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FAIR VALUE HIERARCHY AND EARNINGS VOLATILITY

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Abstract

International Financial Reporting Standard 13 establishes a fair value hierarchy that categorizes sources of information used to measure fair value into three levels. The aim of this paper is to investigate the relation between the use of Level 2 and Level 3 fair value inputs (i.e. mark-to-model) and earnings volatility. The main assumption is that Level 2 and Level 3 inputs are more subjective, contain more measurement errors and allow managers to use their earnings management practices more often in comparison to Level 1 inputs. This estimation error in the measurement of assets and liabilities can be a source of additional financial statement volatility. Accordingly, when assets and liabilities are volatile, so are earnings. Most prior studies were mainly focused on the impact of the fair value hierarchy on the earnings value relevance. However, there is a lack of reliable empirical evidence on fair value hierarchy effects on earnings volatility and this study tries to fill that void.

Keywords: Fair value, Earnings volatility, Fair value hierarchy, Level 3 inputs

1. INTRODUCTION

At the end of the twentieth century, there was a significant shift in the concept of measurement for financial reporting. The Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) have systematically introduced the concept of fair value as a new dominant basis for measurement. The new measurement basis has significant implications for the role and characteristics of the reported financial statements.

Therefore, fair value accounting has become one of the most important areas of research but also a subject to many controversies.

Numerous previous studies concluded that greater application of the concept of fair value accounting leads to higher levels of earnings volatility (Bernard, Merton, & Palepu, 1995; Barth, Landsman & Wahlen, 1995, Barth, 2004, Plantin, Sapra & Shin, 2008; Magnan, 2009; Sun, Liu & Cao, 2011). Namely, fair value represents the present value of expected cash flows, so any subsequent adjustment of expectations related to future cash flow causes a change in fair value. Measurement at historical cost does not recognize these changes in the value of assets and liabilities until they are sold. Accordingly, fair value concept incorporates market fluctuations and market volatility into carrying amounts of assets and liabilities, which consequently leads to higher earnings volatility. Furthermore, greater volatility can be caused by the current financial reporting model that combines different valuation methods. For example, if a business entity measures an asset by the fair value method and related liablity by the cost method, artificial volatility may arise (Barth, 2004). Besides, Barth (2004, p. 323) argues that increased volatility may also result from measurement error. The measurement error will be less significant if the fair value is determined on the basis of the price of the same asset in the active market, i.e. it will be larger if it is determined using the model and the subjective estimates of the manager (mark-to-model). On the other hand, it is also possible that managers could use their opportunities for discretion in fair value estimates to smooth earnings.

The aim of this paper is to investigate the relation between the use of Level 2 and Level 3 fair value inputs (i.e. mark-to-model) and earnings volatility. The main assumption is that Level 2 and Level 3 inputs are more subjective, contain more measurement errors and allow managers to use their earnings management practices more often in comparison to Level 1 inputs. Consequently, the use of Level 2 and Level 3 inputs will increase earnings volatility.

Main empirical results are consistent with our predictions. We find evidence that average percentage of assets measured by Level 1 fair value inputs (i.e. mark-to-market) in total fair value assets is negatively related to level of banks' net income volatility. Findings suggest that banks with higher proportion of Level 2 and Level 3 assets (i.e. mark-to-model) have higher net income volatility.

Most prior studies were mainly focused on the impact of the fair value hierarchy on the earnings value relevance. However, there is a lack of reliable empirical evidence on fair value hierarchy effects on earnings volatility and this study tries to fill that void.

The rest of the paper proceeds as follows. Section 2 presents brief summary of previous research on the impact of fair value accounting on earnings volatility. Section 3 describes the research design, sample, and variables

measurement. Section 4 provides empirical results and paper ends with concluding remarks.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

Fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (IFRS 13.9). Fair value usually means the market value, if there is an active market for asset or liability; or if market price is unavailable then fair value is measured as an estimate of the market price. Despite the fact that fair value accounting is used as the basis for recognizing and measuring different kinds of assets and liabilities, fair value is considered to be the most relevant measure for financial instruments. Namely, subsequent to initial recognition, all financial instruments within the scope of IFRS 9 should be measured at: amortised cost; fair value though other comprehensive income; or fair value through profit or loss.

In order to achieve greater consistency and comparability of fair value measures, IFRS 13 and SFAS 157 have established a fair value hierarchy based on three levels of input data. This hierarchy gives the highest importance to quoted prices in active markets for identical assets or liabilities (Level 1 inputs), and the lowest importance to unobservable inputs (Level 3 inputs). Level 2 inputs are directly or indirectly observable inputs for the asset or liability (inputs like interest rates, yield curves etc.), other than quoted prices included within Level 1. Level 3 inputs are unobservable inputs for the asset or liability that should be used only if relevant observable inputs are not available. It is sometimes possible to use inputs to measure the fair value of an item of assets or liabilities that are categorized within different levels of fair value hierarchy. In these cases, the fair value measurement is categorized in its entirety in the same level of fair value hierarchy as the lowest level input that is significant to the entire measurement (IFRS 13:73).

