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The Effect of Earnings Persistence, Predictability, Smoothness and Stability on the Returns-Earnings Relationship : Evidence from Warsaw Stock Exchange

Zarządzanie. Teoria i Praktyka nr 1 (15), 17-23

2016

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Zarządzanie. Teoria i Praktyka 15 (1) 2016
ISSN 2081-1586
e-ISSN 2449-9730
str. 17-23

THE EFFECT OF EARNINGS PERSISTENCE, PREDICTABILITY, SMOOTHNESS AND STABILITY ON THE RETURNS-EARNINGS RELATIONSHIP: EVIDENCE FROM WARSAW STOCK EXCHANGE / WPŁYW STABILNOŚCI I PREDYKCYJNOŚCI ZYSKU KSIĘGOWEGO NA JEGO UŻYTECZNOŚĆ DLA PROGNOZOWANIA STOPY ZWROTU Z AKCJI NA PRZYKŁADZIE GIEŁDY PAPIERÓW WARTOŚCIOWYCH W WARSZAWIE

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Abstract
This paper examines whether and how earnings quality affects the role of earnings in a firm's valuation. It is basically focuses on the returns-earnings relationship taking into consideration four earnings attributes including persistence, predictability, smoothness and stability. For a large sample of Polish non-financial firms over the period 2009–2016, the study showed that earnings quality has a weak, but positive, influence on earnings response coefficient.
JEL Classification: G11, G17

Key words: earnings quality; earnings per share; stock market return; persistence; predictability; smoothness; stability.

1. Introduction

Earnings (or more precisely, accounting net income) represents the "bottom-line" accounting measure of firm performance. A firm's earnings number is an accrual accounting measure of the firm's profit or loss from business activities and events during a quarter or annual period. A firm's earnings number represents an accounting measure of the change in the value of the firm to common equity shareholders during a period (apart from the effects of direct transactions with shareholders, such as paying dividends or issuing shares) (Nichols, Wahlen, 2004:1).

Security analysts, firm managers, and investors all devote a great deal of attention to firms' reported earnings. Forecasts of earnings are widely disseminated in the financial press, and revisions in analysts' forecasts are closely followed. Managers are keenly interested in maintaining growth in earnings because their compensations are often tied to their firms' profits. News that a firm has fallen short of earnings expectations can immediately send its stock price plummeting; firms that beat expectations, on the other hand, are handsomely rewarded by investors. The focus on earnings is so intense that it has been suggested that the market fixates on firms' bottom line

income, to the exclusion of other indicators of operating performance (Chan et al., 2006: 1041).

The theory linking the firm's earnings numbers to changes in the firm's market value (i.e., stock returns) depends on three assumptions about the information contained in earnings and share prices. First, the theory assumes that earnings (or more broadly, financial reporting) provides information to equity shareholders about current and expected future profitability. Second, the theory assumes that current and expected future profitability provides shareholders with information about the firm's current and expected future dividends. Third, the theory assumes share price equals the present value of expected future dividends to the shareholder. These links imply that new accounting earnings information that triggers a change in investors' expectations for future dividends should correspond with a change in the market value of the firm. To test these theories with empirical data, researchers examine the associations between accounting earnings numbers and share prices (Nichols, Wahlen, 2004: 3).

Nevertheless, *these observations are not fully supported by research-based evidence.* For examples, Ball and Brown (1968) provided evidence of a positive relationship between stock returns and earnings. They simply assume that unexpectedly high (low) earnings will lead to an increase (decrease) in stock prices. In more recent study, Lev (1989) reviewed market-based research on the information content of accounting earnings and found that changes in earnings interpret changes in stock returns only by 10-15%. Moreover, the nature (parameters) of the returns/earnings relation exhibits considerable instability over time. These findings suggest that the explanatory power of earnings for share returns is extremely low and as a consequence the usefulness of quarterly and annual earnings to investors is very limited.

