

THE VALUE RELEVANCE OF EARNING MEASUREMENT USING OHLSON MODEL: A META-ANALYSIS

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ABSTRACT

The purpose of this study is to integrate the value relevance of several earning measurement from prior studies using the Ohlson model. Previous findings consistently show that the earnings on extraordinary items has a positively significant relationships with the equity market value weather, with or without the use of a scale while mixed results has been reported for abnormal earning, earning per share and net income in different country between 1996-2016. Findings also revealed that the value in the relevance level (R^2) varies and have different relationships in the equity market value for the same earning measurement. Researchers used a meta-analysis from the 257 published studies to summaries the findings with a standard statistics in the form of effect sizes. The analysis also allows researchers test the positive relevance without using a regression analysis, to determine the single level of R^2 using the shared variance proportion (r^2) value. The findings specifically confirms that the EPS, abnormal earning per share, earning before extraordinary item per share and the net income have positive relevance. Compared to the quarterly and six month price after the end of the year, the value of the EPS relevance level has a higher if associated with share price at the end of the year. This also happens in an abnormal earning per share with an equity cost capital 8%. The EBEI has a higher r^2 compared to the quarterly share price and the net income with equity market value. The research findings also revealed that the positive relevance of the net income is influenced by a moderating variable.

Keyword: value relevance, earning measurement, Ohlson model, meta-analysis

INTRODUCTION

Ohlson (1995) developed a valuation model that relates the company's fundamental value with the book value of equity, abnormal earning and other relevant information. This model assumes the present value of an expected dividend which determines the market value, the clean surplus accounting and the linear information dynamics of abnormal earnings. This assumption changes the focus of the capital market research which is generally more empirical than theoretical (Beaver, 2002). It provides a foundation for the value relevance research in terms of its logical consistency in accounting data assessment (Bernard, 1995; Lundholm, 1995). Ohlson's model however, obtained several criticisms including its inability to identify specific financial report variables (Bauman, 1996) and analyze the existence of information asymmetry (Beaver, 2002). The criticism also draws on the empirical implications of the model (Holthausen and Watts, 2001) and the validity of the linear information dynamics in abnormal earnings (Lo and Lys, 2000; Myers, 1999; Burgstahler & Dichev, 1997; Bar-Yosef, Callen and Livnat, 1996; Ota, 2002; Dechow, Hutton and Sloan, 1999; Begley and Feltham, 2002).

Abnormal earnings have dynamic behavior, an ability it possesses to enable it provide information for future earnings (Ohlson, 1995). A particular proxy measurement of current earnings was not specified as a component to measure abnormal earnings, but the clean surplus relationship of the earning was stated. This empirical led research using Ohlson models, implemented various measurements other than the abnormal earnings as its net income, earnings per share, earnings before extraordinary items and other measurements. For example, in measuring net income, Deschênes, Rojas, & Morris (2013), Hua & Upneja (2011), Lourenço, et al. (2012), Mey (2016), Rakoto (2013), and Stoel & Muhanna (2011), found that net income has value relevance. However, Srinivasan & Narasimhan (2012) and Eng, Saudagaran & Yoon (2009) actually found that the net income respectively has a negative relationship and no relevant value. This raises a question to determine whether the net income either has a positive or a negative relevance value. This study would therefore combine these conflicting findings to provide evidence that shows the positive value relevance for the net income and all other earnings measurements.

This study would also combine the research findings using Ohlson models in various countries to prove whether the different earnings have a positive or

negative correlation with the value relevance of accounting information. In US for example, researchers who use the capital market data, Bauman (2005), Kohlbeck (2011), Khaledi & Darayseh (2013), Lopatta & Kaspereit (2014) found a positive relationship between the earnings value relevance to equity market value, while Black, Charnes & Richardson (2000) and Amir & Lev (1996) found a negative relationship. In UK Campa (2013) and Canada (Graham, Morrill & Morrill, 2005 & 2012), research for data on capital markets in Paris, London and Frankfurt Müller (2014), found that the income is positively related to the market value of equity. However, in the capital markets in Mexico (Vázquez, Valdés, & Herrera, 2007), Germany and Portugal (Ferreira, Lara, & Gonçalves, 2007), a negative relationship on the relevance of earnings values was found. This shows the difficulty in concluding whether the earnings have a positive or negative value relevant to the equity market value. Researchers would therefore try to prove that the earnings have a positive value relevant relationship when the research finding from different country or capital markets have been combined.

In addition to the differences in the measurement and relevance of the earnings values, the researchers from the above study, mostly used the linear regression analysis and made a conclusion on the relevance value based on the coefficient of determination (R^2). The use of the linear regression analysis does not show the non-linear earnings and stock price volatility (Holthausen and Watts, 2001). Meanwhile, the use of the R^2 value to a certain degree, would cause an increase due to the sampling error found in the sample size and the number of predictors in the regression model (Ellis, 2010). Brown, Lo & Lys (1999) prove the invalidity of R^2 as a value relevance measurement due to the existence of scale factors, which can influence the differences in the R^2 value of the sample from different periods, capital markets, or comparisons between countries. To overcome this weakness, researchers therefore do not use the linear regression analysis and the R^2 .

Researchers would implement a meta-analysis with a standard statistical method in form of size effect. And in order to determine the level of earnings value relevance, the research will be based on the proportion of the shared variance (r^2) values, instead of the R^2 obtained from the average effect size value which is not affected by sampling errors. The researcher would conduct a meta-analysis of the 257 published empirical research from around the world from 1996-2016, to show the various types of earnings measurement with a positive value relevance. The findings show the three earnings measurement with a value

relevance which is not influenced by the moderating variables. Some signs however show the moderating variable's existence which affects the positive value relevance of the net income.

LITERATURE REVIEW

Abnormal earning from Ohlson model is one variable that determines the equity value in addition to the book value and other information. Ohlson provides the measurement of the abnormal earnings as the current earnings minus by multiplying of the previous year's equity book value and risk-free interest rate. However, the empirical research review using the Ohlson model in 1996-2016 showed a variety of proxy for the abnormal earnings measurement. Proxies for such measurements include; earnings before extraordinary items and discontinued operations (Barth, Beaver & Landsman, 1999; Bauman, 1999; Bell, et. al., 2002; Belkaoui & Picur, 1999; Hukai, 2002; Landsman, et al., 2006; Gavius & Russ, 2009; Dawar (2013 & 2014), net income (Lee and Lai, 2012; Grambovas & McLeay, 2006; and Dahmash & Qabajeh, 2011), earnings per shares (Kao, Lee & Chen, 2010), and do not clearly state the proxy for abnormal earnings (Graham & King, 2000; Özer & Çam, 2016; Rodríguez, Muiño & Lamas, 2012; and Swartz, Swartz & Firer, 2006). Differences were also found in the assumption use of the cost of equity capital (r) at 12% and 8%. It is based on a certain value which includes; CAPM, the interest commercial paper and deposits, central bank interest rate, and others (Lee and Lai, 2012; Grambovas & McLeay, 2006; and Dahmash & Qabajeh, 2011; Kao, et al., 2010).

