansowych.

## Introduction

Based on the findings of research related to developed capital markets, especially in the USA, one can ascertain that over the past 30 or more years, analysts' earnings forecasts have been a primary source of information for investors and creditors in their resource allocation decisions, and by academics in their market-related research (Bradshaw et al. 2018). However, there is very limited research that examines the role of analysts and their forecasts in semi-developed and/or post-communist emerging markets. F. De-george et al. (2013) find that the effectiveness of analysts as monitors depends on the level of financial development. Specifically, they find that analyst coverage reduces earnings management only in countries whose financial systems are highly developed. Considering the development of post-World War II economies, B. Amable (2003) identified five different models of capitalism considering institutional complementarity. The collapse of communism in Central and Eastern Europe (CEE) in the late 1980s created the sixth model of capitalism. B. Farkas (2011) found that new EU member states, including Poland, formed a unique model of CEE capitalism. Due to differences in the level of financial development and the institutional environment, prior research results related to analysts in US capital markets cannot be directly extended to the Polish capital market. Our research aims to bridge this gap.

Despite many similarities (Farkas 2011), the countries within the CEE region are very diverse in terms of their institutional perspective, history, culture, political environment, and business arrangements (Albu et al., 2017). FTSE Russell promoted Poland from Emerging Market to Developed Market status on 24 September 2018. Poland is the first country in almost a decade, and the first CEE country to be upgraded to the Developed Market status. The upgrade demonstrates the growth in the Polish economy and the further development of its capital market. This unique institutional background in Poland provides the motivation for our single-country study.

Furthermore, a recent publication in Poland reports that sell-side analysts believe that the primary role of the analyst industry is to add value to the information that is publicly available (<https://strefainwestorow.pl/artykuly/20170622/analitik-gieldowy-praca-sell-buy-side>). This anecdotal evidence suggests that analysts are not primarily interested in forecast accuracy. Rather, their objective is to provide useful information in the form of forecasts to their clients. Their professional success depends on their ability to provide this service. These factors lead us to analyze the informativeness of analyst forecasts on the Warsaw Stock Exchange (WSE), the largest regional capital market.

This study investigates whether earnings forecasts issued by sell-side analysts are incrementally informative about the future returns of firms listed on the WSE. We examine a sample of Polish firms covered by sell-side analysts, traded on the WSE over the period 2008-2016. The informativeness of earnings (and respectively earnings forecasts), is defined as the association between earnings (and earnings forecasts) and returns. The term “informativeness” as used in the current literature is related to the notion of value relevance. Following the reasoning set forth by A. Filip and B. Raffournier (2010) with respect to the level of value relevance in CEE countries, we consider the level of financial development of the Polish capital market to be relatively high.

Our conjecture as to the superiority of earnings forecasts over reported earnings is corroborated by our empirical findings. They indicate that the mean earnings forecasts issued by sell-side analysts for firms listed on the WSE are incrementally informative about firm returns beyond the earnings reported. This result does not depend on firm size, profitability, or market return. The findings indicate that forecasts incorporate useful incremental valuation information above and beyond reported earnings. The findings also suggest that the incremental informativeness of analysts’ forecasts serves to protect the interests of their clients, and it provides corroborating information as to the high level of development of the analyst industry and capital market in Poland.

## 1. Literature review and hypothesis development

Reported earnings are considered to be one of the key metrics used in the evaluation of a firm’s past performance. They are also important in the assessment of a firm’s prospects for the future. Due to the nature of accounting systems and the complexity of many accounting measurements, it is necessary for corporate managers to make judgments and estimations in applying the entity’s accounting policies. Agency theory (Jensen, Meckling, 1976; Fama, 1980; Eisenhardt, 1989) suggests that the amounts recognized in the financial statements depend not only on accounting regulations and policies, but also on discretionary decisions made by management. The asymmetry of information between managers and investors creates a demand for financial market gatekeepers (experts) such as market analysts, auditors, audit committees, and others, who are capable of exploring the information content of financial disclosures and properly interpreting them.

