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SEASONALITY OF EARNINGS FORECAST ERRORS IN THE CASE OF POLISH PUBLIC COMPANIES

Abstract: The earnings forecasts are carefully watched by stock market participants. Analysts, when making those forecasts, exploit a wide range of information. Other approach to earnings forecasting is based solely on corporate historical results and the predictions are made in the mechanical way. However, the empirical evidence points out to low accuracy of earnings forecasts and high seasonality of forecast errors. This stems from the culmination of the assets and liabilities' revaluations at the end of the fiscal year, which results in the increased share of subjectivity in the results reported for the fourth quarter. The paper presents the research on seasonality of the quarterly operating profit forecast errors in the case of Polish public companies. The analysis, conducted for 648 operating profit forecasts in the period between the beginning of 2005 and the end of 2008, showed that the average absolute forecast errors have the highest values in four quarter predictions.

Key words: earnings forecasts, analysts forecasts, mechanical forecasts, forecast accuracy.

1. Introduction

The forecasts of public companies' financial results constitute an essential element of most valuations of those companies (and the process of identification of undervalued/overvalued stocks). Also, beating or missing the financial forecasts constitutes a significant criterion for management quality evaluation and the assessment of corporate growth prospects. In practice, there are two alternative approaches to forecasting corporate financial results. Analysts, when making forecasts, usually exploit a wide range of available information concerning the company under investigation (e.g. planned marketing activities, sales breakdown, employment, fixed-assets investment, etc.) as well as its economic environment (e.g. business climate, competitors' behaviour, customer' preferences, exchange rates, etc.). The second approach is based solely on corporate historical financial results and the predictions are made with the use of mechanical methods (mostly autoregressive). Despite the use of wide range of information the quality of analysts' forecasts is controversial and the research on analysts' forecasts relative accuracy is not unequivocal. Some research, conducted for the companies listed on American stock exchanges, points to the superiority (as regards accuracy) of analysts' forecasts over mechanical (obtained from

simple time-series methods) predictions [White, Sondhi, Fried 2003, pp. 720-721; Chatfield, Moyer, Sisneros 1989], but other research indicates a higher accuracy of simple (in some cases even naïve) forecasting methods in comparison with analysts' predictions [Dreman 1998, pp. 89-136; Malkiel 2007, p. 153]. Other research points to the analysts' superiority in forecasting with one-quarter ahead to two-quarter ahead horizon, comparable accuracy in forecasting with three-quarter horizon and the superiority of mechanical methods in the case of predictions with longer horizons [O'Brien 1988; Rothovius 2008]. Some research states that in the case of companies with negative earnings the analysts' predictions often turn out to be even less accurate than naïve forecasts [Ciccone 2002]. It means that in the periods characterized by significant deterioration (improvement) of corporate financial results and rising (declining) share of companies with losses, the relative accuracy of mechanical forecasts increases (decreases).

Leaving the relative forecast accuracy aside, the empirical research generally points out to high seasonality of corporate earnings forecast errors. The seasonality is discernible mainly in relatively high errors of predictions made for the fourth quarter of the year. This stems from the culmination of the assets and liabilities' revaluations at the end of the fiscal year (before the financial statements' audit), which results in the increased share of subjectivity in the results reported for the fourth quarter [Nissim]. The research indicates that the forecast errors' seasonality is a feature of analysts' as well as mechanical predictions [Brown, Hagerman, Griffin 1987].

The main cause of relatively low predictability of corporate fourth-quarter financial results is making most subjective accounting estimates by the companies at the end of fiscal year. These estimates include among others: inventory write-downs, allowances for doubtful receivable accounts, inventory and fixed-assets physical counts, testing for fixed and intangible assets' impairment and updating the value of provisions for liabilities. All those estimates require substantial dose of subjectivity (with a lot of leeway provided by most accounting standards), what significantly decreases the predictability of financial results in those periods.

The paper presents the research on seasonality of the quarterly operating profit forecast errors in the case of Polish public companies. The errors of analysts' forecasts as well as the forecasts obtained from simple autoregressive model were analyzed.

2. The methodology

The analysis was conducted for the forecasts of quarterly operating profit (with one-quarter ahead horizon) published by four brokerage houses in the period between the beginning of 2005 and the end of 2008. The original sample embraced over 1000 operating profit forecasts, made for several dozens of companies listed on the Warsaw Stock Exchange. However, due to limited data availability and the necessity of estimating autoregressive models (as benchmarks for the analysts' forecasts) the final

sample consisted of 648 forecasts (accounting for all the analysts' predictions for which we were able to obtain the alternative autoregressive forecasts).

Table 1 presents the number of forecasts from each quarter of 2005-2008 period included in the research. The data in the table show that none of the quarters under investigation could dominate the research findings (the share of forecasts from any single quarter does not exceed 15% of the total number of forecasts under research).