Using the abnormal earning measurement, most of the empirical research findings shows that it possesses a value relevance associated positively with the equity market values (Lee and Lai, 2012; Grambovas & McLeay, 2006; and Dahmash & Qabajeh, 2011; Kao, et al., 2010), but there are also some negative results found (Belkaoui & Picur, 1999 and Hukai, 2002). On the other hand, Bauman (1999) discovered that the abnormal earnings have no relevant value because of the conservatism inherent in the book value. These contradictory research findings raises the question of whether the abnormal earnings do have value relevance or not, whether the relationship is positive or negative, and whether it is influenced by variables other than the abnormal earnings as a moderating variables. These questions would be answered by researchers by combining the different empirical findings and putting them to test.

Apart from the abnormal earnings, researchers also use measurements like earning after tax, earnings before extraordinary items, earnings per share and net income. The results of the study using the earnings after tax measurement proved to have value relevance and it is associated positively with the equity market value (Al-Hares, AbuGhazaleh & Hadad, 2011 & 2012; Misund, Osmundsen & Sikveland, 2015); Orr, Emanuel & Wong, 2005; and Tsalavoutas, *et al.*, 2012). There are differences however in the value relevance level, represented by the coefficient of determination (R^2), which was decreased after the IFRS implementation in Greece (Tsalavoutas, André & Evans, 2012) and tested by inserting a dividend (Al-Hares, *et al.*, 2011). These differences in levels create difficulties in defining the degree of the after-tax earning value relevance. The researcher would then combine the differences in these findings in order to confirm that the earning after-tax value is relevant and has a single value relevance level (r^2), not varying values (R^2), not influenced by a moderating variables.

The research finding also shows the differences in the use of earnings before the extraordinary items measurement, both from the significant relationship and the value relevance level. Barth, Beaver & Landsman (1998), Bauman (2005), and Schnusenberg (2003) provides evidence to show that the proxy has a relevant value and is positively associated to equity values. Hukai (2002) found the existence of a negative relationship while Muhanna & Stoel (2010) provided an evidence of the proxy irrelevance. Furthermore, Graham, *et al.* (2005 & 2012), Houmes & Chira (2015), Jenkins (2003), Kothari & Shanken (2003), McNamara & Whelan (2006), Saito (2012), Wang & Alam (2007), and Wang, Pervaiz & Makar (2005) provides evidence to show that the R^2 value using the scale proxy per share have increased, whereas, the decline has also been concluded by Morton & Neill (2001) and Nwaeze (1998). The researcher will investigate the results of these inconclusive findings to show that the earnings before extraordinary item has a positive value relevance.

The earnings per share measurement are the common in the research using the Ohlson model. Some studies provides evidence that proves the earnings per share do not have value relevance and are negatively correlated with equity values (Habib & Weil, 2008; Motokawa, 2015; and Vázquez, *et al.*, 2007), while other research provides evidence to show the positive value relevance of the earnings per share (El Shamy & Kayed, 2005; Gregory & Whittaker, 2013; Ismail, Kamarudin & Zijl, 2013; Jeon & Kim, 2011; Jeroh, 2016; Lee, Chen & Tsai,

2014; Malik & Shah, 2013). To prove that the earnings per share are positively relevant in determining the company's equity value, it is therefore necessary to combine these conflicting findings.

The findings using the net income measurement are still inconclusive. Deschênes, et al. (2013), Hua and Upneja (2011), Lourenço, et al. (2012), Mey (2016), Rakoto (2013), and Stoel & Muhanna (2011) found a positive effect of the net income to equity market value. Meanwhile, Srinivasan & Narasimhan (2012) and Eng, et al., (2009) proved the irrelevance in the case of a consolidated financial statements and the existence of energy contracts. There is a need to emphasise on the corroborated findings in order to prove that the net income has positive value relevance.

In addition to the contradictive findings as described above, the difference in the use of equity market value as a proxy for dependent variable was found in examples like; in study to prove the value relevance of net income, Naceur & Goaid (2004), Russon & Bansal (2016) and Wang (2015) using the stock prices as a proxy for equity market value. On the other hand, Bepari, Rahman & Mollik (2013), Graham, et al. (2012), and Wang, et al. (2005) used the share price in six months after the end of the year, and Gamerschlag (2013) made use of the stock price three months after the end of the year. The use of different equity market value proxies for the same earning measurement would give a different value relevance results. This would instigate an investigation by the researcher on the possibility of the differences in equity market value proxies moderating the relevance of certain earnings measurements.

Furthermore, the empirical research using the linear regression analysis ignores the fact that the earnings and stock prices do not behave in a linear basis (Holthausen & Watts, 2001) thus, that the relation between the share prices and financial variables in a cross-section might be biased due to a correlated omitted variable (Khotari & Shanken, 2003). Moreover, the Ohlson model researchers, as well as other relevant value research studies, also state that the value relevance is based on the coefficient of determination (R^2) which would be dependent on the number of sample and predictors in the regression model (Ellis, 2010) and would also be influenced by a cross-sectional variation if it comes from two different samples (Gu, 2007). The differences in R^2 are therefore influenced by the coefficient of the scale factor variation for research samples gotten from different times, countries, and stock markets (Brown, Lo & Lys, 1999). And due to these

weaknesses, they both can't be used in this study. The effect size value in the form of the Pearson correlation (r) would be used to show the relevance value relationship and the r^2 value derived from the mean effect size used to show the relevance level. The use of these two values allows researchers to combine research findings that originate from different sampling periods, countries, and capital markets.

To achieve the above objectives, the meta-analysis, a methodology used to summarize research findings by estimating the statistical relationship between the explanatory variables containing heterogeneity within and between studies would be used by the researchers (Bergstrom and Taylor 2006). This meta-analysis allows the identification of the influence of each individual finding in the estimation of the general influence of the study population (Hartung, Knapp & Sinha, 2008). The analysis provides information on the development of theory in four ways, namely; drawing conclusions from an inconclusive finding, providing an estimate of the best effect size for a more prospective analysis, allowing a comparison between research findings, and testing untested hypotheses or those that still requires further testing (Ellis, 2010).

In accounting and finance, the meta-analysis has been used to analyze research findings on company performance (Capon, Farley, & Hoenig, 1990 and Dalton, et al, 1998; among others), analyzing internal controls judgment (Trotman & Wood, 1991), transfer pricing of multinational companies (Borkowski, 1996), corporate governance and earnings management (García-Meca & Sánchez-Ballesta, 2009), decision making among the board of directors (Deutsch, 2005), predictions of corporate bankruptcy (Lin & Hwang, 2000), company characteristics and disclosure levels (Ahmed & Courtis, 1999). This research uses a standardized statistical method in form of effect value size, to draw conclusions on the robustness results from several findings. The effect size value can be in form of a group difference index, relationship strength index, correction estimation, and risk estimation (Ferguson, 2009). Combining these allows the analysis find an output in a single value that reflects the degree in the relationship strength between two variables (Borenstein, et al, 2009; Ellis, 2010). For this to be done, the meta analysis literature shows several steps in applying the meta-analysis and they include; collecting research to be mapped, coding, calculating the mean effect size, calculating the statistical significance of the average value, testing the effect size distribution variability, and interpreting the meta-analysis results. These steps would be implemented by making some

modifications in the second and third steps so as to conform to the research objectives.