Multiple studies *using different approaches try* to understand the reasons behind the weak returns-earnings relationship. Some of these studies focus on misspecifications in the return /earnings model or the existence of investor irrationality as factors that may contribute to the observed weak association between earnings and stock returns. Others suggest that the weak returns-earnings relationship is contributed by lack of earnings reliability due management's earnings manipulation (i.e. earnings management). This approach takes into account that reported net income is the result of an extended accounting process with considerable room for managerial discretion at every step. Given the heightened attention to accounting income, managers have an incentive to be aggressive in applying accounting rules so as not to disappoint investors and analysts(Chan et al., 2006: 1042). The Securities and Exchange Commission (SEC) describes a lot of cases in which managers have used accounting tricks to manage their firms' profits. Examples of high-profile firms that have inflated earnings for extended periods include Enron, WorldCom, Xerox *and, as a more recent example, Lehman Brothers Bank.* As a result, there have been growing concerns about firms' "quality of earnings," or the extent to which reported earnings reflect operating fundamentals. In the context of stock prices, to the extent that the market fixates on reported income and does not take into account the quality of firms' earnings, there may be temporary deviations of prices away from their correct values. Put another way, measures of earnings quality may have predictive power for future movements in stock prices (Chan et al., 2006:1042).Therefore, the goal of this research is to examine the returns-earnings relationship taking into consideration the quality of earnings for a sample of non-financial Polish companies listed on Warsaw Stock Exchange over the period (2009–2016).

2. Earnings quality - definition and measures

Earnings quality is a key characteristic of financial reporting. It embodies the principle that financial reports should be as useful as possible to investors and other capital providers in making their resource allocation decisions. High-quality financial reports should improve decision making and, thus, capital market efficiency (Perotti, Wagenhofer, 2014: 548).

Earnings quality is used in numerous empirical studies to show trends over time; to evaluate changes in financial accounting standards and in other institutions, such as enforcement and corporate governance; to compare financial reporting systems in different countries; and to study the effect of earnings quality on the cost of capital (Ewert, Wagenhofer, 2015).

Despite widespread use of the term "earnings quality" in both the academic and practitioner communities, there is no consensus on its definition and meaning, as well as there is no single measure of this concept.

High-quality earnings have been defined/measured in the literature as those that (Dechov et al., 2013):

- are persistent and hence the best predictor of future long-run sustainable earnings, e.g., Penman

and Zhang (2002), Dechow and Schrand (2004) and Melumad and Nissim (2009).

- are smooth, e.g., Francis et al. (2004) and Dechow and Schrand (2004);
- predict future earnings better, e.g., Schipper and Vincent (2003);
- do not have special or non-recurring items, e.g., Dechow and Schrand (2004), McVay (2006);
- are derived under conservative accounting rules or the conservative application of relevant rules (Watts 2003a, 2003b);
- are backed by past, present, or future cash flows, e.g., Sloan (1996), Dechow and Dichev (2002);
- have smaller changes in total accruals that are not linked to fundamentals, e.g., DeAngelo (1986), Jones (1991), Dechow et al. (1995), Kothari et al. (2005).

Earnings quality can be measured based on a variety of factors. These factors are referred to as earnings attributes and can be categorized into accounting-based attributes and market-based attributes. Accounting-based measures only use accounting earnings and components thereof, whereas market-based measures are based on accounting earnings and market returns. If we consider the attributes investigated by Francis et al. (2004), then accrual quality, persistence, predictability, and smoothness can be labelled as accounting-based attributes, whereas value relevance and timeliness are market-based earnings attributes.

To measure persistence, researchers generally estimate a regression of the future value of the variable on its current value (Dechow & Schrand, 2004). Kormendi and Lipe (1987) used firm-level regressions of current earnings on previous year's earnings to estimate the slope-coefficient estimates of earnings persistence. This study employs the measure in Kormendi and Lipe to test earnings persistence using the following equation:

$$NIBE_{i,t} = \alpha + \beta NIBE_{i,t-1} + \varepsilon_{i,t}$$

where:

NIBE (net income before extraordinary items) for company i and year t is scaled by total assets at the beginning of period t.

The measure capturing earnings persistence is based on the slope-coefficient estimate (β). Values of β close to 1 (or greater than 1) indicate highly persistent earnings whereas values close to zero imply highly transitory earnings. Persistent earnings are viewed as higher quality, whereas transitory earnings are viewed as lower quality.