Problems with reliability of fair values are expected to be more severe as fair value inputs become less observable (Song, Thomas & Yi, 2010). Therefore, Level 1 fair value reporting is likely to suffer the least from measurement error and problems with reliability, while measurement error will be the most significant in Level 3 fair values. Problems with realiability and measurement errors of Level 2 fair values potentially fall between those of Level 1 and Level 3. Measurements based on inputs of the first level of fair value hierarchy are also labelled as mark-to market, while fair value measurements based on inputs of lower levels are called mark-to-model (Bosch, 2012).

Almost all theoretical and empirical researches agree that greater application of the fair value accounting would lead to a higher level of earnings volatility (Barth et al., 1995, Bernard et al, 1995, Barth, 2004, Hodder, Hopkins

& Wahlen 2006, Plantin et al., 2008; Magnan, 2009; Novoa, Scarlata & Solé 2009; Sun, Liu & Cao, 2011; Šodan & Aljinović Barać, 2016).

Barth et al. (1995) research is one of the first studies that provided evidence on the impact of fair value accounting on higher earnings volatility. They compared the level of volatility of earnings without unrealized gains (losses) from the changes in fair value to the level of volatility of earnings measured at fair value on the sample of US banks. The obtained results showed that the volatility of earnings measured at fair value was 38% higher than the volatility of historical cost earnings.

On the sample of Danish banks in the period from 1976 to 1989, Bernard et al. (1995) proved that adjustments to the fair value have about four times larger standard deviation in comparison to the earnings before tax without fair value adjustments. Based on such results, they concluded that the fair value gains (losses) significantly contribute to the volatility of reported earnings.

Hodder et al. (2006) investigated the value of the reported risk, i.e. level of volatility of the three measures of financial performance: net income, comprehensive income, and gains/losses generated using full fair value accounting on a sample of US commercial banks in the period 1996 to 2004. The obtained results showed that volatility measured by full fair value accounting is three times higher than the volatility of the comprehensive income, i.e. five times higher than the net income volatility.

Novoa et al. (2009) chose the representative financial statements of a large US commercial bank, a large US investment bank and a major European bank in 2006 and simulated the impact of changes in fair value in different market cycles. They concluded that applying fair value increases the cyclical volatility of capital values.

Sun et al. (2011) analyzed the level of volatility of Chinese listed banks in the period 2005-2009 and concluded that the application of fair value affects the higher earnings volatility.

Studies on the fair value hierarchy inputs are mainly concerned on their impact on earnings value relevance. Accordingly, the Level 3 fair values have, generally lower level of value relevance than Levels 1 and 2 (Kolev, 2009, Goh et al., 2009; Song et al., 2010). Mohrmann and Riepe (2018) found an association between banks' share of Level 3 estimates and higher stock returns volatilities. However, there is still a lack of reliable empirical evidence on fair value hierarchy effects on earnings volatility.

3. RESEARCH DESIGN AND SAMPLE DESCRIPTION

Empirical research is conducted on the sample of active, commercial and investment banks in BvD BankFocus database that apply IFRS and have available

financial reports for each year in period 2011-2016. Respectively, the final sample consists of total of 1,220 banks, or 7,320 bank-year observations. Research sample is limited to banks for several reasons. First, it is expected that companies will have insignificant value of unrealized fair value gains (losses) through net income in comparison to banks (Sodan, 2015). Namely, majority of banks' assets are consisted of financial instruments and large portion of financial instruments are measured by fair value accounting (Nissim & Penman, 2007). Second, previous research have found links between industry membership and earnings volatility (Dichev & Tang, 2009), so industry effects could make bias in research results. Finally, data on fair value inputs hierarchy are often not available or missing for companies in non-banking sector. Also, application of different accounting standards can considerably affect earnings volatility (see Duh, Hsu & Alves, 2012), therefore our research sample consists only of banks that apply IFRS in the whole period 2011-2016.

The main research hypothesis (H1) is that higher share of Level 1 fair value assets (i.e. higher share of mark-to-market fair values) is negatively related to the level of earnings volatility. The sum of shares Level 1, Level 2 and Level 3 fair value assets is equal 100%, therefore higher share of mark-to market assets corresponds to smaller share of mark-to-model fair value assets (i.e. Level 2 and Level 3 fair values).

In order to to test our hypothesis, it is necessary to specify research model and to define variables. Beside the level of fair value inputs, several other factors could affect earnings volatility (Mohrmann & Riepe, 2018) and these factors are included in model as control variables: quality of loans; financial leverage; share of net loans; profitability; and share of fair value assets.