META ANALYSIS METHOD AND RESEARCH CHARACTERISTICS

This study uses a unit of analysis in form of published articles to analyze the Ohlson model. The search process for those using the keyword phrases "Ohlson model", "value relevance" and the original title of an Ohlson's article published in the Contemporary Research Accounting journal was conducted by the researchers. They searched for these in the database on Science Direct, EJS-Ebsco, Blackwell, Emerald, JSTOR, and ABI/INFORM during the 1996 – 2016 period and excluded search results in form of dissertations and thesis and found about 1,642 published articles.

The researcher furthermore applies the sample selection criteria using the following methods; the empirical research article rather than quoting, discussing, commenting on Ohlson's model and having topics such as corporate bankruptcy other than value relevance, articles that are not Ohlson's original studies which are generally a discussion and development, and finally articles using English. About 257 published articles that fulfilled these criteria were found.

The second step in the meta-analysis literature is coding the published articles. Coding is usually done by giving the article an identity while the topic and the relationship between the variables studied. This has been done when searching for articles such as a research samples so that in this stage, researchers can apply the coding to the proxy measurement variable which is the focus of this study, namely the earning and equity market value variable.

The guidelines for coding measurement proxies refers to the earnings items in a published financial statements, the abnormal earnings terminology which would add the word "other" to another measurement (table 2 columns 8). Coding guidelines are also based on adding letters or a combination of letters or numbers. An addition to the main code is to ensure an adaptation in measurement using the scale/deflator, a certain percentage and sampling period. For example, the letter S added to a scale per share, a combination of letters TA added to scale per total assets (TA), and the percentage of the cost of equity capital of like 8% by number (_8) and 12% by number (_12).

Guided by the above coding system, researchers set code for abnormal earnings in ABNI and it can develop into ABNIS for abnormal earnings per share, and also into ABNI_8, ABNI_12, and ABNI_15 to accommodate the use of equity capital costs of 8%, 12% and 15%. The ABNI code can also develop into an ABNI_OTHER due to abnormal earnings measurements that do not mention the equity capital value cost, divided by a scale other than stocks or using logarithms, and other abnormal earnings measurements.

The measuring earning after-tax code is also EAT, earning before extraordinary items, the discontinuous operations is EBEI, net income is NI, while the residual income is RI. These coding can be developed into EATS, EATTA, EBEIS, EBEITA, NIS, NITA, RIS and RITA to adapt those using scale per share or per total asset. Meanwhile, the coding for the earnings per share measurement is EPS and there is no further development due to the fact that it is specific. This specific nature is applied by the researcher in order to encode another earnings measurement proxy by giving the E-OTHER code. There are therefore several main code groups and its development could accommodate the earning measurement proxy (table 2 columns 8).

Table 2 on the other hand, also shows that the equity market value code is MVE and this is useful in testing the possibilities of a moderating variable. Coding for this proxy with income measurement is done by the addition of letters or numbers. If the market value measurement uses a scale per share, the letter S will be added and it becomes an MVES. If the sampling period of the equity market value is six months after the end of the year, 6 would be added to the code system so it becomes MVES6, this goes on for another time period and the word "OTHER" would be added to measure other equity market values (Table 2 column 6).

After the coding process, the researcher would calculate the average effect size value in the third stage. This stage begins by determining the average effect size value in form of the Pearson correlation value (r), as the value of the individual effect size, because it is more appropriate to infer the relationship strength between two variables (Ferguson, 2009). The researcher would then calculate the mean effect size based on individual effect size value and these would be derived from at least 2 articles. It won't be done from those only reported in one article. Another requirement was also added which states that the article must use the same measurement proxy so as to prevent the bias

occurrence in results due to the combining effect of an "actual" effect size from the different measurement proxies like comparing orange vs. apple in the meta-analysis.

The above guideline was also used to determine the research sample. Applying these to the 257 samples above, there were only 96 articles reportedly Pearson correlation. Based on the results, 27 articles using more than one analytical model or regression model such as Gavious & Russ (2009), Kirkulak & Balsari (2009), Graham & King (2000), Konstantinos & Athanasios (2011). It was however excluded by the researchers so as to obtain 69 articles that could be used as research samples for the meta-analysis.

The next stage involves analyzing the significance of the mean effect size value and this is done by determining the two-sided Z statistic at the 95% confidence interval in order to test the relevance of the earning value in relationship to significance. Researchers will also calculate the observed variance (Sr)¹ and the standard deviation (SD)² to test the sample variability. They would also calculate the estimated error variance (Se)³ and percentage explained (Ahmed & Curtis, 1999) in order to find out the variability level of the observed variant. The higher the variance, the higher the sample's heterogeneity, which indicates a possibility moderating variables.

In the literature analysis, the moderating variable terminology explains the existence of the sample heterogeneity in the weighted average effect sizes (Hunter & Smith, 2004) and in line with this opinion, an investigation would be done to figure out whether the heterogeneity can be reduced if the effect size outliers eliminated. Researchers would for this reason, conduct further sample heterogeneity testing by analyzing the chi-square statistics⁴ at $p < 0.01$. If the results show a significant value, this means that the heterogeneity is influenced by other variables like the moderating variables. To determine the moderating variable type, the researcher would have to combine the variable similarity relationships in the form of an equity market value as suggested by Cooper (2009), so as to directly combine the relationships derived from the regression equation if "the outcome and predictor of interest are measured in a similar fashion across the study".

The final stage of the meta-analysis is to interpret the results which would be based on the significance relationship, the sample homogeneity and the proportion of a shared variance (r^2) value. Furthermore, the interpretation of the

value relevance degree is based on Cohen (1988), which establishes guidelines for the correlation degree of the effect size is low at 0.01, moderate at 0.09, and high at 0.26. The result of a meta-analysis will therefore show the earning measurement proxies with a positive value relevant, earning not influenced by the moderating variable and earning with a particular degree of value relevance to the equity market value.

RESULT AND DISCUSSION

RESULT

Table 3 presents the results of the meta-analysis of the relationship between earnings and equity market values. In table 3, column 1, the title "earnings measurement code" shows the earning measurement code and there are 7 earning measurements. The title "sample" in column two shows the number of firm years observation samples for each earning measurement, for example, abnormal earnings having 16.759 firm years. Furthermore, the title of "study" (table 3 columns 3) shows the number of articles that are using certain earning measurements such as ABNI_12 which was derived from 2 published articles from Barth, et al. (1999) and Landsman, et al., (2006). In table 3 column 3, it can be seen that the total number of articles that can be analyzed is 52 from a total of 69 research samples. This reduction occurs because there are 17 articles that have different earnings and equity value measurements which make it impossible to calculate the mean effect size (see table 2 columns 6 & 8). The researcher will describe the meta-analysis results of each type of earnings measurement and a discussion will be carried out by including the results of the analysis in tables 4 and 5 in order to provide a comprehensive analysis. Table 4 presents the results of data processing by implementing assumptions without outliers on the effect size and sample size. Table 5 moderates variable analysis by grouping samples based on equity market values that have a relationship with the earnings variable.

