

The Stock Price Relevance of Accounting Information according to Business Cycle and Industries

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Abstract

This research compares the stock price relevance of the Ohlson model and the extended Ohlson model which is added in debts ratio and size to the Ohlson model. And this research also compares the stock price relevance of those models according to the business cycle and the industry.

The 10,946 firms are sampled out of the firms listed on the KOSPI from 1991 to 2013. The results are as follows;

First, both the basic model and the extended models prone to have stock price relevance, and the debt ratio affects the stock price in reverse U shape. Second, the stock price relevance and the changes of the stock price relevance are different among the industry in both the basic model and the extended model. Third, the significance of coefficients and the stock price relevance changes aren't so different in the business cycle stage.

Keywords: *value relevance of accounting information; business cycles; firm size; book value; earnings*

1. Introduction

According to the Ohlson model(1995), the value of a firm can be evaluated by book value and earnings. After that, there are abundant researches which explain the stock price using book value and earnings. The early researches on the stock price relevance of accounting information using Ohlson model(1995) mostly focus on the extent of stock price relevance of the book value and the earnings, and its changes over the years(Collins et al, 1997). In addition to that, researches also focused on the differences of relative stock price relevance between book value and earnings(Burgstahler and Dichev, 1997). Researches comparing the stock price relevance and its change expended to the comparison among the industries which are differ in the composition of intangible assets (Kenner, 2011), and also to the effect of the financial health on stock price relevance of accounting information(Barth et al, 1998).

Business cycle as an economic environment affects the value of the firm through the interaction with the firm's characteristics(DeStefano, 2004). Therefore, the stock price relevance of accounting information is differs according to the business cycle stage. As the financial factors, the firm's financial characteristics can bring differences in the effects of financial information on stock price through the interaction with the business cycle.

The stock price relevance of book value and earnings can vary according to the industry. The constitution of assets and financial structure may be diverse across the industry. Therefore, the stock price relevance of book value and earnings may vary depending on the industry.

This research analyzes the stock price relevance of basic model and extended model and compares the stock price relevance between both models.¹ Then, the research examines whether the stock price relevance and their differences vary according to the industry or the business cycle stages. Below are the detailed purposes of this research.

First, I compare the stock price relevance of the basic model and the extended model.

Second, I compare the stock price relevance of the basic model and extended models in accordance with the business cycle stages.

Third, I compare the stock price relevance of the basic model and extended models in accordance with the industries.

2. Theoretical Background

According to the Ohlson model(1995), the value of a firm is the weighted average of the net book value and the earnings. In addition to these, Ohlson also included other information as the firm valuation factors. The firm characteristic factors may be included in this other information. Therefore, the researches on the value relevance of accounting information are extended to include the firm characteristic variables such as fair value of fixed assets (Aboody et al, 1999), intangible assets(Klock and Megna, 2000), R&D expense(Lev and Sougiannis, 1996). Also, another stream of researches studied extended model that includes variables such as the firm size, financial structure, and the audit quality(Barth et al, 1998; Hayn, 1995; Collins et al, 1997).

¹ In this research, the basic model comprises the book value and earnings as independent variables, and the extended model adds two more variables – financial health and firm size – to the basic model. And the dependent variable is stock price of the firm.

Since 1980s, the firm size has been regarded as an important factor in valuation research. The study results of the size effect are not coincidence. Some show the size effects on the value(Banz, 1981; Hayn, 1995), and others don't(Dichev, 1998; Shumway and Wather, 1998).

Debt is the major financing source of a company. Generally the debt financing not only has an advantage such as tax shield and management incentives for value creation(Palepu et al, 2013), but also costs– financial distress. The effect of the debt ratio on the firm's value also does not show consistent result. Some studies show the positive effects(Jensen, 1986; Stulz, 1990), and others contend negative effects(Mayers and Majluf, 1984; Friend and Lang). Also, some results show that the non-linear(reverse U shape) relation exists between the debt ratio and the firm's value(Margaritis and Psillaki).

Industry is different in the growth stage and the effects of changes in economic environment and technology. Thus, industry factor can make differences in the extent of the value relevance of accounting information(Keener,2011; Hand, 2005). And business cycles as a macro-economic factor are related with the firm's value(Bolten and Long, 1986; Bolten and Besley, 1991; DeStefano, 2004). So the business cycles can affect the stock price relevance of accounting information(Jenkins et al, 2009).