Similar to persistence, predictability is viewed as a desirable attribute of earnings because it increases the precision of earnings forecasts. Earnings predictability deals with how well past earnings can explain current and future earnings. The time series of earnings is affected by the volatility of operations, the economic environment and the accounting systems employed. Therefore the measure capturing earnings predictability is based on the R^2 of earnings persistence regression. Values of R^2 close to one indicate highly predictable earnings.

Arguments that smoothness is a desirable earnings attribute derive from the view that managers use their private information about future income to smooth out transitory fluctuations and thereby achieve a more representative, hence more useful, reported earnings number (Francis et al. 2004: 972). In measuring smoothness, Leuz et al. (2003) used cash flow from operations as a reference construct for unsmoothed earnings and measure smoothness as the ratio of earnings variability (i.e., smoothed) to cash flow from operations variability (i.e., unsmoothed). Bowen et al. (2003) measured earnings smoothness as the standard deviation of cash flow from operations divided by the standard deviation of earnings. Francis et al. (2004) measured earnings smoothness as the ratio of standard deviation of net income before extraordinary items as proposed by Bowen et al. but standardized them by lagged total assets. This study employs the approach used by Franicis et al. (2004) according to the following equation:

$$\sigma(NIBE_{i,t}) / \sigma(CFO_{i,t})$$

where:

NIBE and CFO are scaled by total assets at the beginning of period t.

Greater values of EQ3 indicate lower smoothness.

To measure stability of earnings, the study *follows* the procedure described by Alaa'A and Al-Debi'e (2015). The stability of earnings is measured by subtracting the mean of net income for the company *i* over the 10 years from net income for company *i* in year *t*, then divide by the standard deviation of net income for the company over the 10 years.

$$Z_{it} = (X_{it} - \mu) / \sigma$$

All these EQ measures are estimated for each firm and year for rolling 10-year periods *t*–9 to *t*.

3. The effect of earnings quality on the returns-earnings relationship: empirical evidence

3.1 SAMPLE DESCRIPTION

The sample consists of Polish non-financial firms drawn from NOTORIA over a 7-year period from 2009 to 2016. To analyze earnings quality measures over this period the study requires financial statements data from 1999 to 2016 because all the earnings quality measures are computed over a 10-year rolling estimation period. To avoid excluding too many firms, the study does not require data availability for each firm over the full 17-year period. As a consequence, the composition of firms in the yearly samples varies. Total number of observations, after excluding the missing data is 905. However, after excluding the outliers the total sample includes 812 firm–year observations. Outliers were excluded based on the 1st and 99th percentile. Table 1 gives descriptive statistics of the main variables used to calculate the EQ measures over the 7 years.

Table 1. Descriptive statistics of main variables

	Stability EQ4	*Smoothness EQ3*	*Predictability EQ2*	*Persistence EQ1*	*Market Stock Return Variable* RET_{it}	*Deflated EPS Variable* X_{it}/P_0
Panel A						
Mean	0,281	1,288	0,176	0,257	0,172	-0,052
Median	0,327	0,983	0,106	0,254	0,022	0,046
Min	-8,667	0,118	0,000	-0,538	-0,812	-9,251
Max	7,146	7,786	0,770	1,172	8,778	1,376
Std. Dev.	1,625	1,177	0,182	0,323	0,776	0,609
No. of observations	812	812	812	812	812	812
Panel B						
Mean	0,271	1,822	0,179	0,269	0,794	-0,351
Median	0,293	0,991	0,105	0,250	0,018	0,045
Min	-47,292	0,090	0,000	-4,985	-0,930	-105,558
Max	134,457	349,182	0,945	8,002	170,250	4,630
1st Percentile	-12,533	0,118	0,000	-0,538	-0,812	-9,251
99th Percentile	7,146	9,055	0,767	1,172	9,208	1,514
Std. Dev.	5,773	11,682	0,192	0,564	7,777	4,301
No. of observations	905	905	905	905	905	905

Source: Own elaboration.

According to Table 1, the mean and median of RET have positive values. *EPS* Variable has a mean of (-0,052), a median of 0.046 and a Std. Dev. of 0,609. This means that EPS deviates from an average of (-0,052) by 0,609 to both sides. On the other hand, the mean of market stock returns is 0,172. Stock returns deviate from the average by a standard deviation of 0,776 to both sides. Stock returns data have a median of 0,022.