Abnormal earnings

Meta-analysis discovered three abnormal earnings measurements which can be measured, the mean effect sizes were ABNI_12, ABNIS_12 and ABNIS_8 (table 3 columns 1). The mean effect size values for each measurement were 0.4199; 0.2567; and 0.6120 (table 3 column 3). At the 95 percent confidence interval, the significance of this measurement is at the lowest lower limit which is 0.1683 (ABNIS_12) while the highest upper limit is 0.6905 (ABNIS_8) and

this shows that abnormal earnings measurement has value relevance. However, if analysed from the low percentage value explained (table 3, column 3), a high variation degree is seen in each abnormal earnings proxy and this shows the heterogeneity of the observed variant which is an indication of the existence of moderating variables. However, the results of normality tests with chi-square statistics indicate that the variation is not significant, so the data is homogeneous ($p < 0.01$) and not influenced by moderating variables (table 3 column 11).

The researchers tried to reduce the high variability of observed variants by eliminating extreme values on the effect size and the sample size. The test results showed that the percentage value that was obtained was the same as that of the previous test because the number of studies tested remains the same and it is not possible to divide them into sub-groups, meaning that the variability also remains the same (Table 4 column 9). The same results occurred in testing the relationship of similar variables that relate abnormal earnings to equity market values and abnormal earnings per share to stock prices (table 5 columns 9). This shows that abnormal earnings measurement without scale (ABNI) and abnormal earnings per share with equity capital cost 12% and 8% (ABNIS₁₂ and ABNIS₈). They also have significant relationships with equity market values and stock prices, at value relevance levels of 17.63%, 6.59%, and 37.46%, respectively (table 5 column 5). This is not influenced by moderating variables because it comes from homogeneous samples, even though the observed variants have high variability.

Earnings before extraordinary items and discontinuous operations

Earning measurements before extraordinary items and discontinuous operations include measurements with scales per share (EBEIS) and per total assets (EBEITA) (table 3 column 1). The average effect sizes of these two proxies are 0.2097 and 0.3877, respectively (table 3 column 4). The results of the Z-statistic test at the 95% confidence interval yielded the lowest lower limit of 0.3112 and the highest upper limit of 0.4642 (table 3 column 10) and this shows a significant relationship with the equity market value. However, the percentage explained values are very low at 0.08% and 1.33% (table 3 column 9) and this shows a high variability of the observed variants.

Table 4 column 10 proves that there is a major rise in the percentage explained for EBEIS to be 12.15%, while that of EBEITA remained the same even after the researchers used the assumption to eliminate the outlier value on the effect size

and sample size. On the other hand, if this proxy is associated to the quarterly share price after the end of the year (MVESQ), it indicates a significant decline in the percentage explained to be 0.04% (table 5 column 9). This indicates that the observed variant in this proxy is heterogeneous, although the chi-square test obtained insignificant results at $p < 0.01$, which refers to the variables derived from homogeneous samples (table 5 column 11). This description suggests that earnings before extraordinary items and discontinuous operations have value relevance to quarterly stock prices after the end of the year. The value relevance level is 42.26% (table 5 column 5) and there is no indication that the relationship is influenced by moderating variables even though it has high sample variability.

Earnings per share

The earnings per share measurement is the most common proxy found in research using the Ohlson model, which comes from 33 published articles (table 3 column 2) with a sample of 379,058 firm years. The mean effect size of earnings per share is 0.5856 (table 3 column 3), with a 95% confidence interval which has a significant value between 0.5030 - 0.6683 (table 3 column 10). However, this significance is derived from the observed variant with a high degree of variability because the ability to explain sample variation is only 0.22% (table 3 column 9). The observed variant is homogeneous based on the chi-square test which is not statistically significant at $p < 0.01$ (Table 3 column 11), meaning that there are no indications of influence by the moderator variable.

The test results obtained by eliminating the outlier value showed a significant increase in the percentage explained to be 0.53 percent (table 4 column 9). However, this value is still very low and still shows high variability even though the data is normal based on the chi-square statistical test (table 4 column 11). Therefore, researchers will conduct sub-group tests to further ascertain whether there are variables that moderate the relationship between earnings per share and equity market value.

Sub-group testing is based on the similarity of variable relationships: earnings per share with stock prices at the end of the year (MVES), stock prices six months after the end of the year (MVES6) and stock prices quarterly after the end of the year (MVESQ). The testing of this moderation variable results in a significantly lower percentage value explained so that the variability of the observed variant is higher (table 5 column 9) even though the homogeneity test results show that the data remains normal (table 5 column 11). This homogeneity

value confirms the absence of moderating variables on the value relevance of earnings per share. This significant relationship has value relevance levels of 52.05% for the year-end share price, 43.58% for the share price six months after the end of the year and 40.85% for the share price quarterly after the end of the year (table 5 column 5).

Net earnings

This proxy was used by 6 published articles with samples of 17,745 firm years and a mean effect size value of 0.8063 (table 3 columns 1 & 3). This proxy has a significant correlation with the equity market value within the range of 0.6759 - 0.9366 at the 95% confidence intervals (Table 3 column 10). This proxy also has an observed variance value with high variability, which is 0.62% (table 3 column 9). The high variability observed was obtained from a homogeneous sample with $p < 0.01$ (Table 3 column 11), thus, it was not influenced by moderating variables. To confirm this tentative conclusion, researchers eliminated outlier values. Table 4 column 9 shows that the decrease in percentage explained is 0.55%, although it remains significant at the interval between 0.7300 - 0.8919 and chi-square statistic result not significant at $p < 0.01$. This raises the question of whether the increase in variability of this observed variant is indeed influenced by outliers or the existence of moderating variables.

The researcher answers the above question by assuming the value of the moderation derived from the equity market which corresponds exactly to the net income proxy. The results of this analysis indicate a significant decrease in percentage explained to only 0.003% (table 5 column 9), suggesting that the variability of the observed variant is getting higher. In addition, chi-square statistics infer that there is a heterogeneity sample at $p < 0.01$ (table 5 columns 11), meaning that there are variables which moderate the relationship between net income and equity market value. Unfortunately, researchers were unable to carry out further investigations on the types of moderating variables because the study sample has been saturated and cannot be subgrouped. This description suggests that the net income measurement correlates significantly with the equity market value in the range of 0.6167 - 1.0145 at the 95% confidence interval (table 5 column 10) and this significance is influenced by moderating variables.

DISCUSSION

The meta-analysis method successfully combines the results of empirical research using Ohlson models in different countries and at different periods. The meta-analysis results suggest that there are three earning measurement proxies which have significant positive values that are relevant to both the stock prices and equity market values. These proxies are abnormal earnings whether using scale or not, with the costs of equity capital being 12% and 8%, earnings before extraordinary items per share, and earnings per share. And one proxy is net income that positive significant value relevant but influenced by moderating variable.

Abnormal earning proxies are proxies which are explicitly stated in Ohlson model. Bauman (1999) found that abnormal earnings do not have value relevance due to the inherent conservatism in book values, while Bell et al., (2002) discovered that they are relevant to companies that report positive earnings. Meta-analysis combines these two conflicting findings and four other empirical research findings (Barth, et al., 1999; Landsman, et al., 2006; and Dawar, 2013 & 2014), and has successfully proven that abnormal earnings do have positive value relevance.