Many empirical studies conclude that the association between earnings and security returns is moderate. They suggest that reported earnings do not provide a good summary measure of the events incorporated in stock prices during the reporting period. In other words, the value relevance of accounting data, usually expressed as the high correlation with market data, is weak. Most of these studies capture value relevance considering mature capital markets. The abundant literature in this area dates back to the 1970s. It is perfectly reviewed by M. Barth et al. (2018), and also in the studies quoted below in this paragraph. Very few studies analyze this issue with respect to emerging

markets, including CEE post-communist countries. Among the exceptions are S. Gomik-Tomaszewski and E.K. Jermakowicz (2001), K. Hellström (2006), D. Dobija and K.M. Klimczak (2010), A. Filip and B. Raffournier (2010), P. Bolibok (2014, 2018). Such markets may attract the attention of investors seeking to further diversify their portfolios.

Filip and Raffournier (2010) present a convincing list of reasons for the low value relevance of accounting data in CEE countries. These include low market efficiency, a bank-oriented financial system, a code-law legal system, and the significant influence of tax rules. They also present arguments explaining why there may be a higher value relevance of accounting data in emerging market countries. In such countries, financial statements may be the primary and, in some cases, the only source of information for investors. Many companies do not disclose earnings forecasts. Furthermore, the analyst industry is typically at an early stage of development, and the financial press is less developed. While the reasons for the low value relevance of accounting data are still appropriate in Poland, the reasons for high value relevance are no longer valid due to the level of development of financial institutions and legal enforcement. Therefore, we expect the incremental informativeness (or value relevance) of earnings forecasts on the WSE, above reported earnings.

A large body of accounting literature analyzes the role of sell-side analysts and their forecasts. This research can be divided into two main areas. The first line of research concentrates on the accuracy of forecasts, while the second line is primarily concerned with the informativeness of forecasts. Accuracy is typically expressed as the deviation of a forecast from reported earnings. Prior research reveals that analysts' forecast accuracy increases with brokerage size (Clement, 1999), forecasting effort (Jacob et al., 1999), all-star status (Stickel, 1992; Groysberg et al., 2011), the size of the analysts' portfolio (Groysberg et al., 2011), and experience (Mikhail et al., 1997), and decreases with the number of companies covered, the number of industries covered (Clement, 1999; Jacob et al., 1999), and the forecast horizon (O'Brien, 1988; Brown, 1991). Some forecasts generate stronger return responses than others. Investors respond more strongly to forecasts issued by more accurate, more credible, and celebrity analysts (Stickel, 1992; Bonner et al., 2007). Analyst turnover is higher when forecasts accuracy is lower than that of other peer analysts (Mikhail et al., 1999). This result is confirmed by B. Groysberg et al. (2011); however, they find no evidence that compensation is related to the accuracy of earnings forecast.

There is also a considerable amount of evidence that suggests forecast accuracy is not the primary concern of analysts. This research infers that analysts sacrifice accuracy for informativeness. H. Louis et al. (2013) present a brilliant review of the existing literature. While it may appear odd that analysts would deliberately provide forecasts that differ from the reported earnings, Louis et al. (2013) argue that earnings estimates are targeted towards clients with medium to long-term investment horizons who need information that is useful in assessing the value of a company. Such clients need informative estimates rather than an accurate forecast of intentionally managed earnings.

Only clients who trade on the basis of short-term news (weeks, days, or even hours) are likely to be interested in information prior to its presentation in the financial statements.

Other research suggests that analysts are rewarded when their forecasts are informative (Barth et al., 2001; Irvine, 2004; Lang et al., 2004). An accurate forecast of the next year's reported earnings might not be informative if reported earnings contain a large transitory element. These findings suggest that analysts focus on the more persistent components of earnings when making their forecasts (Bradshaw, Sloan, 2002). To the extent that analysts anticipate managerial incentives and opportunities to manage earnings, they can make their forecast more informative by estimating and removing the effects of earnings management and other bias.

The idea that analysts provide new information to their clients is supported by other empirical findings. Assuming that analysts accurately forecast earnings, forecast error should be symmetrically distributed around zero. However, J. Abarbanell and R. Lehavy (2003) and J.C. Porter and M. Kraut (2013) find that this is not the case. They find that the distribution of analysts' forecast error shows a higher number of small positive values than small negative values. Furthermore, the left tail of the distribution is longer and thicker than the right tail. Abarbanell and Lehavy (2003) purport that these asymmetries arise because analysts are removing the effects of earnings management and other bias from forecasts. Whatever the reason, they do not forecast reported earnings. Furthermore, fundamental differences between the distributions of reported earnings and forecasts of earnings support the notion that forecast accuracy is not the primary goal of analysts on the WSE (Wójtowicz, 2017). Kowalke (2015) finds high accuracy related to sales forecasts, but low accuracy for forecasts related to earnings before interest and taxes (EBIT), and net income with respect to the firms listed on the WSE.

