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The Effect of Cash based Interest Coverage Ratio on the Value Relevance of Accounting Information

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ABSTRACT

This study empirically verified the effect of cash based interest coverage ratio on the value relevance of accounting information. The accrual based interest coverage ratio, which divides operating profit by interest expense, includes accruals. On the other hand, the cash based interest coverage ratio, which is the cash inflow from the actual business divided by the actual outflow of interest, can be a better useful financial ratio indicator because the manager's discretionary accruals are removed.

Investors in the capital market will be assessed as cash-strapped companies that fail to cover their interest payments with the cash generated by the business if the cash based interest coverage ratio is less than 1. In this case, we expect negative stock price reactions to the company's net profit and net asset book value.

In this study, 2,991 companies that satisfy sample selection criterion of KOSPI and KOSDAQ listed companies from 2011 to 2014, to which International Financial Reporting Standards are obliged, were tested. The empirical results show that the value relevance of net asset value and earnings per share is lower when the cash based interest coverage ratio is less than 1. In other words, it is verified empirically that the cash based interest coverage ratio are useful financial ratios to judge the relationship between accounting information and stock price.

Keywords: Cash based interest coverage ratio, Accrual based interest coverage ratio, Value relevance, The statement cash flow

I. Introduction

This paper empirically examines the effect of cash based interest coverage ratio on the value relevance of accounting information. Accounting information helps to identify an entity's intrinsic value by providing information that is useful in assessing the amount, timing, and uncertainty of future cash flows that an

entity will generate. Thus, accounting information plays an important role in efficiently allocating finite economic resources to capital markets.

The net income accounting information, which is most frequently used by stakeholders among various accounting information, has a positive (+) relationship with the stock price, indicating that the net profit information is useful (Ball and Brown, 1968; Beaver et al., 1980; Kriengkai and Orapin, 2015). The risk, debt ratio, firm size, loss firms and profit firms, profit sustainability, growth potential, and predictability of earnings have an additional effect on the profit response rate of the net profit. (Barth et al., 1998; Burgstahler and Dichev, 1997; Hayn, 1995; Collins et al., 1997;

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Collins et al., 1999; Subramanyam and Venkatachalam, 1998; Setianingtyas et al., 2015).

In particular, the higher the sustainability of net profit, the higher the quality of profit. The higher the probability of cash conversion of the net profit, the higher the profit quality. The higher the profit quality, the more favorable the stock price response to net profit (Comiskey, 1982). Including accruals from managerial discreteness in net income increases forecast errors in accounting earnings and decreases predictability (Bradshaw et al., 2001). As a result, operating cash flow has a stronger explanatory power than future net profit including accruals (Lee et al., 2008).

Recently, restructuring of insolvent companies has become an economic issue. An insolvent company refers to a company whose operating profits generated by a company fail to reach a viable level and depend on the debt to survive. In other words, it refers to a company that does not have a chance to regenerate but only survives with temporary funding from the government or creditors.

If we define such an insolvent company as the financial ratio shown in the financial statement, the ratio of the operating profit divided by the interest expense, that is, the interest coverage ratio is less than 1, is regarded as an insolvent company. The interest coverage ratio is the ratio of financial soundness that shows whether the interest expenses can be covered by the operating profit. If the interest coverage ratio is less than 1, it means that operating profit can not cover interest expenses.

Operating profit is the accounting profit that includes the discretion of the manager, which is calculated by the accruals. On the other hand, the cash generated from the business shown in the cash flow statement represents the degree to which the company generates cash necessary for repayment of borrowings, maintenance of sales capability, payment of dividends, and new investment through business. It is the amount that represents the ability of a pure enterprise to generate cash related to operations that the entity does not fund from outside.

Therefore, the fact that the cash based interest

coverage ratio is lower than 1 means that the cash generated from the actual cash inflows is less than the actual cash outflow. It can be a useful and intuitive financial information. Cash based interest coverage ratio, which divides the cash generated from the cash flow business by the interest payment, compared to the accrual based interest coverage ratio, which divides the operating profit by the interest expense, has a relatively low prediction error of the profit and is highly predictable. Therefore, it can be a more useful financial soundness information for the restructuring of insolvent companies.

In this context, this study empirically examines the effect of cash based interest coverage ratio on the value relevance of accounting information. If the cash based interest coverage ratio is lower than 1, the effect of the stock price on net income and net asset book value will be verified. This paper empirically verifies whether cash based interest coverage ratio is useful for decision making by investors as financial information judged by insolvent companies.