3. Research Design

3.1. Research Hypothesis

In this research, I analyzed three kinds of hypothesis. The first is about the stock price relevance difference between the basic model and the extended models. The hypothesis I is

<Hypothesis 1> The firm size and the debt ratio have additional stock price relevance other than the those of the net book value and the earnings.

The second hypotheses are related with the industry effect on the stock price relevance of accounting information. The hypotheses II are

<Hypothesis II-1> There are no differences in the stock price relevance of the net book value and the earnings across the industries.

<Hypothesis II-2> There are no differences in the additional stock price relevance of debt ratio and the firm size other than the those of the net book value and the earnings across the industries.

The third hypotheses are related with the value relevance difference along the business cycles. The hypotheses III are

<Hypothesis III-1> There are no differences in the stock price relevance of the net book value and the earnings among the business cycles.

<Hypothesis III-2> There are no differences in the additional stock price relevance of debt ratio and the firm size other than the those of the net book value and the earnings among the business cycles.

3.2. Research Models and the Data

In this research, I used three models – the basic model, the extended model I, and the extended model II. The basic model is the conventional Ohlson model which uses the net book value and the earnings as the explanatory variables. And extended model adds the size and the debt ratio to the basic model. In some prior studies, the debt ratio showed non-linear relation - reverse U shape (Margaritis and Psillaki, 2010). Therefore, in this research, the debt ratio is regard as a linear form in the “Extended Model I”, and as non-linear form in “Extended model II”. The models for the analysis are as follows.

$$\text{Basic Model : } P_{it} = \alpha_0 + \alpha_1 \text{EPS}_{it} + \alpha_2 \text{BPS}_{it} + \delta_t + \varepsilon_{it} \quad (1)$$

$$\text{Extended Model I : } P_{it} = \beta_0 + \beta_1 \text{EPS}_{it} + \beta_2 \text{BPS}_{it} + \beta_3 \text{DEBT}_{it} + \beta_4 \text{LNSIZE}_{it} + \delta_t + \varepsilon_{it} \quad (2)$$

$$\text{Extended Model II : } P_{it} = \gamma_0 + \gamma_1 \text{EPS}_{it} + \gamma_2 \text{BPS}_{it} + \gamma_3 \text{DEBT}_{it} + \gamma_4 (\text{DEBT}_{it})^2 + \gamma_5 \text{LNSIZE}_{it} + \delta_t + \varepsilon_{it} \quad (3)$$

P_{it} : Firm i's per share price at the end of March year t+1

EPS_{it} : Firm i's earnings per share for period t

DEBT_{it} : Firm i's debt ratio at the end of period t

LNSIZE_{it} : Firm i's ln(stock price × common stock outstanding) at the end of period t

δ_t : year dummy

In this research, the stock price is measured at the end of the March price year $t+1$, in order to use the stock price that reflects the year t 's financial statements. The earnings is measured by simple EPS of period t and the net book value is measured by (total capital – total par value of preferred stock)/common stock outstanding at the end of period t . The debt ratio(DEBT) is measured by the (total asset – total capital)/total capital. The size(LNSIZE) is the natural log of total market value of common stock. In order to control the effect of outliers, all the variables are winsorized by 1%.

The business cycle is classified by two stages – expansion and recession- according to the announcements of Statistics Korea. The period from the month of the trough to the pre-month of the peak is classified as the expansion stage and the other period is classified as the recession. If both stages are included in the same year, the stage of the year is classified by the longer period.

The 10,946 firms are sampled out of the firms listed on the KOSPI from 1991 to 2013. Among the samples, the manufacturing firms are 7,520, the service firms are 2,828, and the construction firms are 598. And the 4,165(38.05%) are included in the expansion period and the 6,781(61.95%) are included in the recession.

4. The Results of Analysis

4.1. The Value relevance of each model

Table 1 shows the results of regression analyses of each model. The value relevance² of conventional model(EPS and BPS) is 62.86%. The analysis on the extended model I shows that every factor appears to have significant effect on the stock price and the value relevance is 63.69%, which is 0.83% higher than the conventional model. According to the Wald test, the extended model has significant increase in the value relevance($\alpha=0.01$). Namely, the size and the debt ratio have statistically significant value relevance, but the increment is not noticeable. All coefficients of extended model II are statistically significant ($\alpha=0.01$), and the coefficient of DEBT² is a negative(-0.007). This means that debt ratio raises the value to a certain point, and after that point, however, it reduce the value. The extended model II also increase the value relevance(Wald F = 110.89, $\alpha=0.00$), compared to the basic

² The value relevance is measured by the R^2 of OLS regression.

model, however, the extent(0.88%) is not remarkable.