There is systematic evidence that financial market analysts perform an important role as monitors, at least in the USA. Analysts are among the quickest fraud detectors (Dyck et al. 2010). F. Degeorge et al. (2013) find that the effectiveness of analysts as monitors depends on the level of financial development (controlling for other factors). Specifically, they find that analyst coverage reduces earnings management only in countries whose financial systems are highly developed.

In Poland, as in all EU countries, listed companies whose securities are traded on a regulated EU market are required to prepare their consolidated financial statements in conformity with International Financial Reporting Standards (IFRS). Such standards are viewed as high-quality accounting standards, and the informativeness of accounting disclosure may be considered high. Many authors (Ball et al., 2003; Burgstahler et al., 2006; Hail et al., 2010) point out that accounting quality depends on firms' reporting incentives and the functional enforcement regime rather than on the quality of accounting standards per se. Jeanjean and Stolowy (2008) confirm that management incentives and national institutional factors play an important role in framing financial reporting characteristics. Christensen et al. (2016) examine the capital market benefits of securities regulation. They find that, on the average, the EU market abuse and transparency

directives<sup>1</sup> significantly increase the liquidity of stock markets. However, the benefits of securities regulation differ across countries. The effects are stronger in countries with a history of high-quality market regulation. The benefits of securities regulation are also stronger in countries with stricter implementation and enforcement policies.

In a similar vein, Dobija and Klimczak (2010) find positive evidence of the value relevance of reported earnings on the WSE, but no improvement in the strength of the relationship over time within the sample period 1997–2008. They conclude that once basic market institutions are established, further developments in regulations may not result in higher value relevance.

We assess the level of legal enforcement and financial development in Poland using the Audit and Enforcement Index (AE) across the years 2002, 2005, and 2008. We also use the aggregated index of financial development (FD), which takes into account the complex multidimensional nature of this phenomenon (Svirydzenka, 2016). The level of enforcement and financial development in Poland is compared with both selected post-communist countries and financially developed ones (Brown et al., 2014). Table 1 shows the values of these indexes.

**Table 1.** AE Index and FD Index

Country	Year, index						
	2002		2005		2008		2014
	AE Index	FD Index	AE Index	FD Index	AE Index	FD Index	FD Index
Czech Republic	0.20	0.33	0.29	0.44	0.34	0.39	0.35
Hungary	0.27	0.41	0.30	0.50	0.32	0.53	0.45
<b>Poland</b>	<b>0.20</b>	<b>0.32</b>	<b>0.30</b>	<b>0.40</b>	<b>0.50</b>	<b>0.45</b>	<b>0.48</b>
Romania	0.16	0.14	0.20	0.19	0.27	0.22	0.21
Russian Federation	0.32	0.31	0.50	0.40	0.50	0.46	0.58
Ukraine	0.07	0.12	0.11	0.19	0.11	0.25	0.25
Germany	0.32	0.76	0.75	0.79	0.79	0.77	0.75
United Kingdom	0.57	0.89	0.96	0.94	0.96	0.90	0.89
United States	0.70	0.87	0.95	0.87	1.00	0.86	0.87

Source: authors' own elaboration based on P. Brown et al. (2014), Appendix 2; FD Index Database.

<sup>1</sup> In order to make financial markets sounder and more transparent, in June 2014, the EU enacted new rules against market abuse. The new rules strengthened and replaced the original market abuse directive adopted in 2003. The market abuse regulation (MAR) broadens the scope of instruments covered by the market abuse framework, strengthening in the regime for commodity and related derivative markets. The new market abuse directive (new MAD) complements the MAR by requiring Member States to strengthen legal regulations and enforcement with respect to the most serious market abuse offences.