Value relevance is found both in the abnormal earnings measurement that do not use the scale and in those using scale per share. Relevance is also present in its correlation with equity market values and stock prices and at various levels of equity capital costs (12% and 8%). It was also successfully demonstrated in studies using data in developed capital markets like that of the USA (Bauman, 1999; Bell et al., 2002; Barth, et al., 1999; Landsman, et al., 2006) and those who use data from developing capital markets like India (Dawar, 2013 & 2014). The results of the meta-analysis also suggest that abnormal earnings were derived from a homogeneous sample variant, so this proxy can be directly associated to stock prices or equity market values without moderating variables, which in the Ohlson model are book values and other information. However, meta-analysis found high variability observed variants, so that subsequent studies need to consider the possibility of moderating variables derived from book values and other information, including those caused by differences in industry types.

Meta analysts also found measurement proxies that actually "violated" the Ohlson model, including earnings before extraordinary items, earnings per share and net income. Researchers who use this proxy do not explicitly state the

reasons for its use in the analysis other than the reasons for the ease and practicality of obtaining this proxy data from the company's published financial statements.

In the measurement of earnings before extraordinary items, the meta analysis combines the empirical research results using developed capital market data like that of Canada (Graham, et al., 2005 & 2012), USA (Houmes & Chira, 2015; Lopatta & Kaspereit, 2014; and Wang, et al., 2005) and Europe (Manganaris, Spathis & Dasilas, 2006). These studies conclude that earnings before extraordinary items have value relevance with different relevance values (R^2). The meta-analysis confirmed these findings at one value relevance level of 42.26%. Meta-analysis also suggests that the value relevance of this measurement will be obtained if a scale per share (not the scale of total assets) is used and associated with quarterly stock prices after the end of the year. Furthermore, the chi-square test results confirm the absence of variables that moderate those relationships (table 5 column 11), but the variability observed variance is very high (table 5 column 9).

Empirical research is the measuring of the relevance of earnings per share using data from developed and developing capital markets (table 2 column 5). This empirical research has not been able to provide robust conclusions on whether earnings per share have value relevance because there are at least three studies that have found evidence of earnings per share irrelevance like the research on Habib & Weil (2008), Motokawa (2015), and Vázquez, et al. (2007). Meta-analysis confirms that earnings per share do have positive value relevance, if the proxy uses year-end stock prices, quarterly stock prices after the end of the year and stock prices six months after the end of the year as the dependent variable. The value relevance levels (r^2) in each of these relationships are 52.05%, 43.58%, and 40.85% respectively (table 5 column 5). Researchers still find the high variance in this proxy even though it comes from homogeneous samples.

The meta-analysis results confirm that the positive relevance of net income by combining empirical research is inconclusive. Meta-analysis found that equity market value or market capitalization value could be the dependent variables to prove the net income relevance without using a scale per share or another scale. However, the relevance is derived from heterogeneous samples or in other words, there is an indication affected by moderating variables. Researchers

presume that this heterogeneity is influenced by differences in firm size in variables without scaling, thus reducing the efficiency estimates and the coefficient of determination (R^2) (Barth and Clinch, 2009). They also explain that the advantage of using a scale is to eliminate correlations between variables and eliminate the potential heteroscedasticity that is caused by differences in company size, companies with negative earnings and changes in market capitalization that cause negative equity market values. Unfortunately, researchers cannot conduct further tests to find variables that moderate the relevance of net income because the number of published articles in this study cannot possibly be regrouped.

CONCLUSION AND FUTURE RESEARCH

The meta-analytic technique has corroborated international findings within the 1996-2016 period of earning measurement value relevance using Ohlson model. The earning measurements that have positive relevance are abnormal earnings, earnings before extraordinary items, earnings per share and net income. Earnings per share have positive relevance and higher relevance level (r^2), if related to equity market value per share, rather than quarterly and six month share price after the end of the year. Abnormal earnings have a positive relevance whether they use the scale per share or not. However, they have higher r^2 if related to the equity market value per share, with the cost of equity capital being 8% rather than 12%. The findings also confirm the positive relevance of earnings before extraordinary items if using only scale per share and if related to quarterly equity market value per share. Furthermore, we find positive relevance of net income if related to equity market value.

The test of moderating effects revealed that the net income positive relevance was influenced by moderating variables. This will occur if the correlated variable is the equity market value without using a scale per share. Unfortunately, the researchers were unable to determine the type of the moderating variables that requires further research. Future researches that would be conducted to investigate these moderating variables can use variables that are explicitly included in Ohlson model as the equity book value and for other purposes. The studies should use the meta-analysis method so that they can determine the precise type of book value and other information measurements that moderate the earnings relevance.

Meta-analysis also found high variability in the observed variants as well as the findings of previous meta-analysis researches. Ahmed & Courtis (1999) and Lim, et al. (2011) explained that high variability is likely influenced by variability in the effects size sample as Hunter & Smith (2004) argued. Results from the researches suggest that this matter should be further investigated by (1) first assuming the moderating variable type, (2) conducting a meta-analysis in the same industry, and (3) using another effect size value as described in Ferguson. Furthermore, the researchers also presume that high variability is influenced by using Pearson correlation drawn into the regression equation even though this correlation value actually shows one-on-one permutations. Therefore, subsequent researches can apply meta-analysis for SEM (Card, 2012) to meta-analysis the empirical research findings by using regression analysis.

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NOTES

1. The formula that was used to calculate observed varian (Sr) (Ahmed & Courtis, 1999 and Field, 2005) is

$$S_r^2 = \Sigma[N_i(r_i - \bar{r})^2]/\Sigma N$$

In the formula, N is sample size, r is mean effect size, \bar{r} is weighted average mean efek size

2. The formula that was used to calculate standard deviation in statistic literature is

$$SD = \sqrt{\frac{(x - \bar{x})^2}{n - 1}}$$

In the formula, x is mean efek size, \bar{x} is weighted average mean efek size, n is sample size

3. The formula that was used to calculate error varian (Se) (Ahmed & Courtis, 1999 and Field, 2005) is

$$S_e^2 = (1 - \bar{r}^2)^2 / K \Sigma N$$

In the formula, K is number of study, other symbol as defined above

4. Hunter et al. (1982) provided the formula that was used to determine variance homogeneity which is

$$\chi_{k-1}^2 = Ns_r^2 / (1 - \bar{r}^2)^2, \text{ where } k-1 \text{ is degree of freedom}$$

If the $\chi_{statistic}^2 < \chi_{table}^2$, there is a variance homogeneity, and vice versa

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Table 1. Determination of total sample research

| | |
|--|------------|
| The number of articles using search keyword phrases: "value relevance", "Ohlson Model" and "the title of original Ohlson paper" | 1.642 |
| Less: | |
| 1) Articles that cite, discuss, review, comment on, do not apply the Ohlson model, researching company bankruptcy and has the same title | 1.321 |
| | 22 |
| 2) Articles that are original Ohlson's paper | 42 |
| 3) Articles that use languages other than English | 257 |
| The total number of articles using Ohlson model | |