Turning to the four accounting-based earnings attribute measures, Persistence has a mean (median) value of 0,254 (0,253); as a benchmark, the average implied EQl parameter reported by Perotti and Wagenhofer (2014) for, on average, 1 370 firms with a series of data over 1978–2008 is 0,36. Predictability has a mean (median) value of 0,176 (0,106) and a standard deviation of 0,182. In comparison, Perotti and Wagenhofer (2014) report a mean predictability measure of 0,239. Smoothness, which captures the variability of income relative to the variability of cash flows, has a mean (median) value of 1,288 (0,983). In comparison, Leuz et al. (2003) report a mean smoothness measure of 0,765 (for all U.S. firm-year observations, 1990-1999), and Perotti and Wagenhofer (2014) report descriptive data implying a mean ratio of income volatility to cash volatility of 0,709. Finally, Stability, has mean (median) value of 0,281 (0,327). The mean value for the sample is higher in magnitude than the values reported by Alaa' A and Al-Debi'e1(2015) who report 0,049.

Table 2 shows the Pearson correlations between the four EQ measures. With one exception, the correlations are significant, although most of them are economically small. There are few measures which are negatively associated with other measures. High correlations arise only between pairs of measures within the same set, particularly, +0,72805 for smoothness and predictability. The generally low correlation suggests that the various measures capture different attributes or economic concepts.

Table 2. Cross-correlations of earnings quality measures

	EQ4	EQ3	EQ2
EQ3	- 0,08463		
EQ2	*0,0317*	- 0,23561	
EQ1	*0,0137*	- 0,22351	0,72805

Notes:

This table reports Pearson correlation coefficients between the four earnings quality measures. Most correlations are statistically significant at the 5% level; non-significant correlations are shown in italics.

Source: Own elaboration.

3.2 METHODOLOGY AND RESULTS

To evaluate the earnings quality effect on the returns-earnings relationship, the following (OLS) is used in this study:

$$RETit = \alpha_0 + \alpha_1 \Delta Xit / P0 + \varepsilon$$

Where:

$RETit$ = the market stock return for company i in year t,

$\alpha 0$, $\alpha 1$ = the model's coefficients,

ΔXit = the EPS (Earnings per share) change for company i in year t,

$P0$ = the company stock price at the beginning of the window,

ε = error term in the regression model.

Fundamentally, the model requires two main variables; earnings per share deflated by stock price (independent variable) and market stock returns (dependent variable). E*arnings per share* (EPS) for year t *is* measured according to the following formula:

$$Xit = (EPS_{it} / Pi_{t-1})$$

Where:

EPS_{it} = the annual earnings per share for company i in year t. It is calculated through dividing the earnings available for the common stockholders for year t by the weighted average number of common shares outstanding for the same year,

Pi_{t-1} = the company's stock price at the beginning of the window.

Market stock returns ($RETit$) is calculated by measuring the monthly stock return ($R_{i\tau}$) for company i in month τ according to the *following* equation:

$$R_{i\tau} = (P_{i\tau} - P_{i\tau-1}) / P_{i\tau-1}$$

Where:

$Pi\tau$ = the monthly closing stock price for company i in month τ,

$Pi\tau-1$ = the monthly closing stock price for company i in month $\tau-1$.

and then by cumulating the monthly stock return over a 12 month period in order to calculate the annual stock return. This method was used by Al-Debi'e and Abu Nassar (2015).

$$RET_{it} = \prod_{\tau=1}^{12} (1 + R_{i\tau}) - 1$$

Where:

RET_{it} = the annual stock return for company i (Monthly cumulative returns for 12 months) for year t,

Π = the product of 12 months of stock returns,

$R_{i\tau}$ = monthly stock return for company i and month τ,

RET denotes the 12-month return ending 4 months after the end of the fiscal year (the window starts in May for year t and ends in April for year t+1).