Table 1 shows that the level of financial reporting enforcement and financial development in Poland is moderate and similar to the Czech Republic, Hungary, and Russia. While Poland is one of the region's economic leaders, a comparison to Germany, the UK, and the USA, countries considered to be more financially developed, reveals that there are still significant differences. The existing medium level of financial reporting enforcement and financial development in Poland calls for gatekeepers who are able to mitigate the asymmetry of information between management and investors. Analysts are intermediaries who study and evaluate information about firms and provide recommendations and forecasts to their clients about firms' future earnings potential. Their forecasts may provide valuable information about the quality of reported earnings. This is especially important in an environment characterized by complex accounting measurements often requiring managerial judgments and estimations.

Despite the rapid development of the WSE and its unquestionable role as the largest CEE capital market (proxied by the number of companies listed and market capitalization), it faces many problems, including a slow decrease in the number of companies listed (487 at the end of 2016, but only 461 at the end of 2018), and the low capitalization of domestic companies. In recent years, the number of IPOs on the main WSE market has declined<sup>2</sup>. Furthermore, the structure of investors is changing. Table 2 reports the distribution of share turnover on the WSE by the type of investor. Polish investors, especially individual investors, show a decreasing rate of turnover, while the rate for foreign institutional investors is growing. This suggests an increase in the number of status-conscious stakeholders interested in the professional advice of analysts. This conjecture is supported by the findings of I. Karamanou (2012). She examines the role of financial analysts in the setting of emerging markets and finds that as investors become more sophisticated, their reliance on analyst forecasts increases.

**Table 2.** Structure of share turnover across investor groups at WSE

Investor groups	2010	2011	2012	2013	2014	2015	2016	2017	2018
Foreign	46.5	47	48	47	49	51.5	53.5	53.5	59
Institutional Polish	34	34.5	34.5	38	38	36.5	33.5	30.5	29
Individual Polish	19.5	18.5	17.5	15	13	12	13	16	12

**Source:** authors' recalculation based on <https://www.gpw.pl/analizy>.

Sell-side analysts in Poland typically cover up to three industries and up to 15 companies<sup>3</sup>. Analysts use current company financial reports along with other information gathered in meetings with top management. They typically only cover companies with relatively high levels of capitalization and liquidity. Small firms and those with low levels of liquidity whose shares are not actively traded are of little interest to brokerage

<sup>2</sup> <https://www.gpw.pl/podstawowe-statystyki-gpw>

<sup>3</sup> <https://strefainwestorow.pl/artykuly/20170622/analizy-gieldowy-praca-sell-buy-side>

firms. This issue is crucial because brokerage firms earn commissions based on trade volume. There is anecdotal evidence indicating that the role of the whole analyst industry is to add value to the information that is publicly available to investors and creditors. Famed sell-side analyst, Piotr. Zielonka, winner of several Forbes rankings, earned his reputation because of his ability to predict certain events in advance of their actual occurrence. Most managers believe that the value added from Zielonka's insights is the result of his ability to identify key phenomena taking place in companies and their environment often well in advance of other market participants. The value he added was the incremental information he uncovered and used for the benefit of his clients. In the context of the role of analysts, this suggests that investors translated Zielonka's forecasts and recommendations into profitable investment decisions, thus permitting brokerage firms to earn reasonable commissions (Forbes Ranking, 2014).

Given the important role of financial institutions, of which sell-side analysts are a part, and the challenging environment for brokerage firms in Poland, we hypothesize that analysts continue to provide important new information to users of their forecasts. Earnings announcements and other publicly available information from management trigger many analyst revisions. Analysts, as experienced professionals, are able to more efficiently explore the information content of managers' financial disclosures and properly interpret it, providing unique insights to their clients about business firms' future operating performance. Thus, the users of this information (the market), not management, forecast future performance. Given Poland's moderately developed financial system, the following hypothesis is tested:

*Earnings forecasts issued by sell-side analysts are incrementally informative about firm returns beyond the earnings reported.*

### **3. Research design**

#### **3.1 Sample selection**

Our sample is drawn from the Thomson Reuters Eikon Database (specifically from I/B/E/S Estimates) and consists of the firms listed on the WSE. The sample covers a 9-year period from 2008 to 2016. We do not consider data covering years prior to 2008 because such data were not included in the database. Furthermore, there was very limited analysts' coverage for years prior to 2008. We do not require data availability for each firm across all years. In order to avoid the exclusion of a large number of firms from the sample, we include the year 2008. While the number of observations in 2008 (16) is smaller than the observations in subsequent years, excluding such observations would significantly reduce the sample size because a firm is included in the sample if it covers at least 3 years. Thus, the composition and size of the sample varies, as shown in Table 3. The analysis is based on a firm's after-tax income (net income, *NI*), a value commonly forecasted by analysts, and the related mean of earnings forecasts.