Every model has statistically significant value relevance, and the debt ratio and size have an additional explanatory power but the increment is not noticeable. Also, the debt ratio affects the stock price in reverse U shape.

Table 1 The value relevance of each model

| | <i>Basic Model</i> | | <i>Extended Model I</i> | | <i>Extended Model II</i> | |
|-----------------------------------|--------------------|----------------|-------------------------|----------------|--------------------------|----------------|
| | <i>Coefficient</i> | <i>t-value</i> | <i>Coefficient</i> | <i>t-value</i> | <i>Coefficient</i> | <i>t-value</i> |
| <i>EPS</i> | 2.549 | 8.43 | 2.549 | 8.36 | 2.571 | 8.40 |
| <i>BPS</i> | 0.767 | 17.18 | 0.738 | 15.71 | 0.740 | 15.74 |
| <i>DEBT</i> | | | 21.643 | 12.68 | 34.146 | 12.02 |
| <i>DEBT²</i> | | | | | -0.007 | -6.25 |
| <i>LNSIZE</i> | | | 3888.382 | 9.40 | 3804.326 | 9.12 |
| <i>F</i> <i>(p value)</i> | 58.68 (0.00) | | 86.39 (0.00) | | 83.90 (0.00) | |
| <i>R²</i> | 0.6286 | | 0.6369 | | 0.6374 | |
| <i>R² change</i> | | | 0.0083 | | 0.0088 | |
| <i>Wald F</i> <i>(p value)</i> | | | 132.92 (0.00) | | 110.89 (0.00) | |

- The cells are graded if the coefficients are significant at $\alpha=0.05$

4.2. The Value relevance of each model according to the Industry

Table 2 shows the results of regression analysis of each model according to the industry. In the case of manufacturing industry, the results of the analysis do not differ much from the upper analyses results. In all models, each variable has significant effect on the stock price and the coefficient of DEBT² is negative. The extended models have an additional explanatory power, but the increase is not so much.

In the case of service industry, the coefficients of variables and the validity of models are similar to manufacturing industry. The increment of value relevance in extended model I is 2.08% that is comparatively larger than that of manufacturing industry, 0.81%. The extended model II shows statistically significant increment of explanatory power than the basic model, however, the increment of explanatory ability is merely 2.12% which is larger than the manufacturing industry. The explanatory powers of service industry in all models are smaller than those of the manufacturing industry. And, in the case of service industry, the

increment of explanatory power by size and the debt ratio is larger than the manufacturing industry, while **overall** value relevance of all values are smaller.

Constructing industry shows different aspects from the other industries. The significances of coefficients differ from the other industries, and the coefficient of DEBT² is positive. The explanatory powers of each model are fairly low. The conventional model is 18.62%, which is relatively low when compared to the other two industries. The additional explanatory power of extended model has shown statistically significant increment, and the extent is larger than the manufacturing industry while smaller than the service industry.

Generally, the value relevance and its change by the models vary across the industry. And the coefficient of DEBT² appears differently among the industries.

Table 2 The value relevance of each model according to the Industry

| | <i>Manufacturing Industry</i> | | | <i>Service Industry</i> | | | <i>Constructing Industry</i> | | |
|-----------------------------|-------------------------------|-------------------------|--------------------------|-------------------------|-------------------------|--------------------------|------------------------------|-------------------------|--------------------------|
| | <i>Basic Model</i> | <i>Extended Model I</i> | <i>Extended Model II</i> | <i>Basic Model</i> | <i>Extended Model I</i> | <i>Extended Model II</i> | <i>Basic Model</i> | <i>Extended Model I</i> | <i>Extended Model II</i> |
| <i>EPS</i> | 2.604 | 2.591 | 2.616 | 3.201 | 3.145 | 3.158 | -0.085 | -0.167 | -0.187 |
| <i>BPS</i> | 0.812 | 0.782 | 0.784 | 0.480 | 0.419 | 0.421 | 0.627 | 0.534 | 0.519 |
| <i>DEBT</i> | | 27.610 | 45.810 | | 13.994 | 21.277 | | -10.228 | -24.615 |
| <i>DEBT²</i> | | | -0.011 | | | -0.003 | | | 0.012 |
| <i>LNSIZE</i> | | 4577.0 | 4545.4 | | 4661.0 | 4597.1 | | 2026.9 | 2277.3 |
| <i>F (p value)</i> | 46.61 (0.00) | 69.55 (0.00) | 67.33 (0.00) | 23.29 (0.00) | 28.54 (0.00) | 27.65 (0.00) | 13.67 (0.00) | 10.94 (0.00) | 10.61 (0.00) |
| <i>R²</i> | 0.6658 | 0.6739 | 0.6747 | 0.5058 | 0.5266 | 0.5270 | 0.1862 | 0.1963 | 0.1978 |
| <i>R² change</i> | | 0.0081 | 0.0089 | | 0.0208 | 0.0212 | | 0.0101 | 0.0116 |
| <i>Wald F (p value)</i> | | 103.60 (0.00) | 93.71 (0.00) | | 83.73 (0.00) | 57.63 (0.00) | | 9.88 (0.00) | 7.24 (0.00) |