This study covers the period from 2011 to 2014 when International Financial Reporting Standards (IFRS) is applied. The sample companies to be studied are 2,991 companies that meet the sample selection criteria of the KOSPI market and KOSDAQ market.

The empirical results show that the value relevance of the net asset value and the stock price of the earnings per share are lower than that of the companies with the cash - based interest coverage ratio of less than 1. In other words, it is proved that the cash based interest coverage ratio is a useful information that helps to evaluate the relationship between accounting information and stock price as an important financial information representing an insolvent company. These results are the same in the analysis result of the KOSPI market and KOSDAQ listed companies.

This study is organized as follows. Section 2 reviews the contents of the cash flow statement set out in IFRS and existing literature and then develops arguments for our hypothesis. Section 3 describes the research design and samples. Section 4 presents descriptive statistics and the results of empirical tests. Section 5 summarizes the conclusions and limitations.

II. Background and hypothesis

A. IFRS

According to IFRS 1007 cash flow statement, operating cash flow can be either direct or indirect. Direct method is a method of distinguishing total cash inflows and total cash outflows by major items. Indirect method is a method of adding or subtracting adjustment items to net profit or loss. In accordance with IFRS 1007 cash flow statement, cash flows from receipt and payment of interest and dividend payment must be separately disclosed.

The following is a cash flow statement form by indirect method as exemplified in IFRS 1007 cash flow statement. As shown in the cash flow statement form, cash and interest payments generated from the business are separately displayed. As a result, from the fiscal year 2011 when International Financial Reporting Standards (IFRS) became mandatory in Korea, it became possible to directly calculate the cash based interest coverage ratio by dividing cash generated from operations into interest payments, unlike the previous accounting standards (Korean local GAAP).

The cash based interest coverage ratio is calculated as follows.

$$\text{cash based interest coverage ratio} = \frac{\text{cash generated from operations}}{\text{interest payments}} = \frac{2,550}{270} = 9.4 \text{ times}$$

Cash flow statement by indirect method

	(Unit: Won) 20X2
Operating cash flow	
Net income before income taxes	3,350
Adjustment:	
Depreciation cost	450
Foreign currency translation loss	40
Return on investment	(500)
Interest cost	400
	<u>3,740</u>
Increase in account receivables and other receivables	(500)
Decrease in inventories	1,050
Decrease in account payables	<u>(1,740)</u>

Cash generated from operating activities	2,550
Interest payment	(270)
Payment of corporation tax	<u>(900)</u>
Net cash flows from operating activities	1,380

The cash flow statement provides useful information for assessing financial resilience, such as changes in net assets, liquidity and ability to pay, and the ability to adjust the amount and timing of cash flows to adapt to changing circumstances and opportunities. The cash flow information is useful for assessing the ability to generate cash and cash equivalents. In addition, cash flow information eliminates the effects of applying different accounting treatments for the same transactions and events. Cash flow information can be used to identify cash inflows and outflows. Therefore, it is possible to increase the comparability between companies on business performance.

Cash flows from operating activities are important information that can measure how well a company can repay its borrowings through its operations without relying on external financial resources and how well it can maintain its operating capabilities. In addition, cash flows from operating activities can also measure how well cash flows are generated, such as dividend payments and new investments.

B. Preliminary research and hypothesis

Accounting information describes the stock price of a company. In particular, net income has a positive (+) effect on stock prices and is useful for accounting information users' decision making (Ball and Brown, 1968). Risk, profit sustainability, firm size, debt ratio, growth potential, and predictability of profit have an additional effect on the profit response coefficient for the stock price of the net profit (Collins and Kothari, 1989; Easton and Zmijewski, 1989; Dhaliwal et al., 1991).

The higher the persistence of the future net profit and the higher the cash realization possibility of the net profit, the higher the profit quality (Comiskey, 1982). The higher the profit quality, the more positive the stock price response (Imhoff, 1992).

In Bradshaw et al. (2001), which examines profit quality by considering net income and cash flow simultaneously, it is shown that the miscalculated profit margin of financial analysts and the accuracy of prediction are poor when the net income includes a large amount of accruals. The firms reporting the net profits showed higher value relevance to the stock price of the net profit than those reporting the net loss (Hayn, 1995; Collins et al., 1999; Anh, 2017).

If temporary items are included in the net profit, the value relevance of the book value of net assets is higher than the net profit (Subramanyam and Venkatachalam, 1998). Cash flow from operating activities has a stronger (+) explanatory power than future net profit (Lee et al., 2008).

Lee (2002) compared the cash flow forecasting ability of the direct and indirect cash flow statements. The empirical results show that the ability to predict cash flow from operating activities by direct method is superior to that by indirect method.