**Table 3.** Sample composition by fiscal year

Fiscal year	Number of		Firms in the sample as percent of firms listed
	observations	firms listed at end-year	
2008	16	374	18
2009	45	379	18
2010	50	400	17
2011	51	426	16
2012	52	438	16
2013	42	450	15
2014	46	471	14
2015	60	487	14
2016	44	487	14
Total	406	–	–

Source: own elaboration.

The total sample includes 68 firms and 406 firm-year observations. Fourteen to eighteen percent of the firms were included in the sample in every year (Table 3). The average firm contributes 5.97 observations, or 66% of the sample period. Seven firms cover the whole sample period and the number of observations per year varies between 16 and 60, with an average of 45.11.

### 3.2 Empirical models

The informativeness of any economic information, including earnings and forecasts, is difficult to capture. In this paper, informativeness is defined as the association between earnings and returns, and also between earnings forecasts and returns. We apply a general model which uses an association methodology consistent with that developed by D.W. Collins and S.P. Kothari (1989). More specifically, we build on the models applied by A. Daly (2018) with respect to the analysis of the incremental informativeness of public subsidiary earnings. The informativeness of earnings is based on the explanatory power (adjusted  $R$ -squared) and coefficient of earnings on returns ( $\alpha_1$ ) as shown below in our Model (1):

$$R_{i,t} = \alpha_0 + \alpha_1 \frac{NI_{i,t}}{MV_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

where:

$R_{i,t}$  – 52-week buy-and-hold return ending 3 months after the end of fiscal year  $t$  for firm  $i$ , it incorporates the price change and any relevant dividends for the period;

$NI_{i,t}$  – net income after tax reported for firm  $i$  for fiscal year  $t$ ;

$MV_{i,t-1}$  – market value of firm  $i$  at the beginning of fiscal year  $t$ .

To test the research hypothesis, Model (1) is modified to include the mean forecast of earnings issued by sell-side analysts for firm  $i$  for fiscal year  $t$ . Our Model (2) is shown below:

$$R_{i,t} = \alpha_0 + \alpha_1 \frac{NI_{i,t}}{MV_{i,t-1}} + \alpha_2 \frac{MeanF_{i,t}}{MV_{i,t-1}} + \varepsilon_{i,t} \quad (2)$$

where:

$MeanF_{i,t}$  – arithmetic mean of all broker estimates of earnings issued by sell-side analysts for firm  $i$  for fiscal year  $t$ .

Financial analysts use both public and private information in developing their predictions and hence analysts' forecast reflects both types of information. Barron et al. (1998) point out that the mean analyst estimate primarily reflects public information. Private information is lost in the aggregation process.

Model (2) is designed to capture the joint impact of earnings and earnings forecasts on firms' returns. This is accomplished by specifying that the information contained in a firm's earnings forecast is incremental to the information in reported earnings. Specifically, our hypothesis predicts that the explanatory power of Model (2) will be higher than that of Model (1). We attribute this increase to the new information embedded in an analyst's forecast and its effect on returns via a positive coefficient on  $\alpha_2$ . To test the robustness of the results, we use net income before extraordinary items ( $NIBE_{i,t}$ ) instead of  $NI_{i,t}$ ; and median forecast ( $MedianF_{i,t}$ ) instead of  $MeanF_{i,t}$ .

## 4. Empirical results

The descriptive statistics of the variables used over the sample period are reported in Table 4. All variables are winsorized at the 1st and 99th percentiles.