In accordance with expected relationships and defined variables, following regression model can be composed:

$$VOL_i = \beta_0 + \beta_1*LVL1_i + \beta_2*LQUALITY_i + \beta_3*FIN\_LEV_i + \beta_4*LOANS_i + \beta_5*ROE_i + \beta_6*FVASSETS_i + \varepsilon_i \quad (1)$$

where:

VOL_i – level of volatility of bank *i* measured as standard deviation of net income scaled by total assets for the period 2011-2016;

$LVL1_i$ – average share of bank *i* Level 1 fair value assets in total fair value assets for period 2011-2016;

$LQUALITY_i$ – quality of bank *i* loans, measured as average ratio of loan loss reserves and gross loans for bank *i* for the period 2011-2016 in %;

FIN_LEV_i – financial leverage, measured as average ratio of equity and total assets for bank *i* for the period 2011-2016 in %;

$LOANS_i$ – share of net loans, measured as average share of net loans in total assets for bank *i* for the period 2011-2016 in %;

ROE_i – profitability, measured as average return on average equity for bank *i* for the period 2011-2016 in %;

$FVASSETS_i$ – share of fair value assets, measured as average ratio of total fair value assets and total assets for bank *i* for the period 2011-2016 in %.

The share of mark-to-model assets (Level 2 and Level 3) is excluded from the research model because of potential multicollinearity concerns. Namely, as previously mentioned, the sum of mark-to-model assets (Level 1) and mark-to-market assets (Level 2 and Level 3) shares is 100%. Also, it is important to point out that calculated variables in equation (1) are standard deviation/averages taken from panel data for each bank within a period of time. Therefore, equation (1) represents cross-sectional regression model.

4. EMPIRICAL RESULTS

In the first part of the empirical research, descriptive analysis is conducted. Average values, maximum, minimum, median, standard deviation, the first quartile and the third quartile values are presented for each observed variable.

Table 1

Descriptive statistics

Variable	Mean	N	Max	Min	Median	SD	Q1	Q3
LVL3	0.091	844	1	0	0.030	0.155	0.008	0.095
LVL2	0.313	844	1	0	0.197	0.315	0.029	0.556
LVL1	0.595	844	1	0	0.679	0.340	0.292	0.924
VOL	0.008	1176	0.536	0	0.003	0.027	0.001	0.007
LQUALITY (%)	6.021	1178	80.592	0	4.048	7.664	1.778	7.329
FIN_LEV (%)	12.885	1217	99.738	-32.188	10.294	11.291	7.570	14.136
ROE (%)	6.005	1177	157.857	-96.774	6.124	15.596	1.781	11.819
LOANS (%)	55.335	1207	96.960	0.273	59.120	18.545	46.139	67.868
FVASSETS (%)	5.162	1117	79.336	0	1.244	9.873	0.197	5.585

From the table 1 it can be seen that average share of Level 1 fair value assets is almost 60% of total fair value assets, while average share of Level 3 fair value assets is less than 10%. This indicates that banks dominantly use inputs from active markets to determine fair values (mark-to-market). Level 2 inputs are used for 31.3% of fair value assets. Average share of total fair value assets in total

assets is only 5.16%. Thus, it can be concluded that, despite the fact that use of fair value accounting as the measurement attribute in accounting standards has significantly increased in recent time (Šodan, 2015), fair value method is still not dominant basis for measurement in financial reporting. Also, a relatively small proportion of FV assets could lower the magnitude of impact of fair value inputs on earnings volatility.

Table 2 presents estimated Pearson's correlation coefficients between observed variables.

Table 2

Pearson correlation coeficients and p-values (in parenthesis)

Variable	LVL3	LVL1	VOL	LQUALITY	FIN_LEV	ROE	LOANS	FVASSETS
LVL3	1							
LVL1	-0.385** (0.00)	1						
VOL	0.143** (0.00)	-0.066* (0.05)	1					
LQUALITY	0.140** (0.00)	0.046 (0.18)	0.358** (0.00)	1				
FIN_LEV	0.199** (0.00)	0.001 (0.97)	0.139** (0.00)	0.163** (0.00)	1			
ROE	0.031 (0.37)	-0.129** (0.00)	-0.237** (0.00)	-0.211** (0.00)	-0.052* (0.07)	1		
LOANS	0.043 (0.21)	0.005 (0.88)	-0.093** (0.00)	-0.264** (0.00)	-0.260** (0.00)	-0.064** (0.03)	1	
FVASSETS	0.013 (0.71)	-0.304** (0.00)	-0.020 (0.51)	-0.055* (0.07)	0.000 (0.99)	0.002 (0.94)	-0.367** (0.00)	1

Notes: **significant at the 0.05 level (2-tailed), * significant at 0.1 level (2-tailed).