● The cells are graded if the coefficients are significant at $\alpha=0.05$

4.3 The Value relevance of each model according to the Business Cycle

Table 3 shows the results of regression analysis of each model both in the expansion and the recession. In both stages, all the variables have statistically significant effects on the stock price. In all models, the value relevance in the recession(64.87% ~65.87%) is higher than that in the expansion(58.15%~58.91%). The value relevance increments of extended models are statistically significant. However, the increment of extended model I during the expansion is 0.66% and the recession 0.96%, both of which are fairly low. Also, the increment of extended model II is 0.76% during the expansion and 1.01% during the

recession, both of which are not so high. The size and the debt ratio are added the explanatory power to model, but the extents are not so high. Furthermore, the increment of value relevance is not so different between the business cycle stages. The coefficient of $(DEBT)^2$ indicates that the relation between the debt ratio and the stock price is a reverse U shape.

Generally, the significance and the changes in value relevance of the respective models are not so much different between both business stages. And the explanatory power of each model is generally higher in the recession than the expansion.

Table 3 The value relevance of each model according to the Business Cycle

| | <i>The Expansion</i> | | | <i>The Recession</i> | | |
|-------------------------------------|----------------------|-------------------------|--------------------------|----------------------|-------------------------|--------------------------|
| | <i>Basic Model</i> | <i>Extended Model I</i> | <i>Extended Model II</i> | <i>Basic Model</i> | <i>Extended Model I</i> | <i>Extended Model II</i> |
| <i>EPS</i> | 2.172 | 2.249 | 2.284 | 2.729 | 2.683 | 2.711 |
| <i>BPS</i> | 0.766 | 0.747 | 0.750 | 0.765 | 0.730 | 0.732 |
| <i>DEBT</i> | | 18.622 | 32.429 | | 23.752 | 41.044 |
| <i>DEBT</i> ² | | | -0.006 | | | -0.013 |
| <i>LNSIZE</i> | | 2349.7 | 2225.2 | | 4856.3 | 4735.6 |
| <i>F</i> <i>(p value)</i> | 29.21 (0.00) | 52.10 (0.00) | 49.04 (0.00) | 74.75 (0.00) | 96.70 (0.00) | 93.07 (0.00) |
| <i>R</i> ² | 0.5815 | 0.5881 | 0.5891 | 0.6487 | 0.6582 | 0.6587 |
| <i>R</i> ² <i>Change</i> | | 0.0066 | 0.0076 | | 0.0096 | 0.0101 |
| <i>Wald F</i> <i>(p value)</i> | | 42.53 (0.00) | 41.93 (0.00) | | 94.34 (0.00) | 72.33 (0.00) |

● The cells are graded if the coefficients are significant at $\alpha=0.05$

5. Conclusion

This research analyzed the value relevance of the financial statements information and the differences of the value relevance according to the industry and the business cycle. The value relevance was analyzed using conventional model - based on EPS and BPS as independent variables, extended model I - additional factors such as the size and the debt ratio are subjoined to the conventional model, and extended model II - which includes additional variable of the square of debt ratio to the extended model I. The results of analysis on the 10,946 firms from 1991 to 2013 are as follows.

First, both the conventional model and the extended models show the significant value

relevance. And the size and the debt ratio have additional explanatory powers in addition to the EPS and BPS, but the increment is not so noticeable. Also, the debt ratio is proven to effect on the stock price in reverse U shape.

Second, when comparing the value relevance among the conventional model and extended models, the explanatory power and the change of that are different among the industries. The value relevance of service industry is lower than the manufacturing industry while the increment of explanatory power caused by the addition variables – the debt and the size - is higher. On the other hand, in the case of constructing industry, the significances of coefficients are not the same as the other industries, and the square of the debt, unlike other industries, shows positive value.

Third, the significance of coefficient and the changes of the explanatory power of each model do not show much difference according to the business cycle. The explanatory power of the recession is generally higher than the expansion.

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