Source: data processing

Table 2. Studies identity, sample, coding measurement and effect size in meta-analysis

| No | Studies | Sample | | | Equity value measurement | | Earning measurement | | Source information |
|-----|----------------------------|----------|----------|-----------|--------------------------|-------------|---------------------|-------------|----------------------|
| | | Period | Σ | Country | code | Effect size | Code | Effect size | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 1 | Aboody, et al. (2004) | 1996-98 | 2274 | USA | MVES | 0.5100 | EPS | 0.6200 | table 1; pp. 261 |
| 2 | AbuGhazaleh, et al. (2012) | 2005, 06 | 528 | UK | MVOTH ER | 0.6565 | EOTHER | 0.8636 | table 3; pp. 216 |
| 3 | Alali & Foote (2012) | 2000-06 | 1934 | UAE | MVESQ | 0.4505 | EPS | 0.4810 | table 2; pp. 100 |
| 4 | Alfaraih & Alanezi (2011) | 1995-06 | 1057 | Kuwait | MVESQ | 0.7700 | EPS | 0.7730 | table 5; pp. 82 |
| 5 | Alfaraih (2016) | 1994-14 | 2490 | Kuwait | MVESQ | 0.7570 | EPS | 0.7900 | table 2 (B); pp. 231 |
| 6 | Al-Hares, et al. (2011) | 2003-09 | 611 | Kuwait | MVESQ | 0.7250 | EATS | 0.6300 | table 2; pp.64 |
| 7 | Al-Hares, et al. (2012) | 2003-09 | 667 | Kuwait | MVEQ | 0.6400 | EAT | 0.6700 | table 2; pp. 9 |
| 8 | Ballas & Hevas (2005) | 1995-03 | 5957 | 4 EU con. | MVE | 0.5105 | EOTHER | 0.2540 | table 3; pp. 376 |
| 9 | Barth, et al., (1999) | 1987-96 | 15405 | USA | MVE | 0.6200 | ABNI_12 | 0.3900 | table 1 (B); pp.212 |
| 10 | Bauman (1999) | 1980-97 | 6171 | USA | MVES | 0.4700 | ABNIS_12 | 0.2500 | table 2; pp. 48 |
| 11 | Bauman (2005) | 1992-00 | 165 | USA | MVE | 0.8075 | EBEI | 0.7520 | table 2; pp. 62 |
| 12 | Belkaoui & Picur (2001) | 1992-98 | 356 | forbes' | MVES | 0.3731 | EOTHER | 0.3563 | append. 2; pp. 70 |
| 13 | Bell, et al., (2002) | 1996-98 | 255 | USA | MVES | 0.4550 | ABNIS_12 | 0.4200 | table 3; pp. 983 |
| 14 | Bepari, et al. (2013) | 2004-09 | 4885 | Australia | MVES6 | 0.5390 | EPS | 0.5850 | table 1 (C); pp. 234 |
| 15 | Bryan & Tiras (2007) | 1984-03 | 27728 | USA | MVOTH ER | 0.5150 | EOTHER | 0.4500 | table 3; pp. 662 |
| 16 | Bugejaa & Gallery (2006) | 1995-99 | 475 | Australia | MVESQ | 0.6669 | EPS | 0.6361 | table 3; pp. 529 |
| 17 | Campa (2013) | 2005-11 | 3941 | UK | MVES6 | 0.2795 | EPS | 0.286 | table 2; pp. |

| | | | | | | | | |
|----|---------------------------------|---------------------|--------|-------------|-------|---------|--------|--------------|
| | | | | | | | 0 | 693 |
| 18 | Collins, et al. (1997) | 1953-93 | 115154 | USA | MVESQ | EPS | 0.675 | table 2; pp. |
| | | | | | | | 0 | 47 |
| 19 | Dawar (2013) | 2002-11 | 1960 | India | MVES | ABNIS_8 | 0.580 | table 1 (B); |
| | | | | | | | 0 | pp. 47 |
| 20 | Dawar (2014) | 2005-06; 2010-11 | 805 | India | MVES | ABNIS_8 | 0.690 | table 2; pp. |
| | | | | | | | 0 | 128 |
| 21 | Dimitropoulos & Asteriou (2010) | 1996-04 | 101 | Greece | MVES | EOTHER | 0.050 | table 3; pp. |
| | | | | | | | 0 | 206 |
| 22 | El Shamy & Kayed (2005) | 1992-01 | 559 | Kuwait | MVES | EPS | 0.657 | table 1 (B); |
| | | | | | | | 0 | pp.72 |
| 23 | El Shamy, et al. (2014) | 2007 | 35 | Kuwait | MVES | EPS | 0.851 | table 2, pp. |
| | | | | | | | 0 | 362 |
| 24 | Eng, et al. (2009) | 1995-01 | 93 | USA | MVE | NI | 0.539 | table 2; pp. |
| | | | | | | | 0 | 256 |
| 25 | Fung, et al. (2010) | 1984-03 | 32195 | USA | MVESQ | EPS | 0.409 | table 1 (B); |
| | | | | | | | 0 | pp.837 |
| 26 | Gamerschlag, (2013) | 2005-08 | 369 | Germany | MVESQ | EPS | 0.576 | table 4; pp. |
| | | | | | | | 0 | 335 |
| 27 | Giner & Rees (1999) | 1986-95 | 735 | Spain | MVES | EPS | 0.803 | table 4; pp. |
| | | | | | | | 0 | 41 |
| 28 | Gordon, et al. (2010) | 2000-04 | 20907 | USA | MVESQ | EPS | 0.600 | table 4; pp. |
| | | | | | | | 0 | 576 |
| 29 | Graham, et al. (2005) | 1988-02 | 1022 | Canada | MVES2 | EBEIS | 0.563 | table 1; pp. |
| | | | | | | | 3 | 54 |
| 30 | Graham, et al. (2012) | 1990-08 | 1303 | Canada | MVESQ | EBEIS | 0.669 | table 4; pp. |
| | | | | | | | 5 | 192 |
| 31 | Grambovas & McLeay (2006) | 1989-04 | 19158 | Europe | MVES | ABNIS- | 0.023 | table 2; pp |
| | | | | | | | 4 | 76 |
| 32 | Gregory & Whittaker (2013) | 1991-08 | 23599 | USA | MVES | EPS | 0.750 | table 2; pp. |
| | | | | | | | 0 | 9 |
| 33 | Gregory, et al. (2014) | 1992-09 | 16758 | USA | MVES6 | EPS | 0.770 | table 1; pp. |
| | | | | | | | 0 | 643 |
| 34 | Habib, (2004) | 1976-99 | 14605 | Japan | MVESQ | EPS | 0.700 | table 1(B); |
| | | | | | | | 0 | pp. 30 |
| 35 | Habib & Weil (2008) | 1990-99 | 341 | New Zealand | MVES | EPS | 0.690 | table 1 (C); |
| | | | | | | | 0 | pp. 232 |
| 36 | Houmes & Chira (2015) | 1986-11 | 15339 | USA | MVES | EBEIS | 0.589 | table 3; pp. |
| | | | | | | | 0 | 315 |
| 37 | Hu, et al., (2011) | 2006 | 302 | USA | MVEBV | EOTHER | 0.590 | table 2; pp. |
| | | | | | | | 0 | 1364 |
| 38 | Hua & Upneja (2011) | 1965-04 | 147 | USA | MVE | NI | 0.833 | table 2; pp. |
| | | | | | | | 7 | 183 |
| 39 | Ismail, et al., (2013) | 2002-09 | 2663 | Malaysia | MVES | EPS | 0.622 | table 2 (B); |
| | | | | | | | 0 | pp. 64 |
| 40 | Jenkins, (2003) | 1980-99 | 24195 | USA | MVES | EBEIS | - | table 7; pp. |
| | | | | | | | 0.115 | 397 |
| | | | | | | | 0 | |
| 41 | Jeon & Kim (2011) | 1990-05 | 631 | Korea | MVES | EPS | 0.223 | table 4; pp. |
| | | | | | | | 0 | 50 |
| 42 | Jeroh (2016) | 2005-14 | 1050 | Nigeria | MVES | EPS | 0.222 | table 3; pp. |
| | | | | | | | 6 | 34 |
| 43 | Kallapur & Kwan (2004) | 1998 | 227 | UK | MVE | EOTHER | 0.810 | table 3 (A); |
| | | | | | | | 0 | pp.161 |
| 44 | Kao, et al. (2010) | 1996-06 | 7591 | Taiwan | MVES | ABNIS_- | 0.710 | table 2; |
| | | | | | | | 4 | pp.81 |
| 45 | Keener (2011) | 1982-01 | 98284 | USA | MVESQ | EPS | 0.439 | table 2; pp. |
| | | | | | | | 0 | 13 |
| 46 | Khaledi & Darayseh (2013) | 2003-08 | 1338 | USA | MVETA | NITA | 0.920 | table 3; pp. |
| | | | | | | | 0 | 15 |
| 47 | Kohlbeck (2011) | 1993-04 | 2525 | USA | MVESQ | EOTHER | 0.435 | table 4; pp. |
| | | | | | | | 0 | 283 |
| | | | | | | | 0.4505 | |