Table 1. The number of operating profit forecasts for each quarter of 2005-2008 period included in the research

Period	The number of forecasts	The share in general number of forecasts [%]
1 st quarter 2005	23	3.5
2 nd quarter 2005	31	4.8
3 rd quarter 2005	30	4.6
4 th quarter 2005	71	11.0
1 st quarter 2006	57	8.8
2 nd quarter 2006	63	9.7
3 rd quarter 2006	35	5.4
4 th quarter 2006	63	9.7
1 st quarter 2007	46	7.1
2 nd quarter 2007	45	6.9
3 rd quarter 2007	45	6.9
4 th quarter 2007	21	3.2
1 st quarter 2008	22	3.4
2 nd quarter 2008	21	3.2
3 rd quarter 2008	39	6.0
4 th quarter 2008	36	5.6
Total	648	100.0

Source: BRE Bank Investment House, Millennium Brokerage House, PKO Brokerage House, BZ WBK Brokerage House; author's calculations.

Table 2 presents the share of forecasts provided for individual companies embraced by the research in total number of analyzed forecasts. The data in the table show that none of the companies could dominate the research findings (the share of forecasts for any single company does not exceed 5% of the total number of forecasts under research).

As a benchmark for the analysts' forecasts in the case of all the companies and all the periods we used the simple first-order autoregression with additional seasonality, estimated on the basis of the sample embracing the last twelve quarters. Also, several different versions of autoregressive models (including models based on longer samples, models with outlier dummy variables and models with dummy struc-

tural-change variables) were tested, but all of them were characterized by relatively high forecast errors. In the autoregressive model used in the analysis three dummy seasonal variables having the value of 1 in the case of a given quarter and the value of 0 in the case of remaining quarters were included.

Table 2. The number of operating profit forecasts for the individual companies included in the research

Company	The share in general number of forecasts [%]
PKN Orlen SA	4.9
Agora SA	4.6
Asseco Poland SA	4.6
KGHM SA	4.3
Netia SA	4.3
Comarch SA	3.8
Prokom SA	3.8
Telekomunikacja Polska SA	3.8
Modni Świecie SA	3.4
Sygnity SA	3.2
Polimex Mostostal-Siedlce SA	3.0
Kety SA	2.9
Farmacol SA	2.6
PGF SA	2.6
Kogeneracja SA	2.1
ABG Ster-Projekt SA	2.0
Budimex SA	2.0
Others (58 companies)	42.2
Total	100.0

Source: BRE Bank Investment House, Millennium Brokerage House, PKO Brokerage House, BZ WBK Brokerage House; author's calculations.

Hence our autoregressive model took the following form:

$$QOP_t = \alpha_0 + \alpha_1 QOP_{t-1} + \sum_{i=1}^3 \alpha_i \text{QuarterlyDummy}_i + \varepsilon_t,$$

where: QOP_t – quarterly operating profit in quarter t (in millions of PLN), QuarterlyDummy_i – three seasonal dummy variables having value of 1 in the given quarter and value of 0 in the remaining quarters, α_0 , α_1 , α_i – regression' coefficients, ε_t – random factor.

On the basis of the estimated autoregressions the autoregressive forecasts were made, that constituted the alternative for the analysts' forecasts. Then the forecast errors were computed for all the analyzed predictions (i.e. the analysts' forecasts and the forecasts obtained from the estimated autoregressive models). The forecast errors were computed as follows:

$$FE = \left(\frac{F_t - A_t}{A_t} - 1 \right) \times 100,$$

where: FE – percentage forecast error, F_t – the forecast for t period, A_t – the actual value of forecasted variable in t period.

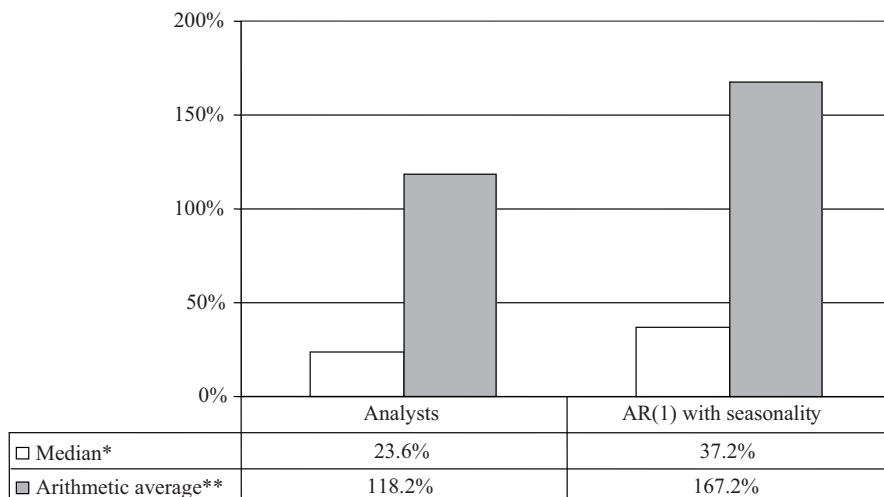
Next, absolute values of all the forecast errors were computed and average absolute errors obtained for the first, second, third, and fourth quarters were compared.