**Table 4.** Descriptive statistics of the variables

Item	Mean	Median	Standard deviation	Coeff. of variation for the std deviation
$R_{i,t}$	0.1526	0.0845	0.4852	3.1805
$NI_{i,t}/MV_{i,t-1}$	0.0530	0.0700	0.1878	3.5396
$NIBE_{i,t}/MV_{i,t-1}$	0.0508	0.0695	0.1847	3.6339
$MeanF_{i,t}/MV_{i,t-1}$	0.0903	0.0806	0.0704	0.7794
$MedianF_{i,t}/MV_{i,t-1}$	0.0898	0.0800	0.0716	0.7976

Source: own elaboration.

An independent  $t$ -test is used to determine whether the overall means of scaled  $NI_{i,t}$  and  $MeanF_{i,t}$  are equal. The  $p$ -value of 0.0002 indicates that the means are significantly different (at any level). An  $F$ -test reveals significant differences in the variances ( $p$ -value = 0.0000). These results are verified with the Mann-Whitney U-Test ( $p$ -value = 0.003). The difference in distributions suggests that the two variables convey different information. The lower variability of mean forecasts suggests a higher explanatory power. These tests show also that there are no significant differences, however, between the scaled  $NI_{i,t}$  and  $NIBE_{i,t}$ , nor between the  $MeanF_{i,t}$  and  $MedianF_{i,t}$ . The paired results suggest that they convey the same information.

**Table 5.** Cross-correlations of the variables. Pearson's coefficients above the diagonal and Spearman's below

Item	$R_{i,t}$	$NI_{i,t}/MV_{i,t-1}$	$NIBE_{i,t}/MV_{i,t-1}$	$MeanF_{i,t}/MV_{i,t-1}$	$MedianF_{i,t}/MV_{i,t-1}$
$R_{i,t}$	1	0.2982	0.2935	0.5096	0.5121
$NI_{i,t}/MV_{i,t-1}$	0.4124	1	0.9935	0.4422	0.4347
$NIBE_{i,t}/MV_{i,t-1}$	0.4081	0.9872	1	0.4372	0.4295
$MeanF_{i,t}/MV_{i,t-1}$	0.4660	0.6890	0.6785	1	0.9896
$MedianF_{i,t}/MV_{i,t-1}$	0.4636	0.6789	0.6681	0.9891	1

Source: own elaboration.

Table 5 reports Pearson's (above the diagonal) and Spearman's (below the diagonal) correlation coefficients between the variables used. All correlations are statistically significant at the 0.05 level (all the  $p$ -values < 0.05). There is essentially a linear relationship between  $NI_{i,t}/MV_{i,t-1}$  and  $NIBE_{i,t}/MV_{i,t-1}$ , despite the coefficient of correlation. This confirms that both types of income convey the same information. Thus, there is no need to test the robustness of the results with respect to the choice of the main explanatory variable. We find the same relationship with respect to scaled mean ( $MeanF_{i,t}/MV_{i,t-1}$ ) and median ( $MedianF_{i,t}/MV_{i,t-1}$ ) forecasts. While the correlation between both types of scaled income and  $R_{i,t}$  is statistically significant, the power of the relationship is rather weak (the absolute value of Pearson's correlation equals to about 0.3). Simultaneously, Pearson's correlation between  $R_{i,t}$  and forecasts is much stronger (0.51). The correlation between each of these two and the 52-week return suggests respectively low informativeness of earnings. Finally, the Pearson's correlation between incomes and mean/median forecasts is moderate (0.43–0.44). These findings corroborate the notion that income reported and forecasts of income convey different information. The results based on Spearman's coefficients are basically the same, i.e., they show a stronger correlation between  $R_{i,t}$  and forecasts than between  $R_{i,t}$  and reported earnings, and a moderate to strong correlation between incomes and mean/median forecasts.

Table 6 reports the results of our regression equations for Models (1) and (2) for firm  $i$  in year  $t$ . We use robust HAC (heteroscedasticity and autocorrelation consistent) standard errors.