Pearson's coefficient values indicate significant and negative association between level or earnings volatility and share of Level 1 fair value assets, as well as positive association between volatility and share of Level 3 fair value assets, as predicted. In addition, volatility is positively correlated with loans quality (LQUALITY) and with financial leverage (FIN_LEV), and negatively correlated with the level of profitability (ROE) and share of net loans (LOANS). These variables are included in the research model as control variables, therefore the sign and impact of correlations between these variables and earnings volatility are not in focus of this research. However, theoretical reasoning and explanations for these relations can be found in Positive accounting theory (Scott, 2003) and previous research (e.g. Mohrmann & Riepe, 2018).

Multiple linear regression model with robust standard errors is used to test the association between earnings volatility and the share of fair value inputs.

Additional variables are included in the model as control variables. Estimated coefficients of the proposed linear regression model are presented in the Table 3.

Table 3

Multiple regression model

Variable	Expected sign	Coefficient	Robust std.err.	t-value	p-value
LVL1	-	-0.0042	0.0014	-3.14	0.002**
LQUALITY	+/-	0.0009	0.0004	2.30	0.022*
FIN_LEV	+/-	0.0003	0.0002	1.41	0.158
ROE	+/-	0.0001	0.0000	1.42	0.157
LOANS	+/-	0.0001	0.0001	1.03	0.301
FVASSETS	+/-	-0.0002	0.0001	-1.23	0.219
Cons.		-0.0023	0.0038	-0.60	0.549
F-value/R^2	4.34**/25.07%				
Sample size	812				

Notes: **significant at the 0.05 level (2-tailed), * significant at 0.1 level (2-tailed).

Estimated results indicate that the overall model is stasticially significant (F-value of 4.34 with p-value of 0.00) and it explains 25% of total variance. Calculated multicollinearity tests suggest that collinearity is not a serious issue (all variance inflation factors are lower than 1.5).

Multiple regression results prove that the share of mark-to-market fair value assets (LVL1) negatively affects the earnings volatility. This means that banks with higher share of Level 1 fair value assets have smoother earnings while banks with higer proportion of mark-to-model assets (Level 2 and Level 3 fair value assets) have more volatile earnings, as predicted. Beside variable LVL1, estimated results suggest that only quality of banks loans variable (LQUALITY) significantly affects earnings volatility.

5. CONCLUSIONS

This paper investigates the relation between the use of different levels of fair value inputs and earnings volatility. It is expected that the higher share of mark-to-model assets (Level 2 and Level 3 fair value inputs) will increase earnings volatility, i.e. higher share of mark-to-market (Level 1 fair value inputs) will lower earnings volatility, because Level 2 and 3 inputs are more subjective and could contain more measurement errors.

Main empirical findings generally support our predictions. Results from empirical analysis indicate that the share of Level 1 assets indeed negatively affects banks' earnings volatility. In other words, banks with higher share of Level 1 fair value assets have smoother earnings while banks with higer

proportion of Level 2 and Level 3 fair value assets have earnings that are more volatile.

The results in this study contribute to the general understanding how application of fair value accounting affects earnings metrics. There are a number of previous researches which analyze relationship between fair value hierarchy and earnings characteristics but they are mainly concern with earnings value relevance. However, relation between fair value hierarchy and earnings volatility has not been documented yet.

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HIJERARHIJA FER VRIJEDNOSTI I VOLATILNOST NETO DOBITI

Sažetak

Međunarodni standard financijskog izvještavanja 13 definira hijerarhiju ulaznih podataka za mjerenje fer vrijednosti te klasificira ulazne podatke u trima razinama. Cilj je ovog rada istražiti odnos uporabe ulaznih podataka druge i treće razine (engl. mark-to-model) i volatilnosti neto dobiti. Glavna je pretpostavka da će ulazni podaci druge i treće razine biti subjektivniji, sadržavati veće greške mjerenja i omogućavati menadžerima računovodstvene manipulacije u većoj mjeri. Greška u mjerenju fer vrijednosti može biti izvor dodatne volatilnosti pojedinih elemenata u financijskim izvještajima, a kada raste volatilnost fer vrijednosti imovine i obveza, onda to vodi prema većoj volatilnosti neto financijskog rezultata. Većina prijašnjih istraživanja uglavnom je usmjerena na utjecaj hijerarhije fer vrijednosti na vrijednosnu važnost objavljene neto dobiti. Međutim, nema dovoljno empirijskih dokaza o tome.

Ključne riječi: fer vrijednost, volatilnost neto dobiti, hijerarhija fer vrijednosti, 3. razina ulaznih podataka.

JEL klasifikacija: M40, M41.