There are also studies that verify that the value relevance of net profit and operating cash flow is different from the life cycle stage of an enterprise. In the growth phase, the net profit showed a greater value relevance than the operating cash flow, and the difference in value relevance between the net profit and the operating cash flow was not significant in the maturation phase and the decline phase (Choi et al. 2006).

In summary, accounting standards and previous studies on related cash flows suggest that the higher the cash realization potential of accounting profits, the higher the quality of accounting profits. The higher the quality of accounting profit, the more positive the stock price response to accounting profit.

The cash based interest coverage ratio, which divides the cash generated from the business by interest payment, can be removed from the manager's discretion and can be a higher quality financial soundness information.

Therefore, investors will judge that if the cash interest is less than 1, cash generated from the business will not cover the interest payment. This is a symptom of a bad company, and it will show a negative stock

price reaction to the company's net profit and net asset book value. The following hypothesis is set in this study.

Hypothesis: The value relevance of net income and net asset book value of the shares will be lower than otherwise if the company's cash based interest coverage ratio of less than 1.

III. Research design and sample

A. Model specification

This study examines whether the value relevance of the net profit and net book value of stocks is relatively low compared to the case where the cash based interest coverage ratio is less than 1.

The cash based interest coverage ratio measures the cash generated from the business in which cash is actually received divided by the interest payments actually paid out of cash. For the hypothesis test of this study, the following equation (1) was set.

This study follows the price-earnings model, as used by Ohlson (1995), where prices are regressed on both the book value of the equity and earnings. According to Ohlson (1995), the value of a firm's equity can be expressed as a function of its book value and earnings, as follows:

$$P_{i,t} = \alpha + \beta_1 BV_{i,t} + \beta_2 EPS_{i,t} + \varepsilon_{i,t} \quad (1)$$

where,

$P_{i,t}$: the price of a share of firms i three months after fiscal year-end t .

$BV_{i,t}$: the book value per share of firm i at the end of year t .

$EPS_{i,t}$: the earnings per share of firm i during year t .

$\varepsilon_{i,t}$: other value relevant information of firm i year t .

The value relevance of the book value and earnings is represented by the coefficient of these variables. The coefficient of the book value and earnings depends on how well a firm's book value and earnings can explain stock prices.

Table 1. Criteria to select the sample

Selection criteria	Number of observations
1. KOSPI and KOSDAQ listed companies (2011 ~ 2014), which are not included in the financial sector	6,084
2. Companies that can not obtain financial information necessary for empirical analysis	(1,139)
3. Companies with negative net interest payments (-)	(1,684)
4. Excluded from the top and bottom 1% of outlier samples removed	(270)
Firm-year final selections for the empirical test	2,991

This study further extends an analysis by running a regression on the following extended model (2), which includes CASHD as a dummy variable, and its interaction with book value and earnings:

$$P_{i,t} = \alpha + \beta_1 BV_{i,t} + \beta_2 EPS_{i,t} + \beta_3 BV_{i,t} * CASHD + \beta_4 EPS_{i,t} * CASHD + \varepsilon_{i,t} \quad (2)$$

where,

$P_{i,t}$: the price of a share of firms i three months after fiscal year-end t .

$BV_{i,t}$: the book value per share of firm i at the end of year t .

$EPS_{i,t}$: the earnings per share of firm i during the year t .

CASHD: 1 if the cash based interest coverage ratio (the cash generated from the business/ the interest payments) is less than 1, otherwise 0.

$\varepsilon_{i,t}$: other value relevant information of firm i for year t .

In this model, the coefficient of the interaction variables $BV * CASHD$ (β_3) and $EPS * CASHD$ (β_4) indicates whether the cash based interest coverage ratio has a significant influence on the value relevance of book value and earnings.

If the cash based interest coverage ratio are less than 1, the regression coefficient of the dummy variable and the net asset book value, the dummy variable and the earnings per share are negative (-), the <hypothesis> of this study will be supported. The value relevance of net income and net asset book value of the shares is lower when the company's cash based interest coverage ratio is less than 1.

B. Data and sample selection

IFRS adoption became effective on January 1, 2011, and the first annual financial statements prepared using IFRS are dated 31 December, 2011. Financial data from 2011 to 2014 was collected for firms listed on the Korean Stock Exchange, as obtained from the KIS-Value Database. The data excluded firms in the banking industry and due to other issues of administration to ensure heterogeneity. Financial institutions are different from general manufacturing companies in their financial statements and in the nature of their accounts. Therefore, we excluded those from the sample to be verified. The method to select these samples was also applied following the procedures.