| | | | | | | | | |
|----|----------------------------|---------|-------|--------------|-------|---------|-------|--------------|
| 48 | Landsman, et al., (2006) | 1997-01 | 1354 | USA | MVE | ABNI_12 | 0.760 | table 3; pp. |
| | | | | | | | 0 | 232 |
| 49 | Lee, et al. (2014) | 1997-01 | 1354 | USA | MVES | EPS | 0.558 | table 3; pp. |
| | | | | | | | 0 | 232 |
| 50 | Lopatta & Kaspereit (2014) | 2003-11 | 16619 | USA | MVETA | EBEITA | 0.360 | table 4; pp. |
| | | | | | | | 0 | 483 |
| 51 | Lourenço, et al., (2012) | 2007-10 | 1597 | USA | MVE | NI | 0.605 | table 3; pp. |
| | | | | | | | 0 | 424 |
| 52 | Malik & Shah (2013) | 2000-11 | 468 | Pakistan | MVES | EPS | 0.730 | table 4; pp. |
| | | | | | | | 0 | 286 |
| 53 | Manganaris, et al. (2016) | 2008-11 | 2223 | Europe | MVEQT | EBEITA | 0.595 | table 3; pp. |
| | | | | | A | | 0 | 222 |
| 54 | Mey (2016) | 2005-06 | 904 | South Africa | MVEQ | NI | 0.725 | table 1 (B); |
| | | | | | | | 0 | pp. 308 |
| 55 | Morris (2011) | 1994-03 | 1362 | USA | MVES4 | EPS | 0.934 | table 3 (B); |
| | | | | | | | 1 | pp. 36 |
| 56 | Motokawa (2015) | 2012-13 | 250 | Japan | MVESQ | EPS | 0.920 | table 3; pp. |
| | | | | | | | 0 | 168 |
| 57 | Naceur & Goaid (2004) | 1984-97 | 239 | Tunisia | MVES | EPS | 0.490 | table 2; pp. |
| | | | | | | | 0 | 1222 |
| 58 | Oliveira, et al. (2010) | 1998-08 | 354 | Portugal | MVESQ | EPS | 0.443 | table 1 (B); |
| | | | | | | | 8 | pp 247 |
| 59 | Osazuwa & Che-Ahmad (2016) | 2013 | 667 | Malaysia | MVOTH | EOTHER | 0.680 | table 2; pp. |
| | | | | | ER | | 0 | 302 |
| 60 | Ota (2010) | 1979-99 | 27993 | Japan | MVESQ | EPS | 0.626 | table 1 (A); |
| | | | | | | | 0 | pp. 41 |
| 61 | Rahman & Mohd-Saleh (2008) | 2002-04 | 730 | Malaysia | MVESQ | EPS | 0.416 | table 2; pp. |
| | | | | | | | 0 | 84 |
| 62 | Rakoto (2013) | 2010 | 119 | Canada | MVES2 | NI | 0.330 | table 3; pp. |
| | | | | | | | 0 | 151 |
| 63 | Rakoto (2015) | 2012 | 116 | Canada | MVESQ | EPS | 0.288 | table 5; pp. |
| | | | | | | | 0 | 103 |
| 64 | Rodríguez, et al. (2012) | 1991-04 | 7997 | UK | MVES | ABNIS_O | 0.545 | table 3; pp. |
| | | | | | | | 0 | 194 |
| 65 | Russon & Bansal (2016) | 2000-14 | 495 | na | MVES | EPS | 0.780 | table 2; pp. |
| | | | | | | | 0 | 122 |
| 66 | Stoel & Muhanna (2011) | 2004-08 | 14885 | USA | MVE | NI | 0.838 | table 1 (B); |
| | | | | | | | 0 | pp. 288 |
| 67 | Wang (2016) | 2010 | 756 | Taiwan | MVES | EPS | 0.790 | table 4; pp. |
| | | | | | | | 0 | 1146 |
| 68 | Wang, et al. (2005) | 1994-02 | 992 | USA | MVESQ | EBEIS | 0.640 | table 3; pp. |
| | | | | | | | 0 | 421 |
| 69 | Zeng (2003) | 1996-98 | 359 | Canada | MVE | EOTHER | 0.490 | table 3; pp. |
| | | | | | | | 4 | 171 |

Note: MVE: equity market value or market capitalisation, MVEBV: equity market value per book value, MVEQ: equity market value 3 month (quarterly) after fiscal years, MVEQ: equity market value 3 month after fiscal years per total asset, MVES:equity market value per share or share price, MVES2: equity market value per share or share price 2 month after fiscal year, MVES4: equity market value per share or share price 4 month after fiscal year, MVES6: equity market value per share or share price 6 month after fiscal year, MVESQ: equity market value per share or share price 3 month (quarterly) after fiscal year, MVETA: equity market value per total asset, MVE-OTHER : other measurement of market value equity, i.e. MVE in year goodwill impairment test (AbuGhazaleh, et al, 2012), monthly closing price adjusted stock and split deviden divided by closing price in earning announcement year end (Bryan & Tiras, 2007), logaritma market share price (Osazuwa & Che-Ahmad, 2016). ABNI_12: abnormal earning with cost o capital 12%, ABNIS_12: abnormal earning per share with cost o capital 12%, ABNIS_8: abnormal earning per share with cost o capital 8%, ABNI_OTH: other abnormal earning measurement i.e., abnormal net income per share (Rodriguez, et al. 2012), lag EPS previous year (Osazuwa & Che-Ahmad, 2016), net earning minus beginning book value multiply by government bond plus 4% (Grambovas & McLeay,2006), EAT: earning after tax, EATS: earning after tax per share, EBEL: earning before extraordinary item and discontinue operation, EBELS: earning before extraordinary item and discontinue operation per share, EBELTA: earning before extraordinary item and discontinue operation per total aset, EOTHER: other eaming measurement, i.e. earning before tax plus loss in goodwill impairment (AbuGhazaleh, et al. 2012), earning after tax before diskontinyu operation, extra ordinary item (Zeng 2003), EBEL minus expected income per share (Kohlbeck 2011), earning per share minus Taiwan central bank rate multiply by book value previous year (Kao, et al. 2010), net income after extra ordinary items (Kallapur & Kwan 2004), eaming per beginning book value previous year (Hu, et al., 2011), earning before tax and ordinary item per log total aset (Dimitropoulos & Asteriou 2010), residual income per share (Belkaoui & Picur 2001), income for shareholder adjusted by minority interest and preferred stock (Ballas & Hevas 2005)