3. The results

Figure 1 presents the medians and arithmetic averages of quarterly operating profits' absolute forecast errors computed for forecasts made by analysts (coming from four brokerage houses) as well as forecasts obtained from autoregressive models. The figure shows the significant superiority (as regards average errors) of analysts' forecasts over analyzed mechanical predictions. Although the median of analysts' forecasts absolute errors amounts to 23.6% (which seems to indicate a low analysts' ability to forecast quarterly earnings), this is a much better result than in the case of the autoregressive model under investigation. It confirms high unpredictability of corporate quarterly operating profits, particularly given the fact that this research relates only to forecasts with short horizon. It should be noticed that both in the case of analysts' forecasts as well as forecasts generated by the analyzed autoregressive model the arithmetic average forecast error significantly exceed the median forecast error. It stems from the high influence of the outliers, characterized by above-average forecast errors.

The figures below present medians and arithmetic averages of absolute forecast errors computed for different quarters. These data confirm the findings of previous research indicating high seasonality of forecast errors in the case of corporate quarterly financial results. Generally, the lowest average absolute errors (as measured by median as well as arithmetic average) are obtained for predictions made for the second and third quarters, both in the case of analysts and mechanical forecasts. The highest absolute errors are obtained in the case of forecasts made for the fourth quarter.

In the case of analysts' forecasts the median errors for the first, second and third quarter differ only slightly (are in the range between 19.6 and 22.4%), but the median error for the last quarter is much higher (30%). A similar situation occurs in the case of the predictions generated by the autoregressive model, however, the median errors for the first, second and third quarter are more differentiated (median errors for these quarters are in the range between 29.6 and 36.7%).



* Median of absolute errors of quarterly operating profit forecasts, ** arithmetic average of absolute errors of quarterly operating profit forecasts.

Figure 1. Median and arithmetic average of absolute errors of quarterly operating profit forecasts in the period between 1st quarter 2005 and 4th quarter 2008

Source: BRE Bank Investment House, Millennium Brokerage House, PKO Brokerage House, BZ WBK Brokerage House; author’s calculations.

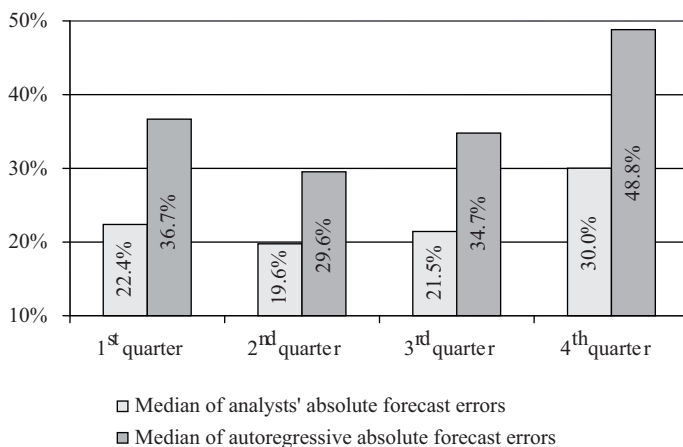


Figure 2. Median absolute errors of quarterly operating profit forecasts computed for different quarters in the period between 1st quarter 2005 and 4th quarter 2008

Source: BRE Bank Investment House, Millennium Brokerage House, PKO Brokerage House, BZ WBK Brokerage House; author’s calculations.

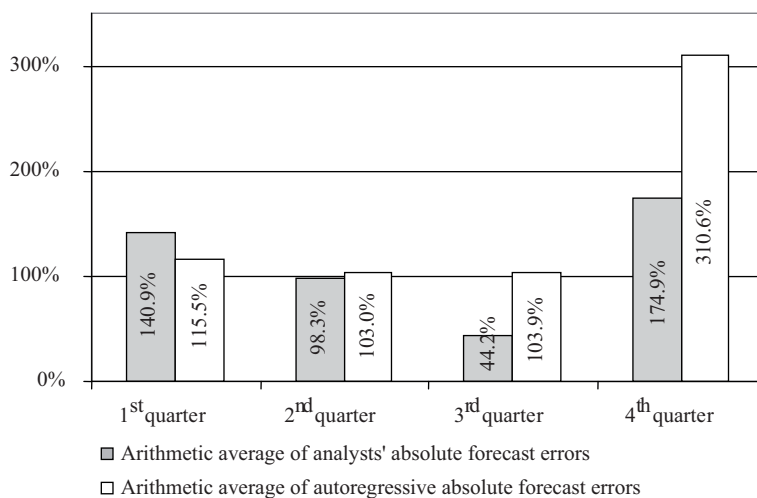


Figure 3. Arithmetic average of absolute errors of quarterly operating profit forecasts computed for different quarters in the period between 1st quarter 2005 and 4th quarter 2008

Source: BRE Bank Investment House, Millennium Brokerage House, PKO Brokerage House, BZ WBK Brokerage House; author's calculations.