In this study, companies with a larger interest earning than interest payments, ie negative net interest payments, were excluded from the verification. This is because the sample with negative cash based interest coverage ratio (-) signifies a sample with a larger interest income than the interest payment, and thus the sample will lose the meaning of the cash based interest coverage ratio indicator.

Finally, this study deletes firm-year observations that are outliers in the top and bottom 1% of independent variables. Table 1 shows 2,991 firm-year observations that were the final selections, as was explained in the aforementioned procedure.

IV. Results

A. Descriptive statistics

Table 2 provides descriptive statistics for the 2,991 firm-year observations and Pearson correlation coefficients between any two of the variables. The descriptive statistics in Table 2 show the data of the total samples (KOSPI and KOSDAQ).

Panel A shows that the statistics of the total samples (KOSPI and KOSDAQ). Panel B reports the correlation matrix between the variables included in the regression model. The correlation matrix shows that the Pearson correlation between P and the other variables used in the model are relatively significant.

B. Regression on the value relevance

Table 3 below shows the result of verifying whether the stock price response to net asset value and net profit is relatively lower when cash based interest coverage ratio is less than 1. The empirical results

show that the regression coefficient of equity per share is significantly positive and the regression coefficient of net earnings per share is a significant positive value.

The interaction regression coefficient of the dummy variable (CASHD) and the equity per share (BV) indicates a negative (-) regression coefficient. And, the interaction regression coefficient of the dummy variable (CASHD) and the net income per share (EPS) is also the negative (-) regression coefficient.

In other words, if the cash based interest coverage ratio is less than 1, investors will see a relatively negative evaluation of net asset value and net profit in the capital market. This is evidence that the cash based interest coverage ratio shown in the cash flow statement has a significant impact on the value relevance of equity value of net assets and net income.

Multilinearity between variables was verified using VIF dispersion expansion coefficient. As a result of the verification, VIF dispersion expansion coefficient of each variable was changed from 1.436 at maximum to 2.275 at maximum, so that there was no multi - collinearity problem between variables.

Table 2. Univariate statistics for sample observations and variable definitions

Panel A: Description of sample

Variables	Mean	Std. Dev.	Min	Median	Max
P	17,902	53,186	107	5,000	1,158,000
BV	15,235	30,539	169	4,615	254,212
EPS	546	2,645	-18,685	136	27,578
CASH	47	745	-1,206	4	30,083
CASHD	0.298	0.457	0	0	1

Panel B: Pearson correlation coefficients for regression variables

Variables	P	BV	EPS	CASH	CASHD
P	1				
BV	0.593***	1			
EPS	0.486***	0.586***	1		
CASH	-0.002	0.000	0.018	1	
CASHD	-0.102***	-0.105***	-0.190***	-0.051***	1

Variable definitions:

P_{it}: the price of a share of firms i three months after fiscal year-end t.

BV_{it}: the book value per share of firm i at the end of year t.

EPS_{it}: the earnings per share of firm i during the year t.

CASH: the cash generated from the business in which cash is actually received divided by the interest payments actually paid out of cash.
CASHD: 1 if the cash based interest coverage ratio (the cash generated from the business/ the interest payments) is less than 1, otherwise 0.
b) ***, **, *: Significant at the 0.01, 0.05, 0.1 levels.

Table 3. The effect of cash based interest coverage ratio on the value relevance

$$P_{i,t} = \alpha + \beta_1 BV_{i,t} + \beta_2 EPS_{i,t} + \beta_3 BV_{i,t} * CASHD + \beta_4 EPS_{i,t} * CASHD + \varepsilon_{i,t} \quad (2)$$

Variables	Pred. sign	Coefficients (t-value)		
		Total sample	Sub-groups divided by stock markets	
			KOSPI	KOSDAQ
Intercept		7752.965(1.01)	10970.000(0.72)	3923.744(1.43)
BV	(+)	0.883 (24.25)***	0.954 (16.19)***	0.565 (15.96)***
EPS	(+)	4.427 (10.45)***	3.747 (5.48)***	5.596 (18.59)***
BV*CASHD	(+)	-0.257 (-3.99)***	-0.333 (-3.37)***	0.348 (4.21)***
EPS* CASHD	(+)	-3.431 (-4.14)**	-2.500 (-1.86)*	-4.920 (-9.11)***
Adjusted R ²		0.4163	0.3867	0.7034
F-Stats		42.82***	18.88***	84.26***
Number of observations		2,991	1,305	1,686

a) Variables are defined in Table 2.

b) ***, **, *: Significant at the 0.01, 0.05, and 0.1 levels, respectively.