Table 3. Meta-analysis result of each earning measurement

| Earning measurement Code | Sample | Study (K) | Mean effect size | Determi- nation Coefisien (r ²) | Observed variance (Sr) | Estimated error varian (SE) | Residual variance (SD) | Percentage explained | 95% confidence interval | Normality test (χ ² _{k-1}) |
|--------------------------|---------|-----------|------------------|---|------------------------|-----------------------------|------------------------|----------------------|-------------------------|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9)= (6):(5) | (10) | (11) |
| ABNI_12 | 16,759 | 2 | 0.4199 | 17.63% | 0.0102 | 0.00008 | 0.0026 | 0.80% | 0.3192 – 0.5206 | 0.0150* |
| ABNIS_12 | 6,426 | 2 | 0.2567 | 6.59% | 0.0011 | 0.00027 | 0.0020 | 24.67% | 0.1683 – 0.3452 | 0.0013* |
| ABNIS_8 | 2,765 | 2 | 0.6120 | 37.46% | 0.0025 | 0.00028 | 0.0016 | 11.34% | 0.5335- 0.6905 | 0.0064* |
| EBELS | 44,364 | 5 | 0.2097 | 4.40% | 0.1268 | 0.00010 | 0.0042 | 0.08% | 0.0832- 0.3363 | 0.5549* |
| EBELTA | 18,842 | 2 | 0.3877 | 15.03% | 0.0057 | 0.00008 | 0.0015 | 1.33% | 0.3112 – 0.4642 | 0.0080* |
| EPS | 379,058 | 33 | 0.5856 | 34.30% | 0.0173 | 0.00004 | 0.0018 | 0.22% | 0.5030 – 0.6683 | 1.2827* |
| NI | 17,745 | 6 | 0.8063 | 65.01% | 0.0067 | 0.00004 | 0.0044 | 0.62% | 0.6759 – 0.9366 | 0.2747* |

*not significant at 0.01, the earning measurement code define in table 2

Table 4. Meta-analysis result of each earning measuring without outlier value

| Earning measurement Code | Sample | Study (K) | Mean effect size | Determination Coefisien (r ²) | Observed variance (Sr) | Estimated error varian (SE) | Residual variance (SD) | Percentage explained | 95% confidence interval | Normality test (χ^2_{k-1}) |
|--------------------------|---------|-----------|------------------|---|------------------------|-----------------------------|------------------------|----------------------|-------------------------|-----------------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9)=(6):(5) | (10) | (11) |
| ABNI_12 | 16,759 | 2 | 0.4199 | 17.63% | 0.0102 | 0.00008 | 0.0026 | 0.80% | 0.3192 – 0.5206 | 0.0150* |
| ABNIS_12 | 6,426 | 2 | 0.2567 | 6.59% | 0.0011 | 0.00027 | 0.0020 | 24.67% | 0.1683 – 0.3452 | 0.0013* |
| ABNIS_8 | 2,765 | 2 | 0.6120 | 37.46% | 0.0025 | 0.00028 | 0.0016 | 11.34% | 0.5335 – 0.6905 | 0.0064* |
| EBEIS | 20,169 | 4 | 0.5992 | 35.91% | 0.0007 | 0.00008 | 0.0006 | 12.15% | 0.5501 – 0.6484 | 0.0049* |
| EBEITA | 18,842 | 2 | 0.3877 | 15.03% | 0.0057 | 0.00008 | 0.0015 | 1.33% | 0.3112 – 0.4642 | 0.0080* |
| EPS | 101,988 | 23 | 0.6714 | 45.08% | 0.0127 | 0.00007 | 0.0021 | 0.53% | 0.5809 – 0.7619 | 0.9287* |
| NI | 17,533 | 4 | 0.8109 | 65.76% | 0.0049 | 0.00003 | 0.0017 | 0.55% | 0.7300 – 0.8919 | 0.8919* |

*not significant at 0.01, the earning measurement code define in table 2

Table 5. Subgroups meta-analysis result of moderating effect: equity market value

| Earning measurement Code | Sample | Study (K) | Mean effect size | Determination Coefisien (r ²) | Observed variance (Sr) | Estimated error varian (SE) | Residual variance (SD) | Percentage explained | 95% confidence interval | Normality test (χ^2_{k-1}) |
|--------------------------|--------|-----------|------------------|---|------------------------|-----------------------------|------------------------|----------------------|-------------------------|-----------------------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9)=(6):(5) | (10) | (11) |
| MVE-ABNI_12 | 16,759 | 2 | 0.4199 | 17.63% | 0.0102 | 0.00008 | 0.0026 | 0.80% | 0.3192 – 0.5206 | 0.0150* |
| MVES-ABNIS_12 | 6,426 | 2 | 0.2567 | 6.59% | 0.0011 | 0.00027 | 0.0020 | 24.67% | 0.1683 – 0.3452 | 0.0013* |
| MVES-ABNIS_8 | 2,765 | 2 | 0.6120 | 37.46% | 0.0025 | 0.00028 | 0.0016 | 11.34% | 0.5335 – 0.6905 | 0.0064* |
| MVESQ-EBEIS | 3,808 | 2 | 0.6501 | 42.26% | 0.4228 | 0.00018 | 0.0150 | 0.04% | 0.4100 – 0.8902 | 1.2683* |
| MVES-EPS | 33,483 | 11 | 0.7214 | 52.05% | 0.5244 | 0.00008 | 0.0125 | 0.014% | 0.5026 – 0.9403 | 22.8043* |
| MVES6-EPS | 25,584 | 3 | 0.6601 | 43.58% | 0.4663 | 0.00004 | 0.0063 | 0.008% | 0.5045 – 0.8157 | 2.9293* |
| MVESQ-EPS | 42,921 | 9 | 0.6392 | 40.85% | 0.4145 | 0.00007 | 0.0089 | 0.02% | 0.4541 – 0.8242 | 9.4773* |
| MVE-NI | 16,629 | 3 | 0.8156 | 66.52% | 0.6699 | 0.00002 | 0.0103 | 0.003% | 0.6167 – 1.0145 | 11.9512# |

*not significant at 0.01, # significant at 0.01, the earning measurement code define in table 2

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