**Table 6.** Regression parameters for models (1) and (2)

Regression results	Model (1) OLS		Model (2) OLS		Model (2) FE	
	Regr. Coef.	<i>p-value</i>	Regr. Coef.	<i>p-value</i>	Regr. Coef.	<i>p-value</i>
Intercept	0.1117	<0.0001	-0.1521	0.0005	-0.2307	<0.0001
$NI_{i,t}/MV_{i,t-1}$	0.7706	<0.0001	0.2341	0.0953	0.0047	0.9730
$MeanF_{i,t}/MV_{i,t-1}$	–	–	3.2363	<0.0001	4.2414	<0.0001
Observations	406		406		406	
F	22.9		39.3		–	
<i>p-value</i> in the overall F-test for regression	0.0000		0.0000		–	
Adjusted R-squared	8.67%		26.26%		42.17%	
AIC	530		444		482	
<i>p-value</i> in the F test (all cross-sectional units have a common intercept)	0.8986		0.0474		–	
<i>p-value</i> in the test of differences between R-squared	–		Model (1) OLS vs. Model (2) OLS 0.0000		Model (1) OLS vs. Model (2) FE 0.0000	

Source: own elaboration.

Table 6 reports the results of the OLS estimation for Models (1) and (2). As expected, there is an increase in explanatory power when including the mean earnings forecasts issued by sell-side analysts, but an econometric issue appears. Basically, we analyze panel data, so the simplest pooled OLS estimator may not be adequate. We perform additional *F*-test for the null hypothesis so that the cross-sectional units all have a common intercept. The *p-value* = 0.8986 in this test for Model (1) reveals that pooled model is correct. Assuming a commonly used level of significance equal to 0.05, the *p-value* = 0.0474 for Model (2) indicates that pooled model is inadequate. Since the *p-value* is very close to the threshold, we tabulate results both for the pooled OLS and the fixed effect (FE) estimation of Model (2). Following the estimation of Model (2), we calculate the Variance Inflation Factors (VIFs) for the regressors. The VIF for each explanatory variable in Model (2) equals 1.243 and indicates a lack of collinearity<sup>4</sup>.

A comparison of Model (1) and Model (2) OLS reveals an incremental informativeness of earnings forecasts. The adjusted *R*-squared increases from 8.67% to 26.26%,

<sup>4</sup> The VIF has a minimum value of 1 when the variable is orthogonal to the other independent variables. A value of VIF greater than 10 is an indicator of a problematic degree of collinearity.

and the coefficient of the mean earnings forecasts ( $MeanF_{i,t}/MV_{i,t-1}$ ) on returns is positive and significant at 3.2363 and  $p$ -value  $< 0.0001$ , respectively. We also test the significance of the difference between both  $R$ -squared. A  $p$ -value of 0.0000 indicates that these coefficients are different across models. Thus, as to Model (1), we can say that reported earnings explain less than 9% of the variability of the 52-week buy-and-hold return in the period ending 3 months after the end of the fiscal year. The explanatory power of Model (2) is much higher than that of Model (1).

A comparison of Model (1) and Model (2) FE shows basically the same results. The adjusted  $R$ -square increases to 42.17%, and the coefficient of the mean earnings forecasts on returns is positive and significant at 4.2414 and  $p$ -value  $< 0.0001$ , respectively<sup>5</sup>. The coefficient of the reported earnings is not significant in Model (2) FE, and is positive yet low and statistically insignificant in Model (2) OLS at 0.05 level of significance ( $p$ -value = 0.0953). These findings suggest that the informativeness of earnings forecasts greatly exceeds the informativeness of reported earnings.

The results of Model (2) FE indicate that a change to scaled earnings reported has no impact on the 52-week return. In other words, the market does not react to earnings reported, probably due to the fact that the information included in earnings was processed and provided earlier via earnings forecasts. Simultaneously, the one percent increase (decrease) of the mean earnings forecast increases (decreases) the 52-week return to about 4.24 percent. The value of the intercept indicates the average level of the 52-week return when the mean forecast of earnings is zero. In Model (2) FE, the intercept is negative and signals poor prospects for the firm. In Model (1), the intercept is positive. Thus, even if the value of earnings reported is zero, positive returns can still be expected. We interpret this as an indication of the poor informativeness of reported earnings, probably due to the fact that they do not capture all of the important information related to future profitability.

Finally, because of a concern related to the appropriate  $R$ -squared with the FE estimation, we apply the Akaike Information Criterion (AIC) to evaluate the explanatory power of the models. The values of the AIC presented in Table 6 indicate that the explanatory power of Model (2) is greater than that of Model (1)<sup>6</sup>, despite the estimation method of Model (2).