To examine the earnings quality effect on the earnings-returns relationship the ordinary least-squares regression (OLS) was conducted for eight samples. The samples were selected by sorting relevant data according to the four EQ measures into two groups:

- top 40% of all observations with the highest EQ score.
- worst 40% of all observations with the lowest EQ score.

The residual 20% of observations was eliminated from the study as it represents the moderate results for each EQ indicator.

In this study, the earnings quality measures were measured as common in the literature. However, smoothness and stability can be interpreted in various ways – one view is that higher smoothness and stability indicate earnings management and thus low earnings quality, while the other view is that they provide useful information. Therefore, this study adopted the assumption that higher value of EQ measure is associated with higher (true) earnings quality.

The study uses (OLS) for the purpose of finding out whether high-quality earnings companies have stronger returns-earnings relationship than low-quality earnings companies. This relationship is depicted by the adjusted R^2 and earnings response coefficient (ERC) *of* the above regression.

Table 3. presents the main results. For all companies the highest value of Adjusted-R^2 among top 40% groups is scored by the EQ4 indicator for a value of 0,15. The lowest value of Adjusted-R^2 among top 40% groups is scored by the earnings predictability indicator for a value of

-0,003. Results for all data reveal that the returns-earnings relationship for top 40% group is stronger than the relationship for worst 40% group for all indicators except for the earnings predictability. Despite the fact that evidence in firm-regressions is not significant for all firms—suggesting that there is no statistical significance in the earnings-return relationship in a short time-series period—for the main part of sample, the most puzzling fact is that some firms, with significant regressions, present a negative coefficient, indicating a negative relationship between the variables. The mean slope α_1 for the top40% samples of EQ1, EQ2 and EQ4 indicators is positive as expected; however, for the top 40% sample of EQ3 indicator and all worst40% samples the mean slope α_1 is negative and significant. This is an intriguing finding because it means that, in general, an increase in accounting earnings negatively affects stock market returns.

Table 3. Results of the returns-earnings relationship

	Benchmark	EQ1		EQ2		EQ3		EQ4	
		Top 40%	Worst 40%	Top 40%	Worst 40%	Top 40%	Worst 40%	Top 40%	Worst 40%
Mean of RET	0,172	0,10	0,216	0,12	0,19	0,13	0,195	0,21	0,12
Median of RET		0,002	0,0171	0,0132	0,032	0,009	0,046	0,09	-0,07
α_0	0,167 p=0,000	0,114 p=0,000	0,183 p=0,00	0,122 p=0,000	0,180 p=0,000	0,131 p=0,000	0,187 p=0,000	0,0001 p=0.99	0,0743 p=0,179
α_1	-0,098 p=0,028	0,073 p=0,09	-0,402 p=0,00	0,056 p=0,236	-0,213 p=0,013	-0,011 p=0,90	-0,169 p=0,026	1,757 p=0,000	-0,175 p=0,003
Adjusted-$R2$	0,005	0,006	0,073	0,001	0,016	-0,003	0,012	0,152	0,023
No. of observations	812	325	325	325	325	325	325	325	325

Source: Own elaboration.

4. Summary and conclusions

There is a wide theoretical literature relating earnings to enterprise value and suggesting that accounting earnings play an important role in valuation process. However, there are many empirical evidences (e.g. Ball and Shivakumar, 2008) showing that earnings announcements are unlikely to be a major source of timely new information. In order to bring to light some evidence regarding the interaction between earnings and stock returns, and especially to examine the determinants enhancing predictive ability of this relationship, the general objective of this study was to examine the effect of earnings quality (measured using four earnings attributes) on the returns-earnings relationship. The results of the study showed that *there is a positive, but weak, correlation* between earnings quality and stock return. The most effective in enhancing the returns-earnings relationship was the stability of earnings indicator. Therefore, stock market participants should avoid investing in shares of companies with fixation on the bottom line number of the Income Statement. Similar to all empirical academic studies, there are some limitations in the analysis and results of this study. Firstly, the conclusions are limited to the sample. However, since the study uses the complete sample available, it is slightly possible to suggest that these findings might reflect a general really in Poland. The second limitation is regarding the measurement of economic observations by using proxies: biased proxies can completely invalidate a study. In order to deal with this challenge different proxies were used in this study and all the proxies were validated by international studies.

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