Table 4. The mean difference between the two groups (CASHD=1 vs CASHD=0)

Variables	Total Sample			KOSPI			KOSDAQ		
	CASHD		Difference	CASHD		Difference	CASHD		Difference
	1 (N=892)	0 (N=2,099)		1 (N=363)	0 (N=942)		1 (N=529)	0 (N=1,157)	
P	9,515	21,467	(7.95)***	15,208	36,535	(6.66)***	5,608	9,199	(5.03)***
BV	10,284	17,339	(6.6)***	20,003	30,362	(4.48)***	3,614	6,737	(8.25)***
EPS	-227	874	(12.17)***	-189	1,475	(8.46)***	-252	385	(10.98)***
CASH	-10	72	(4.28)***	-8	40	(3.53)***	-12	98	(3.32)***

a) Variables are defined in Table 2.

b) ***, **, *: Significant at the 0.01, 0.05, and 0.1 levels, respectively.

On the other hand, the total sample is divided into the companies listed on the KOSPI market and those listed on the KOSDAQ market. Both the companies in the KOSPI market and those in the KOSDAQ market have the same results as the entire sample.

C. Further analysis

Table 4 shows the results of verifying differences in the mean of each group by dividing the total samples to be tested into a group with cash based interest coverage ratio of less than 1 and a group with 1 or more cash based interest coverage ratio.

The group with cash based interest coverage ratio of less than 1 (CASHD= 1) is 892 observations,

and the group with 1 or more (CASHD = 0) is 2,099 observations. As a result of the mean difference test between the two groups, the stock price (P), equity per share (BV) and net income per share (EPS) of the group with 1 or more (CASHD= 0) are significantly higher than those of the group with less than 1 (CASHD= 1).

The cash based interest coverage ratio (CASH), which is a continuous variable rather than a dummy variable, also shows the mean negative (-) value in the group with cash based interest coverage ratio less than 1 (CASHD= 1). On the other hand, in the group with 1 or more (CASHD= 0), the mean positive (+) value was shown. And the mean difference between the two groups was significant.

The results of the mean difference test between

the two groups are also consistent with the overall samples, categorizing the sample into firms listed on the KOSPI market and firms listed on the KOSDAQ market.

V. Conclusions

The accrual based interest coverage ratio, which divides operating profit by interest expense, includes discretionary accruals. On the other hand, the cash based interest coverage ratio, which is the cash outflow from actual inflowed operations divided by the actual outflowed interest payments, can be more useful information for judging the lack of cash because the manager's discretion is removed.

In this context, this study empirically examines the effect of cash based interest coverage ratio on the value relevance of accounting information. If the cash based interest coverage ratio is lower than 1, the effect of the stock price on net income and net asset book value will be verified. This paper empirically verifies whether cash based interest coverage ratio is useful for decision making by investors as financial information judged by insolvent companies.

If the cash based interest coverage ratio is less than 1, it means that the cash flow from the business activity can not cover the interest payment actually paid out. As a result, investors in the capital market have proved to be negative evaluations of cash-scarce companies.

This study covers the period from 2011 to 2014 when International Financial Reporting Standards (IFRS) is applied in Korea. The sample companies to be studied are 2,991 companies that meet the sample selection criteria of the KOSPI market and KOSDAQ listed companies.

The empirical results show that the value relevance of net asset value and earnings per share is lower when the cash based interest coverage ratio is less than 1. In other words, cash based interest coverage

ratio has a significant effect on the value relevance of net asset value and earnings per share calculated according to accrual basis. This is evidence that the cash based interest coverage ratio shown in the cash flow statement has a significant impact on the value relevance of equity value of net assets and net income. These results are the same in the analysis result of the KOSPI market and KOSDAQ listed companies. This study empirically verified that the opportunistic behavior of managers can be useful information that has a significant effect on share price.

The contribution of this study is as follows. First, it has been demonstrated empirically that supervisory authorities and financial institutions can make more rational decision-making if they consider the interest coverage ratio, which is based on the judgment of corporate restructuring. Second, the validity of the cash based interest coverage ratio was verified by using the cash generated from the business and the net interest payment in the cash flow statement prepared in accordance with K - IFRS. This is the financial information that could not be calculated under K-GAAP in the past. This is a new type of financial information that can be calculated because the cash flow statement according to IFRS has been prepared from 2011. This study has significant implications for the empirical validation of the cash based interest coverage ratio, which have relatively low forecast error and high predictability of profit.

Third, it is suggested that investors need more careful analysis in case of companies with low cash based interest coverage ratio.

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