The conducted research confirmed the generally limited predictability of quarterly financial results of public companies. The accuracy of earnings forecasts is particularly low in the case of predictions made for the fourth quarter's results. These findings can be important for stock market investors, as exceeding or missing earnings forecasts can have a significant impact on stock prices. The empirical evidence states that so-called growth stocks (i.e. stocks with above-average pace of revenues and earnings growth) exhibit an asymmetric response to earnings surprises. D.J. Skinner and R.G. Sloan show that while growth stocks are at least as likely to announce negative earnings surprises (i.e. missing earnings targets) as positive earnings surprises (i.e. exceeding earnings targets), they exhibit an asymmetrically large negative price response to negative earnings surprises [Skinner, Sloan 2002]. The other research corroborates these findings, stating that negative earnings surprises cause large and disproportionate negative stock price responses and positive earnings surprises bring about only moderate increase in stock price [Xin 2007]. However, given the high seasonality of earnings forecast errors it seems reasonable to treat quarterly earnings surprises differently in different quarters. For example, the negative earnings surprise caused by missing earnings target by 25% has different meaning when occurring in the second quarter than in the fourth quarter. The negative surprise of this scope should be treated as more significant earnings' deterioration signal in the second quarter (in which median analysts' forecast error amounts to about 20%) than in the fourth quarter (in which the median analysts' forecast error

equals 30%). Hence the earnings surprises of the same scope can entail different stock price responses in different quarters of a fiscal year.

The awareness of deep seasonality of earnings forecast errors is also important for analysts and researchers, because many of them use different measures of corporate earnings predictability in assessment of companies' investment risk. The empirical research found that relatively high forecast dispersion and relatively high forecast inaccuracy is associated with a higher cost of equity [Witmer 2008]. Hence the higher the forecast errors are the higher the cost of equity and the lower the fair-value of a given stock. However, given deep seasonality of earnings forecast errors it is important to ensure, when comparing predictability of individual companies' earnings (and inferring on this basis about those companies' relative investment risk), that all the analyzed companies earnings forecast errors are comparable (i.e. allow for embedded seasonality of those errors).

4. Conclusions

The paper presented the research on the scope of seasonality of earnings forecast errors in the case of quarterly operating profit predictions for the companies listed on the Warsaw Stock Exchange. The analysis was conducted for 648 operating profit forecasts, published by four brokerage houses, in the period between the beginning of 2005 and the end of 2008. The research showed that both in the case of analysts' forecasts as well as mechanical (autoregressive in this case) predictions the average (measured by mean and arithmetic average) absolute forecast errors have the highest values in four quarter predictions. These findings are consistent with other research in this field. The stated deep seasonality of earnings forecast errors is important for investors, analysts and researchers using quarterly earnings forecasts in making investment decisions and in making stock recommendations.

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SEZONOWOŚĆ BŁĘDÓW PROGNOZ WYNIKÓW FINANSOWYCH POLSKICH SPÓŁEK GIEŁDOWYCH

Streszczenie: prognozy zysków są wnikliwie śledzone przez uczestników rynku kapitałowego. Do sporządzania tych prognoz analitycy wykorzystują duży zakres informacji. Odmiennym podejściem do prognozowania zysków jest opieranie predykcji jedynie na historycznych wynikach finansowych spółek, wykorzystując w prognozowaniu metody mechaniczne. Badania empiryczne wskazują jednak na małą dokładność prognoz zysków oraz wysoką sezonowość błędów prognoz. Wynika to z kulminacji aktualizacji wyceny aktywów i pasywów na koniec roku obrotowego, co skutkuje dużym udziałem subiektywności w wynikach finansowych raportowanych za czwarty kwartał. Artykuł przedstawia badanie sezonowości błędów prognoz kwartalnych zysków operacyjnych polskich spółek publicznych. Analizę przeprowadzono dla 648 prognoz zysku operacyjnego w okresie od początku 2005 r. do końca 2008 r. Badanie wykazało, że przeciętne absolutne błędy prognoz są największe w przypadku prognoz sporządzanych na czwarty kwartał.