We performed robustness tests to investigate whether the results are driven by extraneous factors. A series of analyses were performed using dummy variables. We investigated the impact of firm size, profitability, and the sign of the 52-week returns. In every test, we divided the firms in the sample into two groups, based on size, measured by market value at the beginning of fiscal year (below or above mean/median), the sign

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<sup>5</sup> We use the FE model to estimate the parameters of the model such that our dependent variable is in fact an unmodified dependent variable. In such a case the appropriate  $R$ -squared is calculated on the basis of the correlation between the observed and the theoretical (from the model) values of the dependent variable. Such an  $R$ -squared is sometimes called LSDV  $R$ -squared. We present this value (42.17%) in the last column of table 6.

<sup>6</sup> A smaller AIC value indicates a higher relative quality of a model for a given set of data.

of net income reported (positive/negative), and the sign of 52-week total returns (positive/negative). Untabulated results support the findings reported in Table 6 because the differential slope coefficients are statistically insignificant. However, the level of collinearity in the extended models measured by the VIF increased.

## Conclusions

Reported earnings are considered to be one of the key metrics used in the evaluation of a firm's past performance and they are important to the assessment of its future prospects. Agency theory prompts that the amounts recognized in the financial statements result not only from accounting regulations and policies, but also from discretionary managerial decisions. The quality of accounting disclosures depends heavily on the level of legal enforcement and financial development of a country. The asymmetry of information between managers and investors creates a demand for financial market gatekeepers (experts), such as market analysts, who are capable of exploring the information content of financial disclosures and properly interpreting it. A large body of accounting literature analyzes the role of sell-side analysts and their forecasts. This study considers the line of research that investigates the informativeness of analysts' forecasts. There is very little evidence, anecdotal or empirical, that examines the role of sell-side analysts in moderately developed capital markets. This study provides further evidence of the important role that such analysts play in the WSE in Poland. This study finds that Polish sell-side analysts provide useful information in the form of forecasts to their clients, and that forecast accuracy is not their primary concern.

This study investigated whether earnings forecasts issued by sell-side analysts are incrementally informative about the returns of firms listed at the WSE. We carried out our investigation using a sample of Polish firms covered by sell-side analysts, traded on the WSE over the fiscal years 2008–2016. The informativeness of earnings and earnings forecasts respectively, is defined as the association between earnings (earnings forecasts) and returns, and is used to investigate how earnings forecasts affect the information environment of firms listed.

Our findings indicate that mean earnings forecasts issued by sell-side analysts are incrementally informative about firm returns beyond the earnings reported. This result does not depend on firm size, profitability, or market return. These findings have important implications related specifically to what analysts forecast, the usefulness of their forecasts, and their forecasting behavior in the context of emerging markets. Analysts' forecasts incorporate useful incremental valuation information above and beyond reported earnings and serve to protect the interests of their clients by improving the informativeness of their forecasts. Analysts increase both the quantity and quality of information by building upon periodic financial reports. Their professional acumen and the timing of their forecasts refine the quality of information such that investors and creditors can make more informed investment and credit decisions. Our findings

also corroborate the conclusion of Dobija and Klimczak (2010) related to the impact of developments in market regulations on value relevance. The findings suggest a complementarity of the analyst industry and financial reporting, and finally, they corroborate the high level of development of the analyst industry and capital market in Poland.

The practical implications of our paper are twofold. First, accounting standard setters and legal regulators in Poland should put more effort into increasing the informativeness of financial reporting in general, and specifically, the reported earnings. The question of whether any improvement in this area is feasible remains open. Previous research suggests that an improvement may be achieved due to control over reporting incentives and the functional enforcement regime. Second, we signal to investors that they should rely more on earnings forecasts, rather than “raw” earnings reported.

Some limitations of our study provide an opportunity for future research. First, our sample contains only 68 firms, out of 435 listed on average per year, and it covers the period 2008–2016. Thus, there is a somewhat narrow analyst coverage. Second, the sample only considers firms listed on the WSE. Firms from other CEE, i.e., post-communist, emerging capital markets are omitted. Therefore, future research can also explicitly consider whether the level of financial development and other legal enforcement mechanisms influence the informativeness of reported earnings and sell-side analysts’ forecasts.

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